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Video Behavior Profiling for Anomaly Detection Using Self Adaptive Hidden Markovian Model

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Abstract. A self-adaptive Hidden Markov Model (SA-HMM) basedframework is proposed for behavior recognition in this paper. In this model, if an unknown sequence cannot be classified into any trained HMMs, a new HMM will be generated and trained, where online training is applied on SA-HMMs to dynamically generate the high-level description of behaviors. The SA-HMMs based framework consists of training and classification stages. During the training stage, the state transition and output probabilities of HMMs can be optimized through the Gaussian Mixture Models (GMMs) so the generated symbols can match the observed image features within a specific behavior class. On the classification stage, the probability with which a particular HMM generates the test symbol sequence will be calculated, which is proportional to the likelihood.

1 Introduction

Recognizing human behaviors in a video stream is critical in many applications, such as video surveillance, video indexing, video annotation, and video summarization. Behavior recognition is difficult since the mapping between the video signal data and event concepts is not always one-to-one. Among various behavior recognition applications, the automatic abnormal behavior/event detection has recently attracted attention in computer vision and multimodal processing under different names, such as abnormal, unusual, or rare events [1], [2], [3]. This is a challenging problem since events of interest occur much less frequently than normal behaviors and occur unpredictably, such as alarm generation in surveillance systems, and extractive summarization of raw

video events. Due to the difficulty for supervised learning, more methods have been proposed recently for unsupervised learning of abnormal behavior models [6], [4], [3], [5]. Some approaches [4], [6] conduct clustering on observed patterns and label those forming small clusters as being abnormal. Another approach proposed in [3] defines the abnormal behaviors as those patterns which cannot be fit into any normal pattern from a database of spatial-temporal patches using only normal behavior. The approach proposed in [6] cannot be applied to online abnormal behavior detection since it cannot handle previously unseen behavior
patterns. Most recently, Xiang and Gong [5] proposed an online video behavior M. Kamel and A. Campilh profiling framework for anomaly detection, where a Dynamic Bayesian Network (DBN) is proposed to model each behavior pattern, and a runtime accumulative anomaly measure is introduced to detect abnormal behaviors based on an online Likelihood Ratio Test (LRT) method. Although it is unrealistic to obtain a large training data set for abnormal behaviors, it is conversely possible to do so for normal behaviors, allowing the creation of a well-estimated model of normal behaviors. In this paper, in order to overcome the scarcity of training material for abnormal behaviors, a self-adaptive Hidden Markov Models (SA-HMMs) based framework is proposed. This is an on-line learning method which can dynamically generate a number of abnormal behavior models in an unsupervised manner. This SA-HMMs based method is able to learn from current data and generates new models, which differs from previous work on abnormality detection through a number of training data. On the other hand, in the traditional HMMs, only key features are generally of interest. However, for behavior recognition, focusing on key postures are not enough due to a large number of transition postures in human motion. Since the emission distribution of the HMMs is difficult to be evaluated accurately, a single model solution may be insufficient. Therefore, to reduce the

influenceof transition postures, Gaussian Mixture Models (GMM) are developed in thispaper to represent the emission distribution, which allows the model to be more effective at capturing the variability in behavior patterns. Note that our proposed SA-HMMs based framework is a fully unsupervised learning method, where manual data labeling can be avoided in both feature extraction and classification of behavior patterns. Manual labeling of behavior patterns is tedious and sometimes even infeasible given a large amount of the surveillance video data to be processed. It is worth to mention that the proposed SA-HMMs based framework is a general one which can be applied to any type of scenarios. In particular, the proposed approach is able to be self-adaptive, and the models will become much stronger with the consecutive behavior patterns input.

2 The SA-HMMs Approach

A video sequence V is ideally considered as a kind of behavior including N temporally ordered patterns $V = \{v1, \ldots, vn, \ldots, vN\}$. For example, the behavior of "going to bed" contains several elementary patterns such as walking, sitting and lying. Moreover, each pattern vn consisting of Xn image frames is represented as $vn = [In1, \ldots, Inx, \ldots, InXn]$, where Inx is the xth image frame. Before dealing with the video, we need to effectively process all of frames in order to obtain useful information. Our system aims at detecting abnormal behaviors, which consists of two major steps. The first step matches the input postures with the templates trained for normal behaviors, and the second step identifies sequences of the discrete postures through a trained HMM and decides whether the behaviors are abnormal. The block diagram of the proposed system is shown in Fig. 1. When an unknown Abnormal Behavior Recognition Using SA-HMM 339sequence arrives, firstly, the sequence is processed through the templates matching. Since our approach is based on the silhouette of the postures, we employ the Hausdorff distance to measure the similarity between the test frame and templates. The smaller the distance, the higher the similarity is. Then, we will work with HMMs, where the 'observations' of HMMs are drawn from a Gaussian mixture model. The SA-HMMs system can recognize the similar behavior pattern in the recognition process, which includes learning phase and recognizing phase. In the learning phase, the similarity between a new sequence and existent models will be calculated through HMMs. Basically, the decided pattern depends on the threshold for all HMMs. In other words, if the new likelihood dramatically exceeds the threshold, the new sequence will be clustered into a new behavior. In this sense, a new HMM will be generated. The major issue is how to identify appropriate behavior patterns that can enable both behavior recognition and generation. One single sample is obviously insufficient to providea good estimate of the model parameters. To overcome the lack of trainingsamples, we propose an online learning model, where every test sequence can beconsidered as a training sample, and the model will be updated after the inputsequence.

In this paper, a state space approach is used to define each static posture as astate, where these states are associated with certain probabilities. Each behaviorsequence can be mapped into a sequence of states. According to the similarity ofthe silhouette shapes, the human behavior sequence can be classified into severalgroups of similar postures. Each group is treated as a model state, and a humanbehavior can be described by a sequence of model states. In other words, inorder to recognize human behaviors, we first recognize postures frame by frame,and the motion sequence can be represented by the recognition results of eachframe.Since it is easy to obtain a well-estimated model for normal behaviors, westart with one state for a normal behavior. A set of parameters $\Theta*$of the normalbehavior HMM is learned by maximizing the likelihood of observation sequences$X = \{X1, X2, \ldots, Xn\}$ as follows:

$$\Theta* = \text{argmax}\Theta\pi(i=1 - n)P(Xi|\Theta) \quad \ldots\ldots(1)$$

The probability density function of each HMM state is assumed to be a Gaussian

Mixture Model (GMM).When a new HMM is generated, a set of parameters can be evaluated throughthe Baum-Welch algorithm [7], [8], which is a generalized expectationmaximizationalgorithm. Baum-Welch algorithm can estimate maximum likelihoodand posterior mode for the parameters (i.e. transition and emissionprobabilities) of an HMM, given emissions as the training data. Then, a Viterbialgorithm [9] is applied to calculate the likelihood, which is a dynamic programmingalgorithm for finding the most likely sequence of hidden states.

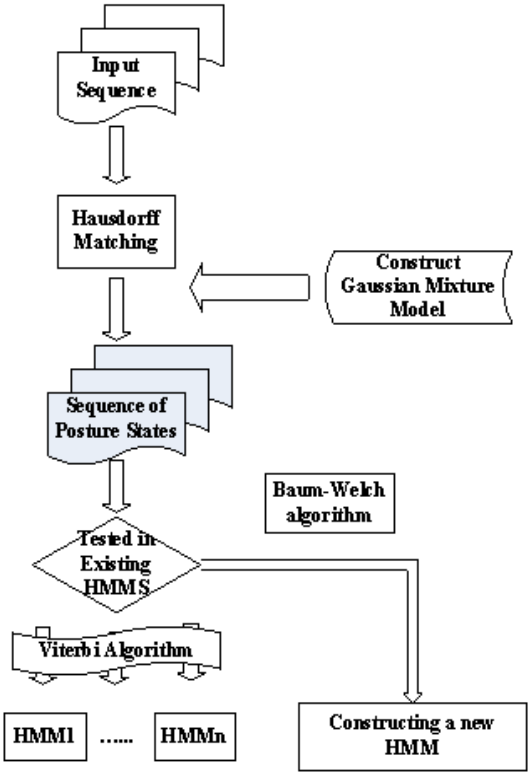

Fig. 1. The block diagram of the SA-HMMs based system

2.1 Shape Matching with Hausdorff Distance

The use of variants of the Hausdorff distance [10] has recently become popularfor image matching applications, which is defined as the maximum distance of aset of points to the nearest point in the other set. Generally, Hausdorff distancefrom set A to set B is a maximum function, which is defined as

$$dAB = \max_{a \in A}\{\min_{b \in B}\{l(a, b)\}\} \quad \ldots\ldots(2)$$

where*a* and *b* are points of sets A and B, respectively, and $l(a, b)$ is a metricbetween these points. Since we are interested in using the Hausdorff distance toidentify similarity of a testing frame with a template frame, the distance vectorcan be defined as $Di = \{di1, di2, \ldots, din\}$, where*i* denotes the *i*th frame of thesequence, and *n* denotes the number of templates pre-stored in the system.

2.2 Hidden Markov Models

A Hidden Markov Model (HMM) [11] is a statistical model in which the systembeing modeled is assumed to be a Markov process with unknown parameters, andthe challenge is to determine the hidden parameters from the observed parameters.The appealing feature of HMM is that no priori assumptions are neededabout the statistical distribution of the data to be analyzed. The HMM consistsof a finite set of states, each of which is associated with a probability distribution.

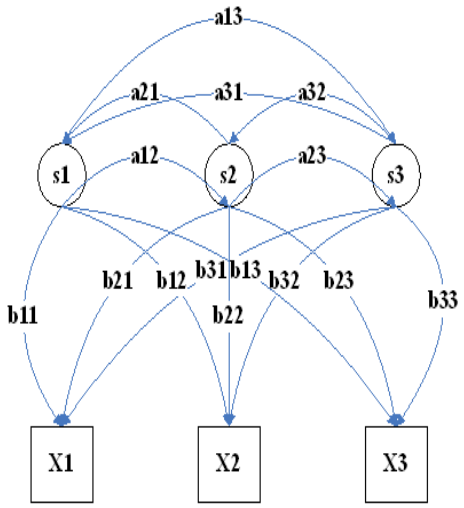

Fig. 2. Probabilistic parameters of a hidden Markov model.*S* represents states, *X*represents possible observations, *a* represents state transition probabilities, and *b* representsoutput probabilities.

Transitions among the states are governed by a set of probabilities calledAbnormal Behavior Recognition Using SA-HMM transition probabilities. In a particular state, an outcome or observation can begenerated, according to the associated probability distribution. The probabilisticparameters of a hidden Markov

model are shown in Fig. 2. Here, we apply HMMfor abnormal behavior recognition.

More specifically, in our system, the parameters of a HMM can be representedas $\Theta = \{\pi, S,A,B\}$, where each parameter is defined as follows:

1. States: $S = \{S1, S2, \ldots, SN\}$, where N is number of states. State of HMM at time t is denoted as qt. In our system, the states are defined as postures, such as walking, sitting, falling, and so on.

2. State transition probability distribution: $A = \{aij\}$, where aij denotes thetransit probability from state Si to Sj , which is defined as:
$$aij = P(qt+1 = Sj \mid qt = Si),\ 1 \le i, j \le N \quad \ldots\ldots(3)$$

3. Observation symbol probability distribution: $B = \{bj(Xt)\}$, where $bj(Xt)$defines the probability of observing X at state Sj at time t.
$$bj(Xt) = P(Xt|qt = Sj),\ 1 \le j \le N \quad \ldots\ldots(4)$$

4. Initial state distribution: $\pi = \{\pi i\}$, where πi represents the probability of a HMM being at state Si at time $t = 1$.
$$\pi i = P(q1 = Si),\ 1 \le i \le N. \quad \ldots\ldots(5)$$

2.3 Gaussian Mixture Model

Observations are emitted on transitions in HMMs and can also be emitted fromstates. As defined in the above section, $B = \{bj(Xt)\}$ is a set of emission probabilities,where $bj(Xt)$ is the probability of observing X on state Sj at time t. Inorder to transform the observed Hausdorff distance D into output elements, aGaussian Mixture Model (GMM) [12] is applied to construct emission functionsin our approach.

GMM is an effective tool for data modeling and pattern classification, whichis a type of density model comprising a number of component functions, usuallyGaussian. GMM assumes that the data under modeling is generated viaa probability density distribution which is a weighted sum of a set of Gaussianprobability density functions. Due to the flexibility of GMM, it has beensuccessfully applied to numerous applications of data modeling and pattern classification[12]. The single Gaussian function is defined as:

$$f(d; \mu, \Sigma) = 1/\_(2\pi)dim|\Sigma| \cdot \exp \_-1/2 \cdot (d - \mu)T\Sigma-1(d - \mu)\_ \quad \ldots(6)$$

whereμ is the mean value, Σ is the covariance matrix, and dim denotes thedimension.The distribution of a random variable $D \in$Rdim is a mixture of k Gaussiansif:

$$f(D = d|\theta) = k\_j=1\omega j \cdot 1/\_(2\pi)dim|\Sigma j| \cdot \exp \_-1/2 \cdot (d - \mu)T\Sigma-1j\ (d - \mu)\_ \quad ...(7)$$

where the parameters of GMM is defined as $\theta = \{\omega j, \mu j, \Sigma j\}kj=1$. $\omega j$is theweights for each Gaussian distribution, and it is constrained by$k_$ $j=1\omega j = 1$ and$\omega j > 0$, $j = 1, \ldots, k$. $\mu j \in$Rdim is a mean vector and Σj is a $dim \times dim$ positivedefinite covariance matrix. The dimension of μ and Σ is the same with D, theHausdorff Distance vector.

In our system, by using an Expectation Maximization (EM) method, an optimalset of parameters for GMMs can be identified in an iterative manner. Bygenerating such a Gaussian mixture model for classification, the influence oftransition postures can be reduced significantly, which leads to more robustnessin recognition.

2.4 Viterbi Algorithm

The Viterbi algorithm is a dynamic programming algorithm for searching themost likely sequence of hidden state, called the Viterbi path, which results in asequence of observed events in the context of hidden Markov models. The ideaof the Viterbi algorithm is to find the most probable path for each intermediatestate, and finally for the terminating state in the trellis. At each time n,only the most likely path leading to each state si survives. A reasonable

optimalitycriterion consists of choosing the state sequence (or path) that has themaximum likelihood with respect to a given model. This sequence can be determinedrecursively via the Viterbi algorithm, which is called the state dynamicprogramming.

Abnormal Behavior Recognition Using SA-HMM

This algorithm makes use of two variables:

1. $\delta n(i)$ is the highest likelihood of a single path among all the paths ending instate *Si* at time *n*, which is defined as:$\delta n(i) = \max q1,q2,...,qn-1 p(q1, q2, . . . , qn-1, qn = si, x1, x2, . . . , xn|\Theta)$ (8)

2. $\psi n(i)$ allows to keep tracking the "best path" ending in state *Si* at time *n*,which is defined as:

$\psi n(i) = \text{argmax} q1,q2,...,qn-1 p(q1, q2, . . . , qn-1, qn = si, x1, x2, . . . , xn|\Theta)$ (9)

In our system, $\delta n(i)$ determines the most possible route to next posture, and$\psi n(i)$ remembers how to get there. This is done by considering all of the productsof transition probabilities with the maximum probabilities derived from theprevious step. The largest product is remembered, together with the one thatprovoked it.

References

1. Chan, M.T., Hoogs, A., Schmiederer, J., Perterson, M.: Detecting rare events in video using semantic primitives with HMM. In: Proc. of IEEE Conf. on ICPR (August 2004)
2. Stauffer, C., Eric, W., Grimson, L.: Learning patterns of activity using realtime tracking. IEEE Transactions on Pattern Analysis and Machine Intelligence, archive 22 (August2000)
3. Zhong, H., Shi, J., Visontai, M.: Detecting unusual activity in video. In: Proc. of IEEE Conf. on Vision and Pattern Recognition (June 2004)
4. Boiman, O., Irani, M.: Detecting Irregularities in Images and in Video. In: Proc. 10th IEEE Int'l Conf. Computer Vision, pp. 462–469 (2005)
5. Xiang, T., Gong, S.: Video Behavior Profiling for Anomaly Detection. IEEE Trans.on Pattern Analysis and Machine Intelligence 30(5), 893–908 (2008)
6. Xiang, T., Gong, S.: Video Behavior Profiling and Abnormality Detection withoutManual Labeling. In: Proc. 10th IEEE Int'l Conf. Computer Vision, pp. 1238–124 (2005)
7. Dempster, A., Laird, N., Rubin, D.: Maximum likelihood from incomplete data viathe EM algorithm. Journal of the Royal Statistical Society 39(B), 1–38 (1977)
8. Baum, L.E., Petrie, T., Soules, G., Weiss, N.: A maximization technique occurring in the statistical analysis of probabilistic functions of Markov chains. Ann. Math.Statist. 41(1), 164–171 (1970)
9. Viterbi, A.J.: Error bounds for convolutional codes and an asymptotically optimum decoding algorithm. IEEE Transactions on Information Theory 13, 260–269 (1967)
10. Olson, C.F.: A Probabilistic Formulation for Hausdorff Matching. In: Proc. of IEEE Conf. on Vision and Pattern Recognition (CVPR 1998), Santa Barbara, CA, pp.150–156 (1998)
11. Rabiner, L.R.: A Tutorial on Hidden Markov Models and Selected Applications inSpeech Recognition. Proc. IEEE 77(2), 257–286 (1989)
12. Batu, T., Guha, S., Kannan, S.: Inferring Mixtures of Markov Chains. In: Shawe Taylor, J., Singer, Y. (eds.) COLT 2004. LNCS, vol. 3120, pp. 186–199. Springer Heidelberg (2004)
13. J. Yin and Y. Meng: Abnormal Behavior Detection In: ICIAR 2009,pp. 340-348. Springer,ICIAR-09

Marathi Search Engine

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Abstract

To search required information from the web is critical in the Internet. Search engines are useful to retrieve information from Internet. Although, Internet users speak different languages, most resources are written and published in the English. Internet search engines provide search in different languages. Although some of them enable the search engine to select the language of the users. Internet users need a Multilanguage search engine, which can give those results in English language and in their own language. This paper explains Marathi search and development of a Marathi search engine model using UML. The purpose of Marathi search model is to help people finding useful contents in Marathi stored in multi-languages databases.

1. Introduction

This paper focuses on information retrieval in Marathi language to help users to find useful contents and documents in Marathi as well as English. Following search engine challenges are solved:

[1] The web is growing much faster than any present search engine can possibly index.

[2] Many web pages are updated rarely, which forces the Marathi search engine to revisit them periodically.

[3] The queries one can make are currently limited to search for keywords.

[4] Dynamically generated sites, which may be slow or difficult to index, or may result in excessive results from a single site.

[5] Many dynamically created sites are not indexable by search engines; this phenomenon is known as the invisible web.

[6] Some search engines do not order the results by relevance, but rather according to how much money the sites have paid them.

Some search engines do not order the results by relevance, but rather according to how much money the sites have paid them.

Search engine rankings, and thereby try to fool the search engines. Each search engine's objective is to produce relevant results. This is because producing the most relevant results of any particular search query is the determining factor of being a successful search engine

2. Search Engine Spamming

Search engine spamming is the technique used to improve the position of a web site in a search engine. Some website owner use spamming techniques to manipulate their positions in search engine rankings, and thereby try to fool the search engines. Each search engine's objective is to produce relevant results. This is because producing the most relevant results of any particular search query is the determining factor of being a successful search engine

2.1 Marathi Search Engine

Marathi search engine works by storing inf ormation about a large number of web pages,

which theyretrievefrom the world wide web. These pages are retrieved,by a webcrawler,an automated web browserwhich follows every link it sees. The contents of all pages are analyzed to describe how it should be indexed (for e.g., words are fetched from the titles, headings, or special fields called meta tags). Data about web pages is stored in an index database for more retrival. Some search engines, such as Google, stores whole page or a part of the source page and also information about the web pages. When a user uses a search engine and asks a query, mostly by giving keywords, the search engine checks in the index and provides a list of best-matching web pages according to its rules and criteria, mostly with a short summary of the document's title and sometimes parts of the text. Information Retrieval (IR) from Marathi document images present in World Wide Web (WWW) has become a challenging problem today due to its rising popularity. Among the most valuable Web assets, categorizing web images and retrieval of information from the images on the Web is quite difficult. This paper proposes a simple and effective method to separate the document images from the available web image sources and to retrieve the information present in those web document images. This system works in two phases: In the first phase, it concentrates on Automatic Image categorization process over web images by employing a filtering technique to discriminate the document images from other images available in WWW. Filtering technique employed here captures the image information by intensity and frequency histograms to discriminate the web document images. As for information retrieval in the second phase, feature string generation technique has been used to generate feature strings for every word images by extracting its shape this generates a feature string for every word image by extracting its features relying on their statistical properties, such as lines, black and white disposition rates and outline features of characters, instead of recognizing the letters and assigning its ASCII value like OCR. This kind of information retrieval has been initiated over a list of web sites and experimental results are recorded[1].

2.2 Proposed Method

Users are required to register to the system and fill out their profile at the first time they are logging in to the system. In the subsequent times, they are identified by the system. A user can change his profile information in any time he enters the system. The profile information consists of name, username, password, age, profession and sexuality. At first the context information that describe the interaction environment between the user and the system are acquired, which consists of [2] [3] [4]: (a) **User role**: User role determines main activity of a user in its current environment. For example a woman is a software engineer then if she searches the query (Java) in system, she probably aims (programming language) Instead of other meanings of (java) such as coffee or an island. If same query is fired by a house wife, she expected result on coffee or island not programming language .Hence, user role can be exploited to disambiguate multi-meaning queries. **(b)User location**: Location of user will be retrieved from the user's Google calendar. Alternately, the system may collect this information from a local Outlook calendar on the user's local machine. If, any user is living in particular area, then result should be related to that area. If user situated in India and fire query (National flower) then result should be related to (lotus) national flower of India. **(c)User interests**: User interests are entered by users to the system and system augments this by inserting hyponyms of the words [5]. System categorized the user interest in following category and sub categories shown in table 1.Interest of a user is saved for their subsequent search [6].

3. Tables and Figure

3.1 Tables and Figures

Table 1: Exprimental Result.

Precision	0.69
Relative Recall	0.47
F-Measure	0.559

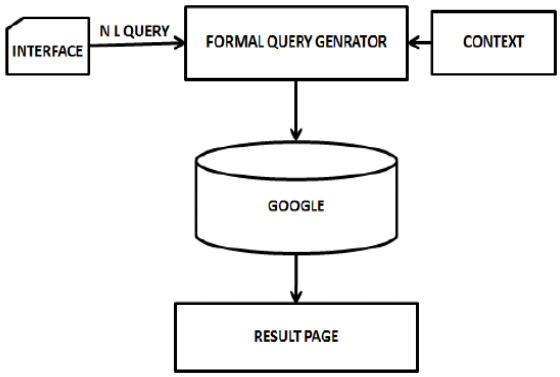

Fig.1Architecture of the method .

4. Conclusions

Internet is not only the huge network with millions of computers but it is the place where people, can exchange knowledge, information, culture and languages. The most important aspect of searching web sites is to enable Internet users to find what they need. Although Internet users differ in languages yet those sites do not offer a Marathi language search. Most of the search engines support one language search i.e English. This paper concerns itself with the Marathi language search process in an attempt to enable users finding information they need in Marathi and English.

Acknowledgments

At this moment of accomplishment, we are presenting our work with great pride and pleasure. We would like to express our sincere gratitude to all those who helped us in the successful completion of our venture. "V. J .KADAM thanks." Sponsor and financial support acknowledgments are also placed here. We are exceedingly grateful to our project coordinator, Prof., for his timely and valuable suggestions.
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References

[01] Brin Sergey, Page Lawrence, The Anatomy of a Large-ScaleHypertextual Web Search Engine[June 1997]

[02] Fagin Ronald et al, Searching the Workplace Web, Accessed on [April 2005]

[03] Franklin Curt, How Internet Search Engines Work, Accessed on [July 2004]

[04] Najmeh Ahmadian, M .A Nematbakhsh and Hamed Vahdat-Nejad," A Context Aware Approach to Semantic Query Expansion" 2011 International Conference on Innovations in Information Technology,2011 IEEE.

[05] Nicole Anderson," Putting Search in Context: Using Dynamically-Weighted Information Fusion toImprove Search Results", 2011 Eighth International Conference on Information Technology: NewGenerations,2011 IEEE.

[06] Farag Ahmed and Andreas N¨urnberger," A Web Statistics based Conflation Approach to Improve Arabic Text Retrieval", Proceedings of the Federated Conference on Computer Science and Information Systems pp. 3–9,2011 IEEE.

Brin Sergey and page Lawrence founded Google, the Internet search engine, while they were graduate students at Stanford University in Palo Alto, California. Since its founding in 1998, Google has become one of the most successful dot-com businesses in history. Both Page and Brin were reluctant entrepreneurs who were committed to developing their company on their own

terms, not those dictated by the prevailing business culture.

Fagin Ronald is an IBM fellow at the IBM ALMADEN RESEARCH CENTER. He is best known for his pioneering work in data base theory, finite model theory, and reasoning about knowledge Fagin' s theorem, which he proved in his PhD thesis states that existential second order logic coincides with the complexity class NP in the sense that a decision problem can be expressed in existential second-order logic if and only if it can be solved by a nondeterministic Turing machine in polynomial time. This work was seminal to the area of finite model theory.

Najmeh Ahmadian ,**M .A Nematbakhsh and Hamed Vahdat-Nejad** A Context Aware Approach to Semantic Query and it is a member of the IEEE and the IEEE Computer Society.

Intelligent Voice Wiki Search

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Abstract

Intelligent voice wiki search is a web based search engine which retrieves information through web and wiki repositories. It is programmed to crawl and index the Web efficiently and produce much more rational results based on user's demand. The main feature of this search engine is that it makes heavy use of wiki repositories such as Wikipedia, Wikimedia, Wikimedia commons, wikitionary and other wiki softwares in addition to the information present on World Wide Web (WWW) in many languages. Also this search engine provides the voice based search through hotline numbers in multiple language support which is especially beneficial for visually impaired or users having difficulty in accessing web.

1. INTRODUCTION

With time Internet has grown much larger than anyone could have possibly imagined. It holds the largest stockpile of information anywhere present. But this "Information Superhighway" also presents the challenge of retrieving quality and required information. At this point of time search engines are the best available tools for information retrieval [3].

1.1 DIFFICULTIES IN INFORMATION RETRIEVAL

But with over 100 billion web pages available it is a daunting task even for a well designed search engine. Also factors such as bogus or irrelevant information (which constitutes almost 90% of web),

commercialization, biased sites, virus and malwares, etc. makes it much more difficult for search engines is to decide what to present [8] .Also factors such as time and memory consumption, processing power of the system and financial limitations produce even bigger engineering and programming challenges.

1.2 CURRENT SCENARIO

The search engine technology has advanced along with the growing web from early tools such as W3 catalog, Archie, Gopher, Altavista to modern Yahoo, Bing, Google along with many regional search engines such as Baidu (China), Yandex (Russia), Rediff (India), etc. Though modern search engines especially Google has changed the face of search technology but still is continuously facing many problems such as quality web results and computational efficiency [1].

1.3 INTELLIGENT VOICE WIKI SEARCH

Search engine development even in today's scenario is much complex task reinforced with the challenge to be up to current standard. The heavy use of wiki repositories has been preferred as these records cover over 50 million rational and highly viewed topics [3] . Along with voice support it is very much user friendly and produce much of the desired result.

2. SYSTEM FEATURES

2.1 PRIORITY SEARCH IN WIKI REPOSITORIES

It gives a lot of rational and healthy results in very early stages of search hence improving quality and speed.

2.2 WEB CRAWLING AND INDEXING

Each time a user searches a term the pages accessed through web crawling is indexed and the resulting index is stored in the database[6] .

2.3 VOICE SUPPORT

This feature is useful in many situations as such blind or other visually impaired users, users having difficulty in accessing net, users facing problem or other unexpected situations during search.

2.4 PAGE RANKING AND FILTERING

Each time a search is made the page viewed more are prioritized. Other factors include number of related words to the search term present in the page, working links to other pages, past viewing and feedback, etc.

3 SYSTEM OPERATIONAL METHODOLOGY

It works by storing information about many page and sites in the database. Then the search is done through the links and indexes already present by using a web spider, a kind of web crawler which is an autobot which follows links and retrieves the pages. The content and viewing of each page determines its indexing in the database [8]. The overall diagram of web crawling is given below:

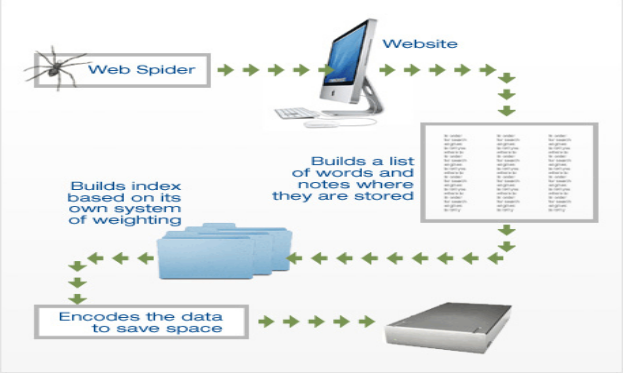

Fig. 1 Overall Working of Search Engine

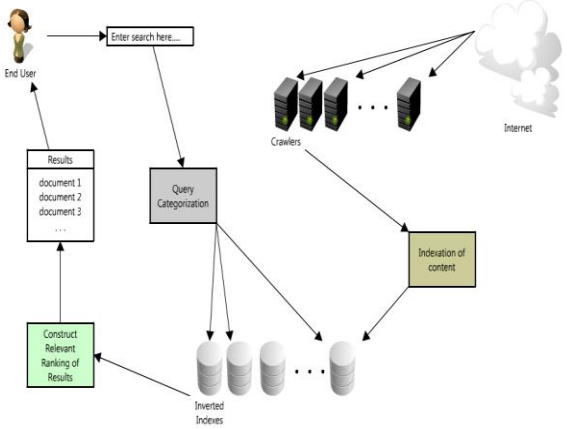

Fig. 2 High Level Architecture

When a user enters a query into a search engine (typically by using keywords), the engine examines its index and provides a listing of best-matching web pages according to its criteria containing the document's title and sometimes parts of the text. Crawler-based search engines have three major elements. First is the spider, also allows users to define the distance between keywords. There is also concept-based searching where the research involves called the crawler [4] . The spider visits a web page, reads it, and then follows links to other pages within the site. This is what it means when someone refers to a site being "spidered" or "crawled" [6] . The spider returns to the site on a regular basis, such as every month or two, to look for changes. The index is built from the information stored with the data and the method by which the information is indexed. The methods also change over time as Internet usage changes and new techniques evolve. Sometimes it can take a while for new pages or changes that the spider finds to be added to the index. Thus, a web page may have been "spidered" but not yet "indexed." Until it is indexed -- added to the index- it is not available to those searching with the search engine [7]. The engine looks for the words or phrases exactly as entered. Some search engines provide an advanced feature called proximity search which using statistical analysis on pages containing the words or phrases as viewed in figure 2 above. A major performance stress is DNS lookup. Each crawler maintains its own DNS cache so it does not need to do a DNS lookup before crawling each document. Each of the connections can be in a number of different states: looking up DNS, connecting to host, sending request, and receiving response [6] . Because of the immense variation in web pages and servers, it is virtually impossible to test a crawler without running it on large part of the Internet. Invariably, there are hundreds of obscure problems which may only occur on one page out of the whole web and cause the crawler to crash, or worse, cause unpredictable or incorrect behavior. Systems which access large parts of the Internet need to be designed to be very robust and carefully tested. Since

large complex systems such as crawlers will invariably cause problems, there needs to be significant resources devoted to reading the email and solving these problems as they come up [9] . These factors make the crawler a complex component of the system. It uses asynchronous IO to manage events, and a number of queues to move page fetches from state to state. t is important for a search engine to crawl and index efficiently. This way information can be kept up to date and major changes to the system can be tested relatively quickly.Most of the system is coded in java along with PHP which allows portability with little modification though originally designed for windows platform with SQL database at the back-end.

4. CONCLUSION

Intelligent voice wiki search has been designed primarily for high quality search output and user friendliness and support. It is designed to be a scalable search engine. Though it is very challenging task to keep up with the increasing size of web priority page search and use of wiki repositories make the task possible in very short time and with much less effort for rational searches.

REFERENCES

[1] Mauldin, Michael L. Lycos Design Choices in an Internet Search Service, IEEE Expert Interview http://www.computer.org/pubs/expert/1997/trends/x1008/mauldin.htm

[2] The Effect of Cellular Phone Use Upon Driver Attention

http://www.webfirst.com/aaa/text/cell/cell0toc.htm

[3] Search Engine Watch

http://www.searchenginewatch.com/

[4] Ben H. Bagdikian. "The Media Monopoly", [Bagdikian 97] , 5th Edition. Publisher: Beacon

[5]Wiki on Wikipedia

http://en.wikipedia.org/wiki

[6] Junghoo Cho, Hector Garcia-Molina, Lawrence Page" Efficient Crawling Through URL Ordering", [Cho 98]

[7] "The Use and Understanding of Keyword Searching in a University Online Catalog," Information Technology and Libraries, [Hildreth 97]

[8] Jack Muramatsu and Wanda Pratt, "Transparent Queries: Investigating Users' Mental Models of Search Engines", [Muramatsu 2001]

[9] Ron Weiss, Bienvenido Velez, Mark A. Sheldon, Chanathip Manprempre, Peter Szilagyi, Andrzej Duda, and David K. Gifford. "HyPursuit: A Hierarchical Network Search Engine that Exploits Content-Link Hypertext Clustering. Proceedings of the 7th ACM Conference on Hypertext" New York, 199

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GraphicalPasswordAuthenticationSystem

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Abstract

Computer security depends largely on passwords to authenticate human users from attackers. The most common computer authentication method is to use alphanumerical usernames and passwords. However, this method has been shown to have significant drawbacks. For example, users tend to pick passwords that can be easily guessed. On the other hand, if a password is hard to guess, then it is often hard to remember. To address this problem, some researchers have developed authentication methods that use pictures as passwords. In this paper, we conduct a comprehensive survey of the existing graphical password techniques and provide a possible theory of our own.

1. Introduction

Human factors are often considered the weakest link in a computer security system. If we point out that there are three major areas where human-computer interaction is important: authentication, security operations, and developing secure systems.

Here we focus on the authentication problem. Userauthenticationisafundamentalcomponenti nmostcomputersecuritycontexts. Studies showed that since user can only remember a limited number of passwords, they tend to write them down or will use the same passwords for different accounts. To address the problems with traditional username-password authentication, alternative authentication methods, such as biometrics, have been used. In this paper, however, we will focus on another alternative: using image as passwords.

2. Graphical Password

Graphicalpasswordsrefertousingpictures(alsod rawings)aspasswords.Intheory,graphicalpassw ordsareeasiertoremember,sincehumansrememb erpicturesbetterthanwords[1].Also,theyshould bemoreresistanttobrute-forceattacks,sincethesearchspaceispracticallyin finite.

In general, graphical passwords techniques are classified into two main categories: recognition-based and recall- based graphical techniques [2].

2.1 Recognition Based System

In recognition-based techniques, a user is authenticated by challenging him/her to identify one or more images he or she chooses during the registration stage. Recognition-based systems, also known as cognometric systems [4] or searchmetric systems [3], generally require that users memorize a portfolio of images during password creation, and then to log in, must recognize their images from among decoys. Humans have exceptional ability to recognize images previously seen, even those viewed very briefly [8], [9]. From a security perspective, such systems are not suitable replacements for text password

schemes, as they have password spaces comparable in cardinality to only 4 or 5 digit PINs (assuming a set of images whose cardinality remains reasonable, with respect to usability). Recognition based systems have been proposed using various types of images, most notably: faces, random art, everyday objects, and icons. Renaud [3] discusses specific security and usability considerations, and offers usability design guidelines focusing on recognition-based systems.

In some graphical password schemes, the system must retain knowledge of some details of the shared secret, i.e., user specific profile data e.g. in recognition schemes, the system must know which images belong to a user's portfolio in order to display them. This information must be stored such that its original form is available to the system (possibly under reversible encryption), and thus may be available to anyone gaining access to the stored information.

E.g. Phishing attack and shoulder surfing attack.

2.2 Recall Based System

In recall-based techniques, a user is asked to reproduce something that he or she created or selected earlier during the registration stage. Recall-based graphical password systems are occasionally referred to as drawmetric systems [4] because users recall and reproduce a secret drawing. In these systems, users typically draw their password either on a blank canvas or on a grid (which may arguably act as a mild memory cue). Recall is a difficult memory task [5] because retrieval is done without memory prompts or cues. Users sometimes devise ways of using the interface as a cue even though it is not intended as such, transforming the task into one of cued-recall, although one where the same cue is available to all users and to attackers.

Text passwords can also be categorized as using recall memory. With text passwords, there is evidence that users often include the name of the system as part of their passwords [6], [7]. Although there is currently no evidence of this happening with graphical passwords, it remains a plausible coping strategy if users can devise a way of relating a recall based graphical password to a corresponding account name.

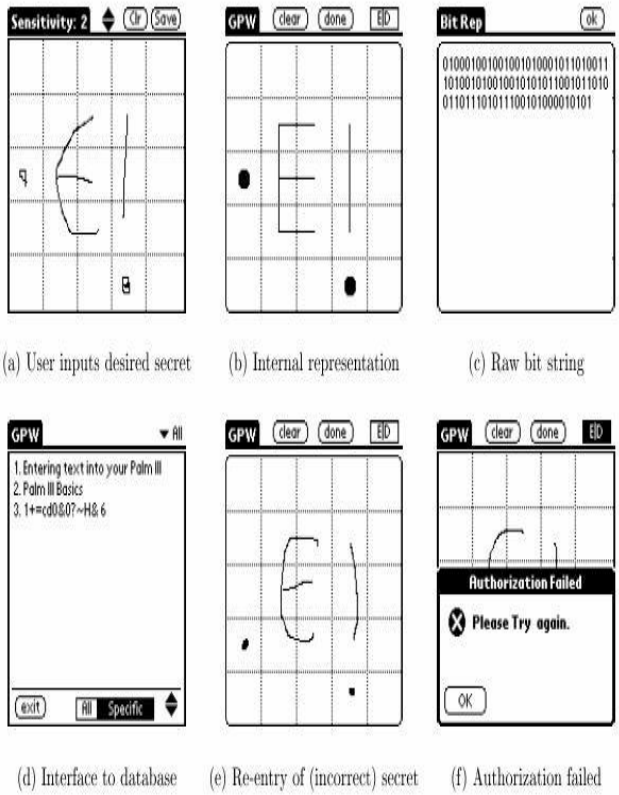

Fig. 1 Recall based system.

These systems are generally susceptible to shoulder surfing to the extent that in many cases, the entire drawing is visible on the screen as it is being entered, and thus an attacker need accurately observe or record only one login for the entire password to be revealed.

3. Proposed System

In graphical authentication there are various techniques to secure your password. Here we are proposing a new algorithm of authentication using images. We used a grid based approach to authenticate by using image as a reference.

At the time of registration, user will upload his/her image or set of images along with all details; then user selected image will appear on the page with transparent grid layer on it. So user will select certain grids to set his/her password as shown in the figure below.

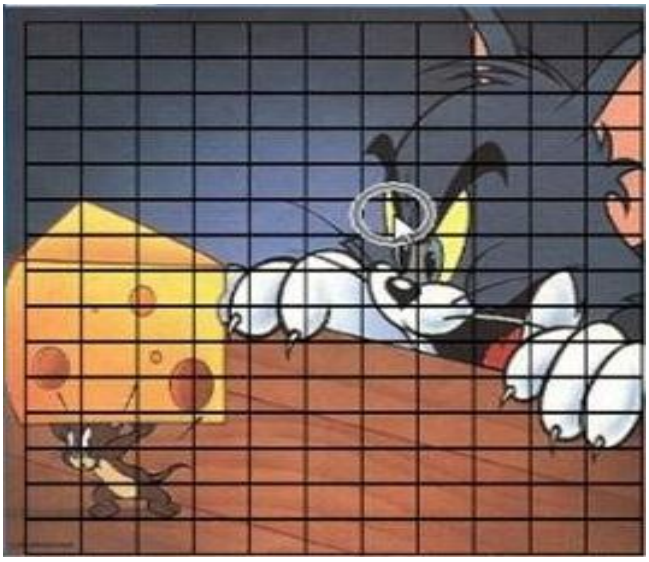

Fig. 2 Grid approach.

Shoulder surfing is a major drawback of graphical password authentication. To overcome this we have developed SSR (Shoulder Surfing Resistant) shield. The shield containing multiple fake mouse pointers are programed in such a way that it moves randomly in an image area and the original pointer will look exactly as fake mouse pointers. This shield provides a top layer for grid clicking as well as confusing other person.

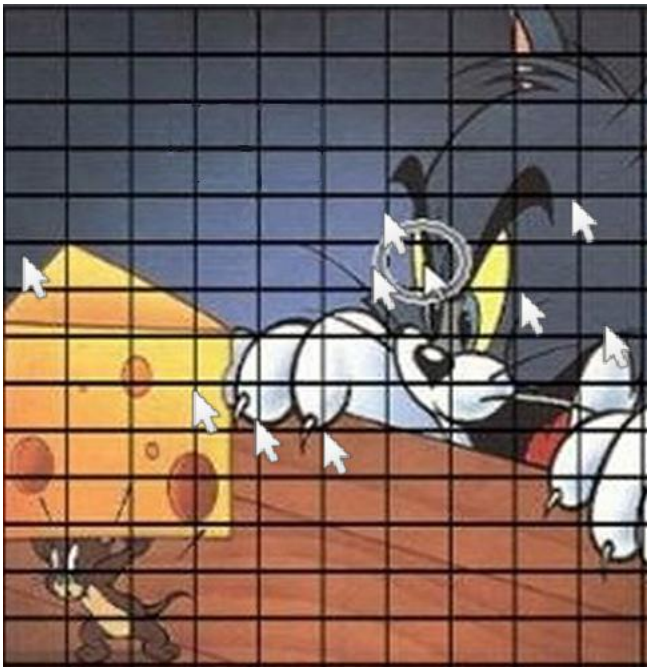

Fig. 3 Shoulder surfing resistant shield.

3. Implementation and Discussion

The proposed system was implemented using PHP, CSS, JavaScript and Macromedia flash 2008(Action Script 2).

This Graphical Password can be implemented in authenticating several systems and websites. The implementation has few focuses:

- Login: Containsusername, images, Graphicalpasswordandrelatedmethods.
- Grids:Containsunique grid valuesand grid clicking relatedmethods.
- Password: Contain image as reference & encryption algorithm.
- SSR shield: Contains shield for Shoulder surfing.

As shown in the figure below researchers are trying to stabilize the goal in text based system. However, the text based approach is not able to achieve the goal because as the

password strength increases usability decreases.

Our main aim is to achieve this goal. In which the usability as well as the security of the system is maintained in such a way that we don't need to compromise on either of these constraints.

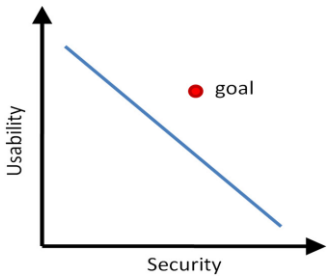

Fig. 4 Usability vs Security.

The working of our system is shown with the help of a flow graph in figure 5.

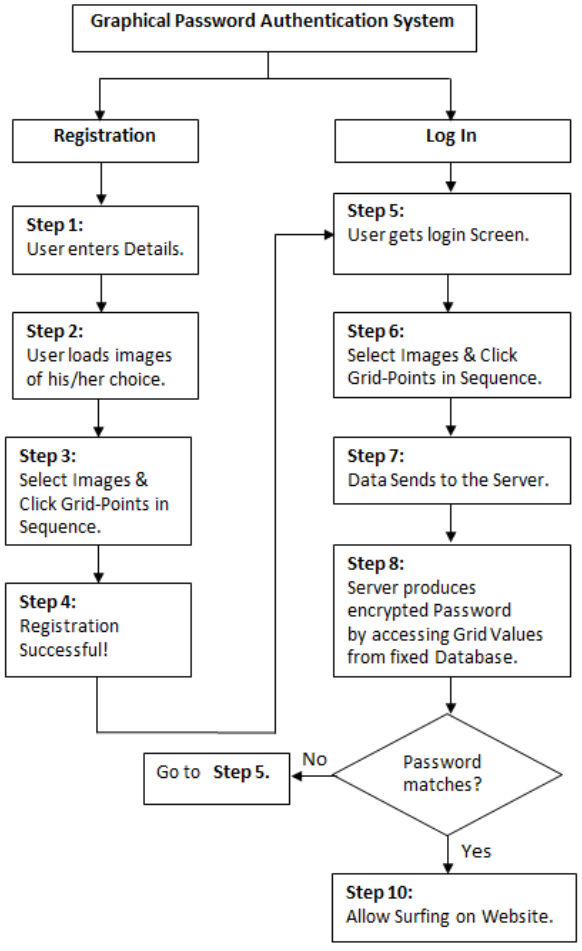

Fig. 5 Flow graph.

4. Conclusions

Inthisextendedabstract we are trying to make our authentication system more user friendly and also we have tried to implement mature & fast Shoulder Surfing Resistant Mechanism. We have considered both methods: text based and graphical based systems and tried to reduce the efforts required by end-user to remember passwords. A look at the advancement in technology over the past few years tells us that the next era will have system security at its core. Thus Graphical Password may be adapted in future as a major authentication system.

References

[1]AntonellaDe,Angeli,LynneCoventry,GrahamJohnson,andKarenRenaud.Isapicturereallyworthathousandwords?exploringthefeasibilityofgraphicalauthenticationsystems.*InternationalJournalofHuman-ComputerStudies*,63:128–152,July2005.

[2]XiaoyuanSuo,YingZhu,andG.ScottOwen.Graphicalpasswords:Asurvey.In*ProceedingsofAnnualComputerSecurityApplicationsConference*,pages463–472,2005.

[3] K. Renaud, "Guidelines for designing graphical authentication mechanism interfaces," International Journal of Information and Computer Security, vol. 3, no. 1, pp. 60–85, June 2009.

[4] A.De Angeli, L. Coventry, G. Johnson, and K. Renaud, "Is a picture really worth a thousand words? Exploring the feasibility of graphical authentication systems," International Journal of Human-Computer Studies, vol. 63, no. 1-2, pp. 128–152, 2005.

[5] F. Craik and J. McDowd, "Age differences in recall and recognition," Journal of Experimental Psychology: Learning, Memory,

and Cognition,vol. 13, no. 3, pp. 474–479, July 1987.

[6] K.-P. L. Vu, R. Proctor, A. Bhargav-Spantzel, B.-L.Tai, J.Cook, and E. Schultz, "Improving password security and memorability to protect personal and organizational information," International Journal of Human-Computer Studies, vol. 65, pp. 744–757, 2007.

[7] S. Chiasson, A. Forget, E. Stobert, P. C. van Oorschot, and R. Biddle, "Multiple password interference in text and click-based graphical passwords. "in ACM Computer and Communications Security (CCS),November 2009.

[8] L. Standing, J. Conezio, and R. Haber, "Perception and memory for pictures: Single-trial learning of 2500 visual stimuli," Psychonomic Science, vol. 19, no. 2, p. 7374, 1970.

[9] D. Nelson, V. Reed, and J. Walling, "Pictorial Superiority Effect," Journal of Experimental Psychology: Human Learning and Memory, vol. 2, no. 5, pp. 523–528, 1976.

Cloud Enabled File Synchronizer

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Abstract

The great advantage of cloud computing is "elasticity": the ability to add capacity or applications almost at a moment's notice. Companies buy exactly the amount of storage, computing power, security and other IT functions that they need from specialists in data-center computing. They get sophisticated data center services on demand, in only the amount they need and can pay for, at service levels set with the vendor, with capabilities that can be added or subtracted at will. Cloud Enabled file synchronizer provides flexible storage that can scale up and down as needed. The data can be synchronized to other devices using the cloud sever. It's as easy as copying a file to a different folder and later viewing a file from a folder. Can be synced anywhere, anytime with the help of any one device. It requires no capital outlay and offers a pay-as-you-go model.

Keywords: Cloud, File Synchronizer

1. Introduction

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" .As the number of user-managed devices continues to increase, the need for synchronizing multiple file hierarchies distributed over devices with ad hoc connectivity is becoming a significant problem.

In this project, we propose a new approach for efficient cloud-based synchronization of an arbitrary number of distributed files. Our approach maintains both the advantages of peer-to-peer synchronization with the cloud-based approach. The document, a media or any file is added to the destination folder. The next time the user open the same folder on the other devices, the added file will be present there with help of synchronization process. The server will be common for one working environment. A server may be provided to multiple clients which will work as the cloud storage. For one company, one organization or can be for one branch. The different files will be organized as per their types. The duplication will also be avoided. The user can also sort the file in the order required.

2. Literature Surveyed

For reference we referred IEEE paper "Cloud-based Synchronization of Distributed File System Hierarchies" to understand the cloud based synchronization. We have also referred the paper "Cloud Computing for mobile World" which states that cloud computing in mobile platforms has invoked a new wave of evolution in the rapidly developing mobile world. We also went through some other literatures "Cloud-assisted mobile desktop search", "System and method for media file synchronization", "File Exchange in Cloud" to get more clear idea about cloud based file synchronization.

3. Proposed System

3.1 Figure

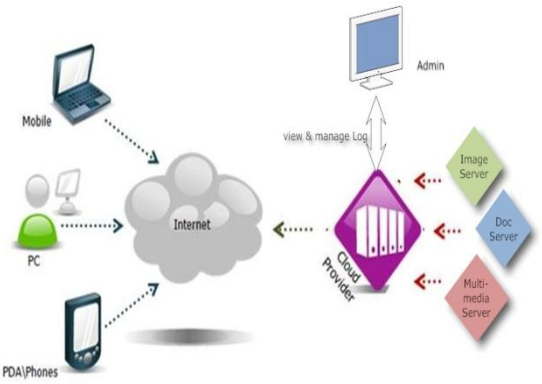

Fig. Cloud Enabled File Synchronizer

The Media files such as Pictures, Sound Video etc will be synchronized. It is an object of the system To arrange the data files in order required. Store these files in the other devices available. The data can be synchronized to other devices using the cloud sever. The list can me multi-selected by the user as per the required devices. It is an object of the present invention to incorporate certain support means for determining which files should be synchronized within a certain system, and which files are already present within the systems and simply need to be referenced. It also incorporates certain means to effectively find and locate redundant files so as to reduce storage costs by eliminating redundant file storage. While uploading files, the files will be first converted to the binary format. Thus, security issues are also considered while sending the file through the internet.

4. Feasibility Study

This section includes detailed information regarding the different feasibilities in the system.

4.1 Technical Feasibility
The Cloud Enabled File Synchronizer will be developed in .Net platform. The .Net platform provides most intelligent IDE called Microsoft Visual Studio which helps in coding and other development related activities. The .NET Framework consists of three main parts: the common language runtime, the class libraries, and ASP.NET. ASP.NET provides a new programming model and infrastructure that enables a powerful new class of applications. The Microsoft SQL Server will also be used. SQL Server 2005 exceeds dependability requirements and provides innovative
e capabilities that increase employee effectiveness, integrate heterogeneous IT ecosystems, and maximize capital and operating budgets. To provide the cloud services Microsoft Windows Azure is used which is an internet-scale cloud services platform hosted in Microsoft data centers, which provides an operating system and a set of developer services that can be used individually or together. Android is an operating system for mobile devices such as smart phones and tablet computers.

4.2 Operational Feasibility
The site will reduce the time consumed to maintain manual records and is not tiresome and cumbersome to maintain the records. Hence operational feasibility is assured.

4.3 Economical Feasibility
Once the hardware and software requirements get fulfilled, there is no need for the user of our system to spend for any additional overhead.

4.4 Motivational Feasibility
The users of our system need no additional training. Visitors do not require entering password and are shown the appropriate information.

4.5 Legal Feasibility
The licensed copy of the required software is quite cheap and easy to get. So from legal point of view the proposed system is legally feasible.

5. Conclusion

The Cloud Enabled File Synchronizer allows the users to conveniently upload the file on the

cloud and this file will be synchronized to all the devices through the synchronization process. The user can also efficiently download a particular file from the cloud as and when required. Also, there is no need of cables. Cloud Enabled File Synchronizer also aims at cutting down the expenses faced by the users to buy special hardware and software.Its a flexible storage that can scale up and down as needed. Its a flexible storage that can scale up and down as needed.

6. Refrences

[1]Realization of open cloud computing federation based on mobile agent
Zehua Zhang; Xuejie Zhang;

[2]Green Cloud Computing: Balancing Energy in Processing, Storage, and Transport Baliga, J.; Ayre, R.W.A.; Hinton, K.; Tucker, R.S.;

[3]Analysis and Research of Cloud Computing System Instance
Shufen Zhang; Shuai Zhang; Xuebin Chen; Shangzhuo Wu;

[4] Cloud Computing for Mobile World
S Chetan, G Kumar, K Dinesh, K Mathew

[5] Cloud-based Synchronization of Distributed File System Hierarchies
Sandesh Uppoor, Michail D. Flouris, and Angelos Bilas*;*

[6]System and method for Media File Synchronization
Alexandar Savenok, Pavel Savenok

[7] Mobile search and the cloud: The benefits of offloading
Lagerspetz, E.;

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Universal Document Viewer.

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ABSTRACT

The Universal Document Viewer , as the name suggest is an application that can be used to view all different types of documents ranging from a Text file to HTML file, a Word file to PDF file etc. The Universal Document Viewer overcomes the headache of installing separate application for different files. The main USP of Universal Document Viewer is that it can open almost all the types of documents under it. The tabbed feature allows you to open different files retaining or without closing the previous one. The Universal Document Viewer is one man show i.e. what all different applications, text editors do, it does all. It is integration or consolidation of all different applications like Notepad, MS Office Word, Adobe PDF Reader, Web Browser and Image Viewer in to one single application.

1. INTRODUCTION

Universal Document Viewer is a software application that can be easily install by user without any constraints until minimum software requirement is maintained. This application will have the real-time usage in schools, offices, colleges, home etc. Since this application requires only basic configuration it can easily be installed in school computers which are not of much high configurations. In corporate offices this application will support a lot in saving memory space and RAM utilization which indirectly can be used for other purposes such as memory for database, running different applications. These are the areas where Universal Document Viewer will be used. Consider a particular scenario where there are many (more than 100) computers in particular organization. So in order to view multiple documents with different file formats there is needs to install applications for all different like format like MS Word, Acrobat reader, Image viewer etc. which eats up users time , more system memory and also the CPU utilization .In this scenario our application can be beneficial in many respect which helps to save the time as well as resources to install different applications in all the PC'S.As the size of the application will be just few MB so it is easy to put the software on the LAN(Local Area Network) which allows to access the user with ease. For example, In our college it becomes cumbersome to install all the applications such as MS Office, PDF reader, Image Viewer etc of time and resources. And in case if user pc have MS word 2003 installed and he want to view word document(.docx) of Ms word 2007 (or .pdf document), then it is not possible for him to view .docx (or .pdf) file in MS word 2003. For that purpose he require to install MS word 2007 (or Acrobat Reader) in his PC. But in case of our application he can view any type of document without installing any software related to particular file format. This is how the UDV will be advantageous. .Since all the PC's are connected via LAN(Local Area Network) and the application size will be small as compared to all the other Licensed software's it can easily be shared among the computers and install them with minimum usage.

2. PROPOSED SYSTEM

We decided to build such an application that would be basically consolidation of all the different applications.
The File formats supported by Universal Document Viewer will be:
1 .txt Notepad
2 .doc/ .docx MS Word
3 .pdf Adobe Reader

4 .html Web browser (Internet Explorer, Mozilla Fire Fox)
5 .xml Notepad
6 .jpg, .jpeg, .gif, .bmp, .png Windows Picture Viewer, Picasa etc.

3. FEASIBILITY STUDY OF PROPOSED SYSTEM

This section includes detailed information regarding the different feasibilities in the system.

3.1. Technical feasibility

The Universal Document Viewer will be developed in .Net platform. The .Net platform provides most intelligent IDE called Microsoft Visual Studio which helps in coding and other development related activities.Net is platform independent language. It support 21 different languages; 4 native languages and others are third party languages. Native languages include VB, J#, VC++, C# and third party languages include APL, Cobol, Eiffel, Perl, Python etc.NET Framework is designed for cross-language compatibility. Cross-language compatibility means .NET components can interact with each other irrespective of the languages they are written in. An application written in VB .NET can reference a DLL file written in C# or a C# application can refer to a resource written in VC++, etc. This language interoperability extends to Object-Oriented inheritance. The language used for developing Universal Document Viewer is C#. The main reason for using the C# is that it uses all the same library files defined for .Net platform. Universal Document Viewer will use .Net Framework 3.5. It is the one of the recent version of framework for the .Net environment.

3.2 .Operation feasibility

Universal Document Viewer as the name suggests is an application that is basically used for viewing/ reading all kinds of documents. This includes word, .pdf, .text, .xml, .rtf and images like .jpg, .jpeg, .gif, .png, .bmp and .tiff. Universal Document Viewer will replace almost all the application that is used to view the above documents. This will benefit other users in following ways:
1. No separate installation required
2. Less Cost
3. Less memory Usage
4. Multiple files can be opened at same time without closing other

3.3. Economical feasibility

The cost of developing and maintaining the Universal Document Viewer is extremely less as compared to installing different third party applications and maintaining them. The Universal Document Viewer is economically feasible with respect to following points:
1. No purchase of different applications
2. No separate licensing cost involved
3. Less memory utilization
4. The Universal Document Viewer replaces following applications: MS Word, Adobe Reader, Foxit Reader, Notepad, Image Viewer, Internet Explorer and Mozilla Fire Fox.

3.4. Legal feasibility

The Universal Document Viewer will involve engines to open corresponding documents and engines. These engines will anyhow not be related to existing engines that are needed to open those documents.
These engines will developed by us by examining the exact structure and format of the documents. These engines are actually the heart of Universal Document Viewer.
Universal Document Viewer will not refer to any existing copy righted API's.

4. CONCLUSION

The Universal Document Viewer is based on providing the users with a single platform to access multiple types of file formats. We have provided Universal Document Viewer as an approach to aid the users by providing a one step solution as opposed to the hassle of downloading separate softwares for the purpose of viewing each of the different file formats that are used commonly. The Universal Document Viewer also aims at cutting down the expenses faced by the users to buy the original softwares like Microsoft

Office, Adobe pdf Reader, Windows Picture Viewer etc. The Universal Document Viewer also ensures that there is much lesser consumption of disk space. Thus this is one of the best solutions to all the above stated problems that are faced by the users.

REFERENCE

[1] Engineering Documents into XML File Formats
[2] A New Method of Extraction From PDF Files.
[3] Brian Benz and John R. Durant, XML Programming,Wiley, 2003.
[4] Robert J. Glushko and Tim McGrath, Document Engineering −Analyzing and Designing Documents for Business Informatics and Web Services, the MIT Press, 2005.
[5] Adobe Systems Incorporated, PostScript Language Reference Manual, Addison Wesley, 1985.
[6] http://www.cs.wisc.edu/~ghost/.
[7] Art Baker and Jerry Lozano, The Windows® 2000Device Driver Book: A Guide for Programmers, 2nd Ed., Prentice-Hall PTR, 2000.
[8] Jonathan J. Hull and Peter E. Hart, 'Toward Zero- Effort Personal Document Management,' Computer, March 2001, pp. 30-35.
[9] Ion Muslea, Steve Minton, and Craig A. Knoblock. A hierarchical approach to wrapper induction, Proceedings of the Third International Conference on Autonomous Agents, Seattle, WA1999, 221-227
[10] Nicholas Kushmerick. Wrapper Induction: Efficiency and expressiveness, Artificial Intelligence, 2000(118): 15-68
[11] Zhu Ming, Wang Jun, Wang Junpu. Multiple Record Extraction from HTML Page Based On Hierarchical Pattern, Computer Engineering, 2001, 27(9): 40-42
[12] Zhu Ming, Huang Yun, Cai Qingsheng. Information Extraction From Web Pages Based On Multi-Knowledge, Mini-Micro System, 2001, 22(9): 1058-1061
[13] Adobe Systems Incorporated. Adobe Portable Document Format Version 1.4, American Addison Wesley, 2001
[14] Ben Litchfield PDFBOX[CP] http://sourceforge.net/projects/pdfbox*

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Free and open source Web blogging software - A review

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Abstract
A blog (a portmanteau of the term web log) is a discussion or informational site published on the World Wide Web and consisting of discrete entries ("posts") typically displayed in reverse chronological order (the most recent post appears first). A weblog, sometimes written as web log or Weblog, is a Web site that consists of a series of entries arranged in reverse chronological order, often updated on frequently with new information about particular topics. The emergence and growth of blogs in the late 1990s coincided with the advent of web publishing tools that facilitated the posting of content by non-technical users. Although not a requirement, most good quality blogs are interactive, allowing visitors to leave comments and even message each other via GUI widgets on the blogs, and it is this interactivity that distinguishes them from other static websites. This is possible due to specialized content management systems called Web blogging softwares. Many Web blogging softwares available over Internet for free. In this paper, we introduced and compared top Free and open source Web blogging software available.

Keywords: Web blogging, Blogware, *Content management system, plug-in.*

1. Introduction

The As we mentioned **"**A blog (a portmanteau of the term web log) is a discussion or informational site published on the World Wide Web and consisting of discrete entries ("posts") typically displayed in reverse chronological order (the most recent post appears first).”[1][2] The term "weblog" was coined by Jorn Barger[3] on 17 December 1997. The short form, "blog," was coined by Peter Merholz, who jokingly broke the word weblog into the phrase we blog in the sidebar of his blog Peterme.com in April or May 1999.[4][5][6] Shortly thereafter, Evan Williams at Pyra Labs used "blog" as both a noun and verb ("to blog," meaning "to edit one's weblog or to post to one's weblog") and devised the term "blogger" in connection with Pyra Labs' Blogger product, leading to the popularization of the terms.[7].A content management system (CMS)[8][9][10] is a computer program that allows publishing, editing and modifying content as well as maintenance from a central interface. Such systems of content management provide procedures to manage workflow in a collaborative environment.[11] These procedures can be manual steps or an automated cascade. The first content management system (CMS) was announced at the end of 1990s. This CMS was designed to simplify the complex task of writing numerous versions of code and to make the website development process more flexible. CMS platforms allow users to centralize data editing, publishing and modification on a single back-end interface. Blog software, also known as weblog software, blogging software, or blogware, is software designed to simplify creating and maintaining weblogs. As specialized content management systems, weblog applications support the authoring, editing, and publishing of blog posts and comments, with special functions for image management, web syndication, and post and comment moderation. Free and open-source software (F/OSS, FOSS) or free/libre/open-source software (FLOSS) is software that is

both free software and open source. It is liberally licensed to grant users the right to use, copy, study, change, and improve its design through the availability of its source code.[12] This approach has gained both momentum and acceptance as the potential benefits have been increasingly recognized by both individuals and corporations.[13][14] In the context of free and open-source software, free refers to the freedom to copy and re-use the software, rather than to the price of the software. The Free Software Foundation, an organization that advocates the free software model, suggests that, to understand the concept, one should "think of free as in free speech, not as in free beer".[15] Many free and open source Web blogging software available namely Movable Type, WordPress, Drupal, ExpressionEngine, Serendipity, Dotclear, Nucleus CMS, LifeType, boastMachine, Textpattern, b2evolution, Eggblog , Subtext, BlogEngine. NETPresstopia Blog etc. We introduced some of these and compared them in the next sections.

2. Movable Type

Movable Type is a weblog publishing system developed by the company Six Apart. It was publicly announced on September 3, 2001;[16] version 1.0 was publicly released on October 8, 2001.[17] On 12 December 2007, Movable Type was relicensed as free software under the GNU General Public License.[18] The current version is 5.2.[19] Movable Type has several notable features, such as the ability to host multiple weblogs and standalone content pages, manage files, user roles, templates, tags, categories, and trackback links.[20]The application supports static page generation (in which files for each page are updated whenever the content of the site is changed), dynamic page generation (in which pages are composited from the underlying data as the browser requests them), or a combination of the two techniques. Movable Type optionally supports LDAP for user and group management and automatic blog provisioning. Movable Type is written in Perl, and supports storage of the weblog's content and associated data within MySQL natively. PostgreSQL and SQLite support was available prior to version 5, and can still be used via plug-ins.[21] Movable Type Enterprise also supports the Oracle database and Microsoft SQL Server. Movable Type is free software under the GPLv2 license. In addition to the free version, users can purchase support or buy commercial, education, or nonprofit licenses, which come with support contracts, author limits, and unlimited blogs.[22]

3. WordPress

WordPress is a free and open source blogging tool and a content management system (CMS) based on PHP and MySQL. It has many features including a plug-in architecture and a template system. WordPress is used by over 16.7% of Alexa Internet's "top 1 million" websites and as of August 2011 manages 22% of all new websites.[24] WordPress is currently the most popular blogging system in use on the Internet.[25][26]It was first released on May 27, 2003, by founders Matt Mullenweg[23] and Mike Little[27] as a fork of b2/cafelog. As of December 2011, version 3.0 had been downloaded over 65 million times.[28] WordPress has a web template system using a template processor. WordPress users may install and switch between themes. Themes allow users to change the look and functionality of a WordPress website or installation without altering the information

content or structure. Themes may be installed using the WordPress "Appearance" administration tool or theme folders may be uploaded via FTP.[29] The PHP and HTML code in themes can also be edited for more advanced customizations. One very popular feature of WordPress is its rich plugin architecture which allows users and developers to extend its abilities beyond the features that are part of the base install; WordPress has a database of over 18,000 plugins[30] with purposes ranging from SEO to adding widgets. Widgets are small modules that offer users drag-and-drop sidebar content placement and implementation of many plugins' extended abilities. Widgets allow WordPress developers to add functionality to their sites. These small modules can be used to add functionality such as a slideshow, Facebook-like box, small news slider, and more. Prior to WordPress 3.0, WordPress supported one blog per installation, although multiple concurrent copies may be run from different directories if configured to use separate database tables. WordPress Multi-User (WordPress MU, or just WPMU) was a fork of WordPress created to allow multiple blogs to exist within one installation that is able to be administered by a centralized maintainer. WordPress MU makes it possible for those with a website to host their own blogging community, as well as control and moderate all the blogs from a single dashboard. WordPress MU adds eight new data tables for each blog. WordPress MU merged with WordPress as part of the 3.0 release.[31]Native applications exist for WebOS,[32] Android,[33] iOS (iPhone, iPod Touch, iPad),[34][35] Windows Phone, and BlackBerry[36] which provide access to some of the features in the WordPress Admin panel and work with WordPress.com and many WordPress.org blogs. WordPress also features integrated link management; a search engine–friendly, clean permalink structure; the ability to assign nested, multiple categories to articles; and support for tagging of posts and articles. Automatic filters are also included, providing standardized formatting and styling of text in articles (for example, converting regular quotes to smart quotes). WordPress also supports the Trackback and Pingback standards for displaying links to other sites that have themselves linked to a post or article.

4. Drupal

Drupal is a free and open-source content management framework (CMF) written in PHP and distributed under the GNU General Public License.[37][38][39] It is used as a back-end system for at least 2.1% of all websites worldwide[40][41] ranging from personal blogs to corporate, political, and government sites including whitehouse.gov and data.gov.uk.[42] It is also used for knowledge management and business collaboration.The standard release of Drupal, known as Drupal core, contains basic features common to content management systems. These include user account registration and maintenance, menu management, RSS feeds, page layout customization, and system administration. The Drupal core installation can be used as a brochureware website, a single- or multi-user blog, an Internet forum, or a community website providing for user-generated content. By extending the Drupal core with contrib modules there is virtually no limit to the sorts of web applications that can be built. As of September 2012, there are about 18,200 free community-contributed addons, known as contrib modules, available to alter and extend Drupal's core capabilities

and add new features or customize Drupal's behavior and appearance. Because of this plug-in extensibility and modular design, Drupal is described as a content management framework.[38][43] Drupal is also described as a web application framework, as it meets the generally accepted feature requirements for such frameworks. Although Drupal offers a sophisticated programming interface for developers, no programming skills are required for basic website installation and administration.[44] Drupal runs on any computing platform that supports both a web server capable of running PHP (including Apache, IIS, Lighttpd, Hiawatha, Cherokee or Nginx) and a database (such as MySQL, MongoDB, MariaDB, PostgreSQL, SQLite, or Microsoft SQL Server) to store content and settings. Drupal 6 requires PHP 4.4.0+ while Drupal 7 requires PHP 5.2.5 or higher.[39]

5. Serendipity

Serendipity is a PHP-powered weblog application which gives the user an easy way to maintain an online diary, weblog or even a complete homepage. While the default package is designed for the casual blogger, Serendipity offers a flexible, expandable and easy-to-use framework with the power for professional applications.[45]

6. Dotclear

Dotclear is open-source web publishing software created in 2002 by Olivier Meunier. A one man's project at first, Dotclear soon gathered a team comprising different personalities with various backgrounds. The project's purpose is to provide a user-friendly tool allowing anyone to publish on the web, regardless of their technical skills. Dotclear is free software primarily designed for its users and regularly improved by their contributions. Everyone may use it and modify it according to the software license. [46]

7. Nucleus CMS

Nucleus CMS is also a popular content management system. It is actually more than a blog engine. Nucleus supports a multi-lingual and multi-author blogging environment. Some other extensive features are the availability of a huge number of templates and plug-ins, an easy administration panel, easy syndication support, etc. Nucleus exposes a rich set of APIs to extend it via plug-ins. Administration of Nucleus is more complicated than that of other blog engines. [47]

8. LifeType

LifeType supports multiple blogs and users, media management, generation of standard content, clean URLs and support for subdomains. LifeType is released under the GPL license, and requires PHP and MySQL to work. [48]

9. boastMachine

boastMachine is an open source, state of the art publishing platform written from scratch, that makes your web publishing experience so fun and easy as never before! From the fully automated installation to advanced content management featuresto spam fighting, boastMachine provides you with all that you would ever need!

It is written in PHP and backed by MySQL. [49]

10. Textpattern

Textpattern is a flexible, elegant and easy-to-use content management system. It is both free and open source. When it comes to publishing on the internet, beginners and experts alike are met with a bothersome paradox: word processors and graphics applications allow anyone to do a pretty good job of managing text and images on a personal computer, but to make these available to the worldwide web – a seemingly similar environment of documents and destinations – ease of use vanishes behind sudden requirements for multilingual programming skills, proficiency in computer-based graphic design, and, ultimately, the patience of a saint.[50]

11. b2evolution

b2evolution is a powerful blog tool you can install on your own website. It includes all the features of traditional blog tools, and extends them with evolved features such as file & photo management, advanced skinning, multiple blogs support as well as detailed user permissions.[51]

12. eggBlog

eggBlog is the free php & mysql blog software package, allowing you to create your own online website, journal or weblog (blog) using your own web-space. Powered by PHP and MySQL, eggBlog has a wide range of features including: easy to use web-based administration to add, edit and delete news articles, easy to use web-based configuration to manage your web site setting, WYSIWYG easy-to-use text editor for publishing or editing news articles, download themes to easily change the style, layout and colours of your site and more.[52]

13. Zomplog

There are many great weblog systems around, but they all require technical knowledge from their users. Zomplog is different: it lets you focus on content instead of code. Software should empower you to do great things, not stand in your way. Zomplog has been designed to be logical and easy to use for anyone, not just programmers.

Subtext is a personal blog publishing platform that focuses on usability, elegance, and simplicity, it is written in C# for the ASP.NET platform. If you've ever caught yourself throwing your hands in the air and declaring that you're going to write your own blogging engine, then Subtext is for you.[53]

14. BlogEngine.NET

BlogEngine.NET is an open source .NET blogging project that was born out of desire for a better blog platform. A blog platform with less complexity, easy customization, and one that takes advantage of the latest .NET features.BlogEngine.NET was designed using the current .NET framework and focused on simplicity, ease of extendibility, and innovative features. With BlogEngine.NET, we hope to create the natural blog of choice for all .NET developers worldwide.[54]

15. Presstopia Blog

Presstopia Blog is a standalone, open source weblog application that runs on the ASP.NET platform. The software is 100% free of charge, and licensed under an Apache Open Source License. It includes all the features you need to run a great blog, without the clutter so often associated with other high-end blogging applications.[55]

16. Comparison

Distribution is calculated from the top million websites on the internet is shown in figure 1.[56].It shows out of top million sites which uses content management system,63.71% uses wordpress;9.52% uses drupal. Comparison of top Free and open source Web blogging software in terms of Platform, Supported databases and their usage is shown in table 1.

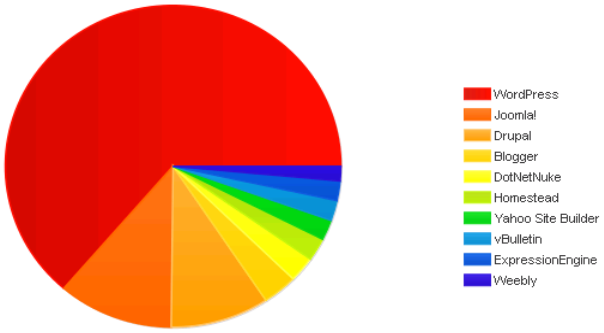

Fig. 1: CMS Distribution in Top Million Sites

Table 1: Comparison of top Free and open source Web blogging software

Name	***Platform***	***Supported databases***	***Blog platform usage Top 100***
Movable Type	*Perl, mod perl, FastCGI, w/PHP*	*MySQL, Oracle, Microsoft SQL Server, SQLite, PostgreSQL*	*12*
WordPress	*PHP*	*MySQL*	*27*
Drupal	*PHP*	*MySQL*	*4*
ExpressionEngine	*PHP*	*MySQL*	*1*
Serendipity	*PHP+ Smarty*	*MySQL, PostgreSQL, MySQLi, SQLite*	*0*
Dotclear	*PHP*	*MySQL, PostgreSQL, SQLite*	*0*
Nucleus CMS	*PHP*	*MySQL*	*0*
LifeType	*PHP*	*MySQL*	*0*
boastMachine	*PHP*	*MySQL*	*0*
Textpattern	*PHP*	*MySQL*	*0*
b2evolution	*PHP*	*MySQL*	*0*
Eggblog	*PHP*	*MySQL*	*0*
Subtext	*ASP.NET*	*Microsoft SQL Server*	*0*
BlogEngine.NET	*ASP.NET*	*SQL Server, MySql, SQLite, VistaDB*	*0*
Prestopia Blog	*ASP.NET*	*Microsoft SQL Server, MySQL and MS Access*	*0*

17. Conclusion

A blog is a special kind of website which is updated frequently with new postings and

published in reverse chronological order (the most recent posting is on top of the page). Since there is free software available, everyone with a connection to the internet has the ability to publish a weblog.

References

[1] Rebecca Blood, "practical advice on creating and maintaining your blog", the weblog handbook perseus publishing, July 2002 ISBN: 073820756X
[2] Blood, Rebecca (September 7, 2000) "Weblogs: A History And Perspective".
URL-
http://www.rebeccablood.net/essays/weblog_history.html
[3] "After 10 Years of Blogs, the Future's Brighter Than Ever". Wired. 2007-12-17. Retrieved 2008-06-05.
[4] "It's the links, stupid". The Economist. 2006-04-20. Retrieved 2008-06-05.
[5] Merholz, Peter (1999). "Peterme.com".The Internet Archive.Archived from the original on 1999-10-13.Retrieved 2008-06-05.
[6] Kottke, Jason (2003-08-26). "kottke.org".Retrieved 2008-06-05.
[7] Origins of "Blog" and "Blogger", American Dialect Society Mailing List (Apr. 20, 2008).
http://listserv.linguistlist.org/cgi-bin/wa?A2=ind0804C&L=ADS-L&P=R16795&I=-3
[8] a b c Managing Enterprise Content: A Unified Content Strategy. Ann Rockley, Pamela Kostur, Steve Manning. New Riders, 2003.
[9] The content management handbook. Martin White. Facet Publishing, 2005.
[10] Content Management Bible, Bob Boiko. John Wiley & Sons, 2005.
[11] Moving Media Storage Technologies: Applications & Workflows for Video and Media Server Platforms. Francis US, 2011. Page 381
[12]Free Software Foundation. "What is free software?".Retrieved 14 December 2011.
[13]Hatlestad, Luc (9 August 2005). "LinuxWorld Showcases Open-Source Growth, Expansion". InformationWeek. CMP Media, LLC. Archived from the original on 25 November 2007.Retrieved 25 November 2007.
[14] Claburn, Thomas (17 January 2007). "Study Finds Open Source Benefits Business". InformationWeek.CMP Media LLC.Archived from the original on 25 November 2007. Retrieved 11 2 5 2007.
[15]"The Free Software Definition". GNU.org. Retrieved 4 February 2010.
[16] "Licensing and Pricing FAQ". *www.movabletype.com*. What's the difference between Movable Type, Movable Type Pro, and Movable Type Enterprise?. Retrieved August 27, 2010.

[17] "Welcome". Six Apart. September 3, 2001. Retrieved August 27, 2010.

[18] Trott, Mena (October 8, 2001). "Please Read Before Downloading". Six Apart.Retrieved August 27, 2010.

[19] Dash, Anil (December 12, 2007). "Movable Type Open Source".Retrieved August 27, 2010.

[20] Osanai, Takeshi (September 26, 2012). "Movable Type 5.2 is finally released!".Six Apart.

[21] Hacker, Scot (2003). "Put Weblogs to Work: low-cost tools let you publish professional and personal sites instantly". *Macworld***9**. Retrieved August 27, 2010.

[22] "Migrating to MySQL from SQLite or PostgreSQL". Six Apart. November 19, 2009. Retrieved June 23, 2012.

[23] Mullenweg, Matt. "WordPress Now Available".WordPress.Retrieved 2010-07-22.

[24]Rao, Leena (19 August 2011). "WordPress Now Powers 22 Percent Of New

Active Websites In The U.S.". TechCrunch.Retrieved 28 September 2011.

[25] "Usage of content management systems for websites". http://w3techs.com/technologies/overview/content_management/all Retrieved 8 August 2011.

[26] "CMS Usage Statistics". http://trends.builtwith.com/cms BuiltWith. Retrieved 2011-08-26.

[27] "Commit number 8".wordpress.org

https://core.trac.wordpress.org/changeset/8

[28] "WordPress Download Counter". wordpress.org. Retrieved 2011-02-10.

[29] Theme Installation rel=”nofollow”

http://codex.wordpress.org/Using_Themes

[30] See the counter in the official plugin directory http://wordpress.org/extend/plugins/

[31] "WordPress 3.0 "Thelonious"". Wordpress.org. 2010-06-17.Retrieved 2011-12-18.

[32] "WordPress for WebOS". *WordPress*.Retrieved 2012-03-06.

[33] "WordPress publishes native Android application". Android and Me. 2010-02-02.Retrieved 2010-06-15.

[34] "Idea: WordPress App For iPhone and iPod Touch". *WordPress iPhone & iPod Touch*. 2008-07-12.

[35] "18 Million WordPress Blogs Land on the iPad". *ReadWriteWeb*. March 24, 2011.

[36] "WordPress for BlackBerry". *WordPress*.Retrieved 2009-12-27.

[37]"Licensing FAQ". *drupal.org*. Retrieved 2009-04-08.

[38] "The Drupal Overview". *drupal.org*. Retrieved 2009-04-08.

[39] "System Requirements". *drupal.org*. Retrieved 2009-04-08.

[40] W3Techs (2011-07-15). "Usage of content management systems for websites".Retrieved 2011-07-15.

[41] BuiltWith (2011-03-28). "Drupal Usage Statistics".Retrieved 2011-03-28.

[42] "The State of Drupal 2010 speech". Archive.org. 2001-03-10.Retrieved 2011-08-31.

[43] "Modules". *drupal.org*. Retrieved 2011-08-18.

[44] "Features". *drupal.org*. Retrieved 2009-04-08.
[45] http://www.s9y.org/ Retrieved 2012-11-11.
[46] http://dotclear.org/ Retrieved 2012-11-11.
[47] http://nucleuscms.org/ Retrieved 2012-11-11.
[48] http://www.lifetype.ru/ Retrieved 2012-11-11.
[49] http://boastology.com/ Retrieved 2012-11-11.
[50] http:// textpattern.com/ Retrieved 2012-11-11.
[51] *http://b2evolution.net/* Retrieved 2012-11-11.
[52]*http://eggblog.net/*Retrieved 2012-11-11.
[53]*http://www.zomp.nl/zomplog/*Retrieved 2012-11-11.
[54]http://www.dotnetblogengine.net/
[55]*http://presstopia.com/dnn/Default.aspx?tabid=160*
Retrieved 2012-11-11.
[56] http://trends.builtwith.com/cms Retrieved 2012-11-11.

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VIDEO STEGANALYSIS USING HULFMAN CODING & DECODING OF AVI FILE USING MATLAB

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Abstract
This project is aimed at developing a systemusing**Video Steganography,** a technique tohide any kind of file having any extension into aVideo file. This project is the applicationdeveloped to embed any kind of data (File) inanother file, which is called carrier file. Thecarrier file must be a video file. It is concernedwith embedding information in an innocuouscover media in a secure and robust manner. Thissystem makes the Files more secure by using theconcepts such as Steganography andCryptography.

I. INTRODUCTION
A video file is a combination of both image and audio. So, video steganography is nothing but a combination of image and audio Steganography.
So, the combined evaluations i.e., the evaluations for image and audio steganography can be taken together for the evaluation of video steganography. While doing video steganography, the effect on video has to be kept in mind to achieve a secure communicating media. Steganography is gaining new popularitywith the current industry demands for digital watermarking and fingerprinting of audio and video. Steganography in images has truly come of age with the invention of fast ,powerful computers. The most popular technique in image Steganography is Least Significant Bit Insertion . More precisely as Kuhn puts it :The goal of Steganography is to hide messages inside other harmless messages in a way that does not allow any enemy to detect that there is a second secret message present.

In this project we focus to develop one system, which uses both cryptography and Video Steganography using image morphing or wrapping technique for better confidentiality and security. Presently we have very secure methods for both cryptography and Steganography. To develop a new system with extra security features, where a meaningful piece of text message can be hidden by combining security techniques like Cryptography and 2 Steganography. As we know that Hiding data is better than moving it shown and encrypted

II. Literature survey
Visualizing Data:
All the graphics features that are required to visualize engineering and scientific data are available in MATLAB. These include 2-D and 3-D plotting functions, 3-D volume visualization functions, tools for interactively creating plots, and the ability to export results customize plots by adding multiple axes; changing line colors and markers; adding annotation, LaTEX equations, and legends; and drawing shapes.

Creating and Editing Plots Interactively:
MATLAB provides interactive tools for designing and modifying graphics.
From a MATLAB figure window, you can perform the following tasks:
- Drag and drop new data sets onto the figure.
- Change the properties of any object on the figure.
- Zoom, rotate, pan, and change camera angle and lighting.
- Add annotations and data tips.
- Draw shapes.
- Generate a function that can be reused with different data

Importing and Exporting Graphic Files:
MATLAB lets you read and write common graphical and data file formats, such as GIF, JPEG, BMP, EPS, TIFF, PNG, HDF, AVI, and PCX. As a result, you can export MATLAB plots to other applications, such as

Microsoft Word and Microsoft PowerPoint, or to desktop publishing software. Before exporting, you can create and apply style templates, covering characteristics such as layout, font, and line thickness, to meet publication specifications.

III. Problem definition

Objective

To hide data in a popular object that will not attract any attention. In case the data is extracted, it will be encrypted. But still there is a chance that the intruder can break the code. In our new system instead of applying existing techniques directly we will be using the following approach

- We will first extract frames from target video file
- Instead of hiding the complete encrypted text into an frame, we will be hiding a part of the encrypted message.
- Unhidden part of the encrypted message will be converted into two secret keys.
- Then we reconstruct the frames of video file that contains data behind another image for further security an confusion by use of mirage algorithm.
- In this system to get the original message one should know, along with keys for Cryptography and Steganography, two extra keys and the reverse process of the key generation. So our final goal of the project is to develop a new system which is highly secured and even if somebody retrieves the message from stego image it becomes a meaningless for any existing cryptographic techniques.

IV. Motivation

Totally secure steganography systems are those systems that their messages cannot be identified as steganographic messages with any rational means better than random guessing. This fact was stated by Christian Cachin in an information-theoretic model for steganography in which he related the security of such systems against passive eavesdroppers, in this model it is assumed that the attacker has a complete knowledge of the algorithm and he only hasn't the secret key material. The attacker can use detection theory to decide between hypothesis C (that message contains no hidden message) and hypothesis S (that a hidden message exists inside the dummy message), the steganography algorithm is perfectly secure if no decision rule exists that can perform better than random guessing. To achieve this goal the dummy message containing steganographic message shouldn't differ in anyway form matching type files. This simple rule was constantly been violated in all steganalysised algorithms as shown in the numerous steganalysis algorithms and papers. The detectability of a message as earlier stated is also a function of the change of the vessel characteristics; the less error introduced to the vessel characteristics the less detectable it is. And so in order to reduce detectability one can make one of the counter measurements falling in one of those acts category:

- Make the insertion rate statistically insignificant to the size of the vessel.
- Select a vessel that best suits your message with minimizing change.
- Select a dynamic insertion schema that seeks minimization of error.

V. Huffman Coding:

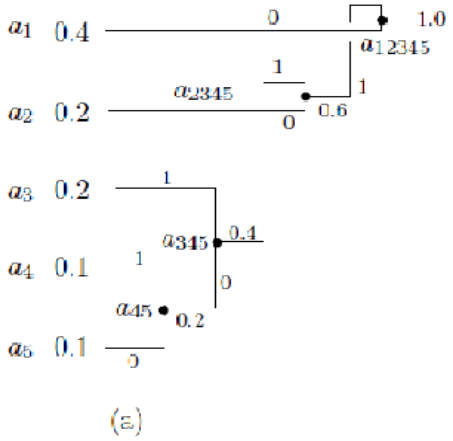
Huffman coding is a popular method for compressing data with variable-length codes. It is also fast,conceptually simple, and easy to implement. The Huffman encoding algorithm starts by constructing a list of all the alphabet symbolsin descending order of their probabilities. It then constructs, from the bottom up, a binary tree with a symbol at every leaf. This is done in steps, where at each step twosymbols with the smallest probabilities are selected, added to the top of the partial tree,deleted from the list, and replaced with an auxiliary symbol representing the two originalsymbols. When the list is reduced to just one auxiliary symbol (representing theentirealphabet), the tree is complete. The tree isthen traversed to determine the codewordsof thesymbols.

This process is best illustrated by anexample. Given five symbols withprobabilitiesas shown

in Figure (a), they arepaired in the following order:

1. *a*4 is combined with *a*5 and both arereplaced by the combined symbol *a*45,whoseprobability is 0.2.
2. There are now four symbols left, *a*1, with probability 0.4, and *a*2, *a*3, and *a*45,withprobabilities 0.2 each. We arbitrarily select*a*3 and *a*45 as the two symbols withsmallestprobabilities, combine them, and replacethem with the auxiliary symbol *a*345, whoseprobability is 0.4.
3. Three symbols are now left, *a*1, *a*2, and*a*345, with probabilities 0.4, 0.2, and0.4,respectively. We arbitrarily select *a*2 and *a*345, combine them, and replace them withthe auxiliary symbol *a*2345, whose probability is 0.6.
4. Finally, we combine the two remainingsymbols, *a*1 and *a*2345, and replace themwith*a*12345 with probability 1.

The tree is now complete. It is shown inFigure (a) "lying on its side" with itsroot on the right and its five leaves on the left. To assignthe codewords, we arbitrarilyassign a bit of 1 tothe top edge and a bit of 0 to the bottom edge, ofevery pair ofedges. This results in the codewords0, 10, 111, 1101, and 1100. The assignments ofbitsto the edges are arbitrary.



The average size of this code is 0.4 ×1+ 0.2 ×2 + 0.2 ×3 + 0.1 ×4 + 0.1 ×4 =2.2bits/symbol, but even more importantly, theHuffman code is not unique. Some of thestepsabove were chosen arbitrarily, because therewere more than two symbols withsmallestprobabilities.

Figure (b) shows how the same five symbols canbe combineddifferently to obtain a differentHuffman code (11, 01, 00, 101, and 100). Theaveragesize of this code is 0.4 ×2 + 0.2 ×2 +0.2 ×2 + 0.1 ×3 + 0.1 ×3 = 2.2 bits/symbol,thesame as the previous code.

System Design

Steganoghraphy Architecture Overview ss

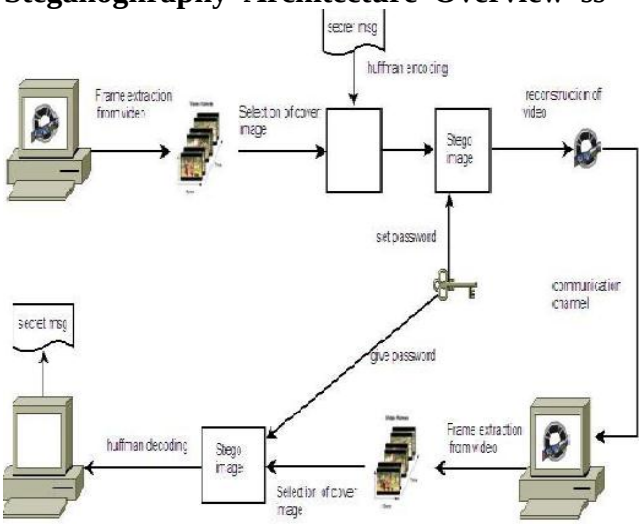


Fig 1

VI. SCOPE OF THE PROJECT

Scope of Project is:

Video Steganography gives the advantage that itcan be used to secretly transmit messageswithout the fact of the transmission beingdiscovered .Often, using encryption mightidentify the sender or receiver as somebodywith some-thing to hide . For example ,thatpicture of your cat could conceal the plansfor your company's latest technical innovation.However ,Steganography has a number ofdisadvantages as well .Unlike encryption ,itgenerally requires a lot of overhead to hide arelatively few bits of information . However,there are ways around this. Also, onceaSteganographic system is discovered, it isrendered useless. This problem, too , can beovercome if the hidden data depends onsome sort of key for its insertion andextraction.

VI. Requirement Analysis

Software requirement specification

- Operating system: windows 7, windosxp
- IDE(integrated developmentenvironment) : MATLAB R2008b
- Simulink tool for Wimax Simulation

Hardware requirement

- Hard disk : 40 GB
- RAM : 1 GB
- Processor Speed : 3.00GHz
- Processor : Pentium IVProcessor

Reference

[1] Ken Cabeen and Peter Gent, ―Image Compression and Discrete Cosine Transform‖, College of Redwoods.http://online.redwoods.cc.ca.us/instru ct/darnold/LAPROJ/Fall98/PKen/dct.pdf

[2] Jessica Fridrich, MiroslavGoljan, and Rui Du, ―Detecting LSB Steganography in Color and Gray-Scale Images‖, Magazine of IEEE Multimedia, Special Issue on Multimedia and Security, pp.22-28, October-December 2001.

[3] Andrew B. Watson, ―Image Compression Using the Discrete Cosine Transform‖, NASA Ames Research Center , Mathematica Journal, 4(1), p.81-88,1994

[4] MohesenAshourian, R.C. Jain and Yo-Sung Ho, "Dithered Quantization for Image Data Hiding in the DCT domain", in proceeding of IST2003, pp.171-175, 16-18 August, 2003 Isfahan Iran.

[5] Ren-Junn Hwang, Timothy K. Shih, Chuan-Ho Kao, "A Lossy Compression Tolerant Data Hiding Method Based on JPEG and VQ." Journal of Internet Technology Volume 5(2004).

[6]J.R.Krenn, ―Steganography and Steganalysis‖, January 2004.

[7] Hsien – Wen Tseng and Chin – Chen Chang, ‖ High Capacity Data Hiding in JPEG Compressed Images‖, Informatica, Volume 15 , Issue 1 (January 2004) 127-142, 2004,0868-4952

[8] Youngran Park, Hyunho Kang, Kazuhiko Yamaguchi and Kingo Kobayashi, ―Integrity Verification of Secret Information in Image Steganography‖, Symposium on Information Theory and its Applications, Hakodate, Hokkaido, Japan, 2006.

[9] Takayuki Ishida, Kazumi Yamawaki, Hideki Noda, MichiharuNiimi, "Performance Improvement of JPEG2000 Steganography Using QIM", Department of System Design and Informatics, Journal of Communication and Computer, ISSN1548-7709, USA, Volume 6, No. 1(Serial No. 50), January 2009.

[10] Neeta Deshpande, KamalapurSneha, Daisy Jacobs, ―Implementation of LSB Steganography and Its Evaluation for various Bits‖ Digital Information Management, 2006 1st International Conference on. 06/01/2007; DOI: 10.1109/ICDIM.2007.369349

BLUETOOTH HOTSPOT

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ABSTRACT

This project deals with the concept of providing internet connectivity on low end devices using Bluetooth technology. Bluetooth (IEEE 802.15.1) is an industrial specification for wireless PAN (Personal Area Network). It is a cheap, short range, low power consuming wireless technology. Laptops, PDAs etc make use of Wi-Fi Hotspots to access Internet. These devices are expensive. However some low end devices not having Wi-Fi facility can make use of Bluetooth hotspot. Moreover, Bluetooth consumes less power compared to Wi-Fi. Mobile phones need not have GPRS connection or a SIM card in it to access the internet. The Server(PC or Laptop) receives request from mobile phone to which it responds by delivering requested webpage.

1. INTRODUCTION:

As the number of Bluetooth products increases eachyear, it is important to develop applications and servicesto take full advantage of their potential and capabilities. Abroadband hotspot is one application where Bluetooth hasa value in providing Internet access to mobile users.Consumers owning a Bluetooth enabled mobile phone caneasily access a Bluetooth hotspot to browse the internetwithout having to carry a PDA or a laptop.A higherproportion of PDA owners use the device to access theInternet through Wi-Fi which is more costly as comparedto Bluetooth.The penetration rate for using mobile phone is veryhigh. In fact, it is becoming the internet access point formany people encountering the Internet for the first time.The size of the device is getting smaller, making itconvenient for consumers to carry and the capabilities arebecoming more powerful and sophisticated. Mobile phonecreates more possibilities for social networking. Thedeployment of Bluetooth hotspots will widen access tobroadband services using mobile phones not only toprofessionals and mobile workers but more importantly, to other segments of consumers who want to go on-linefor non-business related and sociable purposes, and toconsumers who do not own PCs.

In terms of social conception, Bluetooth hotspots havethe ability to bridge the digital divide between people whodo or do not have access to the technology. It is notnecessary to purchase a PC**,** a laptop or a PDA which areoften used for business and work related purposes, foroccasionally checking email and browsing the Internet.There are some consumers who are not a frequent user ofthe Internet due to the nature of their work, lifestyleor income. This group of people can invest in a Bluetoothenabled mobile phone to access the Internet.

2. PROPOSED SYSTEM:

2.1 Proposed System Overview:

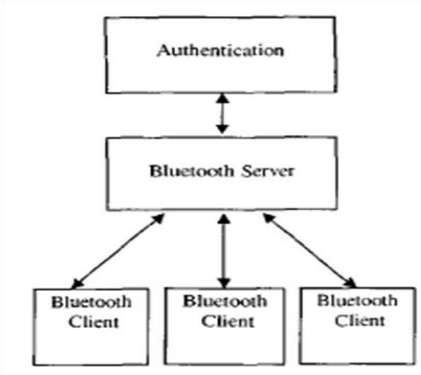

Fig 2.1 Proposed System Overview

The above diagram gives a very extensive idea about the system proposed. This system essentially covers most of the issues related to setting up a basic network.

There are two major components of the entire system. The first component is the Bluetooth hotspot network which consists ofmany

machines in a client server configuration. The Bluetooth network is essentially a collection of many Bluetooth devices like mobile phones. A "Bluetooth Server" connects the entire network to the Internet acting as a gateway to the "clients".

The second part of the network is the Bluetooth service manager. This is mainly the software used to manage the users of that particular system. This system takes care about the login and authentication. The customer enters his/her user details to gain access to the service. Then the authentication process validates the users. User details are stored in a database with access details.

Bluetooth dongles are used as an access point for the clients and the servers. Windows XP has been proved to give the best support for Bluetooth. ThusWindows XP would be the best possible candidate forthe server environment. The dongle is installed with drivers which enable it to perform various network functions including Internet access.

2.2 Methodology:

Before the clients can be connected to the server, they have to be paired with the Bluetooth Server. Pairing is an important part in a Bluetooth setup. When the client requests to be connected to the server, the server asks for a passkey. When the client and the server enter the same passkey then the devices are paired together and can perform network functions. Fora hotspot network, a common passkey could he maintained forthe day. The patrons can be provided this passkey over the counter. This passkey can be changed on a daily basis. Authentication is probably the most important part of the system. Therefore we prefer a manual control on the devices present in the hotspot in the form of hotspot manager.

The server has to be setup to enable Internet Connection and redirect the web pages to mobiles. The server recognizes the client's request for Internet access and sends the request to the Internet Server. It gets the web page in the format accessible in mobiles from the Internet Server and sends it to the requesting client and thus enables the client to access Internet.

A centralized database will maintain the details of all users along with date and time of login registered to the system. Once the user enters the hotspot, a simple "Passkey" facility will enable the user to access the Internet.

3. CONCLUSION:

The realization of the importance of extending the availability and accessibility of information, mobile phone manufacturers are exploiting the development of wireless technology to include Bluetooth in particular, in most of their mobile phone models. As a result, the functionalities and capabilities of a mobile phone have extended, not just to make and receive calls but also to surfthe Internet, check email, download software or application, play games and listen to music.

Bluetooth hotspot is one of the potential services to be offered to mobile phone users. It will make surfing Internet free of cost in Bluetooth Hotspot enabled area. So one does not have to depend on the costly GPRS system provided by the telecom companies. Also the power consumption is much low as compared to Wi-Fi Hotspot.

REFERENCES:

1. C.S.R. Prabhu, A. PrathapReddi "**BLUETOOTH TECHNOLOGY and its Application with Java and J2ME**"

2. Bruce Hopkins, Ranjith Antony "**BLUETOOTH FOR JAVA**"

3. JazilahJamaluddin, Ratish Nair, Reuben Edwards, and Paul Coulton"**Widening Access to Broadband Hotspots Employing Bluetooth", IEEE 2004.**

4. Bluetooth Hotspot Using Internet Gateway
Access Profile (IGAP)

WEBSITES:

1. http://www.bluetooth.com

2. http://forum/nokia.com

3. http://www.ieee.com

4. http://www.jsr82.com

5. http://www.bluecove.com

Multimodal Biometric Authentication Using Face and Voice

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Abstract

Most of the unimodal biometric systems fail to be sufficient for recognition due to limitations such as noisy sensor data, non-universality, large intra-user variations, lack of individuality of the chosen biometric trait, susceptibility to spoof attacks and poor error rates. Some of these problems can be alleviated by using multimodal biometrics systems that fuse evidence from multiple biometric sources of the same identity. Ambiguities in one modality like lighting problem can be compensated by another modality like speech features. Hence, multimodal biometric system normally performs better than any of unimodal biometrics.

1. Introduction

The need for reliable user authentication techniques has increased in the wake of heightened concerns about security and rapid advancements in networking, communication and mobility. Traditional identity verification methods relied on passwords and cards have a few drawbacks. Passwords can be forgotten and cards can be lost, stolen or shared. Hence, they are not sufficient identity verification systems in this modern world. Biometrics offers a natural and reliable automated method of identifying or verifying the identity of a Person based on a physiological or behavioral characteristic that are inherent to the person. Physiological characteristics consist of hand or finger images, facial characteristics and iris recognition. Behavioral characteristics includes speaker verification, dynamic signature verification and keystroke dynamics. Some of biometric characteristics which have been using in biometric systems are as shown.

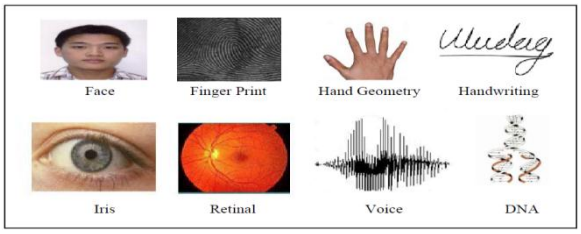

Figure 1.1 Multimodal Biometrics Types

2. Proposed System

2.1 Face Recognition System

Generally, faces are used to recognize individuals in our daily lives. Advancements in technologies such as computing, image processing and pattern recognition enable face recognition automatically. Research in automatic face recognition is motivated not only by the challenges it poses but also by the numerous practical applications where human identification is required. Face recognition has many advantages over other biometric technologies because it is natural, nonintrusive and easier to use. Automatic face recognition can be used for both identification and verification mode.Figure2.4 illustrates the general process flow for face verification system.

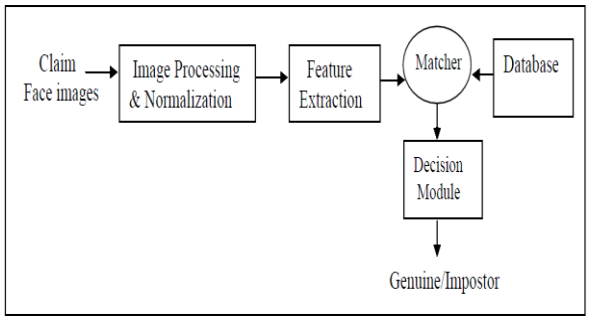

Figure 2.1 Overview of the face recognition system

2.2 Speaker recognition system

The purpose of the speaker recognition system is to automatically recognize the individuals using their voice or speaker biometrics. However, speaker recognition is different technology than speech recognition which recognizes words as they are articulated, which is not a biometric. Analysis occurs on a model in which changes over time are monitored, which is similar to other behavioral biometrics such as dynamic signature, gait and keystroke recognition.

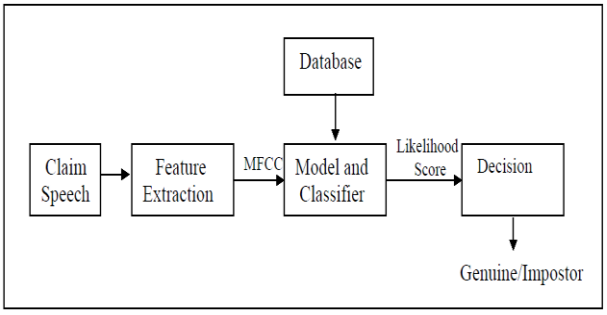

Figure 2 Overview of the speaker recognition system

2.3 Biometric Fusion

In a multimodal biometric system, fusion can be performed at the sensor level, feature extraction level, matching score level and decision level. Sensor level fusion is quite rare because fusion at this level requires that the data obtained from the different biometric sensors must be compatible, which is seldom the case with biometric sensors. Fusion at the feature level is also not always possible because the feature sets used by different biometric modalities may either be inaccessible or incompatible. Fusion at the decision level is too rigid since only a limited amount of information is available. Therefore, fusion at the score level is preferred as it offers the best trade-off in terms of the information content and the ease in accessing and combining matching score. Score fusion techniques can be divided into four categories: combination approach fusion, transformation based score fusion, density based score fusion, Transformation-based score fusionand classifier based score fusion.

Major headings are to be column centered in a bold font without underline. They need be numbered. "2. Headings and Footnotes" at the top of this paragraph is a major heading.

3. Algorithms

3.1 Algorithm for face recognition: PCA (principle component analysis)

PCA is a way of identifying patterns in data and expressing the data in such a way to highlight their similarities and differences. The purpose of PCA is to reduce the large dimensionality of the data space to smaller intrinsic dimensionality of feature space which are needed to describe the data economically.

3.2 Algorithm for voice recognition: MFCC

The speech input is recorded at a sampling rate of 22050Hz. This sampling frequency is chosen to minimize the effects of aliasing in the analog-to-digital Conversion process.

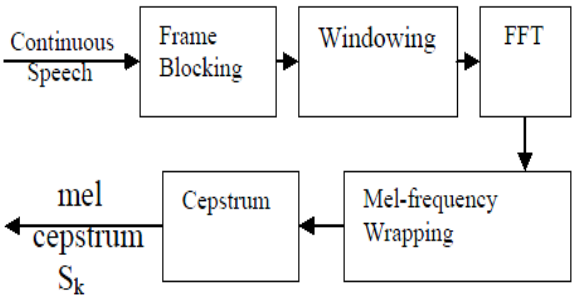

Figure 3 MFCC engine

4. Validating Voice and Face Recognition

In order to verify that voice and face recognition are functioning correctly, multiple users who are in the database as well as those

who are not will need to test the system. The training library and recognition algorithms will also be modified as needed. One note is that we must make sure that the system rejects the users who are not in the database. When testing the algorithms that we will be using for feature extraction and classification, we will use a confusion matrix to determine the likeliness that a certain input sample is one of the users. In this matrix, the columns will represent what was detected, and the rows will represent the actual user. For example:

Table 1 Confusion Matrix

	User 1	User 2	... User n	No One
User 1	10	0	0	0
User 2	1	8	0	1
... User n	0	0	10	0
No One	0	0	0	10

5. Acceptance and Rejection

When the recognition engine processes an utterance, it returns a result. The result can be either of two states: acceptance or rejection. The performance in this system is measure in terms of False Acceptance Rate (FAR) and False Rejection Rate (FRR). FAR is the case where an impostor, claiming the identity of a client, is rejected. FRR is the case where a client, claiming his true identity is rejected.

6. Conclusion

Biometric recognition systems are being widely deployed in a variety of commercial applications such as access control to network, building or system. Most of the biometric recognition systems currently rely on finger print, face or voice biometrics. Each biometric has its own advantages and drawbacks in terms of accessibility, power, complexity, robustness, cost, etc. In this project, face and voice biometrics will be used because their recognition become more and more important owing to rapid advances in technologies such as digital cameras and mobile devices. Such systems known as multimodal biometric systems can also improve matching performance, increase population coverage, deter spoofing.

References

[1] IEEE Transaction on Consumer Electronics,Vol.56,No 4,November 2010

[2] IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART A: SYSTEMS AND HUMANS, VOL. 40, NO. 3, MAY 2010.

[3] /prosncons.hthttp://www.en.wikipedia.org/wiki/Biometrics

[4] http://ieeexplore.ieee.org/xpls/absall.jsp?arnumber=5427303&tag=1

[5] http://www.csc.liv.ac.uk/student/projects/projects.html

[6] http://www.bioenabletech.com/multimodal-biometric-system-fingerprint-face-iris-passward

[7] http://ntrg.cs.tcd.ie/unsergrad/4ba2.02/biometricsml

Server Load Balancing

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Abstract*:*

Large companies and enterprises expect high performance, high availability and secure and scalable solutions to support all applications at all times. However, the availability of these applications is often threatened by network overloads as well as server and application failures. If there is only one server responding to all the incoming requests, the capacity of the file server may not be able to handle high volumes of incoming traffic. The files will load slowly as some of the users will have to wait until the server is free to process their requests. The increase in traffic and connections can lead to a point where upgrading the server hardware will no longer be cost effective.In order to achieve server scalability, more servers need to be added to distribute the load among the group of servers. The load distribution among these servers is known as load balancing. Load balancing applies to all types of servers. At an Organization, information concerning the safety of the assets and to keep a track of all the activities is very important. The expected value of the overall completion time for a given initial load under the centralized one-shot LB policy for an arbitrary number of nodes. The central server forwards incoming requests from number of users to group of servers

1.INTRODUCTION

Distributing processing and communications activity across a computer network so that no single device is over whelmed. Load balancing is especially important for networks where it is difficult to predict the number of requests that will be issued to a server. Load balancing is a 'technology' used for dividing the work among two or more servers. [3]Server Load Balancing (SLB) is defined as "A process and technology that distributes site traffic among several servers using a network-based device". This device intercepts traffic destined for a site and redirects that traffic to various servers. The load-balancing process is completely transparent to the end user. There are often dozens or even hundreds of servers operating behind a single URL. For balancing a work load, if two servers are used, then a third server is required to determine to which server work should be assigned. Load balancing is combined with failover and backup services as it requires multiple servers.

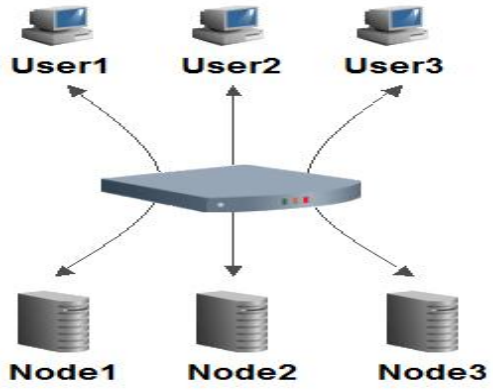

Fig. 1. Load Balancing

2. LOAD BALANCING ALGORITHMS

Load balancing algorithm directly influences the effect of balancing the server workloads.[2] Its main task is to decide how to choose the next server and transfer a new connection request to it. There are four basic steps that that algorithms should follow:

1) Monitoring server performance (load monitoring)

2) Exchanging this information between servers (synchronization with load-balancer)

3) Calculating new distributions and making the balancing decision. (Rebalancing criteria)

4) Actual request serve (fulfilling demand)

The two major categories for load-balancing algorithms are

A. Static Load Balancing

B. Dynamic Load Balancing

A. Static Load Balancing:

Static load balancing algorithms allocate the tasks of a parallel program to workstations based on either the load at the time nodes are allocated to some task, or based on an average load of our workstation cluster. The advantage in this sort of algorithm is the simplicity in terms of both implementation as well as overhead, since there is no need to constantly monitor the workstations for performance statistics. The static algorithm is easily carried into execution and takes less time, which doesn't refer to the states of the servers. However, static algorithms only work well when there is not much variation in the load on the workstations. Clearly, static load balancing algorithms aren't well suited to a NOW environment, where loads may vary significantly at various times in the day, based on the issues discussed earlier. Different Algorithms to Implement Static load balancer:

1. Random Scheduling:

The Random algorithm is self-explanatory. Traffic is directed arbitrarily to any server in your farm. In a random Scheduling, the requests are assigned to any server picked randomly among the group of servers. *Pros:* Random Scheduling load balancing algorithm is simple to implement. *Cons:* It can lead to overloading of one server while under-utilization of others.

2. Round-Robin Scheduling:

Robin Scheduling Algorithm is that the IP sprayer assigns the requests to a list of the servers on a rotating basis. For the subsequent requests, the IP sprayer follows the circular order to redirect the request. Once a server is assigned a request, the server is moved to the end of the list. This keeps the servers equally assigned. *Pros:* Better than random allocation because the requests are equally divided among the available servers in an orderly fashion. *Cons:* Not enough for load balancing based on processing overhead required and if the server specifications are not identical to each other in the server group.

3. Weighted Round-Robin Scheduling:

One can assign a weight to each server in the group so that if one server is capable of handling twice as much load as the other, the powerful server gets a weight of 2. In such cases, the IP sprayer will assign two requests to the powerful server for each request assigned to the weaker one. *Pros:* Takes care of the capacity of the servers in the group. *Cons:* Does not consider the advanced load balancing requirements such as processing times for each individual request.

B. Dynamic Load Balancing:

Dynamic load balancing algorithms make changes to the distribution of work among workstations at run-time; they use current or recent load information when making distribution decisions. As a result, dynamic load balancing algorithms can provide a significant improvement in performance over static algorithms. However, this comes at the additional cost of collecting and maintaining load information, so it is important to keep these overheads within reasonable limits [3]. The dynamic algorithm is self-adaptive algorithm, which is better than static algorithm. Self-adaptive load balancing system mainly includes two processes: monitoring the load states of servers and assigning the request to the servers. The state supervision, which depends on the load information of each server in the cluster monitored and collected periodically by the front-end balancer, raises the effect of load balance by monitoring load variety, however, this will burden the workload of balancer which is the bottleneck of the cluster system.

3. IDEA TO IMPLEMENT LOAD BALANCING

While using system sometimes user feels that the machine is getting very slow, then launch the task manager and look at the CPU utilization.[4] If it is low, then the memory is low, and disk must be trashing. Well, this works if user is around the machine and has one or two machines to monitor. When there are more machines, one couldn't monitor machines constantly and even if he somehow manages it but, you can't distribute their workload manually. So, you need load monitoring and load distributing features all together to enhance the whole assembly. For 24*7 running application online, performance of total assembly is more depends on how servers are performing. Idea is to monitor server performance by collecting parameter information of processor, Disk utilization, Memory health, User time etc.

User can monitor system performance by launching Task Manager and by looking at the CPU utilization in the Performance tab start monitoring the CPU utilization. Now notice the counter values and values stay almost constant. Now close Task Manager, run media player or any other application, wait about 5 seconds and start it again. A big peak in the CPU utilization should be noticed. In several seconds, may be the peak vanishes. Here if performance counters values are reported instantly one could think that our machine was extremely busy (almost 100%) at that moment. That's why rather than reporting instance values, several samples of the counter's values are collected and will report their average. The CPU utilization is not enough for a realistic calculation of the machine's workload; more than one counter should be monitor at a time such as disk utilization, memory usage, I/O etc. Now the machine load will be calculated as the sum of the weighted averages of all monitored performance counters. A counter is set to 0. All parameter values are collected in certain interval till counter value becomes 5. Then sum and average of parameter values are calculated. Depends on that calculated values, less loaded server or high performance system is being selected for load balancing and serving the coming request at best.

4. DESIGN OVERVIEW

The implementation can be preceded through Socket in java but it will be considered as peer to peer communication .For proactive routing we need dynamic routing. So java will be more suitable for platform independence and networking concepts. For maintaining route information we go for MS-Access as database back end.

- In a LB we have centralized LB server.
  - The LB Server performing the following process…
    - Process the Client Request / Response
    - Maintain the file List in different file formats
    - Send the appropriate file list to the Client for user selected file type.
    - Also allocate the server for each client.
- Every new client request for the download process, the Threshold value is updated.
  - Threshold value is find out the client request to LB server and LB Server send the request to current process allocate server and get the response time from the above same wise versa.

- Each time we compare the existing response time and current response time.

- LB Server is forward the client request to the appropriate servers based on its response time.
  - Each Request performing time we compare the Existing and current response time.
  - If the current response is greater than to the previous value then the next server allocating for the next request
  - Every client request comes to LB server then these way only server is allocated.
- When the client request exceeds the currently running process than it will forward to the next server.
  - The new process is comes then now it will go the new allocating server.
  - Server get the Client request file from the appropriate server place and that is transfer to the client through the LB Server.
- All the processing is done through by LB Server way.
- LB Server is allocating the server for every new client request.
- Dynamically allocating the server for each client.
- But process performed all the clients execute LB synchronously.
- Every request, response, allocating server these all information's are maintain by one queue in server.
- These processes are handled by the LB server.

5. CONCLUSION

The proposed load balancing policy minimizes the average completion time per task while improving the system processing rate. The highest performance is achieved when the processing power of servers is used intelligently.
Advanced server load balancing products can direct end-user service requests to the servers that are least busy and therefore capable of providing the fastest response times. Server load balancing is its ability to improve application availability. If an application or server fails, load balancing can automatically redistribute end-user service requests to other servers within a server farm or to servers in another location

REFERENCES

[1] Li Wenzheng, Shi Hongyan: "Novel Algorithm for Load Balancing in Cluster Systems" Publidhe by IEEE Proceedings of the 2010-978-1-4244-6763-1/10.
[2] Remi Badonnel, Mark Burgess: "Dynamic Pull-Based Load Balancing for Autonomic Servers" Published by IEEE 978-1-4244-2066-7/08.
[3] Greg Funk, Michael King, Malcolm Turnbull. (2009).loadbalancing. Available: http://searchciomidmarket.techtarget.com/sDefinition/0,,sid183_gci214490,00.html. Last accessed 2 November 2009.
[4] Jiubin Ju, Gaochao Xu, Kun Yang: "An Intelligent Dynamic Load Balancer for Workstation Clusters" Published by ACM.

Secure Mobile Messaging Application Using AES Algorithm

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Abstract

Short Message Service (SMS) and multimedia message service (MMS) has grown in popularity over the years and it has become a common way of communication. SMS is usually used to transport unclassified information, but with the rise of mobile commerce it has become a popular tool for transmitting sensitive information between the business and its clients. By default SMS does not guarantee confidentiality and integrity to the message content. There is no end-to-end security (including authentication, and non-repudiation) in these services. Therefore SMS is not totally secure and reliable. This hinders service providers to provide some services that require communication of high-level security. In this paper, we describe a system for securing SMS messages during and after its transmission over mobile network. The system can also be used for protecting personal data for users who desire to keep their confidential data stored on their mobile phones. The system has been implemented employing the AES encryption algorithm and using symmetric-key encryption.

Keywords:Authentication, encryption, decryption, *symmetric-key encryption*, cipher text, digital signature.

1. Introduction

Cell phone owners require better secure and private transaction in their regular usage of their cell. This is vital in communications of secret nature such as that in military and governmental communication. Securing voice calls is a difficult task as calls may be tabbed in transmission through various means. On the other hand, securing communication through the popularly used means, namely text messages, can be helpful and useful in many cases.[1]

We describe a secured text messages communication environment via SMS. For this purpose, we develop a mobile-based application named Secret Short Message Service (SSMS). It encrypts a text message before sending it and decrypts the message in the receiver's side. In this way, the message is unreadable while transmitted even if it is intercepted while transmitting it over the network. The proposed system can send encrypted messages via SMS and allow users to encrypt/decrypt messages for personal usage without sending them. The latter feature is desirable for those who want to ensure the privacy of their own information.[2]

SSMS employs symmetric-key encryption. The same secret key is used for both encryption and decryption. Therefore, the secret key must be known by the sender and the receiver of the message. Key distribution remains a problem when using symmetric-key encryption, but we found that it is the best solution when considering time complexity, efficiency, and costs. SSMS depends on secret key embedding, where the message's secret key is distributed inside the cipher text after message encryption process. Secret key embedding is used for checking the correctness of a decryption key which is entered by the user. This schema saves time and space as there is no need for a database to store the secret key related to each message.[3]

2. Background and Related Work

Many governmental and civilian applications benefit from encryption. Such applications include secure communication, e-commerce, mobile telephone networks, e-banking, and digital right management. Although encryption protects the confidentially of messages, other techniques are required to verify the integrity and authenticity of the messages; for example, a message authentication code (MAC) or digital signatures. Standards and computer programs to perform encryption are widely available, but successful employment of encryption to ensure security is a challenging problem. A single blunder in system design or execution may allow dangerous attacks. In some cases, an adversary can obtain valuable information without directly undoing the encryption.[4]

A conventional encryption scheme has five major parts: Plaintext, Encryption Algorithm, Secret Key, Cipher text, and Decryption Algorithm. In such a scheme, it is essential for secure communication that the sender and receiver have a way to exchange secret keys in a secure manner. Symmetric key encryption is faster than public key encryption since public key encryption places heavier computational load than symmetric key encryption [5]. Examples of commonly used symmetric-key encryption algorithms are: DES (Data Encryption Standard), TripleDES/3-DES, AES/Rijndeal.[6][7][8]

Table 1: Symmetric-key algorithms

Algorithms	Length(Bits)	Known Vulnerabilities
DES	64	Yes
AES	128,192,256	No
Triple DES	128,192	No

3. The Proposed System

Our proposed system (SSMS) uses symmetric-key encryption where messages are encrypted, and decrypted using a single secret key. We have selected AES (Rijndeal) algorithm to be employed in SSMS. 128-bits length is suitable for our purpose for practical message length and processing time resulting in a reasonable cost this is incurred by a service provider. A message's secret key is embedded into the cipher text by random positioning using a suitable hash function. This operation is a very helpful and powerful operation. It helps in checking the correctness of an entered secret key by comparing it to the message's real secret key after extracting it from the cipher (where the key is embedded). In addition, it is very powerful and space saving. It eliminates the need for a database to keep the secret key that is related to each message. Message decryption is performed without checking the entered secret key. This will save time. For correctly entered secret keys, such a process will be fast. But it might cause some problems with incorrect entries. If a wrong key is entered the cipher will be decrypted displaying a non-understandable text. Wrong keys may cause problems (i.e. long time which may lead to a hanging)[9]

To ensure the protection of the embedded secret key in the message, the secret key will be encrypted before encrypting the text. Encryption as well as decryption will be done using the encrypted secret key. This encryption is performed using a non-complicated hash function which results in a suitable encrypted key. When a secret key is entered for decryption, the entered secret key will be automatically encrypted using the same hash function, and then it is compared to

the message's secret key. Fig. 1 depicts the architecture of the proposed system. The business model is depicted in Fig. 1.

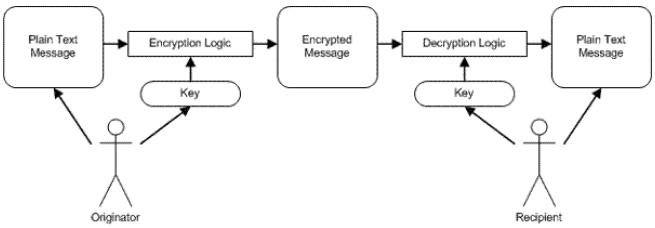

Fig. 1: System Architecture

4. Basic Scheme to Protect SMS Message Security

After the Message Management Toolkit along with the system parameters are set up in a mobile device, it can communicate securely with the SP, or another mobile device from the same SP. The Message Management Toolkit would encrypt a message with the system parameters. The ID of the sender can uniquely identify a SMS message. A destination device can also be identified by its ID. Thus an encryption key used in identity-based cryptography can be determined using these two identities.

When user A sends a SMS message to user B (A or B can be the SP), it encrypts and authenticates the message as follows:

1. A first generates an implicit shared key with B, without any interaction with B.

2. A encrypts payload of the message M to C. The encrypted message C is put in the payload field. The encrypted packet is handed to network operator.

After it transits through the Internet and mobile network, at the receiver B side, the message is decrypted as follows:

1. B first generates the implicit shared key with A, without any interaction with A.

2. B decrypts the payload of the message C to M'. The decrypted message M′ equals to the original message M. The encryption and decryption processes provide authentication also, since the message is encrypted at the sender with its private key and the receiver's public key.

5. An Improved Scheme to Protect SMS Message Security

The above basic scheme relies much on access security of mobile networks. The integrity of message cannot be verified. To improve the security level of it, i need space in the packet to carry signature and algorithm parameters. While signature signed with sender's private key is widely used in Internet to protect integrity and authentication of data, such as e-mails and URLs, it is not so easy to use in SMS messages. The reason is that the packet of SMS message is usually very short (140 bytes) and simple and lacks fragmentation and reassembling mechanism like IP packets. SMS interface in most mobile phones fragments and resembles at application layer, the messages that are too long to be sent in a single SMS packet.

A further solution needs some space reserved for signature and security parameters. Security parameters can contain useful values, such as Sequence Number or Timestamp. Security parameters are appended to message first, as the entire message to be processed. The message is then encrypted, and the

signature is calculated and appended to the message at the end.

When user A sends a SMS message to user B, it encrypts and authenticates the message as follows

1. A first generates an implicit shared key with B, without any interaction with B.

2. A encrypts the message M (the reduced payload), and outputs the cipher text.

3. A signs the message with its own private key and the receiver's public key. The encrypted message C and signature S are put into the payload field of the standard SMS packet, M.

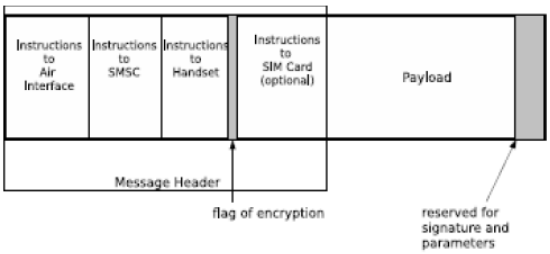

Figure 2: Packet Format of a Secured SMS Message

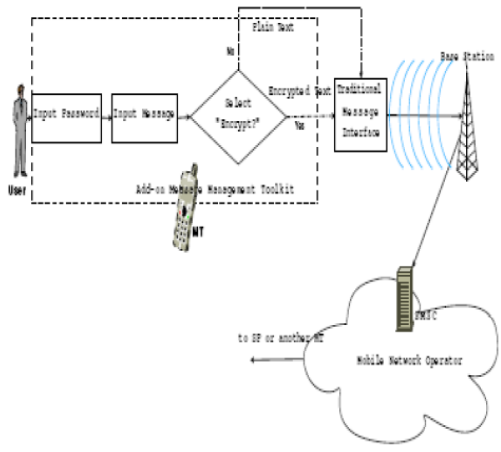

Figure 3: A User Sends a Message using the Message Management

5.1 Toolkit

At the receiver B side, the message is verified and decrypted as follows:

1. B first generates the implicit shared key with A, without any interaction with A.

2. For a received message M′ in the defined format with signature S and ciphertext C, the signature is verified. If S matches the new calculated result S′, the integrity and authenticity are confirmed, and the message is processed further. Otherwise, the message is discarded.

3. For the received message, B decrypts it with the shared key, M″.

M″ should be the same as the original message M.

6. Use of the System

The Message Management Toolkit does not change the traditional message input/output interfaces in the mobile phone, but is built on top of them. It is like a new message management interface, whereby the user receives and sends all messages. The user chooses an option to read or send a message as encrypted message or plain text message. An encrypted message has a special flag embedded, to inform the application if or not it should be processed by the application. To bind the private key to the user, the application should be protected by a password set by the user at the first time it is used. J2ME Mobile Information Device Profile (MIDP) provides a Persistent Storage feature that ensures that the record generated by a Java application is only accessible by itself. The security of the password is protected by this feature. The packet format of a SMS message in fig. 1, fig. 2 illustrates how a user sends an encrypted

message fig. 3 illustrates how a user receives an encrypted message. In all this communication, the network operator has an access to only the encrypted text. Anyone who has intercepted the traffic, either from the air, or by getting into the network operators network, will also see only the encrypted messages, or cannot get the clear text as what they could do earlier.[10][11][12]

7. Results of the Work

The proposed scheme provides integrity, authentication, and confidentiality of SMS messages by binding a message with a private key possessed only by the mobile phone. It effectively prevents the following attacks previously available on SMS:

A. Identity Impersonation:

The address of the original sender is bound to the private key of the sender. The attacker, not knowing the private key, cannot forge an arbitrary address.

B. Message Forgery and Tampering:

The attacker, not knowing the private key of the sender, cannot tamper the message and generate a correct signature. It's easy to verify the integrity of the message.

C. Message Replay:

Replaying an authentication response could be a more serious vulnerability. If Sequence Number or Timestamp is put in the parameter field in my scheme, these attacks can be prevented or detected.

D. Eavesdropping:

With the proposed scheme, the message is encrypted, and only the sender and receiver know the decryption key. Any attacker will need a great deal of effort if he wants to crack the encryption.

E. Non-repudiation:

The solution to this problem is to trace the route of the message which is protected by access security of mobile networks. The SP should keep a log of traffic between itself and SMS operator, although the SMS operator should always have CDR files of all traffic in a certain period.

8. Conclusions

The paper presents a scheme to build secure channels for messaging services in mobile networks using identity-based cryptography. This scheme provides end-to-end security for both SP-to-user and user-to-user messaging communication. It suggest that this scheme be used by commercial companies and government authorities, who need confidential information transmitted over the air, e.g. banks providing mobile bank service, policemen exchanging data of criminals, etc. Mobile operators might also be interested in this scheme since it can bring more business into mobile telecommunication networks.

References

[1] N. Croft, M. Olivier, "Using an approximated One-Time Pad to Secure Short Messaging Service (SMS)", in Proceedings of the Southern African Telecommunication Networks and Applications Conference (SATNAC), 2005, pp. 71–76.

[2] H. Ratshinanga, J. LO, J. Bishop, "A Security Mechanism for Secure SMS Communication", in South African Institute of Computer Scientists and Information Technologists (SAICSIT), 2004.

[3] K. Chikomo, M. K. Chong, A. Arnab, A. Hutchison (2006), "Security of mobile

banking", University of Cape Town, South Africa, Tech. Rep. [Online]. Available: http://pubs. cs.uct.ac.za/archive/ 00000341/01/Security of Mobile Banking paper.pdf

[4] A. Shamir, "Identity-based cryptosystems and signature schemes", in CRYPTO: Proceedings of Crypto, 1984.

[5] Joan Daemen, Vincent Rijmen, September 1999, AES Proposal: Rijndael, Belgium pp 1-45 csrc.nist.gov/archive/aes/rijndael/Rijndael-ammended.pdf

[6] Rick Smith and Rick Wanner, Mobile encryption, Group discussion and project, CDI east 2006, pp 1-14 www.sans.edu/resources/student_projects/200612_001.pdf.

[7] Eric Olson and Woojin Yu, Encryption for mobile computing, 2003.wrc.eecs.berkeley.edu/classes/cs252/Projects/Reports/yu_olson.pdf

[8] Helger Lipmaa and Shiho Moriai, Efficient Algorithms for Computing Differential Properties of Addition. In Mitsuru Matsui, editor, Fast Software Encryption: 8th International Workshop, FSE 2001, volume 2355 of Lecture Notes in Computer Science, pages 336--350, Yokohama, Japan, April 2--4, 2001. Springer-Verlag.ISBN 3-540-43869-6.

[9] M. Hassinen, SafeSMS - end-to-end encryption for SMS, Proceedings of the 8th International Conference on Telecommunications Volume 2, ConTEL 2005,

ISBN: 953-184-081-4

[10] RSA laboratories, http://www.rsa.com .

[11] MyCrypto, http://www.mycrypto.net .

[12] Wikipedia, http://www.wekipedia.org.

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Digital Watermarking: Implementation of Visible & Invisible Digital Image Watermarking

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Abstract

The advent of the Internet has resulted in many new opportunities for the creation and delivery of content in digital form. Applications include electronic advertising, real-time video and audio delivery digital repositories and libraries, and Web publishing. An important issue that arises in these applications is the protection of the rights of all participants. It has been recognized for some time that current copyright laws are inadequate for dealing with digital data. This has led to an interest towards developing new copy deterrence and protection Mechanisms. One such effort that has been Attracting increasing interest is based on digital Watermarking techniques.

1. INTRODUCTION

Digital watermarking [1] is the process of embedding information into digital multimedia content such that the information (which we call the watermark) can later be extracted or detected for a variety of purposes including copy prevention and control. Digital watermarking has become an active and important area of research, and development and commercialization of watermarking techniques are being deemed essential to help address some of the challenges faced by the rapid proliferation of digital content. In our project, original images will be watermarked digitally and the secured image will be given as output. This will include both visible and invisible watermarks.

2. DIGITAL WATERMARKING

The main objective for developing this application is that, it can provide the user with security of data. The output watermarked image must be **Robust** and should fulfill the following properties:

1) A digital watermark should be perceptually invisible/ visible to prevent obstruction of the original image.

2) Watermarks should be robust to filtering, additive noise, compression, and other forms of image manipulation.

3) The watermark should be able to Determine the true owner of the Images. Digital watermark project aims at both visible and invisible watermarking. Hence, our project will include the following features:

- It will embed any text data into an image without actually changing the content of the carrier file. (invisible)
- It will embed any image into an image without actually changing the content of the carrier file. (invisible)
- It will embed any text into an image without actually changing the content of the carrier file. (visible)
- It will embed any image or logo into an image without actually changing the content of the carrier file. (visible).

3. APPLICATION

Many potential applications exist for digital watermarking. **Artists and photographers**

could Mark their images to secure Ownership rights.

Publishing companies who commercially distribute their images could watermark them to prevent unauthorized distribution. Digimarc Corporation [3] already has a software package that searches the Internet for web pages containing specific watermarks.

Ownership assertion: Watermarks can be used for ownership assertion [7]. To assert ownership of an image, user can generate a watermarking signal and then embed it into the original image. He can then make the watermarked image publicly available. Later, when attacker contends the ownership of an image derived from this public image, user can produce the unmarked original image and also demonstrate the presence of her watermark in attacker's image Since user's original image is unavailable to attacker, he cannot do the same. For such a scheme to work, the watermark has to survive image processing operations aimed at malicious removal. In addition, the watermark should be inserted in such a manner that it cannot be forged as user would not want to be held accountable for an image that she does not own.

Fingerprinting: In applications where multimedia content is electronically distributed over a network, the content owner would like to discourage unauthorized duplication and distribution by embedding a distinct watermark (or a fingerprint) in each copy of the data. If, at a later point in time, unauthorized copies of the data are found, then the origin of the copy can be determined by retrieving the fingerprint. In this application the watermark needs to be invisible and must also be invulnerable to deliberate attempts to forge, remove or invalidate. Furthermore, and unlike the ownership assertion application, the watermark should be resistant to collusion. That is, a group of k users with the same image but containing different fingerprints should not be able to collude and invalidate any fingerprint or create a copy without any fingerprint.

Copy prevention or control: Watermarks can also be used for copy prevention and control. For example, in a closed system where the multimedia content needs special hardware for copying and/or viewing, a digital watermark can be inserted indicating the number of copies that are permitted. Every time a copy is made the watermark can be modified by the hardware and after a point the hardware would not create further copies of the data. An example of such a system is the Digital Versatile Disc (DVD)[3]. In fact, a copy protection mechanism that includes digital watermarking at its core is currently being considered for standardization and second generation DVD players may well include the ability to read watermarks and act based on their presence or absence.Another example is in digital cinema, where information can be embedded as a watermark in every frame or a sequence of frames to help investigators locate the scene of the piracy more quickly and point out weaknesses in security in the movie's distribution. The information could include data such as the name of the theater and the date and time of the screening. The technology would be most useful in fighting a form of piracy that's surprisingly common, i.e., when someone uses a camcorder to record the movie as it's shown in a theater, and then duplicates it onto optical disks or VHS tapes for distribution.

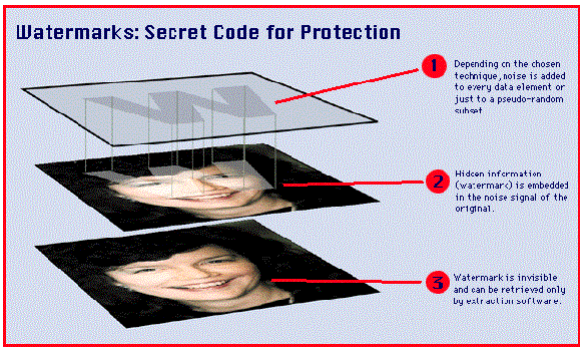
4 IMPLEMENTATION

4.1 VISIBLE WATERMARK

In **visible watermarking**, the information will be visible in the image. Typically, the information is text or a logo which identifies the owner of the media.

4.2 INVISIBLE WATERMARK

In **invisible watermarking**, information is added as digital data but it cannot be perceived as such (although it may be possible to detect that some amount of information is hidden).A watermarking system is of no use if it distorts the cover image to the pointof being useless, or even highly distracting. Ideally the watermarked imaged should look indistinguishable from the original even on the highest quality equipment.



The LSB is the most straight-forward method of watermark embedding. Given the extraordinarily high channel capacity of using the entire cover for transmission in this method, a smaller object may be embedded multiple times. Even if most of these are lost due to attacks, a single surviving watermark would be considered a success.

The LSB technique is the simplest technique of watermark insertion. If we specifically consider still images, each pixel of the color image has three components — red, green and blue.

Let us assume we allocate 3 bytes for each pixel. Then, each color has 1 byte, or 8 bits, in which the intensity of that color can be specified on a scale of 0 to 255.

So a pixel that is bright purple in color would have full intensities of red and blue, but no green. Thus that pixel can be shown as

X0 = {R=255, G=0, B=255}

Now let's have a look at another pixel:

X1 = {R=255, G=0, B=254}

We've changed all the value of B here. But how much of a difference does it make to the human eye? For the eye, detecting a difference of 1 on a color scale of 256 is almost impossible.

Now since each color is stored in a separate byte, the last bit in each byte stores this difference of one. That is, the difference between values 255 and 254, or 127 and 126 is stored in the last bit, called the Least Significant Bit (LSB).

Since this difference does not matter much, when we replace the color intensity

information in the LSB with watermarking information, the image will still look the same to the naked eye. Thus, for every pixel of 3 bytes (24 bits), we can hide 3 bits of watermarking information, in the LSBs.

4.3 ALGORITHM

Steps:

1. Let Wi be the ith bit of watermark.
2. Let Pj be the j th pixel of base image.
3. Lsb converts the lsb of Pj to Wi.

Since only LSBs are converted, the modification does not cause much perceptible noise to the image.

5 Conclusions

As mentioned earlier, the project name "DIGITAL WATERMARKING" was assigned to our team. We conducted depth study of various factor affecting the design of the software. We tried to understand the true meaning and importance of topic assigned to us. Finally we have incorporated our entire prior knowledge of system development in an attempt to make the design efficient and effective as possible. A thorough detailed analysis of the required system has been carried out its scope and advantage has been studied.

7 References

[1] R.Chandramouli, "Digital watermarking" , Hoboken NJ, 07030

[2] ProfEr-Hsien Fu , "Literature Survey on Digital Image Watermarking", EE381K-Multidimensional Signal Processing.

[3] R. C. Carter, "Steganography and Digital Watermarking", Available http://www.digimarc.com

[4] K.R. Ramakrishnan,"A DCT Domain Visible Watermarking Technique for Images".

[5] Dumitru Dan BURDESCU, Liana STANESCU, "A spatial watermarking algorithm for digital images" in CEAI, Vol. 6, No. 3, pp. 57-62, 2004.

[6] Alexander Hasslacher, "Digital Watermarking", EMT-Institut, JKU-Linz, 0056448.

[7] P. Curtis, "Mudding: Social phenomena in text-based virtual realities," Aug.2005,Availablehttp://www.alpvision.com /watermarking.html

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Spam Avoidance Using Fuzzy Logic

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Abstract
Electronic mail is widely used for communication now-a-days hence it is required to make it spam free so that it can be used more effectively. Spam or junk emails are the unwanted bulk emails sent by some local companies and several people by the intention of promoting their products or to spread offensive content. To avoid this many machine learning techniques have been used till the date. Here we emphasis on fuzzy logic that will automatically filter out spam emails based on the textual content and not on fixed set of keywords

Keywords: email,spam,fuzzy logic

1. Introduction

Email spam, also known as junk email is a set of nearly identical messages sent to numerous recipients by email.Clicking on links in junk mails may send users to phishing web sites or sites that are hosting malware. Spam email may also include malware as scripts or other executable file attachments.

Anti Spam techniques

Some of the spam avoidance techniques are email filtering based on the content of the email, DNS-based blackhole lists, greylisting, spamtraps, checksumming systems to detect bulk email, and by putting some sort of cost on the sender via a micropayment. The approach used in this paper uses fuzzy sets to encode various features extracted from an email message and according to some fuzzy rules classify the message as spam or legitimate. Feature extraction not only detects 'spam word' and 'spam phrase', also identifies other aspects of an email such as an empty From/To field which are strong indication of a message being a spam.

2. Existing Techniques

2.1 Greylisting

A mail transfer agent using greylisting will temporarily reject any email from a sender it does not recognize. If the mail is legitimate the originating server will, after a delay, try again and, if sufficient time has elapsed, the email will be accepted.

2.2 Spamtraps

These are usually email addresses that are created to avoid spam. These e-mail address will typically only be published in a location hidden from view used by spammers and no sender would be encouraged to send messages for any legitimate purpose. Hence any e-mail messages sent to this address are immediately considered unsolicited.

2.3 A DNS-based Blackhole List (DNSBL):It is a list of IP addresses published through the Internet Domain Name Service (DNS).These are used to publish the addresses of computers or networks that are linked to spamming.

2.4 Content Based Filtering

SpamAssassin is a computer program used for e-mail spam filtering based on content-matching rules.It uses a variety of spam-detection techniques, that includes DNS-based and fuzzy-checksum-based spam detection, Bayesian filtering, external programs, blacklists and online databases.The program can be integrated with the mail server to automatically filter all mail for a site. It can also be run by individual users on their own mailbox.

Filtering using fuzzy logic is a scalable and easy to update approach. If each email that comes in is used as part of the data pool to make decisions about future emails, spam trends will be detected and adapted to automatically. There is not the large cost of recalculation that would occur with manual maintenance of rules-based filters.

3. Proposed System

3.1 Figure

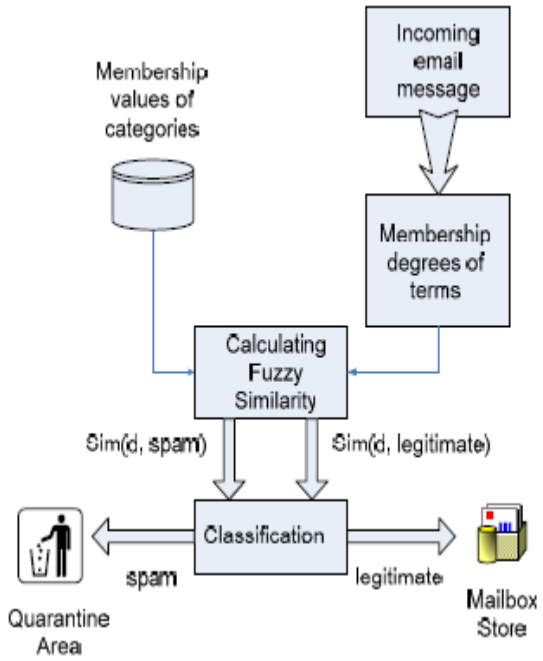

Fig. 1 A Fuzzy Classification Model.

3.2 Algorithm

Step 1:Select email content to be categorized.

Step 2:Remove all HTML tags, stop words , etc.

Step 3:Tokenize message into strings separated by white spaces.

Step 4:Preprocessing

4.1 Convert mixed case to all lower case and all upper case to other form

4.2 Covert words into base form

4.3 Remove tokens occurring less than 3 times.

Step 5:Combine all tokens to one vector and determine number of occurrence of each token in each of spam and legitimate category.

Step 6:Select a training data set and calculate membership value of a token in ti each category c i.e. $\mu_R(ti,cj)$.

Step 7:Calcualte fuzzy similarity between received message d and each category c.

Step 8: Determine memebership degree $\mu_d(ti)$ of each token ti to message d.

Step 9:Determine fuzzy similarity measure SM .

Step 10:Decide λ such that if

$$\frac{SM(d,spam)}{SM(d,legitimate)} > \lambda$$

Then d is spam else it is legitimate.

4. Conclusion

The intention of this paper is to assist in bringing a change in the traditional method of spam filtering.Fuzzy similarity approach classifies the email based on textual content rather than set of fixed key words. Our goal is to replace the standard spam filtering approach by a dynamic classification approach. The traditional method of learning fails when the spammers purposely change the spelling of 'spam identifier keywords',sender's address etc. The fuzzy model can be further improved top dynamically update its knowledge base so that

it can adapt spammers' tactics.A received spam email is preferred over a legitimate mail classified as spam.Hence this approach will try to minimize false positive rate.

References

[1]A Fuzzy Similarity Approach for Automated Spam Filtering
El-Sayed M. El-Alfy
Fares S. Al-Qunaieer

[2] A Fuzzy Clustering Approach to Filter Spam E-Mail
N.T.Mohammad

[3] An Anti-Spam Engine using Fuzzy Logic with Enhanced Performance Tuning"
Vijayan R,Viknesh S T G M ,Subhashini S

[4] A Bayasian Approach to Filtering Junk Email"-Meharan Sahami,Susan Dumais

[5] A Model for Fuzzy Logic Based Machine Learning Approach for Spam Filtering"-
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Web 2.0: Emerging Trends

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Abstract

Web 2.0 technologies have changed the way the Web is used and perceived. Rather than a mechanism to provide information, the web is now interactive and harnessing the wisdom of many through wikis, blogs, and communities. New terms have been coined to explain the new phenomenon; Really Simple Syndication, Podcasting, Wikis, Tagging, Bookmarking, Online Applications and Web Operating Systems are the buzz words of the next generation Web. Companies no longer only use the Web as a tool for information dissemination and marketing but as a way to include the customer base in design, development and support. Web 2.0 is about inclusion, harnessing the collective wisdom to reach new conclusions and optimizing research and learning. Online Web applications and Web based Operating Systems have brought the revolution in Web technology. This paper presents emerging trends of Web 2.0 technologies.

Keywords:*Wiki, Blog, Tag, RSS, Mashup, Folksonomy, Podcast*

1. Introduction

The Web is continuously evolving and changing. Initially, the purpose of Web was to distribute the information over Internet. The information was designed by the specialist having the knowledge of the Web Technology. The foundation of the Web was to be able to disseminate the information. Now publishing information on the Web no longer require programming or Web design skills. Individual having very little knowledge of Web can post their contribution through Wiki's and Blogs. Now we are entering the next generation of the Web – Web 2.0. The term Web 2.0 was coined by Tim O'Reilly at a conference in 2004 and it has become the mechanism to refer to the next generation Web. Rather than just a static repository for data, the Web has become a platform for applications and the enabler for online participation, collaboration, harnessing collective intelligence and more. The key concept is participation, interaction, collaboration and social networking. The Blogging, Mashups, Really Simple Syndication, Podcasting, Wikis, Tagging, Bookmarking, Online Web Applications and Web Operating Systems are the buzz words of the next generation Web.

2. Wikis

A Wiki is a server program that allows users to collaborate in forming the content of a Web site. With a Wiki, any user can edit the site content, including other users' contributions, using a regular Web browser. Basically, a Wiki Web site operates on a principle of collaborative trust. A Wiki allows a visitor to the Web site to edit the content of the site from their own computer. Visitors can also create new content and change the organization of existing content. Wiki supports hyperlinks and has simple text syntax for creating new pages and cross links between internal pages on the fly. More advanced Wikis make it possible to add or change images, tables, and certain interactive components. A Wiki provides a simplified

interface. At any time, contributors can conveniently view the Web page as it looks to other subscribers, before and after the changes they have made. The best known example of a Wiki is Wikipedia Web site, an online dictionary building collaboration. A collaborative Web site comprises the perpetual collective work of many authors. Similar to a blog in structure and logic, a Wiki allows anyone to edit, delete or modify content that has been placed on the Web site using a browser interface, including the work of previous authors. In contrast, a Blog, typically authored by an individual, does not allow visitors to change the original posted material; only add comments to the original content. Allowing everyday users to create and edit any page in a Web site is exciting in that it encourages democratic use of the Web and promotes content composition by nontechnical users.

3. Blogs

Blogging is another facet of Web 2.0. Blog is a short form of the word weblog and the two words are used interchangeably. Blog represent an increasingly quick and popular way to share your thoughts with others without understanding the technicality of publishing. A Blog is a frequently updated online personal journal or diary that is frequently updated and intended for general public consumption. It is a place to express yourself, share your thoughts and your passions. In simple terms a Blog is a Web site where entries are written in chronological order and commonly displayed in reverse chronological order and updated on an ongoing basis. Many Blogs provide commentary or news on a particular subject; others function as more personal online diaries. A typical Blog combines text, images, and links to other Blogs, Web pages, and other media related to its topic. The ability for readers to leave comments in an interactive format is an important part of many Blogs. Blogs generally represent the personality of the author or reflect the purpose of the Web site that hosts the Blog. Topics sometimes include brief philosophical musings, commentary on Internet and other social issues, and links to other sites the author favors, especially those that support a point being made on a post. The author of a Blog is often referred to as a Blogger. Many Blogs syndicate their content to subscribers using RSS, a popular content distribution tool. Blogs have reshaped the Web, impacted politics, shaken up journalism, and enabled millions of people to have a voice and connect with others. A Blog gives you your own voice on the Web. It's a place to collect and share things that you find interesting— whether it's your political commentary, a personal diary, or links to Web sites you want to remember. Many people use a Blog just to organize their own thoughts, while others command influential, worldwide audiences of thousands. Professional and amateur journalists use Blogs to publish breaking news, while personal journalist reveals inner thoughts. Blogging is about more than just putting your thoughts on the Web. It's about connecting with and hearing from anyone who reads your work and cares to respond. The Blogger can control the access to Blogs. The Blogger.com, Wordpress.com, Typepad.com, Livejournal.com, Squarespace.com and Livelogcity.com are some of the very popular blog sites.

4. Really Simple Syndication

Another important feature of Web 2.0 is RSS which stands for "Really Simple Syndication". In fact RSS is a tool often used by news Web sites, and Bloggers to alert users to new postings. It allows users to receive any new content added by a Web site, thus avoiding the necessity of continually visiting sites to check for updates. Notifications of changes to multiple Web sites are handled easily, and the results are presented to you well organized. It is made up of a list of items presented in order from newest to oldest. Each item usually consists of a simple title describing the item along with a more complete description and a link to a Web page with the actual information being described. Sometimes this description is the full information you want to read and sometimes it is just a summary. The RSS information is coded in XML into a single file on a Web site in a manner similar to normal Web pages. The author of the Web site maintains a list of notifications on their Web site in a standard form. This list of notifications is called an "RSS Feed". The RSS aggregator is similar to a web browser for RSS content. RSS aggregators are programs which automatically check a series of RSS feeds for new items on continuous basis, making it is possible to keep track of changes to multiple Web sites without needing to tediously read and re-read each of the websites yourself. RSS aggregators are also sometimes known as "RSS Channels" and "RSS Readers". They detect the additions and present them all together to you in a compact and useful manner. If the title and description of an item are of interest, the link can be used to quickly bring the related Web page up for reading. Producing an RSS feed is very simple and many Web sites now provide this feature, including major news organizations like the New York Times, the BBC, and Reuters, Times of India , Indian Express as well as many Blogs. It is getting more and more common for Web sites to have RSS feeds. They usually indicate the existence of the feed on the home page or main news page with a link to "RSS", or sometimes by displaying an orange button with the letters "XML" or "RSS". There are many RSS aggregators available. Some are accessed through a browser, some are integrated into email programs, and some run as a standalone application on your personal computer.

5. Mashup

Another interesting feature of Web 2.0 is Mashup. Basically Mashup are defined as Web pages or application that take data from more than one online source and combine it to create new hybrid services unintended by original content owners. In terms of technology, a Mashup is a Web application that combines data from more than one source into a single integrated tool. An example is the use of cartographic data from Google Maps to add location information to real-estate data from Craigslist, thereby creating a new and distinct Web service that was not originally provided by either source. Content used in Mashups is typically sourced from a third party via a public interface or API. Other methods of sourcing content for Mashups include Web feeds (e.g. RSS or Atom), Web services and screen scraping. Many people are experimenting with Mashups using Amazon, eBay, Flickr, Google, Microsoft, and Yahoo APIs, which has led to the creation of the Mashup editor.

6. Bookmarks

Bookmarks are links to your favorite Web sites. Bookmarks are an online service that lets you save links to your favorite Web sites and access them from any computer anywhere in the world. Favorite Bookmarks can be described, tagged, collaboratively shared, and searched for by others. Basically tags are keywords or labels that you can add to the bookmarks you save to help organize them. Instead of organizing bookmarks in the traditional single file folder structure, you can "Tag" a Bookmark with several labels. Tagging is a new way to organize information. Tags can eliminate the need to remember where you saved a bookmark within a hierarchy of folders and subfolders. You can give a Bookmark several tags and search Bookmarks by any tag you remember to view Bookmarks labeled with that tag. A Bookmark can have a multiple number of Tags, so Tag to your heart's content. The Bookmarks can be searched based on title, tag cloud or notes. The most popular bookmarking services are currently available on http://del.icio.us & http://ikeepbookmarks.com. The Google and Yahoo are another two very important Web sites offer the facility of bookmarks on their Web sites.

7. Tagging

Until recently, the folder concept was most commonly used as a way of grouping and organizing digital data, but the folder concept has its limitations. The most significant limitation of folders, especially for digital photo organization, is that an item can only be in a single folder at a time without duplicating that item. Tagging represents a significant shift in the way digital data is sorted, saved, searched, and shared at the moment. Tagging has been around for a few years. On the Web it is being used to categorize Web pages through social bookmarking sites such as Del.icio.us, Technorati, and others. Basically Tags are keywords that describe the content of a Web site, Bookmark, and Photo or Blog post. You can assign multiple Tags to same online resource and different people can assign different Tags to the same resource. Tag enabled Web services include Bookmarking Web sites like Stumbleupon, Del.icio.us , photo sharing Web sites like Flickr and Jumpcut and Blog tracking sites like Technorati. Tags provide a useful way of organizing retrieving and discovering information. A Tag cloud is a visual depiction of content Tags used on a Web Site. Tags are typically listed alphabetically, and Tag frequency is shown with font size or color. Thus finding a Tag by alphabet and by popularity is possible. The Tags are usually hyperlinks that lead to a collection of items that are associated with that Tag.

8. Podcasts

A Podcast is a digital media file, or a related collection of such files, which is distributed over the Internet using syndication feeds for playback on portable media players and personal computers. Podcasts are audio distributed in MP3 format using RSS technology. The host or author of a Podcast is often called a Podcaster. The Apple iPod being the brand of portable media player for which the first Podcasting scripts were developed. These scripts allow podcasts to be automatically transferred to a mobile device after they are downloaded. Though Podcaster’s Web sites may also offer direct download or streaming of their content, a

Podcast is distinguished from other digital media formats by its ability to be syndicated, subscribed to, and downloaded automatically when new content is added, using an aggregator or feed reader capable of reading feed formats such as RSS or Atom. For example an on line publisher produces audio content in the form of an mp3 file and mp3 file is referenced as an enclosure in those publishers RSS feed. People who want to listen to that content subscribe to that RSS feed using a program called iPodder. The iPodder automatically downloads the mp3 file when it's published and automatically loads the mp3 file into iTunes, an Apples digital music player. Finally iTunes automatically loads the mp3 file onto the listener's iPod portable music player. The entire procedure is termed as Podcasting.

9. Folksonomy

Folksonomy is the practice and method of collaboratively creating and managing tags to annotate and categorize content. It is also known as collaborative tagging, social classification, social indexing, and social tagging. Folksonomic tagging is intended to make a body of information increasingly easy to search, discover, and navigate over time. A well developed Folksonomy is ideally accessible as a shared vocabulary that is both originated by, and familiar to, its primary users. Folksonomy creation and searching tools are not part of the underlying World Wide Web protocols. Folksonomies arise in Web based communities where provisions are made at the site level for creating and using tags. These communities are established to enable Web users to label and share user generated content, such as photographs, or to collaboratively label existing content, such as Web sites, books, works in the scientific and scholarly literatures, and Blog entries. A visual representation of a Folksonomy is the tag cloud – a sequence of words of different sizes that represent popular tags by showing them in a larger font type. Tag clouds can be constrained in different ways: for example, anyone who tags will accumulate a personal tag cloud that reflects how frequently they use any given tag. A community can create a tag cloud describing its interests by merging the personal tag clouds of its members. Top level tag clouds are created by sites like Del.icio.us when they compile tag clouds showing their most popular tags in any given time period, such as the previous week, in a glance. Tagging is exemplified by the social bookmarking service Del.icio.us. Del.icio.us lets you tag any Web page you visit with relevant words to describe its content. Anyone can view Web pages corresponding to a specific tag or view which tags a given page has received. This tagging concept is synonymous with the phrase metadata and has been discussed for decades, but has never really caught on until the advent of Del.icio.us. The tagging service Technorati lets users do the same thing with Blog posts. Because these are supplied by the poster rather than unbiased visitors, Technorati tags don't always accurately reflect the content of the post, but 99.9% of the time, they do. Technorati tags are extremely popular, and today a substantial portion of all Bloggers use them.

10. Online Web Applications

Online Web applications are new phenomena on Internet. The user is required to have only Web browser on their computers. The development of such applications could be possible due to the evolution of robust web programming languages and tools. Google Docs is a hosted service where you can create, store and share documents. You can work on your own or collaboratively. You can also import docs from MS Office and Open Office. Google Docs is an easy-to-use online word processor, spreadsheet and presentation editor that enables you and your students to create,

store and share instantly and securely, and collaborate online in real time. You can create new documents from scratch or upload existing documents, spreadsheets and presentations. There's no software to download, and all your work is stored safely online and can be accessed from any computer. The following picture is showing the Zoho Writer an online word processor. It also includes documents, spreadsheets, and presentations can be created within the application itself, imported through the Web interface, or sent via email. They can also be saved to the user's computer in a variety of formats. By default, they are saved to Google's servers. Open documents are automatically saved to prevent data loss. Documents can be tagged and archived for organizational purposes. Collaboration between users is also a feature of Google Docs. Documents can be shared, opened, and edited by multiple users at the same time. Zoho is another fascinating Web site which offers host of online applications free of cost through Web browser. The applications offered are word processor, presentation tool, spreadsheet, web conferencing, project management, customer relation management tool, note taker, organizing tool, instant messaging, web application creator, and wiki with public, private and group permissions.

11. Online Desktops

Desktoptwo is a free Web based desktop or WebTop that mimics the look, feel and functionality of a desktop environment of an operating system, all contained within browser window and fully accessible from any Internet. Desktoptwo is fully Web based and requires Flash player to operate and it has been developed using PHP language. Think of Desktoptwo as your free mobile computer on the Internet with all of your personal information, programs and applications in one easy-to-use, feature-rich location and, because all you need is a Web browser to access your account, even the simplest Web device can become your personal space. Desktoptwo belongs to a category of services that intend to turn the Web into a full-fledged platform by using Web services as a foundation along with display technologies that replicate the experience of desktop applications for users. The following picture is showing the online desktop of Desktoptwo site. In a "Cloud OS" which is essentially a Service-oriented architecture, the functionality of a server is granularized and abstracted as Web services that Web developers can use to create composite applications similar to how desktop software developers use several APIs of the OS to create their applications. At present Desktoptwo provides File sharing, Webmail, Blog editor, Website editor, Instant Messenger, Calendar, Notepad, Message boards, Disk space, Address Book, MP3 Player, RSS Reader, Office productivity applications and Online document collaboration. Desktoptwo is a free Web based desktop or WebTop that mimics the look, feel and functionality of a desktop environment of an operating system, all contained within browser window and fully accessible from any Internet. Desktoptwo is fully Web based and requires Flash player to operate and it has been developed using PHP language. Think of Desktoptwo as your free mobile computer on the Internet with all of your personal information, programs and applications in one easy-to-use, feature-rich location and, because all you need is a Web browser to access your account, even the simplest Web device can become your personal space. Desktoptwo

belongs to a category of services that intend to turn the Web into a full-fledged platform by using Web services as a foundation along with display technologies that replicate the experience of desktop applications for users. The following picture is showing the online desktop of Desktoptwo site. In a "Cloud OS" which is essentially a Service-oriented architecture, the functionality of a server is granularized and abstracted as Web services that Web developers can use to create composite applications similar to how desktop software developers use several APIs of the OS to create their applications. At present Desktoptwo provides File sharing, Webmail, Blog editor, Website editor, Instant Messenger, Calendar, Notepad, Message boards, Disk space, Address Book, MP3 Player, RSS Reader, Office productivity applications and Online document collaboration.

12. Conclusion

The Web is not a destination anymore for browsing the static Web sites for information. Web sites have been evolving continuously. With evolution of robust programming languages the Web has taken over the job of other Internet services such as Email, Chat and File Transfer. The e-Business, e-Learning and e-Governance have made the impact on society. Now users have the opportunity to interact in infinite ways, participate and interact with other users in a far more interactive manner than previous. The participation of users has increased significantly through Web sites such as Youtube, Flickr and Blogger. The collaboration of contents through Wiki's and interaction through social networking sites such as Orkut, Myspace and Facebook sites has increased to highest level. The distributed convergence of information allows users to actively personalize, create, view, remix, absorb and redistribute media from a range of locations and to suit their recreational and informational needs. Online services under the Web 2.0 umbrella will increasingly impact on the online environment as we incorporate them into our professional and personal lives.

References

[1] Gottified Vossen, Stephen Haqemann, "Web 2.0: From Concepts to Creativity", (Morgan Kaufmann, 2007).

[2] Gwen Solomon, Lynne Schrum, "Web 2.0: New Tools, New Schools", (ITSE, 2007).

[3] http://www.flickr.com

[4] http://www.jumcut.com

[5] http://www.esnips.com

[6] http://www.youtube.com

[7] http://www.facebook.com

[8] http://www.myspace.com

[9] http://www.orkut.com

[10] http://del.icio.us

[11] http://www.stumbleupon.com

[12] http://digg.com

[13] http://www.technorati.com

[14] http://www.blogger.com

[15] http://www.worpress.com

[16] http://www.typepad.com

[17] http://www.livejournal.com

[18] http://www.squarespace.com

[19] http://www.livelogcity.com

[20] http://www.wikipedia.com

[21] http://www.thinkfree.com

[22] http://www.ajax13.com

[23] http://www.vozme.com

[24] http://www.weebly.com

[25] http://www.google.com

[26] http://www.zoho.com

[27] http://www.desktoptwo.com

[28] http://www.pandora.com

[29] http://www.musicport.com

[30]http://www.rss-specifications.com

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Automated FTP

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Abstract

This report will give a clear overview of the File Transfer Protocol (FTP) along with the Secure File Transfer Protocol (SFTP). These protocols used for transferring files have several weaknesses. The software going to be developed by us would resolve erroneous file transfers and would keep up with the growing need for smaller bandwidth. The need for smaller bandwidth is especially important today because of the ever growing number of mobile devices.The project developd by us will be programmed using c#.net technology, and email support will be provided by Gmail only. Gmail provides us with POP and IMAP services which are more convenient to use incomparison to other mail providers.

1. Introduction

The File Transfer Protocol (FTP) is a protocol used to send files between different computers and platforms. The protocol is open to all companies and developers for free, which makes it very widely deployed, used, and well known. The FTP protocol allows an FTP server and an FTP client to send files to each other. All commands are issued by the FTP client to the FTP server. The official specification of FTP is given in RFC 959 which was created in October 1985. The first mention of FTP was given in April 1971.

FTP defines 30 or so commands that can be used by the connecting FTP client. These commands cover authorization, obtaining lists of files on a server, navigating through the directory structure of a server, downloading files, uploading files, deleting files and directories, and several other options and queries.

2. Description

2.1 LITERATURE SURVEYED

File Transfer has become commonplace in today's world. But there are some negative effects of transferring file manually. The file being transferred can get misplaced because of human limitations. Also process of transferring files manually is very tedious. It takes a lot of time andeffort. Instead transferring files automatically saves that much time and effort. It is also a lot more safer than manual transmission of files.

Classification accuracy above 97% and low false positive rates are achieved in many test cases.Automated FTP makes use of Artificial Intelligence to search files automatically.The system will receive an email from the particular sender who wants a file from the system then the system will search the particular file in the hard drive if it has the file then it will send the system will send the file else it wont.

2.2 ANALYSIS

File Transfer has become an area of interest for people . But one of the greatest hurdles in the transfer of files is the speed of transfer. Another obstacle in the path of file transfer is that one has to manually search the particular file to be transferred which is a tedious process. Automated FTP is designed to solve both these problems.

First it is designed in such a way that the system will automatically search the requested file and give it to the device which is

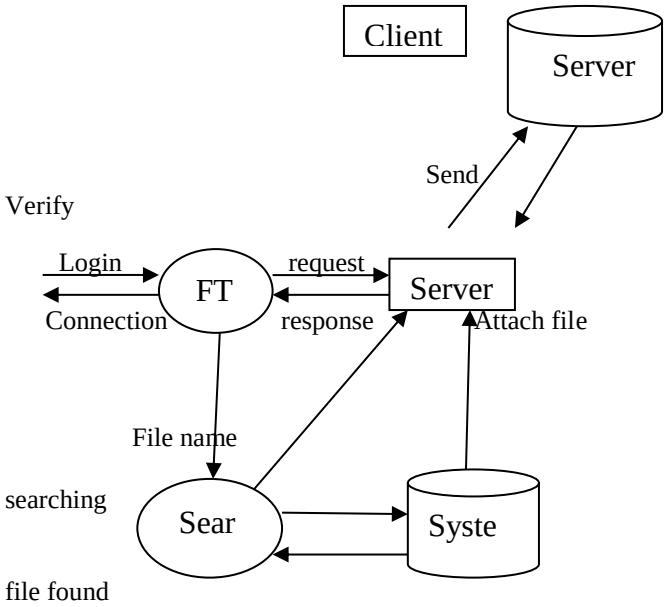
requesting the file. This saves the overhead of searching the file manually.Gmail is another feature of Automated FTP which helps in automatically searching the file. This method considers the content of the message to predict its category rather than relying on a fixed pre specified set of keywords.The concept of Artificial Intelligence is also exploited to a great extent in Automated FTP. SHM algorithm has been used in the implementation this project.

It has been built using c# and SQL.

Simulation results done in c# show that the proposed system gives higher accuracy and a very low false positive rate.

3. Tables, Figures and Algorithms

3.1 PROPOSED SYSTEM



1. Data flow diagram

3.2 SHA Algorithm

Step 1: Append Padding Bits

Message is “padded” with a 1 and as many 0’s as necessary to bring the message length to 64 bits fewer thanan even multiple of 512.

Step 2:Append Length

64 bits are appended to the end of the padded message. These bits hold the binary format of 64 bits indicating the length of the original message.

Step 3: Prepare Processing Functions

SHA1 requires 80 processing functions defined as:

f(t;B,C,D) = (B AND C) OR ((NOT B) AND D) (0 <= t <= 19)

f(t;B,C,D) = B XOR C XOR D

(20 <= t <= 39)

f(t;B,C,D) = (B AND C) OR (B AND D) OR (C AND D) (40 <= t <=59)

f(t;B,C,D) = B XOR C XOR D (60 <= t <= 79)

Step 4:Prepare Processing Constants

SHA1 requires 80 processing constant words defined as:

K(t) = 0x5A827999

(0<= t <= 19)

K(t) = 0x6ED9EBA1

(20 <= t <= 39)

K(t) = 0x8F1BBCDC

(40 <= t <= 59)

K(t) = 0xCA62C1D6

(60 <= t <= 79)

Step 5:**Initialize Buffer**

SHA1 requires 160 bits or 5 buffers of words (32 bits):

H0 = 0x67452301

H1 = 0xEFCDAB89

H2 = 0x98BADCFE

H3 = 0x10325476

H4 = 0xC3D2E1F0

Step 6: Pseudo Code

For loop on k = 1 to L

(W(0),W(1),...,W(15)) = M[k] */* Divide M[k] into 16 words */*

For t = 16 to 79 do:

W(t) = (W(t-3) XOR W(t-8) XOR W(t-14) XOR W(t-16)) <<< 1

A = H0, B = H1, C = H2, D = H3, E = H4

For t = 0 to 79 do:

TEMP = A<<<5 + f(t;B,C,D) + E + W(t) + K(t) E = D, D = C,

C = B<<<30, B = A, A = TEMP

End of for loop

H0 = H0 + A, H1 = H1 + B, H2 = H2 + C, H3 = H3 + D, H4 = H4 + E

End of for loop

Output:

H0, H1, H2, H3, H4, H5: Word buffers with final message digest

$\mu_R(ti,cj)$.

4. Conclusion

This project covers ways to reduce bandwidth, save money, search, allow mobile devices to synchronize faster, accomplish faster downloads, and verify data integrity in seconds. All the methods discussed are extremely easy to add to existing FTP servers and FTP clients. This new version of FTP presents no threat to the standard FTP protocol. It simply adds additional functionality that is there if needed. Any one of the additions would be more than enough to convince a company to extend its FTP capabilities.

References

[1]Network Working Group J. Postel

[2]Request for Comments: 959
J. Reynolds

[3]Obsoletes RFC: 765 (IEN 149)
October 1985

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Intranet Video Broadcasting

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Abstract

Intranet video broadcasting specially developed for communicate with LAN connected machine. In this application we can do text chat, transfer files, broadcast webcam captured video and microphone captured voice, broadcast Audio – Video files. For this application we have used socket, UDP and TCP programming.

Keywords*: User Datagram Protocol,Transmission Control Protocol***.**

1. INTRODUCTION

An intranet is a private computer network that uses Internet protocols and network connectivity to securely share any part of an organization's information or operational systems with its employees.Sometimes the term refers only to the organization's internal website, but often it is a more extensive part of the organization's computer infrastructure and private websites are an important component and focal point of internal communication and collaboration.An intranet is built from the same conceptand technologies used for the Internet, such as clients and servers running on the InternetSuite (TCP/IP). Any of the well known Internet protocols may be found in an intranet, such as HTTP(web services),
SMTP (email), and FTP (filetransfer).Intranets differ from extranets in

that the former are generally restricted to employees of the organization while extranets may also be accessed by customers, suppliers, or other approved parties.Intranets are being used to deliver tools and applications, e.g., collaboration (to
facilitateworking in groups and teleconferencing) or sophisticated corporate directories, sales and Customer relationship management tools, project management etc., to advance productivity.Intranets are also being used as corporate culture-change platforms. For example, large numbers of employees discussing key issues in an intranet forum application could lead to new ideas in management, productivity, quality, and other corporate issue.

2. LITERATURE SURVEYED

To get the idea of how intranet video broadcasting can be useful in various processes of broadcasting we began searching papers related to intranet We came across apaper titled “Robust Video Broadcasting over 802.11a/gin Time-Correlated Fading Channels”.and”An Improved UDP Protocol for Video Transmission Over Internet-to-Wireless Networks”

This paper proposed to enrich the broadcasting specially developed for communication with LAN connected machine. In this Intranet application we can do text chat, Audio, Video broadcasting and also receive from one to many over LAN. For this application we have used socket, UDP and TCP programming.
we are trying to develop server based application which would include following objectives:

1. The basic file transfer feature

Computers which provide a file transfer service are called file servers. Depending on the client’s perspective, client can accept or reject the request which comes from server side. If the request the client accepts the request, he can save the file in his drive and can view it at his leisure.

2. Multimedia data transfer

It is software made to broadcast videos from one computer to another through LAN.The files can be either audio or video.The broadcasting of videos is done through LAN's IP address.

3. Text chatting

Text chattingrefers to any kind of communication over the Intranet, that offers a real-time direct transmission of text-based messages from sender to receiver, hence the delay for visual access to the sent message won't hamper the flow of communications in any of the directions. There is a select file option which helps to select a particular file.

4. Send Web Cam and Receive Web Cam

Webcams take personal computer communications to the next level. Video conferencing and video chat programs enable real-time and face to face personal interaction to be possible on LAN network.

3. OVERVIEW OF TCP AND UDP PROTOCOL

User Datagram Protocol or UDP is part of the Internet Protocol suite, using which, programs running on different computers on a network can send short messages known as Datagram's to one another. UDP can be used in networks where TCP is traditionally used, but unlike TCP, it does not guarantee reliability or the right sequencing of data. Datagram's may go missing without notice, or arrive in a different order from the one in which they were sent.Though these factors might seem to suggest that UDP is not a useful protocol, it still finds good use in particular areas where speed, more than reliability, is of utmost importance. Since UDP does not have the overhead of checking whether the data has reached the destination every time it is sent, it makes the protocol that much faster and more efficient. UDP is often used for time-sensitive applications where missing data is preferred to late-arriving data.UDP is a stateless protocol which is useful for servers engaged in answering short queries from a large number of clients. While TCP is mainly used for communication between a server and a single client, UDP is used for packet broadcast or multicasting whereby the data is sent to all the clients in the network.Since UDP lacks any kind of mechanism to control or avoid network congestion, other forms of network-based control mechanisms need to be implemented to ensure smooth flow of traffic in a UDP network. One of the solutions being designed to tackle this problem is DCCP or Datagram Congestion Control Protocol which is aimed at monitoring and controlling traffic congestion in a UDP network.

A typical IP network consists of five layers:

1. The Physical Layer consisting of the actual channel for data flow like coaxial, twisted pair or fiber optic cables
2. The Data Link Layer implementing Wi-Fi, ISDN, GPRS etc
3. The Network / Internet Layer
4. Transport Layer implementing TCP, UDP etc
5. Application Layer running DNS, FTP, HTTP, POP3, SMTP, Telnet etc

As shown above, UDP belongs to the fourth layer. Although the entire amount of UDP traffic in a network is a small fraction of the whole, a number of key application in the fifth layer like DNS and SNMP or simple network management protocol use UDP.

TCP/IP is the most important internetworking protocol suite in the world it is the basis for the Internet, and the "language" spoken by the vast majority of the world's networked computers. TCP/IP includes a large set of protocols that operate at the network layer and above. The suite as a whole is anchored at layer three by the Internet Protocol (IP), which many people consider the single most important protocol in the world of networking.Of course, there's a bit of *architectural distance* between the network layer and the applications that run at the layers well above. While IP is the protocol that performs the bulk of the functions needed to make an internet work, it does not include

many capabilities that are needed by applications. In TCP/IP these tasks are performed by a pair of protocols that operate at the transport layer: the *Transmission Control Protocol (TCP)* and the *User Datagram Protocol (UDP)*.Of these two, TCP gets by far the most attention. It is the transport layer protocol that is most often associated with TCP/IP, and, well, its name is right there, "up in lights". It is also the transport protocol used for many of the Internet's most popular applications, while UDP gets second billing. However, TCP and UDP are really peers that play the same role in TCP/IP. They function very differently and provide different benefits and drawbacks to the applications that use them, which makes them both important to the protocol suite as a whole. The two protocols also have certain areas of similarity, which makes it most efficient that I describe them in the same overall section, highlighting where they share characteristics and methods of operation, as well as where they diverge.In this section I provide a detailed examination of the two TCP/IP transport layer protocols: the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP). I begin with a quick overview of the role of these two protocols in the TCP/IP protocol suite, and a discussion of why they are both important. I describe the method that both protocols employ for addressing, using transport-layer ports and sockets. I then have two detailed sections for each of UDP and TCP. I conclude with a summary quick-glance comparison of the two.Incidentally, I describe UDP before TCP for a simple reason: it is simpler. UDP operates more like a classical message-based protocol, and in fact is more similar to IP itself than is TCP. This is the same reason why the section on TCP is much larger than that covering UDP: TCP much more complex and does a great deal more than UDP.

4. STREAMING

A technique for transferring data such that it can be processed as a steady and continuous stream. Streaming technologies are becoming increasingly important with the growth of the Internet and LAN based systems because most users do not have fast enough access to download large multimedia files quickly and it will take a lot of time to download these files. With streaming you can directly play the files. For streaming to work, the client side receiving the data must be able to collect the data and send it as a steady stream to the application that is processing the data and converting it to sound or pictures. This means that if the streaming client receives the data more quickly than required, it needs to save the excess data in a buffer. If the data doesn't come quickly enough, however, the presentation of the data will not be smooth.

5. CONCLUSION

The intention of this paper is to assist in bringing achange in the traditional method of serverless method of intranet broadcasting . Our goal is to replace the serverless communication with server orinented communication so that unwanted communication with friends in office environment reduce and paper notice from higher authority is not needed as communication is server oriented .

REFERENCES

[1] Intranet[online].Available at:http://en.wikipedia.org/wiki

[2] Haratcherev et al., "Optimized Video Streaming over 802.11 by cross-layer signaling", *IEEE Communications Magazine*, Jan 2006.

[3] Sgardoni, P. Ferré, A. Doufexi, A. Nix and D. Bull, "Frame Delay and Loss Analysis for Video Transmission over timecorrelated 802.11a/g channels", *IEEE Conf.PIMRC'07*, pp.1-5,Sept. 2007.

[4] K. Buchanan, R. Fudge, D. Mcfarlane, T. Phillps, A. Sasaki, and H.Xia,"IMT-2000: Service provider's perspective," IEEE personal communications,Aug. 1997.

[5] R. Pandya, D. Grillo, E. Lycksell, P. Meiybegue, H. Okinaka, and M.Yabusaki, "IMT-2000 standard: Network aspects," IEEE personal communication,Aug. 1997.

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Automated Vehicle System

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Abstract

Auto Vehicle System is a new information system for automobile drivers to solve problems caused by automobiles and road traffic. It is based on the concept of info-mobility. Auto Vehicle System deals with four fields: information systems for a single vehicle, for inter-vehicles and for vehicle-to-road relations, and studies on vehicle-to-driver relations. The system candidates include: a cooperative driving system, a control configured vehicle system, an active driver assistance system, an intelligent infrastructure, intelligent logistics, and machine vision; however, SSVS focuses mainly on advanced vehicle control systems (AVCS). The effects of SSVS on the safety of automobile traffic are also evaluated

Keywords*:* info-mobility, information systems, machine vision, intelligent logistics, AVCS

Tech :Visual Studio.

1. Introduction

Automated Vehicle Guidance (AVG) systems are systems in which driving tasks of a driver are taken over partly or entirely by an automated system. Many different configurations of AVG systems have been proposed in the literature. The proposed configurations range from Adaptive Cruise Control (ACC) systems which maintain a vehicle's speed while keeping a safe distance to a predecessor, to fully automated car-driving systems (hands, feet, and brain off) which are able to communicate with other vehicles as well as the road-side systems.

The reported benefits of AVG systems involve improvements of the road traffic performance, safety enhancements and increased driver and passenger comfort. The road traffic performance improvements mainly follow from the possible shorter distance in time and space between two vehicles with AVG capabilities. A promising concept of organizing AVG vehicles is platooning. A platoon is a group of vehicles which can safely drive with (very) short intra-platoon distances and with (very) large inter-platoon distances at high speed. The safety is enhanced by the homogeneous automated systems which are able to coordinate movements much better than human drivers and from the small intra-platoon distances and the large inter-platoon distance. The small intra-platoon distance ensures that collision of vehicles within a platoon will occur with small relative speed differences. The large inter-platoon distance ensures that the platoons will come to a stop before they collide. See Shladover (1991) for clear discussion of this subject. The increased driver and passenger comfort follows from the reduction of the driving task of the driver and from the possibility of a more stable traffic flow (less accelerating and decelerating of vehicles) due to the increased homogeneity among the vehicles.

Worldwide, the research efforts for AVG systems is considerable. A subdivision of the research efforts can be made in the technical research of the AVG systems themselves and the research efforts which focus on assessing the impact of the AVG systems. The main objective of the latter research direction is the identification and formulation of concepts for

AVG systems, the introduction of these systems, and the determination of the likely (dis)benefits of AVG systems.

This report will be devoted to assessing the impact of AVG systems. Especially, the traffic effects of the interaction of automated and manually driven vehicles will attain attention. This aspect was identified in many studies on the impact of AVG systems as a crucial element for the success of AVG systems. The studies mention that this interaction determines whether the increased theoretical capacity can be obtained in reality. Since these studies also report a limited knowledge of this interaction, this study is aimed at the investigation and the collection of the reported knowledge on this subject in the literature. The most important traffic effects of transportation systems with AVG systems are the achievable (lane) capacity and safety.

2. Literature Survey

The three development stages of AVG systems

In this chapter we describe the distinguished evolutionary steps. It should be noted that the subdivision is a global chronological development path of AVG systems. This path is mainly defined for presentational purposes. They should not be interpreted as our view on the three steps in the evolution of AVG systems**.**

2.1 Stage 1: Early AVG in Mixed Traffic

This stage consists of the introduction and use of systems that can support or take over certain driving tasks. An example of such system is the previously mentioned ACC. ACC is capable to control speed and headway. In this stage ACC is a system with no communication or intervention from the roadside systems. At this stage, no dedicated roads are assigned to AVG vehicles and these vehicles mix with non-AVG vehicles on existing roads. The driver is responsible for controlling the vehicle. AVG functions are enabled and disabled by the driver. Apart from the longitudinal driving support (i.e.breaking and accelerating), lateral control (i.e. steering) may also be offered by the early AVG systems. Stage 1 within the AVG developments could be reached within a few years. The PROMETHEUS program has demonstrated a wide variety of AVG systems in 1992. The CHAUFFEUR program focuses at automated platooning of initially two trucks with the use of existing techniques and solutions. Another demonstration of the state-of-the-art of AVG systems on standard roads is planned in the summer of 1998 in The Netherlands.

2.2 Stage 2: Introduction of AVG lanes

This stage discerns from the previous stage by the dedication of infrastructure to AVG vehicles. This infrastructure will mainly involve a lane for exclusive use by vehicles with a sufficient level of automation. Since the vehicles on these lanes can be regarded as homogenous by the minimum standards on automation, traveling can be assured to be safe, fast and comfortable. For maximum use of the dedicated lanes, the level of automation should be sufficiently large, such that more driving tasks are taken over or supported. The driver may be obliged to switch on the AVG functions while driving on the dedicated lanes due to both safety as well as capacity considerations. The infrastructure is equipped with basic, non-communicative functions. For example, this equipment can consist of special marks for lateral control.

2.3 Stage 3: intelligent AVG infrastructure

This stage discerns from the previous stages by the equipment of the infrastructure with intelligent, communicative systems. This equipment allows for vehicle-road communication. Another major development within this step is the expansion of the dedicated lanes to a network of special AVG roads. The control of AVG vehicles is now very advanced. Driving tasks could be taken over completely by the AVG functions. Research corresponding to this stage of AVG development mainly involves the work in the United States by the National Automated Highway Systems Consortium (NAHSC) and in Japan by the Advanced Cruise Assist Highway System Research Association (ASHRA). In Japan working prototypes of the AHS concept were developed and a first demonstration was given in Japan in 1996. The research supervised by the NAHSC should result in the specification of an automated highway in 2002. A demonstration of the technical feasibility of an automated highway in the USA was held in 1997.

2.4 Stage 4: AVG in Mixed Traffic

The AVG systems which are investigated in this stage can be described as follows:

1) Informative AVG system: the driver is informed about the distance and speed (changes) of its predecessor. The driver performs all driving tasks. A Collision Warning System (CWS) is considered to be an informative AVG system. CWS warns when the headway falls below a certain threshold for a given criterion.

2) Autonomous Cruise Control: ACC is able to control speed and headway. The driver is responsible for lateral control and emergency detection and braking.

3)Cruise Control: based on inter-vehicle communication. The functions of the system and the driver are identical to ACC. Cruise Control with inter-vehicle communication is likely to be capable to maintain shorter headway's and maybe be able to support platooning.

The research on AVG systems in this stage is much more homogeneous than the research on the other two stages. This is not surprising, since less aspects can be subject to changes by the introduced AVG systems. Most authors report an improvement of the maximal throughput with several percentages. Several authors also reported a degradation in the maximal throughput if the target headway was set only slightly higher.

3. Sensors

Autonomous Vehicle Systems develops advanced sensor systems for use in autonomous vehicles.

Our sensor systems work in various ranges of electromagnetic spectrum to provide the "eyes" and "ears" for autonomous ground vehicles. We also develop a modular software system that allows sensors to be added or removed as the customer or mission requires.
Some of the sensor systems we utilize:

3.1 Vision

We have teamed with one of our partners to develop a high speed parallel processing system for adaptive vision processing. This system provides vision processing at speeds only recently available.

3.2 RADAR

Recent developments in mm-wave RADAR scanning will make this a promising technology in the near future for collision avoidance, especially when the environment is obscured with smoke, dust, and weather.

3.3 LADAR/LIDAR

LAser **D**etection **A**nd **R**anging
or **LI**ght **D**etection **A**nd **R** anging utilizes laser light to detect the distance to objects similar to a RADAR system.

3.4 Vehicle Sensors

Other sensors attached to the vehicle are also used to provide feedback as to the vehicle state or health. Traditionally these sensors are the same as would be located on a driver console or dashboard. Odometer, engine temperature, oil pressure, battery & fuel levels are just some of the information we monitor.

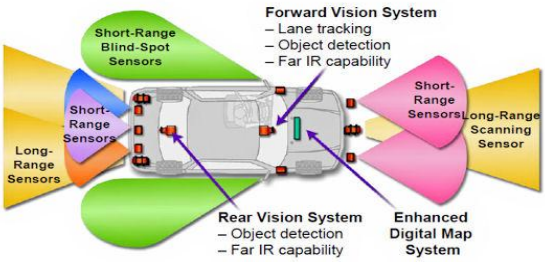

Fig. 1 Various sensors available

4. Automatic Distance Control (ADC)

ADC automatic distance control helps to avoid accidents by always keeping your car at a safe distance from the traffic ahead.Working together with the radar-controlled Front Assist traffic monitoring system, our cruise control system with automatic distance control keeps you a safe distance from the vehicle in front and that makes driving much easier in slow and stop and go traffic. It means you'll be more relaxed and comfortable on long journeys, knowing you have an extra helping hand.

You pre-set the speed range which you want the Adaptive Cruise Control to brake and accelerate the car within - you can restrict your car's speed to the limit of the road you're on, for example. The system builds on the familiar cruise control system by adding a radar sensor. It immediately detects traffic slowing ahead and automatically reduces your speed to match. If you are driving too close to the car in front, it will warn you in two stages. First, with visual and acoustic signals, and then with a short braking jolt. If necessary, the system will bring your car to a complete stop. It does this with the help of the Front Assist system which primes the brakes if it senses a collision is likely, shortening the stopping distance when the driver hits the brake pedal.

5. How it works

The system's radar sensor has a range of up to 200 metres and a beam angle of 12 degrees. The radar sensor and control unit are combined into a single unit which is located - on the Passat, for example - behind the Volkswagen badge in the radiator grille.

Using the signals from the radar sensor, the control unit computes the distance to the vehicle ahead and your car's speed relative to it. It also works out its lateral position on multi-lane roads. If there are several vehicles within the sensor's field of coverage at the same time, this information is used to select which of the vehicles the system should track. The radar sensor is not capable of detecting stationary obstructions, such as the end of a tailback or crash barriers, however.If approaching a slower vehicle ahead or if another vehicle cuts in front of you, the automatic distance control slows down the car by initiating corrective controls in the engine management and, if necessary, in the braking system too. If the required rate of deceleration exceeds 30% of the vehicle's maximum stopping power, visual and audible warning

signals will prompt the driver to apply the brakes manually

6. Conclusion

An Automated vehicle system focused on information fusion is designed and implemented using .net. It is based on three utilities i.e comfort, time and distance . It works in both partially and fully observable environment. It is totally based on Artificial Intelligence. It uses the concept of Rational agent. Thus from the above project synopsis we can infer that BEST FIRST SEARCH and IDA* are promising algorithms which helps in finding the shortest path and that will lead to a goal. The above mentioned algorithms are feasible and optimum. Their performance is very high as compared to other algorithms which are currently used in Artificial Intelligence.

References

[1] Arem, B. van & C.A. Smits (1997). An exploration of the development of Automated Vehicle Guidance Systems, TNO-Report INRO-VVG 97/NV/040.

[2] www.google.com

[3] www.wikipedia.com

Bluetooth Remote Control

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Abstract

This project deals with accessing computer by mobile using Bluetooth technology. This mobile java Bluetooth remote control system is a java application with a client and server sides that insure the use of Bluetooth-enabled and java embedded mobile phone to remotely control the normal use of the PC such as controlling the flow of PowerPoint slides and managing the playlist in windows media player etc.

1. Introduction

The text must be in English. Authors whose English Nowadays, Bluetooth has become a good medium of transferring files between two PDAs. This is concept that has been used in this project to control different Computer functions. Bluetooth is an industrial specification for wireless personal area networks (PANs), also known as IEEE 802.15.1.

As the number of Bluetooth products increases each year, it is important to develop applications and services to take full advantage of their potential and capabilities. Bluetooth provides a way to connect and exchange information between devices like personal digital assistants (PDAs), mobile phones, laptops, PCs, printers, digital cameras and video game consoles via a secure, globally unlicensed short-range radio frequency. Bluetooth is a radio standard and communications protocol primarily designed for low power consumption, with a short range (power class dependent: 1 meter, 10 meters, 100 meters) based around low-cost transceiver microchips in each device. The Bluetooth stack is used to establish a connection between two Bluetooth enabled devices and can be used to control them via Bluetooth. The Bluetooth stack is a controlling agent (it could be software, firmware, hardware, or a combination of all three) that implements the Bluetooth protocol and also allows you to control your Bluetooth device programmatically. The Bluetooth stack allows you to do these two things:

- Communicate with other Bluetooth devices
- Control your own Bluetooth device

A Bluetooth device without a stack can be compared to a computer without an Operating System. More specifically, it's like a computer peripheral without a driver. So, in order to communicate with the Bluetooth protocol and to control a Bluetooth device, your computer uses a Bluetooth stack.

There are three classes of Bluetooth with different range of upto 100m.

2. Proposed System

2.1 Proposed System Overview

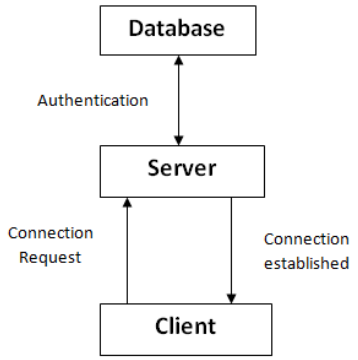

Fig:2.1 Authentication of Devices

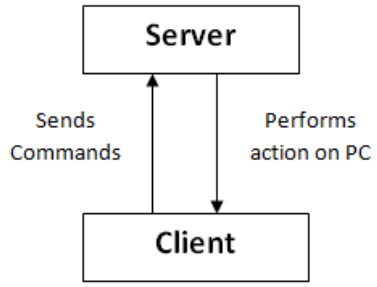

Fig:2.2 Proposed System Overview

The above diagrams gives a very extensive idea about the system proposed. This system essentially covers authentication of devices and controlling of computer.
There are two major steps of the entire system. The first step is to authenticate the Client.
Before the clients can be connected to the server, they have to be paired with the Bluetooth Server. Pairing is an important part in a Bluetooth setup. When the client requests to be connected to the server, the server asks for a passkey. When the client and the server enter the same passkey then the devices are paired together and can perform network functions. The passkey must be provided by the Server.The patrons can be provided this passkey over the counter. This passkey can be changed on a daily basis. Authentication is probably the most important part of the system. The devices those are present in the server database can only control the computer.
The second step of the system is to control computer by sending appropriate commands.
The system is composed of two components Server Program and Client Program. Server program accepts the commands coming from the Client and executes them in order to start the corresponding service in computer.Client sends different commands over Bluetooth to the Server program. Client has different functionalities such as Controlling media player, controlling power point slides, Opening different files of computer, shutting it down or restarting it, browsing the disk drives Etc.
A centralized database will maintain the details of all users along with date and time of login registered to the system.

3. Conclusion

The use of mobile phones is much more higher than any other handheld devices. Due to the fact that it is affordable and small, every segment of society including teenagers, professionalsand elderly people has a mobile phone for social networking, business or work related purposes. The realization of the importance of extending the availability and accessibility of information, mobile phone manufacturers are exploiting the development of wireless technology to include Bluetooth in particular, in most of their mobile phone models. As a result, the functionalities and capabilities of a mobile phone have extended, not just to make and receive calls but also to surf the Internet, check email, download software or application, play games and listen to music.
Bluetooth Remote is an application which is based on Client Server model. The Client application runs on mobile where as Server application runs on computer. This project reduces our dependencies on wired devices as we can use our mobile phone for different purposes. It can be used to control computer using mobile.

References

[1] C.S.R. Prabhu, A. PrathapReddi "BLUETOOTH TECHNOLOGY and its Application with Java and J2ME".
[2] Bruce Hopkins, Ranjith Antony "BLUETOOTH FOR JAVA"
[3]Matthew A. Stoecker, "Developing Windows Based Application using VB.net".
[4] Quasy H. Mahmoud "Wireless Application Programming with J2ME and Bluetooth".

A Conceptual Method for Searching

A positive integer searching algorithm

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Abstract
In this paper I proposed searching technique for positive integer number. In which time complexity is depends on the number of digit of search element (i.e. if searching number is 141 than time complexity will depends on 3) despite of number of elements a list contain.
Keywords:*Time complexity, List.*

1.Introduction to Searching

Searching is a fundamental for computer processing, so any attempt to design fast methods for this operation is important. Earlier Searching techniques are depends on the number of element in the list like in binary search algorithm the searching algorithm depends on number of element a list contain i.e. if we want to search 145 and the list contain 10,000 integer number then the time complexity depends on 10,000 and average case will be 10,000/2.

2. My Approach

Instead of searching the entire element I started to look at the number that I have to search from given N numbers then I saw that every number that we have to search has some attributes that makes it constant and unique. Every number has its own unique attributes like number of digit that it has, value of 1st digit etc. So based on this attribute I started to store it on the basis of this attribute and search it accordingly.

I have consider an example of library which contain thousands of books and each book has its own unique location and number based on that a librarian can easily find out a book that a reader wants. So I thought why not a positive number which has unique attributes can be placed in such a way that it can be search by its unique attributes.

3. Proposed Technique

Proposed technique is based on the attributes (that has described before) of a searching number and placement of the N numbers.

We want to store the entire number based on its unique attributes like number of digit and value of 1st digit by given simple pseudo code.

Number of digit of search element (D):

```
while (x > 0)
    {
      r = x % 10;
      D++;
      x =x/ 10;
    }
```

Value of 1st digit (F):

```
x = Math.abs(x);
F=(int)Math.floor(x/Math.pow(10,Math.floor(
Math.log10(x)))
```

And stored accordingly like if we want to store 345 than calculate number of digit i.e. 3 and Value of 1st digit i.e. 3 and placed it accordingly.Now if we want a number that has to be search (like 145) from given stored N

numbers then we have to calculate its unique attributes like number of digit and value of 1st digit by given same above pseudo code.

After calculating these attributes send it to there where the three digit number and value of 1st digit is 1. Suppose we want to store only up to 3 digit numbers i.e. maximum element are 999 (or more if the some number is repeated).

Consider if number is not repeated then based on its unique attributes, maximum number of 1 digit element will be 1, maximum number of 2 digit element will be 10, maximum number of 3 digits element will be 100 and so on, despite of numbers of element a List contain.

3.1 Abbreviations and Acronyms

Number of digit is D accordingly if number of digit is 1 then D1 and so on and Value of 1st digit is F accordingly if value of 1st digit is 1 then F1 and so on. Let α be the number of digit of element that we have to search, β be the 1st value of that element and ρ be number of value that we have entered in a list with respect to α and β, σ be the number of element that is repeated in a particular List, List corresponds to Array list.

3.2Pseudo code:

a) Storing:

1) Take input and calculate its unique attributes (D and F)
2) Based on D and F store it to their respective List
3) If list is not present create List
4) If end, stop else go to step 1.

b) Searching:

1) Take the element to be search and calculate its D and F.
2) Based on D and F send it to search respective List.
3) Search the List
4) If element present send success message else not present.

Consider we want to store up to a 3 digit number, then maximum number that we can store are 999 (if element is not repeated). Let D1, D2, D3 are the number of digit i.e. 1, 2, 3 respectively and F1 to F9 are the value of 1st digit then it can be graphically presented asfollow

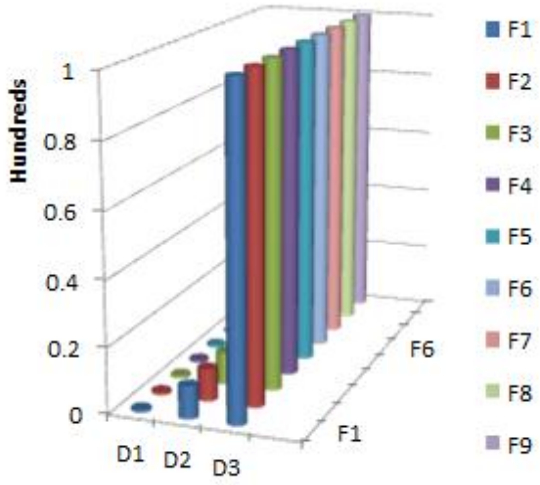

Fig. 1 Storing the element in List

4. Searching from list

After storing 999 elements on the list we can search directly based on their unique attributes.

Example:If we want to search 345 from list we have to calculate its number of digit i.e.3 and value of 1st digit i.e. 3 now send it to that place where it these attributes matches.

Now it searches the particular List if present then it send success message else not found.

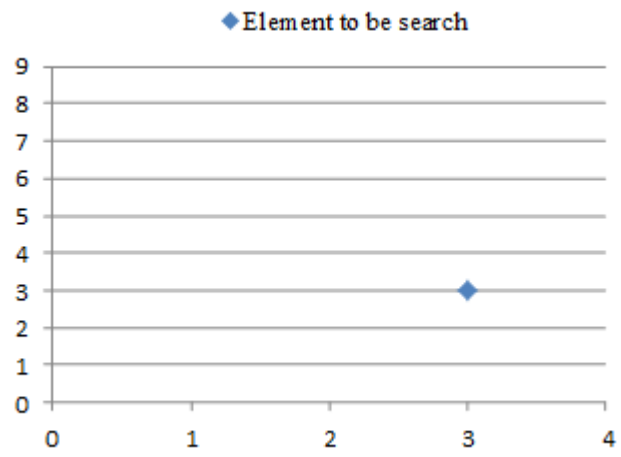

Figure 2: Searching Element from list

Where X-axis is D and Y-axis is F.

5. Time Complexity

As discussed before that time complexity is depends on the attributes.

Let α be the number of digit of element that we have to search

Let β be the 1st value of that element.

Let ρ be number of element present in a list with respect to α and β, then time complexity will depend on ρ.

Let σ be the number that repeated in a particular List

The worst case would be O(ρ+σ).

For exampleIf we want to search 345 then its α=3 and β=3 and suppose we entered 3 digit number starting with 3 is 40 i.e. ρ=40 then time complexity for worst case would be O(40).

6. Applications

- Searching of number has many applications like in Data base system using above technique a Data base administrator can easily find out unique id number.
- In Banking system, An account number can easily searchable.
- Based on this searching technique it can be used in Sorting the List.

Acknowledgments

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References

[1] J. J. Arulanandham. The Bead-Sort Animation, www.cs.auckland.ac.nz/~jar-u003/BeadSort.ppt.

Software Based RBC Count

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ABSTRACT

Fast and cost-effective production of blood cell count reports is of paramount importance in the healthcare industry. The traditional method of manual count under the microscope yields inaccurate results and put an intolerable amount of stress on the Medical Laboratory Technicians. Although there is hardware solutions such as the Automated Haematology Counter, developing countries are not capable of deploying such prohibitively expensive machines in every hospital laboratory in the country. As a solution to this problem, this research project aims to provide a software-based cost effective and an efficient alternative in recognizing and analyzing blood cells.

1. INTRODUCTION

One of the most important tests carried out in the pathology lab is the blood count test. On the basis of this test various diseases are recognized. So it is required that the result of this test should be accurate and also should be available in time. In our project we are developing a software which will give the blood count accurate and also in least time.

Problem Definition:

The goal of this research is to provide software that can be used for recognizing and analyzing the blood cells. This will help us to produce the blood count which is much cost effective than the existing technology. With the help of image processing language 'matlab' we will recognize the red blood cells present in the image and will provide us with the count which can also be stored in database for further references of the patient .

Relevance of Project:

Counting of red blood cells in a blood sample can give the pathologists valuable information regarding various haematological disorders. In the classical method for diagnosis of red blood examination in a blood sample, it is counted by manpower; hence it has deficiencies such as poor reliability, low efficiency and strong subjectivity. The diagnosis is the process of finding out what kind of disease a certain patient has and those diagnosed must always be accurate. A wrong diagnosis may lead the situation and condition of a patient become worst and some case, patient dies due to wrong dosage of drugs given. In order to overcome that weakness, some researchers have done some useful works especially in classifying blood cells from other cells.

2. REVIEW OF LITERATURE

The erythrocytes are the most numerous blood cells in the human body and it also called red blood cells. The red blood is a blood that functioned as carry oxygen throughout

our body. The normal red blood cell in our body is divided into four categories of ages, which are newborn, children, women and men. Red blood is measured by the amount of haemoglobin in our blood. The level of haemoglobin in our blood will affect our health tremendously. We suffered fatigue and short of breath when the level of haemoglobin is too low due to not enough oxygen supply to our tissues. This so called Anaemic. The effect of having high red blood cells in our blood is it can be an indication of an undetected heart or lung problems. When any of these organs is

not functioning properly, then blood oxygen levels go down. In order to normalize oxygen supply, the body increases its production of red blood cells.

There are currently two methods through which red blood cells are counted. The first one is traditional one which is done by manual counting and the other is through automated machine.

Existing Systems:

An **automated analyser** is a medical laboratory instrument designed to measure different chemicals and other characteristics in a number of biological samples quickly, with minimal human assistance. These measured properties of blood and other fluids may be useful in the diagnosis of disease.

Figure 1**:**Automated analyzer

Many methods of introducing samples into the analyzer have been invented. This can involve placing test tubes of sample into racks, which can be moved along a track, or inserting tubes into circular carousels that rotate to make the sample available. Some analysers require samples to be transferred to sample cups.

However, the effort to protect the health and safety of laboratory staff has prompted many manufacturers to develop analysers that feature closed tube sampling, preventing workers from direct exposure to samples.

Samples can be processed singly, in batches, or continuously.

The automation of laboratory testing does not remove the need for human expertise (results must still be evaluated by medical technologists and other qualified clinical laboratory professionals), but it does ease concerns about error reduction.

This is a commercial product developed by CellaVisionAB. The CellaVision DM Analyzer consists of a fully-automated system of counting blood cells. To analyze a sample of blood the following steps are undertaken:

1. The vials containing the blood are bar-coded for identification.

2. All the vials are fed in to the Automated Hematology Counter for the Standard Count.

3. Samples are taken for morphological review, where a piece of hardware known as the “slide maker” or “strainer” is used to get blood on to a thin film on a slide.

4. These slides are kept in a special container and placed in a hardware which is used to automate the manual differential count.

5. The slides are then moved under a microscope using a robot arm and images of the WBCs are taken.

6. The images are analyzed and classified accordingly.

Other Techniques:

Manual methods for cell counting:

In a manual RBC count, 10 µl of blood is diluted in 1990 µl of dilution solution. This results in a dilution of 1:200. This suspension is usually well-mixed and be immediately placed into the counting chamber. After approximately 3 minutes, the RBCs will have

settled, and the MLT begins counting the RBCs in 80 small squares. The calculation is achieved by following the formula below using these factors:

i. The number of RBCs counted in the small squares

ii. The dilution of the cell solution
iii. The number of counted small squares
iv. The volume above one small square

(i)# Of counted WBC X (ii) dilution

(iii)# Of counted square X (iv) volume of one big square

Equation for Calculation of RBC per micro-liter

In 80 small squares, around 400 RBCs are counted for normal values. This yields a coefficient of variation (variability) of ±5%. This constitutes the highest acceptable amount of random error (accuracy). In Clinical Laboratory technicians prepare the slide by mixing related reign with known quantity of blood to examine it under the microscope for blood cell counting. Count is obtained by putting contented cells as inputs in different equations.

Limitations with Existing Methods:

(i)Drawbacks of the manual method

• Visual inspection of microscopic images is time consuming and exhaustive. If the counting process is interrupted, the MLT has to start over again from the scratch.

• An experienced MLT carries out the cell analysis by the comparison of images of cell types she sees and is familiar with. On the other hand less experienced MLT in order to confirm on the cell types would have to check with medical manuals repeatedly to make sure that the counting of given sample is accurate. Thus manual counting methods are vulnerable to human mistakes that can easily result in errors.

• After the blood cell slides have been analyzed, they are kept away. There is no quick and easy way of retrieving analyzing lot of images for future reference as with a computerized system.

(ii)Drawbacks of analyzer

• This product is not widely available.

• The cost of this machine is unbearable for medical laboratories in developing countries.

Solution to above mentioned limitation of existing system:

As a result of the above problem this software based project is proposed as a new method of cell counting which is easy to use, don't need fully experienced men to handle, much more accurate then the manually counting method and is very economical way of cell counting .This software base solution will assist the medical laboratory technician (MLT) to detect and find a blood cell count and produce an accurate cell count report. This would be very helpful to a physician in identifying the cause of his patient’s diseases.

Now there are some diseases where the person has to frequently count his blood and also compare it with the previous count to check the increase or decrease in the blood count. For this purpose this project maintains a database in which the count of the patient will be stored.

3. METHODOLOGY TO SOLVE PROBLEM

This software can be used for recognizing and analyzing red blood cells and produce blood count reports. The operation of this software is purely based on image processing and computer vision technologies.

Following figure shows the flow chart of the red blood cells counting process.

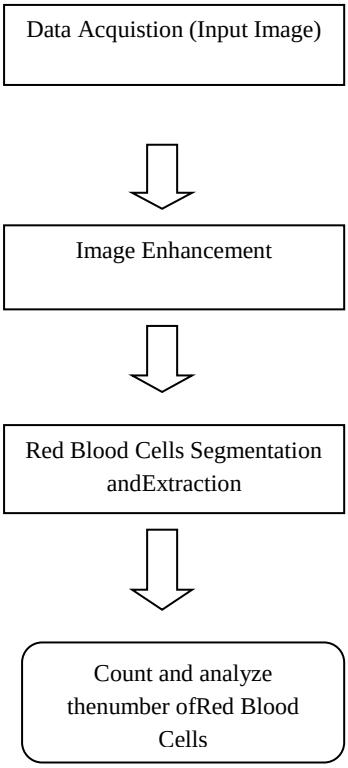


Figure 2: Flow chart of the red blood cells counting process.

Data Acquisition:

The images of blood are taken from microscope camera. The images taken were verified by the microbiologist and homology experts to make sure that we have taken correct snap shots input to put methods. The images include three images of each blood test.

Image Enhancement:
The original binary image consists of small spots within the image. These small spots are assumed as noise and need to be removed from the image. Hence, we use salt and pepper technique to remove the noise. By using this technique, every object in an image which has lower pixel value will be eliminated. This is the best method that can be used because it does eliminate only the unwanted noise in the image.

Further the image can be enhanced by converting it into HSV image. Below figure shows the flow process in enhancement processing which are analyses in hue-saturation value color space (HSV). For HSV, we proceed with analyses in saturation component, S, because this S image show clearly the bright objects such as white blood cell and parasites, therefore, it's easy to distinguish the red blood cells with another cell.

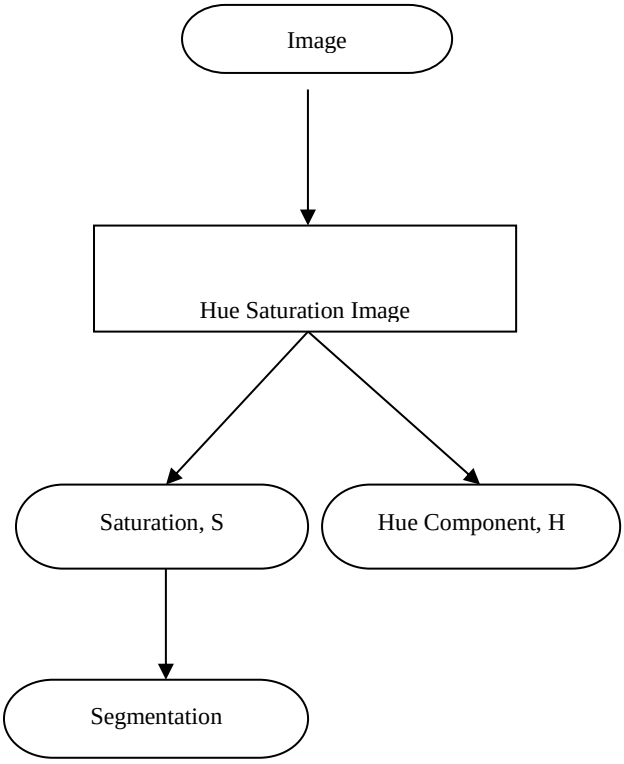


Figure 3: Flow chart of image enhancement.

Red Blood Cells Segmentation and Extraction:

In the segmentation process, morphological technique is major used because the mathematical morphology offers a powerful

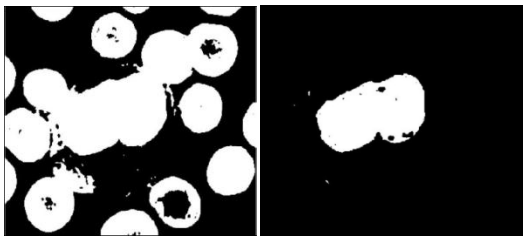
tool for segmenting images and useful to describe the region shape, such as boundaries, skeletons and texture. The first method in this process divides saturation, S image into two images output by applying the thresholding process. Thresholding is one of the methods to extract andsegment the object from the background by selecting any point, T.

Any point *(x, y)* for which *f (x, y) > T* is called an object point; otherwise the point is called background point. Thresholding normally results in binary image and the mathematically; the operation can be expressed as;

$$g(x,y)=\begin{cases}1 & if\ f(x,y)>T\\ 0 & if\ f(x,y)\le T\end{cases}$$

where the pixels labeled 1 is corresponded to object whereas the pixels labeled 0 are corresponding to the background.

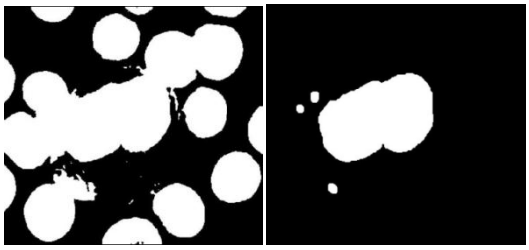
Figure 4 shows two images with having higher than 0.53 pixel values (lower pixel) and another image is higher than 0.96 pixel value (high pixel). This process is important to distinguish between background and the red blood cells, as well as other cells.



(a) (b)

Figure 4: (a) Image with higher than 0.53 pixel value (lower pixel) (b) Image with higher than 0.96 pixel value (higher pixel).

From the lower pixel image we perform the morphological area closing to fill the hole and eliminate the unwanted small pixel. The other image which is higher pixel value has been used as an input for next processes which are dilation and area closing. Figure 5 shows the area closingon the lower pixel image and higher pixel image. It can be seen that the hole in the cell has been filled up.



(a) (b)

Figure 5: (a) Morphological area closing on lower pixel value image. (b) Morphological dilation and area closing on higher pixel value image.

From the result after morphological from both lower and higher pixel, the range value of pixel is determined. The histogram is suitable to describe where the position of the range value we want in this work. Histogram of saturation, *S* image is shown in Figure 6. In this histogram, we want to preserve the image that has higher than 0.53 and less than 0.96 pixels.

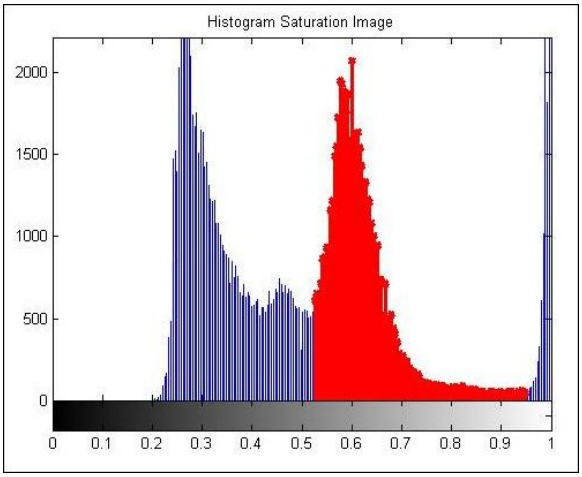


Figure 6: Histogram of saturation, S image.

To preserve the saturation, *S* image value between 0.53 and 0.96 as highlighted with red in the histogram graph, the XOR and area opening with disk structural element has been introduced. Figure 6 shows the result when XOR operation and area opening with disk structural element introduces to both of result after morphological on lower and higher pixel image. From the result of these two operations, we change the red blood cells from white color to black color and background took a white color. Once again, the XOR operation is used and the resulted image is shown in Figure 7.

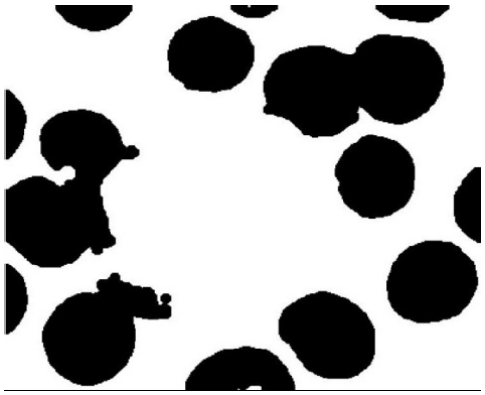


Figure 7: Result of morphological XOR operation.

Counting the number of Red Blood Cells:

In order to estimate the number of red blood cells in the blood smear image, some techniques have been proposed. The following techniques such as morphological erosion, median filter and Hough transform are discussed.

By using the result from Figure 7, morphological erosion technique and also median filter with 4x4 neighborhoods had been applied to this image to eliminate small unwanted pixel and image smoothing. Red blood cells showed by black and background in white. The resulted image was used as an input for Hough transform process.

The final process in the algorithm of counting the number of red blood cells is to perform Hough transform technique. The Hough transform was initially developed to detect analytically defined shapes such as straight line, circle, as well as the parameter curve [16-18].

This technique is able to detect and estimate the number of red blood cells by determining the center point of the circle. In order to determine the center point, radius of circle is needed and from original image, we found the radius by using the MATLAB function, "IMDISTLINE". In this image the minimum radius is 36 pixels and maximum radius is 40 pixels. Thus, the Hough transform is applied when both radiuses have been determined and the result of this process is shown in Figure 8. Red blood cells have been bounded by green circle and counting process refers to this green circle in this image.

Figure 8: Result of red blood cells estimation.

4. RESULTS AND DISCUSSION

The results are presented and the graphical user interface (GUI) is developed to provide user friendly for analysis. This GUI was developed using GUIDE (Graphical User Interface Development Environment) which is one of the tools that have been provided in the MATLAB.

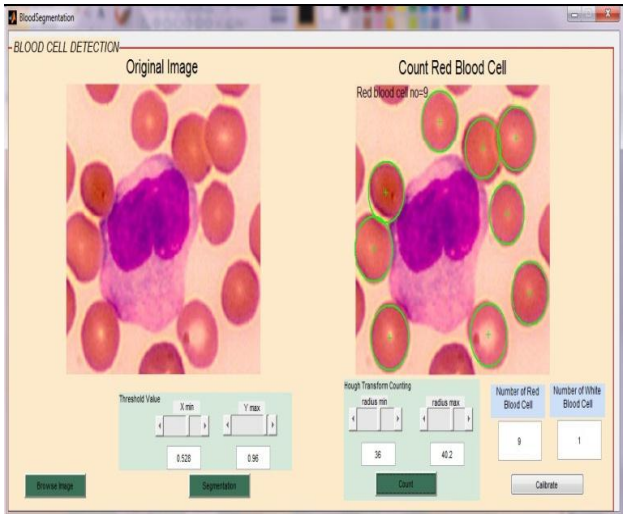


Figure 9: GUI shows a case of estimating number of red blood cells.

Figure 9 shows the GUI for estimating the number of red blood cells in blood smear image. An important in this estimating process is radius of red blood cells. Each image has different radius that need to determine before proceed to the estimating process. Table 1 presents the radius parameter for each 10 set of images collected from different sources.

Table 1: Training data.

Image	Radius	
	Minimum	Maximum
1	33	40
2	36	40
3	37	40
4	32	40
5	26	34
6	15	30
7	21	28
8	11	20
9	18	24
10	12	18

From this image samples, the average computational time by this system is 3 seconds per sample. The accuracy is measured based on final results produced by the algorithm to refer to the manual counting process. Table 2 shows a comparison between manual counting and estimation by computer for 10 image samples. The average of accuracy of these 10 image samples is 96%.

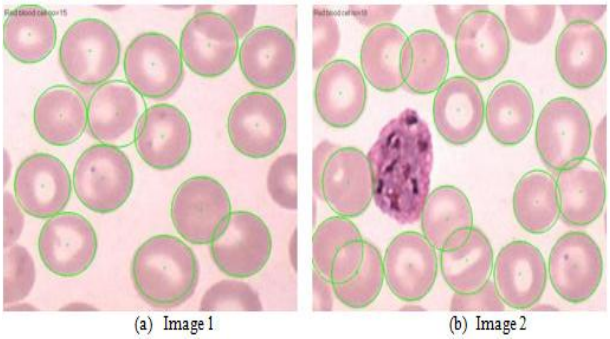
Table 2: The accuracy of 10 image samples

Image

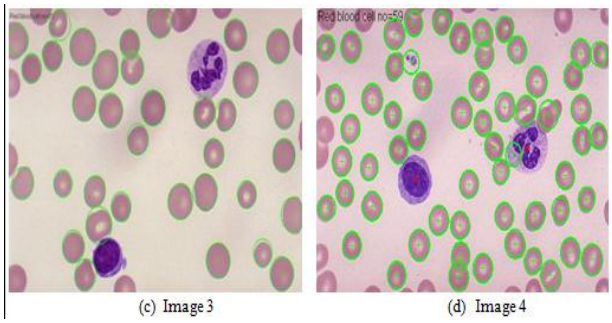
Image	Number Of Red Blood Cells	
	Manual Counting	Computer Counting
1	15	15

2	20	19
3	37	35
4	60	59
5	18	18
6	34	35
7	37	35
8	60	54
9	102	95
10	9	9

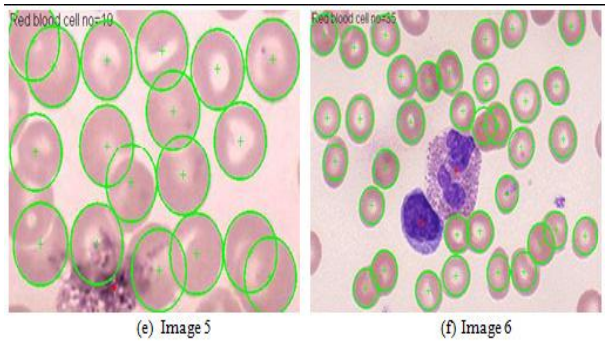
Figure 10 shows the result of image blood samples by using Hough transform technique.



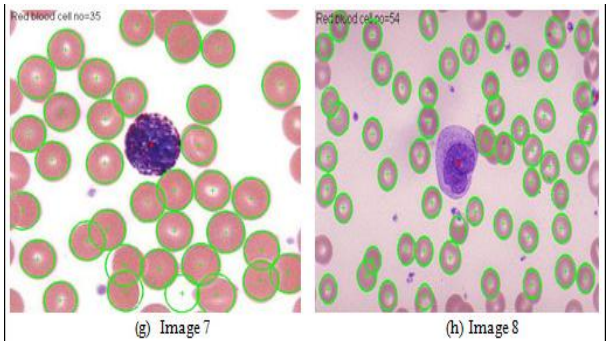
(a) Image 1 (b) Image 2



(c) Image 3 (d) Image 4



(e) Image 5 (f) Image 6



(g) Image 7 (h) Image 8

Figure 10: The results of 8 samples of red blood cells after performing Hough transform technique.

5. CONCLUSION

As a conclusion, this research successfully utilizes morphological approached for segmentation, extraction and estimation in order to solve problem in image processing of the red blood cells. The results of the image can be used as good input in determining the number of red blood cells by using Hough transform technique. By using the MATLAB, all the importance's aspects like correct algorithm and system has been successfully produced. With correct algorithm, the red blood cells can be detected and segmented as well as estimated the number of the red blood cells. Through system created using MATLAB, it also enable the study of the morphological features of the red blood cells image, thus, can determine whether the person is normal or otherwise by referring amount of red blood cells in human blood. This technique does not involve too much looping process when develops the MATLAB source code program. One of the issues that need to be considered to improve this study is to reduce the time taken by the user determine the red blood cells parameters.

Agent Based Personalized E-learning

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Abstract

In e-learning systems, currently present, the adaptive feedback and facilitation to student learning is very absolute. The teachers as well as students involved in distance learning education face a critical lapse towards proper development of skills as the present technologies are not sufficiently A.I.capable.We ought to propose a paradigm in reference to addition of soft computing technologies and agent based simulation in this paper. The technologies currently under implementation don't possess the centralized controlling via artificially enhanced agents which can favour the suggestion process. The algorithms and methodologies used in this paper create an agent which is efficient. This paper gives a general description of technologies, contrasting them and provides a proposed solution to it.

Keywords:*Distancelearning, A.I.Capable,Soft Computing, Agentbased computing,Enhanced Agents.*

1. Introduction

Pedagogy is the science and art of education. Its aims range from the full development of the human being to skills acquisition. In correlation with those instructive strategies the instructor's own philosophical beliefs of instruction are harbored and governed by the pupil's background knowledge and experience, situation, and environment, as well as learning goals set by the student and teacher. Pedagogical Patterns are high-level patterns that have been recognized in many areas of training and pedagogy such as group work, software design, human computer interaction, education and others. The concept is an extension of pattern languages. In both cases, the patterns seek to foster best practices of teaching.
There are 9 pedagogical patterns:

- Language teaching methodology: Methodology in language teaching has been characterized in a variety of ways. A more or less classical formulation suggests that methodology is that which links theory and practice. Theory statements would include theories of what language is and how language is learned or, more specifically, theories of second language acquisition (SLA).
- Montessori education is characterized by an emphasis on Independence, freedom within limits, and respect for a child's natural psychological development, as well as technological advancements in society.
- An internship is an agreement between you and a company or organization for a fixed period of time, such as a semester or quarter.
- Critical pedagogy is a philosophy of education as an "educational movement, guided by passion and principle, to help students develop consciousness of freedom, recognize authoritarian tendencies, and connect knowledge to power and the ability to take constructive action."
- Applied learning pedagogies: Methodology for significant student learning and the challenges of facilitating and assessing that learning, often innon-traditional ways that involve experiential strategies outside the classroom as well as individualized outcomes.
- Didactics: Teaching method that follows a consistent scientific approach or educational style to engage the student's mind. The didactic method of instruction is often contrasted with dialectics and the Socratic Method; the term can also be used to refer to a specific didactic method, as for instance constructivist didactics.

- Educational psychology: A branch of psychology that studies children in an educational setting and is concerned with teaching and learning methods, cognitive development, and aptitude assessment. Psychological principles to improving curriculum, teaching methods, and administrative procedures.
- Phonics: A method of teaching people to read by correlating sounds with letters or groups of letters in an alphabetic writing system. Phonics is a form of instruction to cultivate the understanding and use of the alphabetic principle.
- Pedagogic integrated development environment: A Pedagogic integrated development environment is an integrated development environment (IDE) developed primarily for educational purposes.In addition to the normal range of features in an IDE, these often offer development tools to support learning such as the learning languages in DrRacket (formerly DrScheme), or the direct manipulation object creator/inspector in BlueJ. There is usually a range of supporting materials including textbooks.

2. Literature Survey

After conducting an extensive survey and researches about the existing literature the limitations encountered in [1] are Availability of the lecturers as they are medical professional so online streaming is not practically ideal.Agents are static. They are not smart enough to control entities throughout the website. Partially automated-the admin has to follow a tedious job for any modification to the website. Load on admin for sorting-management of predefined resources are also chaotic for user as well as supervisor. Drawbacks of [2] are proposed system is not efficient in terms of input and hencenot fast to produce desired output. Age old method application is does not provide a good user experience. Demerits of [3] are that it is an agentless system and very old.Computer assisted systems do not provide any algorithm which is fast enough in providing the user the desired response.
FAQ assisted plus added feedback leaves user with a minimum amount of options to enquire his/her query.
Certain existing e-learning systems were studied which included a web site built on video tutorials about the courses available and their in-depth explanations it was found that it is tough to find entry-level training for very complex software, i.e., better for keeping skills sharp than learning high-end software from scratch.
Pedagogical aspect is the main drawback of some websites. Assisted learning is not implied in some system whereas they emphasis on the professional individual or groups. All the data management aspect of system was solely dependent on system administrator.
Complexity of these sites caused naïve users to lose their interest. Cost feasibility is also drawback, one, simply, has to input their resources to obtain its services. Licensing does not provide a demonstration of courses one has applied to, so it remains on the user to take the proceeding step. These sites have a very complicated terms and conditions. The offers and pricing of some system as per the resources provided is not optimum. Absence of Chats and Discussion boards leads to unsolved queries of the users. These problems provide a loophole in effective communication between administrator and user.

3.Proposed System

The software system proposed connects the learning repositories with the users. The strong tie up is focused on efficiency and reliability.
The basic aim of Agent based personalized e-learning is to serve the following purpose:

- To collect all the digital reference data in terms of text, images videos etc.
- To maintain attractive interface towards display of the resources as in PDF or document formatting in case of texts playable flash formats for videos etc

- To connect the resources to the users for centralized access.
- To simplify the access process
- To provide better learning experience
- To maintain discussion boards and groups and extend supervision
- To learn the behavior of user and suggest future steps as per course taken or tests evaluated.
- To assist professors regarding student progress and ease the work for them.

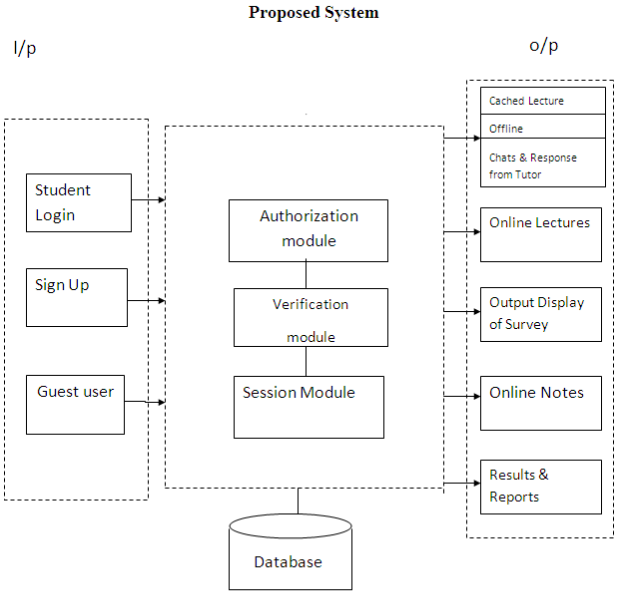

Figure 1: System Block Diagram

The figure 1 is system block diagram of proposed system which contains following Input:

- Student Login-It is the basic input to the system. The registered student may authenticate itself and may perform required actions accordingly, this input is processed i.e. authenticated and verified by the system.
- Sign Up-The unregistered user may register to the website. User just needs to fill the form with proper details which is displayed at the front end.
- Guest User-The guest user can surf, who just wants to survey the website in terms of demo lectures streaming, information about the courses, professor information etc.

The utilization of agents in the e-learning domain with the favor of Artificial Intelligence is proposed here. The agents are segregated on the basis of usage as secretary and tutor. The agent as a secretary manages the workload of the professor. The scheduling of lectures and sending e-mails to defaulters is handled by the secretary. The tutor is responsible for taking lectures as per schedule. The users are classified as students and professors. The authorized user is given access rights to the sites. The ability of student is verified by the agent. The bifurcation the activity as per the choice of the user to attend the lecture, clear doubts and gives exams
The following processing blocks in which agent plays vital role are explained as follows

- Authorization Module-The login credentials are checked by the system and the authorized person is given access to the system.
- Verification Module-This module keeps check on activities performed and wants to perform by the user.
- Session Module-The diagram of this module is shown in Figure 2.This module takes care of studies related activities viz attend lectures, doubt clearing and tests which are explained below.
- Attend Lecture – The authorized user is allowed to attend lectures as per the schedule. The agent manages the activity of input from user and the actions to be performed on user request.
- Doubt clearance - The streaming lectures as per the schedule and availability of professors to clear doubts falls in the online resources. The pre cached lectures, notes, discussion boards are part of offline resources. The chats and responses given to professors are made easy to the user by the tutor.

- Test Module - Examination is another highlight of the system. The students are asked for submission of the assignments provided before examination. The student on completion of submission of the term work has access to the examination portal. On selecting the specified course the student gives the exam. The digital Secretary computes the examination results and forwards it to the professor for analysis.

Figure 2 has the following output blocks as follows

- Offline - This block is responsible for management of the offline resources for e-learning. The cached lectures in the form of the videos, stored in the database are provided as output. Chats and

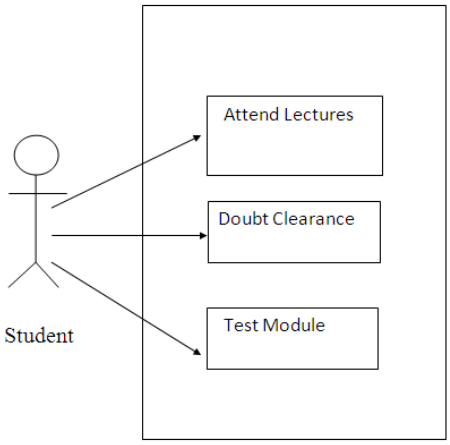

Figure 2 Session Module

responses from tutors in the form of discussion boards also falls under this block.

- Online Lectures - The availability of a professor defines the online lecture module. The class timings are predefined and the schedule is followed by the system.
- Guest user Front end - The guest user is open to the permissions and privileges of survey of the website and can check the resources and course guidelines
- Online Notes - The notes and varied course materials are put up online for easier access by the students. Reference materials in the form of books and the other documents are made available here.
- Results and reports - The examination module which manages the tests and results is put on display through this module.

4.Features Overcoming the Drawbacks

The system proposed in this paper is

- An agent who favors both admin and student.
- Courses are provided in the technical domain so there constant availability of lecturers
- Cached offline availability of resources for convenience is also offered.
- It is fully automated and there is no load on admin for sorting
- It is efficient and fast and implemented on latest computing algorithms in Java.

5.Conclusion

At last we conclude that in this paper for Agent Based Personalized Elearning, a convenient way of online education can be provided. It is also going to give the facility to provide ease and user friendliness for the beginners. Adaptive feedback favors student learning by the utilization of artificial agents.The efficient algorithms and methodologies utilized here can be a source of help to future cross platform systems. Agent based suggestions improvises the proper development of skills via the proposed system.

References

5. Yuh-Ming Cheng; Lih-Shyang Chen; Hui-Chung Huang; Sheng-fengWeng; Yong-Guo Chen; Chyi-Her Lin, "Building a General Purpose Pedagogical Agent in a Web-Based Multimedia Clinical Simulation System for Medical Education," Dept. of Comput. Sci. & Inf. Eng., ShuTe Univ., Yanchao, Taiwan ,Volume: 2, Issue: 3,July-Sept. 2009,pp.216 - 225.
6. Yuh-Ming Cheng; ShuTeUnig; Kaohsiung; Lih-Shyang Chen; Sheng-fengWeng; Yong-Guo Chen; Chyi-Her Lin,"Applications of a Pedagogical Agent Mechanism in

a Web-based Clinical Simulation System for Medical Education",vol.1.ShuTe Univ., Kaohsiung ,26-28 Nov. 2007,pp.635-638.

7. Masson, A.M, "Web-based simulations for computer-assisted learning in the higher education sector",vol.8, issue:3,Aug 1999,pp.107 - 114 .

8. Atolagbe,T.A, "E-learning: the use of components technologies and artificial intelligence for management and delivery of instruction",vol.1.Sch.ofComput.Inf.Syst.&Math.,South Bank Univ.,London,26-28 Nov. 2007,pp.121 – 128.

9. "Analysis of Pedagogy". Educ.utas.edu.au. Retrieved 2010-09-20.

10. Lombardi, S.M. . (2011). "Internet Activities for a Preschool Technology Education Program Guide by Caregivers". Doctoral dissertation, North Carolina State University. p. 140.

11. TeachShare.org (Techniques) describes how to use a variety of teaching techniques.

12. SocialPedagogyUK.com Developments in the field of Social Pedagogy in the UK.

13. Steffi Domagk, Helmut Niegemann (2005), "Pedagogical Agents in Multimedia Learning Environments", Towards Sustainable And Scalable Educational Innovations Informed by the Learning Sciences, ISBN 9781586035730

14. Roxana Moreno (2005), "Multimedia Learning with Animated Pedagogical Agents", The Cambridge Handbook of Multimedia Learning, Cambridge University Press, p. 507, ISBN 9780521838733

Panorama For Surveillance

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Abstract

This paper addresses the problem of creating panoramic images from source images for security purpose. The images are stitched in such a way that it gives a larger field of view which can be useful for Security.

The approach has been designed so that it will work with different image and will work well on both indoor and outdoor scenes. This paper shows a vision based system that is able to capture individual images from different cameras fixed at certain position. The individual images are then stitched together to form one single Panoramic image which gives a wide field of view. Physically setting up the camera and configuring it to capture all photos identically and then taking the sequence of photos. It involves choosing the order and precise positioning which mutually aligns all photos. To form final panorama image, the captured images are sequentially matched using image matching. For this purpose edge detection has been carried out using Canny edge detection operator and Sober filter, according to percentage of matching the offset value of edge is found. Based on the offset value the images are stitched together to form uniform panoramic image.

1. Introduction

Panorama Stitching or image stitching is the process of combining multiple photographic images with overlapping fields of view to produce a segmented panorama or high-resolution image. Commonly performed through the use of computer software, most approaches to image stitching require nearly exact overlaps between images and identical exposures to produce seamless results.

As Security is on high rise and the use of image processing is becoming a trend for providing security. So the aim is to increase the level of surveillance by a technique known as Video Analytics for Panorama Creation has been taken as an initiative by the B.A.R.C. To form a panoramic image captured from different cameras to give an image providing a large field of view which enhances the viewing capability of Security person. Since a larger field of view is been provided in the image it is easier for surveillance. Hence the numbers of systems are gradually reduced. The Quality for ensuring the security is thereby increased in the organization. On the other hand, as the hardware for image processing has been developing, the image processing has been applied to many kinds of similar purpose recently. This is a brief survey of the papers that have emphasized the generation of panoramic images for Security.

2.Proposrd System:

2.1 Panorama Stitching:

Panorama Stitching or image stitching is the process of combining multiple photographic images with overlapping fields of view to produce a segmented panorama or high-resolution image. Commonly performed through the use of computer software, most approaches to image stitching require nearly exact overlaps between images and identical exposures to produce seamless results.

In current image acquisition is based on the screen and the display devices. Hence we do not get a full view of the image. Here in the figure shown below we don't get

a view of the whole picture. Below fig shows the individual images captured from sensors i.e. cameras.
In general,

- Compact Camera FOV = 50 x 35 degree
- Human FOV = 200 x 135 degree

Fig 2.1 Source Image Sequence

Hence, Panorama is thereby used to increase the viewing range of images by stitching images together. But after panaroma image creation,

- Compact Camera FOV = 50 x 35 degree
- Human FOV = 200 x 135 degree
- Panoramic Image = 360 x 180 degree

Fig 2.2Image AfterStiching

2.2 Panaromic Image Stitching stages:

Phase One: Image Acquisition
Initially image acquisition is done with the help of web camera.Images are captured using different cameras placed at different position.Image is captured using the face-time camera with a resolution of 640*480. This image is saved as reference image at a particular location specified in the program. The ordering of Images also takes place at this phase. RGB to gray conversion is done on the reference image.

Fig2.2.1 Image captured at 640*480 resolution

Phase Two: Edge Detection and Image Overlap
In this phase the Edge detection of these real time captured images is now done with the help of Canny edge detection operator. After the edge has been detected determine the overlapping area of images. Based on overlapping areas compute the edge offset of the overlapping image and determine the pixel where overlapping takes place and merge the images.

Phase Three: Image Stitching, Normalization and Display
Once the edge is detected and overlapping pixels are found stitch the image using image stitching algorithm. image stitching can be done in either two ways:

1. Direct Method
2. Feature Based Method

Direct Method

Direct method uses pixel-to-pixel matching. To use a direct method, a suitable *error metric* must first be chosen to compare the images.Once this has been established, a suitable *search* technique must be devised. The simplest techniqueis to exhaustively try all possible alignments, i.e., to do a *full search*. In practice, this maybe too slow, so *hierarchical* coarse-to-fine techniques based on image pyramids have been developed.

Alternatively, Fourier transforms can be used to speed up the computation.

Feature Based Method

The other major approach is to first extract distinctive *features* from each image,to match these features to establish a global

correspondence, and to then estimate the geometrictransformation between the images.

Our proposed system uses the Feature based Method for Image Stitching.

Image Stitching Algorithm Overview:

- Detect/extract keypoints (e.g., DoG/SIFT)

This stage also called as the SIFT feature extraction. The reliability of a motion estimate depends most critically on the size of thesmallest eigenvalue of the image Hessian matrix, λ0. This makes it a reasonablecandidate for finding points in the image that can be matched with high accuracy.

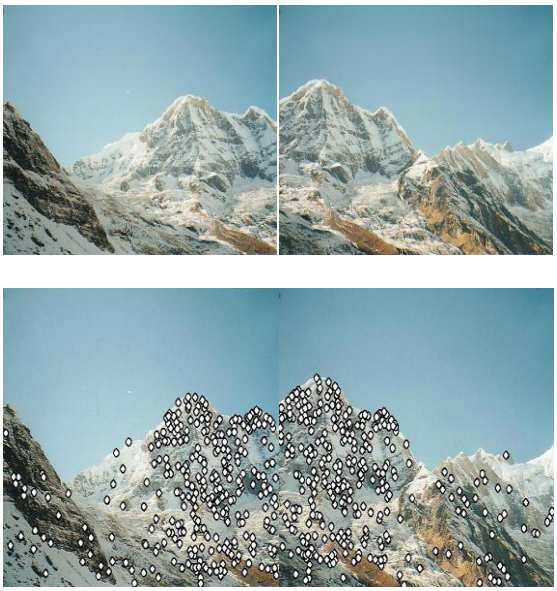

Fig 2.2.2 Initial Matched Points.

- Match keypoints (most similar features, compared to 2nd most similar)

This stage also called as Image Matching. After detecting the features (keypoints), we must *match* them, i.e., determine which features come

from corresponding locations in different images.Because feature points may not be exactlylocated, a more accurate matching score can be computed by performing incremental motionrefinement. The simplest way to find all corresponding feature points in animage pair is to compare all the features in one image against all the features in the other, using oneof the local descriptors

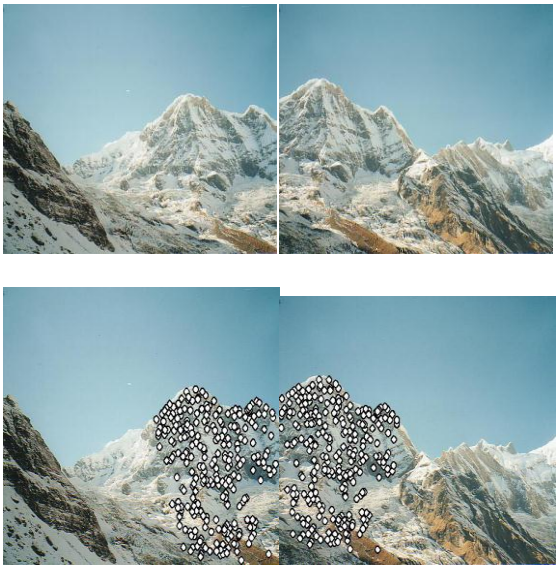

Fig 2.2.3 Final Matched Keypoints

- Points verification and Coincidence

Once an initial set of feature correspondences has been computed, weneed to find a set that is will produce a high-accuracy alignment. One possible approach is tosimply compute a least squares estimate or to use a robustified iteratively re-weighted) version ofleast squares. Two widely used solution to this problemare called RANdomSAmple Consensus, or RANSACfor shorthand *least median of squares* (LMS).Boththeniques start by selecting (at random) a subset of k correspondences, which is then used tocompute a motion estimate p. The *residuals* of the full set of correspondences are then computed as ri = ˜x′i(xi; p) − ˆx′i, where ˜x′i are the *estimated* (mapped) locations, ˆx′i are the sensed (detected) feature pointlocations.

The RANSAC technique then counts the number of *inliers* that are within ϱof their

predicted location, i.e., whose ||ri|| ≤ ϱ. (The ϱvalue is application dependent, but often is around 1-3 pixels.) Least median of squares finds the median value of the ||ri||values. This stage is called as Homography.

RANSAC: RANdomSAmple Consensus

Scenario: We've got way more matched points than needed to fit the parameters, but we're not sure which are correct

RANSAC Algorithm

Repeat N times

1.Randomly select a sample –Select just enough points to recover the parameters

2.Fit the model with random sample

3.See how many other points agree

4. Best estimate is one with most agreement

–can use agreeing points to refine estimate

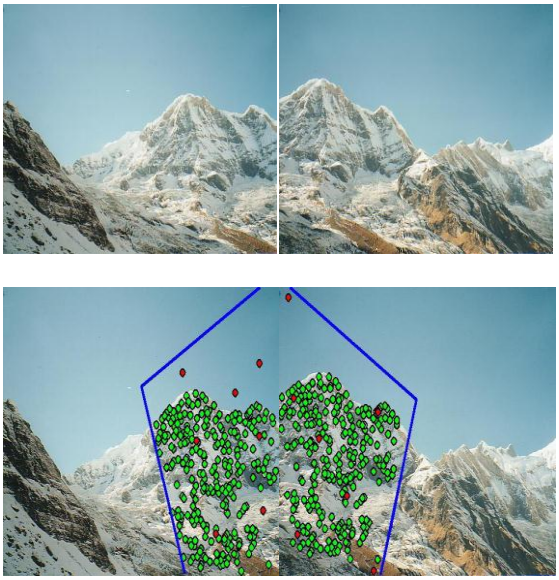

Fig 2.2.4 Keypoints Verification for Coincidence using RANSAC

- Transform the images using this homography

The random selection process is repeated S times, and the sample set with largest number of inliers (or with the smallest median residual) is kept as the final solution. Either the initial parameterguess p or the full set of computed inliers is then passed on to the next data fitting stage.Once we have computed a set of matched feature point correspondences, the next step is to estimatethe motion parameters p that best register the two images.The usual way to do this is to use leastsquares, i.e., to minimize the sum of squared residuals given by ELS=Xi ||ri||^2 = ||˜x′i(xi; p) −ˆx′i||^2.

Thus the stitching of the image has taken place as shown in the figure below.

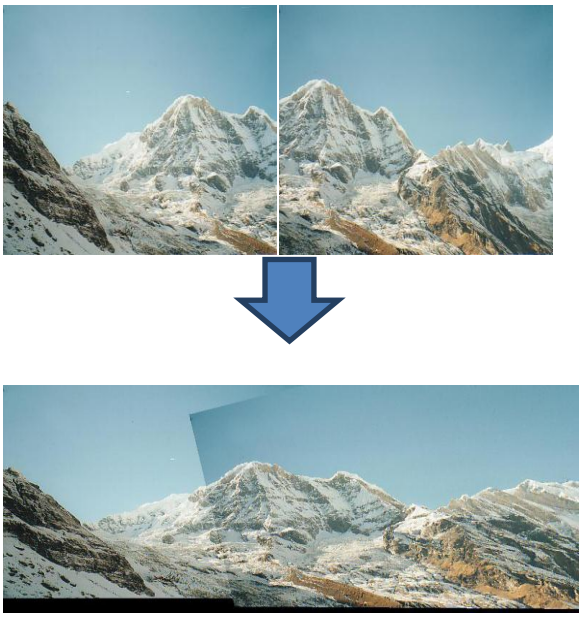

Fig 2.2.5 RANSAC for Homography

Phase Four : Object Detection

The core problemcan be defined as follows: Given an imageX with known figure/groundlabels L, infer the figure/ground labels L′ of a new image X′ closely related to X. For example, wemay want to extract a walking person in an image using the figure/ground mask of the same personin

another image of the same sequence. Our approach is based on training a classifier from theappearance of a pixel and its surrounding context (i.e., an image patch centered at the pixel) torecognize other similar pixels across images. This can be done by the technique called as the Foreground-Background Seperation/Extraction.

A key element is the use of a prior segmentation to reduce the complexity of thesegmentation process. As argued image segments are a more natural primitive for imagemodeling than pixels. More specifically, an image segmentation provides a natural dimensionalreduction from the spatial resolution of the image to a much smaller set of spatially compact andrelatively homogeneous regions.We therefore propose a region-based method to extract foreground regions. The foreground regionis decided by voting with scores from background subtractionto the sub-regions by graph- based segmentation.Background subtraction is one of the most commonapproaches for detecting foreground regions.

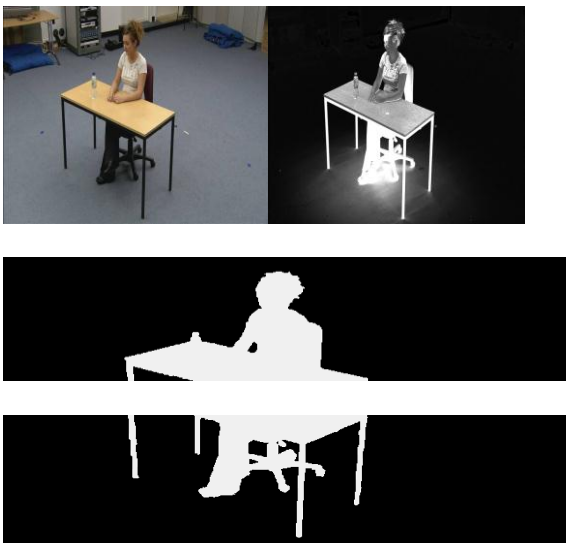

Fig:2.2.6 Object Detection using Foreground-Background Seperation

2.3 Block Diagram:

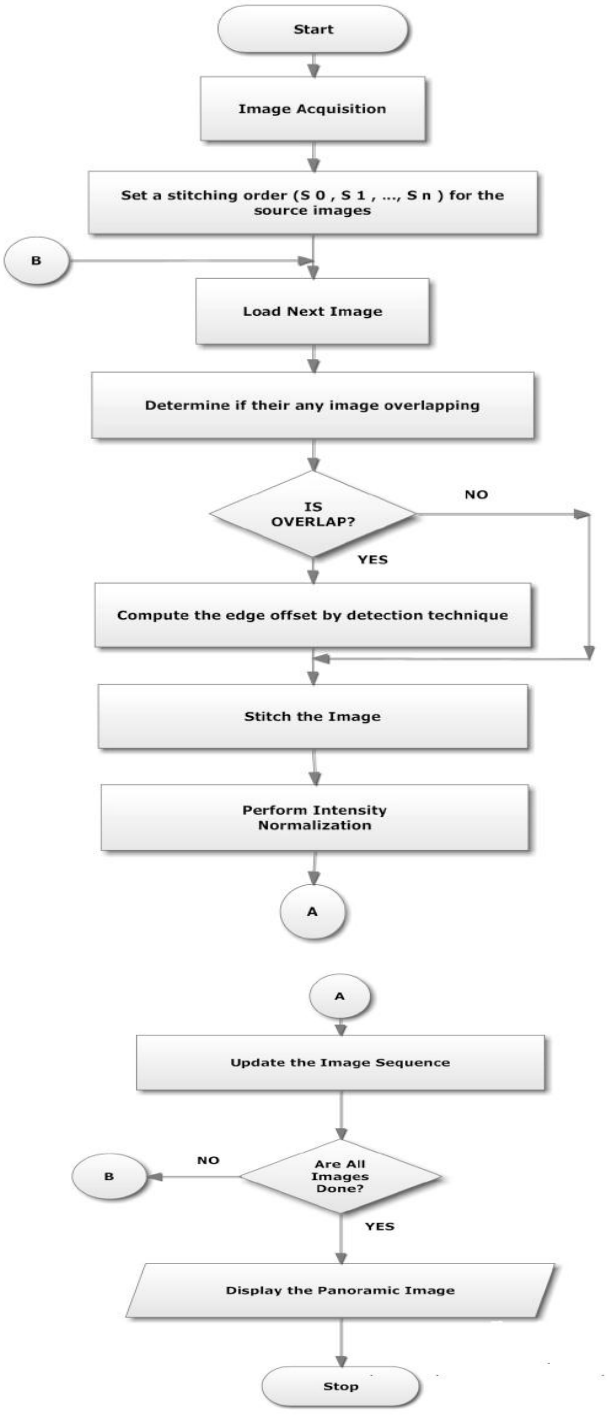

Fig 2.2 Block Diagram of Panaromic Image Stitching

2.3.1 ALGORITHM

1. First we will acquire the images from different cameras.
2. Set the order of the image acquired and take initial image and put it in panoramic image.

3. Now load the next image.
4. Determine if the image is overlapping. If no go to step 6.
5. Compute the edge offset and the pixel where overlapping takes place.
6. Stitch the image.
7. Perform Intensity Normalization to generate a uniform image.
8. Update the current panoramic image.
9. Repeat step 3 to 8 till all images are taken into consideration.
10. Display the final image.

2.4 Future Scope:

Every system developed is never complete there are always ongoing changes and the changes are iterative in nature. The idea behind this is to create a system with new features and functionalities being added to it. The service provided also needs to be enhanced. As our proposed system is generating Panaromas for Surveillance which only includes basic Object detection of images using Segmentation based approach. We can extend our system to include sound and remote control functions. It can be further be extended to be used for 3-D system.

Our proposed system is only for computer based security. In the future the Security feature can be implemented on mobile phones. It should be able to perform its intended functions in different work environments.

3.CONCLUSION:

The prime aim of this project is to capture individual images from different cameras fixed at certain position. The individual images are then stitched together to form one single Panoramic image which gives a wide field of view. This Panoramic image is then used for object detection.To learn some of the important techniques used in image processing and apply them to create an application which works on real world data to produce reasonable results.To perform functions using webcam as an input tool.To build a virtual input system.To build panoramic Image.To identify an object from an image.To extract features from input image.

4.REFERENCES:

[1]Y. Xiong and K. Pulli: "Fast Panorama Stitching for High-Quality Panoramic Images"– IEEE Paper – 2010.
[2]Wai-Kwan Tang, Tien-Tsin Wong, and Pheng-Ann Heng :"A System for Real-Time Panorama Generation and Display in Tele-Immersive Applications": IEEE TRANSACTIONS ON MULTIMEDIA, VOL. 7, NO. 2, APRIL 2005.
[3]Jiang Yu Zheng:" Digital Route Panoramas"-IEEE Paper – 2003.
[4]Digital Image Processing Second Edition- Rafael C. Gonzalez ,Richard E. Woods
[5]Image Alignment and Stitching: A Tutorial Richard Szeliski
[6] M. Brown, D. G. Lowe, Recognising Panoramas, ICCV 2003

Harmonic Reduction and Power Factor Correction using Boost Converter

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ABSTRACT

The conventional power factor correction circuit has a fixed output voltage. However, in some applications, a PFC circuit with a wide output voltage range is needed. A single phase power factor correction circuit with wide output voltage range is developed in this work.After a comparison of two main power stage candidates (Boost) in terms of efficiency, complexity, cost and device rating, the boost converter is employed as the variable output PFC power stage. From the loss analysis, this topology has a high efficiency from light load to heavy load.The control system of the variable output PFC circuit is analyzed and designed. Charge average current sensing scheme has been adopted to sense the input current. The problem of high input harmonic currents at low output
voltage is discussed. It is found that the current loop gain and cross over frequency will change greatly when the output voltage changes. To solve this problem, an automatic gain control scheme is proposed and a detailed circuit is designed and added to the current loop. A modified input current sensing scheme is presented to overcome the problem of an insufficient phase margin of the PFC circuit near the maximum output voltage. The charge average current sensing circuit will be bypassed automatically by a logical circuit when the output voltage is higher than the peak line voltage. Instead, a resistor is used to sense the input current at that condition.

1. INTRODUCTION

In the last years the use of electronic equipment has been increasing rapidly. This equipment draws a different current from the AC mains when compared to traditional loads such as motors and resistive heating elements. The current drawn from the AC mains has harmonic components, which leads to low power factor, low efficiency, interference in some instruments and communication equipment by the EMI, overtaxed electrical-distribution systems, overheated transformers and electromagnetic fields. A classical solution is the use of passive filters to suppress harmonics in power systems. However, passive filters have many disadvantages, such as large size, resonance, and fixed compensation characteristics. Therefore, it does not provide a complete solution.

The objective of active power factor correction is to make the input to a power supply look like a simple resistor. An active power factor corrector does this by programming the input current in response to the input voltage. As long as the ratio between the voltage and current is a constant the input will be resistive and the power factor will be 1.0. When the ratio deviates from a constant the input will contain phase displacement, harmonic distortion or both and either one will degrade the power factor. The most general definition of power factor is the ratio of real power to apparent power.

$$PF = \frac{P}{(V_{rms} \times I_{rms})} \text{ or } PF = \frac{Watts}{V.A.} \quad \text{.....(1)}$$

Where P is the real input power and $V_{rms}$and I_{rms} are the root mean square (RMS) voltage

and current of the load, or power factor corrector input in this case. If the load is a pure resistance the real power and the product of the RMS voltage and current will be the same and the power factor will be 1.0. If the load is not a pure resistance the power factor will be below 1.0.

Phase displacement is a measure of the reactance of the input impedance of the active power factor corrector. Any amount of reactance, either inductive or capacitive will cause phase displacement of the input current waveform with respect to the input voltage waveform. The phase displacement of the voltage and current is the classic definition of power factor which is the cosine of the phase angle between the voltage and current sinusoids.

2.1 HARMONICS:

Switching converters of all types produce harmonics because of the non-linear relationship between the voltage and current across the switching device. Harmonics are also produced by conventional equipment including:

1) Power generation equipment (slot harmonics).
2) Induction motors (saturated magnetic).
3) Transformers (over excitation leading to saturation).
4) Magnetic-ballast fluorescent lamps (arcing).
5) AC electric arc furnaces.

All these devices cause harmonic currents to flow and some devices, actually, directly produce voltage harmonics.

All loads are connected to a common bus called as point of common coupling and these loads are fed through power electronic equipments. These loads are called as harmonic producing load as they are fed through power electronic equipments. Because of switching action of power electronics switches, current and voltage waveform gets distorted which results in poor power factor and generation of harmonics. These produced harmonics are introduced into the system which results in poor power quality and also affects on the other consumers connected to the utility source.

To work system effectively and efficiently the high power quality of source is desired. So to avoid power quality pollution by harmonics, some international agencies like IEEE and IEC are enforcing consumers to prevent harmonics travelled back to the power system and affecting other consumers so there is need to take care of harmonics produced at the load side by the consumers, in other word the voltage at the point of common coupling should not get distorted. If the system impedance of the system is high, then the current harmonics that are introduced into the system are low. It means that the harmonics content that are introduced into the system by

the consumer load depends on the short circuit capability of the system.

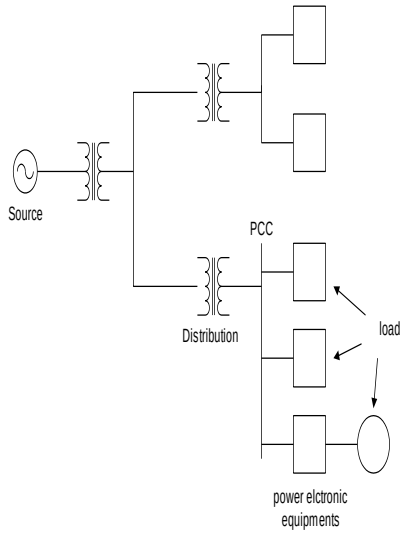


Fig.2.1 Single Line diagram of power system.The above Fig.2.1 is the fig of Single Line diagram of power system. In these fig we connect the load at the terminal end, to gate the wave form of the system in which the harmonic is present or not

2.2 POWER FACTOR:

Power factor is defined as the cosine of the angle between voltage and currentphasors in an accircuit. Cos Ø is called the power factor of the circuit. If the circuit is inductive, thecurrent lags behind the voltage and power factor is referred to as lagging. However, in acapacitive circuit, current leads the voltage and the power factor is said to be leading.In a circuit, for an input voltage V and a line current I,

VIcos Ø –the active power in watts or kW.

VIsin Ø- the reactive power in VAR or KVAR.

VI- the apparent power in VA or KVA.

Power Factor gives a measure of how effective the real power utilization of the system is.

It is a measure of distortion of the line voltage and the line current and the phase shift between them.

$$\text{Power Factor} = \frac{\text{Real power (Average)}}{\text{Apparent power}} \quad \textbf{.....(2)}$$

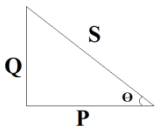
Where, the apparent power is defined as the product of rms value of voltage and current.The amount of displacement between the voltage and current indicates the degree to which the load is reactive. If the reactance is a small part of the impedance the phase displacement will be small. An active power factor corrector will generate phase displacement of the input current if there is phase shift in the feed forward signals or in the control loops.

Any filtering of the AC line current will also produce phase displacement. Harmonic distortion is a measure of the non-linearity of the input impedance of the active power factor corrector. Any variation of the input impedance as a function of the input voltage will cause distortion of the input current and this distortion is the other contributor to poor power factor. Distortion increases the RMS value of the current

without increasing the total power being drawn.

A non-linear load will therefore have a poor power factor because the RMS value of the current is high but the total power delivered is small. If the non-linearity is small the harmonic distortion will be low. Distortion in an active power factor corrector comes from several sources: the feed forward signals, the feedback loops, the output capacitor, the inductor and the input rectifiers.

Power factor depend upon active power and reactive power.



P-----Active power (KW)

Q------Reactive power (KVAR).

S-------Apperent power (KVA)

θ --------Cosine Angle.

Cos θ ------Power factor.

2.3 BOOST CONVERTER:

The most usual single phase non-linear load is the fiontend rectifier followed by a bulk capacitor, which draws current from the input during its charging. The boost preregulator, shown in Fig. 1 [l] [2], is a well-established technique that is used to reduce the harmonic contents and improves the power factor. The current control loop consists in the average current mode technique. The boost preregulator has some disadvantage because it can not be used in equipment already in service, and it is applied only to one kind of non-linear load which is the front end rectifier followed by a bulk capacitor.

A very interesting solution is the use of a single-phase active power filter, which is connected in parallel with the non-linear loads as shown in Fig. 2, allowing its use in existing plants. The active power filter concept uses power electronics to produce harmonic components which cancel the harmonic components from the non-linear loads. It can limit harmonics to acceptable levels and can adapt itself in case of harmonic component alteration or even changes in the non-linear loads types. Usually the technique used to control the single-phase active filter senses the non linear load current and calculates its harmonics components. This technique is not suitable in small power (up to 3kW). Reference [3] presented an easier way to control the active filter, sensing the input current and comparing it with a sinusoidal reference in phase with the AC mains voltage. The current control loop is based in a slide mode control technique. This paper will focus on the design and the control strategy for a shunt single-phase active power filter. The active filter is able to compensate the displacement of the input current in relation to

the AC mains voltage and the harmonics components of single and multiple non-linear loads, through the sensing of the input current. The current control loop is the same employed in the boost pre-regulator, which is the average control technique.

2.4 EFFECTS OF HARMONICS ON POWER QUALITY:

The contaminative harmonics can decline power quality and affect system performance in several ways:

1) Conductor loss and iron loss in transformers increase due to harmonics decreases the transmission efficiency and causes thermal problems.

2) The odd harmonics in a three phase system overload of the unprotected neutral conductor.

3) High peak harmonic currents may cause automatic relay protection devices to mistrigger.

4) Excessive current in the neutral conductor of three-phase four-wire systems, caused by odd triple-n current harmonics (triple-n: 3rd, 9th, 15th, etc.). This leads to overheating of the neutral conductor an relay.

5) Telephone interference and errors in metering equipment.

6) The line rms current harmonics do not deliver any real power in watts to the load, resulting in inefficient use of equipment capacity (i.e. low power factor).

7) Harmonics could cause other poblems such as electromagnetic interference to interrupt communication, degrading reliability of electrical equipment, increasing product defective ratio, insulation failure, audible noise etc..[2]

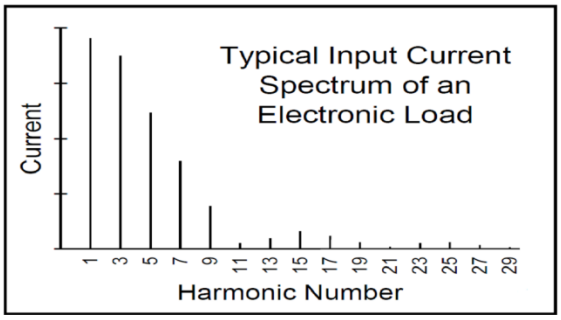


Fig 2.5 Harmonic number[6].

The above fig show the harmonic number in the system and which are affect to the equipment many the most harmful harmonic in the system are (3^0 &5^0 &7^0) harmonic in the system. To filter we are design the boost converter to filter out the harmonic in the system.

These fig. show current verses harmonic number, these harmonic is generated from electronic equipment. As the harmonic order goes on increase current goes on decreases and the effect on the equipment is also goes on decreases.

3. PRINCIPLE OPERATION

The converter, which is used as the active filter, is a full- bridge voltage source inverter, due to its current reversibility characteristics. The full-bridge inverter is

connected in parallel with the AC mains through a filter inductance Lf, and the DC side of the inverter is connected to a filter capacitor Cf, . Thanks to the appropriate control of the full bridge switches, the current If cancels the harmonics components of the non-linear loads, resulting in a sinusoidal input current in phase with the AC mains voltage. The switching frequency is constant and the SI and S2 gate signals are complementary to S3 and S4 ones. If the output voltage of the active filter (Vf) is kept constant, then the active power flowing in the active filter is zero. Thus, in the active filter flows a reactive power that cancels the reactive power generated by the non-linear loads, emulating a resistive load for the AC mains.

The outer voltage loop consists in the comparison of the voltage Vf with a reference voltage. The resulting error isinjected in an appropriate voltage controller. The output of the voltage controller is then multiplied by a sinusoidal signal proportional and in phase with the input voltage. The result of this multiplication is a reference current Iref. The inner current loop consists of the comparison of the reference current with the input current. The resulting error is injected in an appropriate current controller that in this case uses the average current mode technique. The output of the current controller is then compared with a triangular signal, generating the drive signals to the :switches. The control strategy of the active filter allows the compensation of harmonics and phase displacement of the input current for any non linear and linear load. Disturb waveform show the poor power quality in the system. We get this waveform from simple fan load i.e (inductive load).

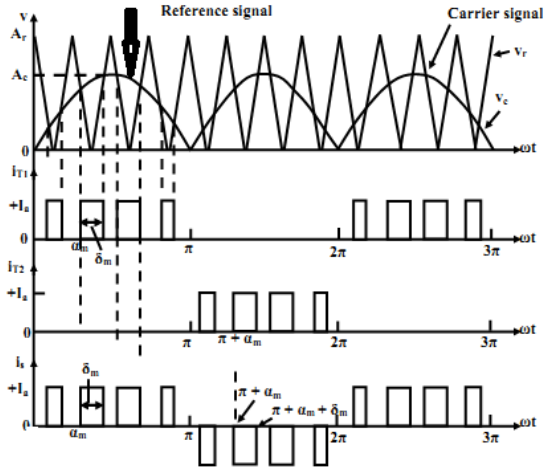


Fig 3.9 Pulse width modulation[6].

The relevant equations used to design the active filter, its outer voltage control loop and the inner current loop are presented below. The active filter capacitor Cf is calculated using (1). The voltage ripple is defined about 10% Vf, Po is the active power of the non-linear Load(s), and f_{line} is the frequency of the AC mains. The active filter inductance Lf is calculated using (2). AI,,, is the maximum current ripple and f, is the switching frequency. The smaller the inductance Lf, the better the ability to track

the desired input current. However, the maximum ripple increases. The choice of the maximum current ripple depends on the harmonics components of the non-linear loads. The bigger the harmonic distortion of the load, the bigger should be the tolerated ripple, otherwise the inductor will not track properly the input current.

$$C_f \geq \frac{P_0}{2 f_{line}(V_{f\max^2} - V_{f\min^2})} \quad \text{……(3)}$$

$$L_f = \frac{0.5 V_f}{\Delta I_{\max} f_s} \quad \text{……(4)}$$

The DC voltage-to-inductor current transfer function is presented in (3). The controller is an one pole one zero configuration. The zero must be located at a small frequency (around l Hz), and the pole must be located at about two decades above the zero. The voltage controller transfer function is presented in

$$G_v(s) = \frac{\Delta v_f(s)}{\Delta I_f(s)} = \frac{V_{s_{rms}}}{v_f} \cdot \frac{1}{C_f s^2} \quad \text{…….(5)}$$

$$H_v(s) = k_v \frac{(1 + S/W_{ZV})}{(1 + S/W_{pv})} \quad \text{……..(6)}$$

The inductor current-to-duty cycle (D) transfer function is presented in (5). As can noticed the difference between this transfer function and the one obtained in the boost pre-regulator is the gain. Thus the controller is the same used for the boost pre-regulator, which is an one zero two poles configuration. However, due to the different gain, the 1position of the poles and zero are different. The zero must be located about two decades above the switching frequency, one pole is located at 0 Hz and the other pole must be located around the switching frequency. The current controller transfer function is presented in (6). The transfer function of the ac line current sampling effect is shown in (7) and must be taken in consideration in the current controller design.

$$G_i(S) = \frac{\Delta I_f(s)}{\Delta D(s)} = \frac{-2V_f}{L_f} \cdot \frac{1}{S} \quad \text{…….(7)}$$

$$H_i(s) = k_i \frac{-(1 + S/W_{Zi})}{S(1 + S/W_{Pi})} \quad \text{……..(8)}$$

$$H_e(s) = 1 - \frac{S}{2 f_s} + (\frac{S}{\Pi f_s})^2 \quad \text{……(9)}$$

ADVANTAGES

- One of the main advantages of using an is that it can be used to reduce the effects of harmonics of more than one order.
- Boost converter are also useful in flickering problems that are caused in the power system.
- It is complex in the nature.
- Better utilization of electrical machine.
- Better utilization of electrical line.
- Reduction of losses.
- Reduction of voltage drop.
- Improved voltage level.
- Improved efficiency.

- Improved power quality.
- Extended life of equipment.
- Reduce the utility bill.

REFERENCE

[1] IEEE 519-1992 "IEEE Recommended Practice And Requirements For Harmonic Control In Electrical Power Systems .IEEE Power Application Society/ Power Engineering Society/ Institute of Electrical And Electronics Engineers, Inc. 345 East 47th Street, Newyork, Ny 10017, Usa. Published In 30 March 1999

[2] Rashid power electronics.

[3] C. S. Silva, "Power factor correction with UC38.54," Application Note, Unitrode, 1991, Lexington, MA, EUA.

[4] G. Hua, C. S. Leu, F. C. Lee, "Novel zero-voltage transition dual converters," IEEE PESC'92 Records, 1992, Toledo, Spain.

[5] D. A. Torrey, A. AI-Zamel., "Single-phase active power filters for multiple nonlinear loads," IEEE Transactions on Power Electronics, Vol. 10, pp. 263-271, may 1995.

[6]power factor correction of non linear load employing a single phase active filter.

Protection Based on Fault Induced High Frequency Current and Wavelets for Six Phase Transmission Line

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Abstract

Six-phase transmission is an optimal solution for increasing the power transmission capability of overhead power transmission lines over existing rights-of-way. This new technology, however, causes some protection problems. This paper introduces a new technique based on wavelet transform for high-speed distance protection of six-phase transmission lines. The technique utilizes a wavelet to capture the fault induced high frequency transient currents superimposed on the power frequency modal currents. The trip decision is based on the relative arrival times of these high frequency signals at the relaying point. The introduced technique is tested and validated through simulation studies. The technique is accurate and high-speed in fault detection irrespective of the fault type, fault inception angle, and fault resistance. Moreover, it is insensitive to the line terminals and transposition.The technique utilizes the wavelet transform for extracting the fault induced high frequency transient signals, and the travelling waves theory for determining their consecutive arrival times. Moreover, it is not affected by the line terminals and line transposition. The accuracy of the technique is proportional to the sampling frequency rate, however the error in determining the fault distance in the worst case does not exceed 1.5km. This accuracy could be improved either by increasing the sampling frequency rate or by using a smoothing algorithm.Wavelets are mathematical functions that cut up data into different frequency components, and then study each component with a resolution matched to its scale. They have advantages over traditional Fourier methods in analyzing physical situations where the signal contains discontinuities and sharp spikes.

1. Introduction

Three-phase transmission system encounters someProblems such as increasing demand and restrictions on rights-of-way (environmental laws). In this respect, six phase transmission system is Introducedas an optimal solution for mentioned problems. The existing double-circuit three-phase transmission line can be successively converted to a singlecircuit six-phase line. In this context, the first empirical six-phase line in the world was energized in USA in 1992. Therefore, there is a need to establish protection schemes for six-phase transmission system because the additional three-phases complicate the fault analysis and consequently the required protection. In this respect, the number of shunt faults is “120” in a six-phase system whereas it is only “11” in a three-phase.So far, there is a few protection schemes dedicated for sixphasetransmission lines. In this paper, a newprotection approach based on wavelet transform (WT) anddistance protection is presented.The WT of a signal consists of measuring the similaritybetween the signal and a set of translated and scaledversion of the basis function “mother wavelet”. Themother wavelet is a chosen fast decaying oscillatoryfunction The WT maps a given nonstationary signal fromthe time domain into time-frequency (scale) domain. Themain advantage of the WT is its ability to extract a tinydiscontinuity on a disturbed signal. This feature is usedfor detecting the abrupt disturbances such as faults in transmission lines. In this paper, a useful application of the WT ispresented for distance protection of six-phase transmissionlines. The technique is based on fault induced highfrequencies (HF) transient modal currents captured usingwavelets and the travelling wave theory. Extensivecomputer simulations of the proposed scheme show thatthe technique is accurate and high-speed irrespective offault type, fault inception angle and fault resistance.Moreover, it is unaffected by line terminals and linetransposition. .

2. Six Phase Transmission System

The 6-Φ transmission system can provide the same power transfer capability with lower ROW or can transfer 73% more power for the

same ROW as compared to the 3-Φ double-circuit system. Some of the advantages of using the 6-Φ transmission system are increased transmission capability, increased utilization of ROW, lower corona effects, lower insulation requirement and better voltage regulation. These benefits are among the reasons why power system engineers are enticed to consistently pursue knowledge on the power.

3. Wavelet Transform

Wavelet transform is relatively a new mathematicaltechnique for a non stationary signal analysis. In thisrespect, the WT of a time dependent signal *f(t)*consists of finding a set of coefficients *C(a,b)* that measure the similarity between the signal and a set of scaled (compressed or dilated) and translated (shifted) versions of a function *y(t)* called the mother wavelet that given by:

$$\psi_{a,b}(t)=\frac{1}{\sqrt{|a|}}\psi\left(\frac{t-b}{a}\right), \qquad a\neq 0$$

Where *"a"* and ***"b"*** represent the time dilation andtranslation respectively. The selection of the motherwavelet depends on the application. The coefficients*c(a, b)*, for the continuous wavelet transform, are defined by the following inner product:

$$CWT(a,b)=\int_{-\infty}^{+\infty} f(t).\,\psi^{*}_{b,a}(t).dt$$

Where "*" refers to complex conjugate.
Wavelet transform of a sampled signal can be obtainedby using the following discrete wavelet transform (DWT):

$$DWT(f,m,n)=\frac{1}{\sqrt{a_0^m}}\sum_k f(k)\,\psi^{*}\left(\frac{n-ka_0^m}{a_0^m}\right)$$

Where a_0^m , *k* represent a time exponential dilation andtime shift, respectively, n, k, a. are integers; % is some selected spacing factor (usually chosen equal to *"2"* for dyadic grid), and the dilation index (scaling) m is0,1,2,3 ,.... The DWT analysis involves successive pairs of low pass and high-pass filters at each scaling stage of the WT, The first scale covering a large frequency range at the high frequency end of the spectrum with the highest time resolution. The higher scales covering the lower end of the frequency spectrum with progressively shorter bandwidths with increasingly longer time interval.

4. Fault Induced Transient And Modal Transform

When a fault occurs on a power transmission line, high frequency transient signals of currents and voltages are induced at the fault point. These HF signals travel toward the line ends then they reflect back and forth between the fault point and the line ends until the post fault steady state is reached. However, these HF signals, which contain awealth information about the fault type, distance, and its direction are superimposed on *the* power frequency signals of the faulted and un-faulted phases due to the mutual coupling between phases. Therefore, modal transformation is used to decouple the phase signals into their respective aerial and ground modes. The relation between the phase currents and the modal currents given by:

Iphase = T* Imode

whereTis the modal transformation matrix and Iphase, Imodeare the phase and modal current vectors, respectively. Inthis study, the six-phase transmission line is assumed ideally transposed; therefore the Clarke's constant and realtransformation matrix is used

$$T=\begin{pmatrix} 1/\sqrt{6} & 5/\sqrt{30} & 0 & 0 & 0 & 0 \\ 1/\sqrt{6} & -1/\sqrt{30} & 4/\sqrt{20} & 0 & 0 & 0 \\ 1/\sqrt{6} & -1/\sqrt{30} & -1/\sqrt{20} & 3/\sqrt{12} & 0 & 0 \\ 1/\sqrt{6} & -1/\sqrt{30} & -1/\sqrt{20} & -1/\sqrt{12} & 2/\sqrt{6} & 0 \\ 1/\sqrt{6} & -1/\sqrt{30} & -1/\sqrt{20} & -1/\sqrt{12} & -1/\sqrt{6} & 1/\sqrt{2} \\ 1/\sqrt{6} & -1/\sqrt{30} & -1/\sqrt{20} & -1/\sqrt{12} & -1/\sqrt{6} & -1/\sqrt{2} \end{pmatrix}$$

The arrived phase signals are first transformed to theirmodal signals. The first mode (mode 0) is frequencydependent and refers to the ground mode that is usuallyused to distinguish grounded faults. The other five modes(model . . .mode5) are frequency independent and refer to the aerial modes that are present for any kind of fault.Accordingly, the fault distance is determined based on theaerial rnodes and their velocity.

5. Wavelet For Six-Phase Lines Distance Protection

The proposed approach uses wavelet transform as afault induced HF transient currents detector. For thispurpose, it is tuned to extract the HF currentssuperimposed on the modal power frequency currents atfreque.ncy ranges between 50 and 100 KHz. In this respect,the so-called "D4" mother wavelet, which is more suitablefor transient analysis, time-frequency localizing, is used.The fault distance calculation is based on thereflections times of the HF signals either from the faultpoint only or from both the fault point and far-end bus.This depends on the existence of a connection between thefault and the ground.

5.1. Ungrounded Faults

When the fault is ungrounded or symmetrical, thereflection from the remote end is insignificant and the faultdistance *x* is determined by measuring the time intervalbetween the first two consecutive peaks of similar polarityof the WT coefficients of the considered signal as follows:

$$x=\frac{v.\tau}{2}$$

Where V is the wave velocity of the aerial mode and z is the time interval between the two consecutive peaks of the WT coefficients. On the other hand, if the first two consecutive peaks are of opposite polarities, then fault is considered out of protection zone.

5.2 Grounded Faults

For a grounded fault the reflections from the fault point and from the remote end buses will be observed at the sending end of the faulted line. Depending on the fault distance, the reflections from the remote end buses may arrive before or after those reflections from the fault point. It cm be easily verified by using the lattice diagram method, that the remote end bus reflections will arrive later than the fault reflections if the fault occurs within the first half of the line. The opposite will be true if the fault occurs in the second half of the line. Another problem arises due to a ground connection is that the reflections may be from the adjacent (faulted/unfaulted) line.
Therefore, a suitable algorithm is developed to distinguish the faulted line and the fault distance as follows:

1. If the first two consecutive reflections are with same polarity, the fault is in the first half of the line. Moreover, if the time interval between these reflections plus the time interval between the first one and the first significant reflection of opposite polarity is equal to twice the traveling time of the considered line, the fault is on the considered line. Otherwise the fault is on the adjacent line.
2. If the first two consecutive reflections are with opposite polarities, the fault should be in the second half of the line. Moreover, if the time interval between these reflections plus the time interval between the first one and the first significant reflection of same polarity is equal to twice the traveling time of the considered line, the fault is on the considered line. Otherwise the fault is on the adjacent line.
3. If the two peaks of the WT coefficients are equal this refers to coincidence

between the reflected signals from the fault and from the far-end bus.

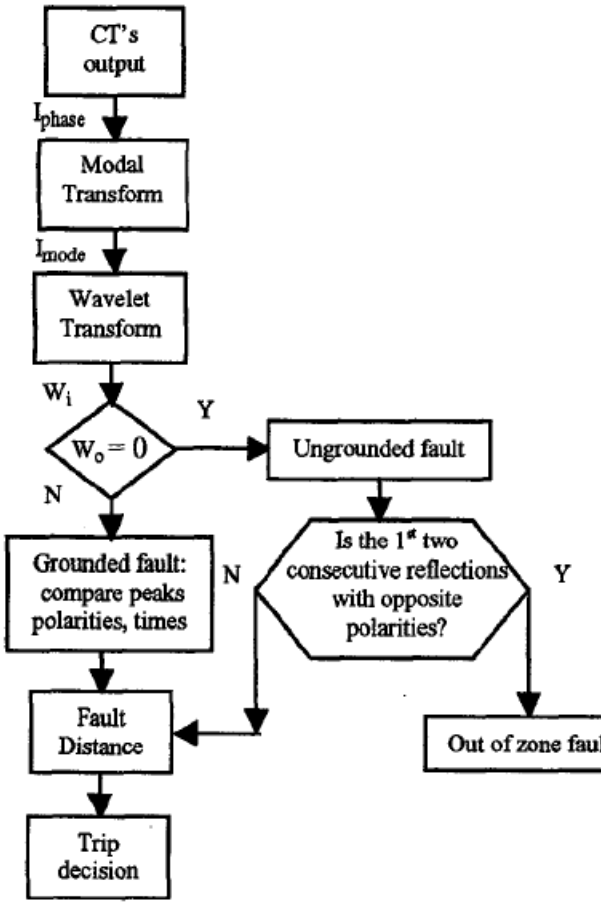
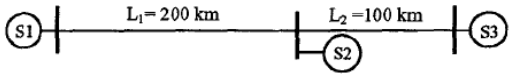


Figure 1. Shows a schematic block diagram of the proposed distance protection approach

6 Simulation Results

A verification of the developed approach with practical cases is carried out with the help of electromagnetic transient program (PSCAD/EMTDC). The algorithm of the proposed approach is programmed under the MATLAB environment and using its wavelet toolbox. The study is conducted on a 230 kV six-phase power transmission system shown in Fig. 2. The line parameters are considered to be frequency dependent. The source's impedances Zsl, Zs2 and Zs3 are 20, 10 and 20 ohms respectively. The arc resistance is included in the fault model.



The system is simulated under various types of faults at different locations, fault resistances, source configurations and fault inception angles. Moreover, the line transposition and untransposition are also considered. The relay is located at bus 1. A sampling frequency of 200 kHz is used and the CWT at scale 2 is used to capture the HF current signal superimposed on the aerial modes.

6.1 Source Configuration

Fig. 3 depicts the CWT coefficients of the modal current signal corresponding to phase **"a"** to ground fault at 180 km from source S1 on line L1 for fault inception angle of 90" of phase "a". Fig. 3.a corresponds to S1, S2, S3 impedances of 20, 10 and 20 ***i2*** respectively, whereas Fig. 3.b corresponds to equal sources impedances of 20 ohms. As shown in Fig. 3.a and 3.b, the first and second HF transientsignals arrive at bus bar 1 with positive and negativepolarities at times tl = 5.122 ms, **t2** = 5.255 **ms**respectively, this signifies that the fault is at the second half of the line. The time interval **z1** between tl, t2 is 0.133 **ms** and the time interval **z2** between tl and tlo is 1.2002 ms, where tlo is the arrival time of the first significant positive reflection, tlo = 6.3222 **ms.** Hence, z = **21+22** = 1.3332 **ms** which correspond to the 399.98 km which equals to the twice of the line length of L,. Therefore, the faulted line is**L1** and the fault distance is 180.05 **km.** Accordingly a trip decision from the relay near bus1 should be issued to the dedicated circuit breaker. This assures that the technique is insensitive to the system source configuration. This is due to the bus bar capacitances, which act as a short circuit at the considered range of frequency.

6.2 Fault Resistance

Fig. 4 shows the WT coefficients of the modal transient current for a single line to ground fault 'f-g' at 25 km from busl for a 135' fault inception angle and 400 *i2* fault resistance. Despite the WTC magnitude reduction, the wave shapes of the captured signals remain unchanged and accurate fault distance is calculated as follows: tl = 4.6 ms, tz = 4.764 ms and t4 = 5.772 ms, thus z 31-4. Hence, L1 is the faulted line and the fault distance is 24.6 lan. The obtained result proves that the proposed approach is insensitive to the fault resistance

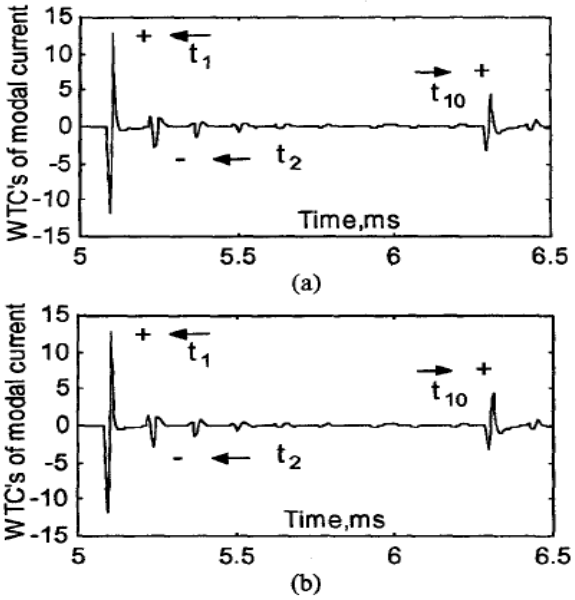


Fig. 3. A line-to-ground "a-g" fault at 180 km from S1: (a) Zs1 = Zs3 = 20 Ω, Zs2 = 10 Ω, (b) Zs1 = Zs2 = Zs3 = 20 Ω.

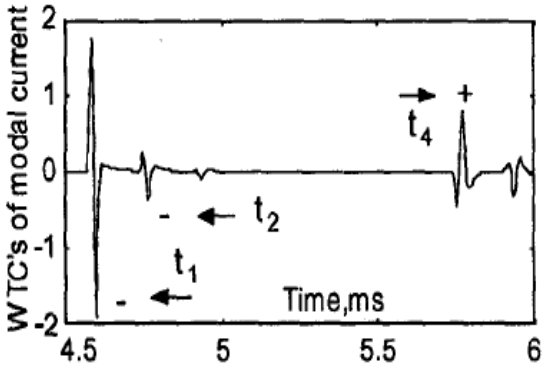


Fig. 4. A line-to-ground "f-g" fault at 25 km from S1 with φ = 135° and R_f = 400 Ω.

6.3 Fault Inception Angle

Figure 5 shows the WT coefficient for a single line to ground fault 'b-g' at 50 km bus1 for a zero fault inception angle and 0.5 ohms fault resistance. The fig. Shows that level of signals are smaller than those with higher fault inception angle, fig.3 , but the propagation characteristics of the HF transients are similar. This demonstrates that the proposed technique does not suffer from the limitations of a zero voltage fault inception angle as other traditionaltravelling wave travelling wave technique.

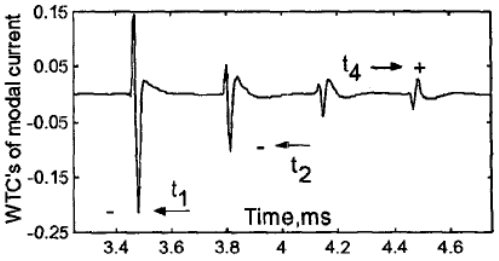


Fig. 5. A line-to-ground "b-g" fault at 50 km from S1 with φ = 0° and R_f = 0. 5 Ω.

6.4 Faults Type

Fig. 6 shows the WT coefficients for symmetrical 3-phase fault "b-d-f" at 130 km of **SI.** Since **WO** = 0 and the first two consecutive reflections are with similar polarities, the fault is at L1 and the fault distance is 130.5 km.

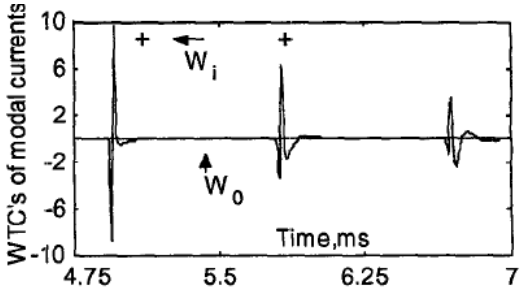


Fig. 6. A 3-phase "b-d-f" fault at 130 km of line L_1.

Fig. 7 shows the WT coefficients for a 4-phase fault "c-d-e-f" at 60 **km** of L. Also, since **(WO** = 0) and the **first** two consecutive reflections are with opposite polarities the fault is on the adjacent line and the relay will reset.

6.5 Untransposed Line

Due to untransposition, mutual couplings arise between the phases which consequently affect significantly the ground mode signal, whereas the aerial mode signals are slightly affected. Since the proposed method is based on the aerial modes, the WT coefficients will not affected by line untransposition as shown in Fig. 8, which corresponds to a six-phase fault at 130 km of the untransposed line L1. Therefore, the proposed approach is suitable and accurate for both transposed and untransposed lines.

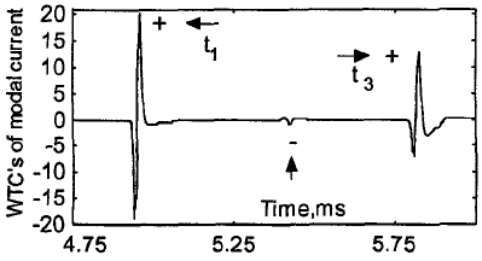


Fig. 8. A six-phase fault at 130 km from S1 of an untransposed line L_1.

Finally, it is worth noting that the proposed distanceprotection technique is complemented by the authors with a fault classification and phase selection technique

7. Conclusion

This paper presents a new distance protection technique based on the WT and a fault induced HF transients to be used for six-phase transmission. The technique utilizes the WT for extracting the fault induced HF transient signals, and the traveling waves theory for determining their consecutive arrival times. Studies show that the technique is high-speed and accurate irrespective of the fault type, fault inception angle and fault resistance. Moreover, it is not affected by the line terminal and line transposition. The accuracy of the technique is proportional to the sampling frequency rate, however the error in determining the fault distance in the worst case does not exceed 1.5 km. This accuracy could be improved either by increasing the sampling frequency rate or by using a smoothingalgorithm.

8. References

[1] J. R. Stewart, and D. D. Wilson, "High phase orderTransmission part I and 11," *IEEE Trans. on PAS Vol. 97, No. 6, Nov./Dec. 1978,pp. 2300-2317.*

[2] **S. S.** Venkata and et al, "Six phase (multi phase) power transmission systems fault analysis," *IEEE Trans.* ***on*** *PAS,Vol. 96, No. 3, MayIJune. 1977, pp. 758-767.*

[3] A. **A.** Hajjar, M.M. Mansour, and H. **A.** Talaat,
"Travelling wave-based protection of six-phase transmission lines," *The* ***41h*** *Conference* ***of*** *Arab CZGRE National Committees, Mars 18-21,2001, Tripoli Libya.*

[4] Mohamed Redzuan Bin Ahmad "Static and Dynamic Impacts Of Six-Phase Power Transmission System"

Role Of Gas Insulated Switchgear (GIS) In Power Distribution System

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Abstract

The necessity of space saving design has resulted in the use of Gas insulated switchgear (GIS) in modern power transmission and distribution systems. GIS can be considered superior from conventional air insulated switchgears. It has higher reliability and flexible design, reduced maintenance, better seismic withstanding capability, quicker installation time and most important of all, it has substantially smaller size reducing the area under operation tremendously for medium and high voltage transmission. In spite of all the advantages, we have to keep in mind that using Sulfur Hexafluoride (SF6) gas can pose environmental concern. This paper deals with the operating principle, SF6 monitoring, switching schemes and various components of GIS and the prospects of GIS in improving the power distribution system, if implemented in a city.

Keywords: Switchgear, Gas Insulated Switchgear, Power Distribution System.

1. Introduction

A Gas Insulated Switchgear substation (GIS substation) uses Sulfur hexafluoride gas (SF6 Gas) whose dielectric strength is higher than that of air, to provide the phase to ground insulation forthe switchgear of an electrical substation. This works where by the conductors and contactsare insulated by pressurized SF6 gas meaning clearances required are smaller than that ofAIS substations.

The major advantage of the GIS substation is that this phase to phase spacing can be reducedsignificantly resulting in a substation with comparable load capability to an AIS substation butwith a much smaller compound footprint. This is particularly advantageous in an urbanenvironment where land size is at a premium. It also results in a smaller visual impact on alandscape as it can result in a significantly smaller footprint than its AIS counterpart.The main disadvantage of the GIS substation type is the reduction in scope of the substationfor future offloading, as equipment can be costly and difficult to source over the long term.

However, with much more installations of GIS substations around the world, more standardization has been introduced into manufacturing of the GIS equipment and thereforesourcing of any such required equipment has become less onerous and costly.As a rule GIS are installed indoor. However outdoor GIS have also been installed in the recentpast and are becoming a more common option. Gas-insulated switchgear(GIS) also offers operators of high-voltagesupply systems reliable and flexible solutionsin areas where load densities arehigh and substation sites have to be keptsmall.

2. Construction

To short vacuuming process, but in case of intervention, to limit number of elements which getting fulland empty, a switchgear field has been sectioned per gas zones. Number of gas zones depends on theswitchgear size. Each gas zone is equipped with gas manipulating connector, vacuum meter forcontrolling and signaling the gas conditions, as well as with safety membrane.

Metal-enclosed SF6 gas insulated switchgearconsist of all elements (like other switchgear typeshave) necessary for switchgear manufacturing. To any single pole scheme available. Theseelements are:

- Circuit breakers,
- Insulators,

• Earthing switch,

• Bus-bars,

• Instrument transformer,

• Conducting insulators for operating

connection to power network,

• Cable end connections, or,

• Direct connections without air insulation.

The GIS consists of the electro technical power equipment, the local control and the monitoring equipment.

The GIS equipment is made up of bays (Fig. 1, 2&3).

Each bay contains:

1. all the devices attached to the wiring diagram busbar components, circuit breaker
2. and the various disconnectors,
3. The total control monitoring cubicle for the bay devices.
4. Local bay control panel

Control cubicle:

The local bay control panel contains;

1. the single phase mimic diagram of the bay,
2. the control switches of the switching devices,
3. the position indicating lamps of the switching devices,
4. the local remote mode selector switch,
5. the alarm panel board with signaling lamps.

The alarm panel signals any disturbance on:

1. SF6 gas monitoring
2. Circuit breaker monitoring,
3. Disconnectors monitoring,
4. Auxiliary supplies.

Bay control mode:

The control mode determines the control possibilities of the devices in each bay (disconnector, earthing switch and circuit breaker).

Priority:

Priority is normally given to continuity of supply. Operation is thus designed to respect this priority. For example if a monitoring function reveals a failure, an alarm is triggered, but bay operation is not interrupted.

Dependability:

Dependability is ensured by the interlocking functions between bay device operations. The interlocking functions only allow operations without risk for personnel and equipment.

3. SF_6Gas

- In pure form it is inert, exhibits exceptional thermal stability and has excellent arc quenching properties as well as exceptional high insulating properties, one of the most stable component, non-flammable, non-toxic and odorless.
- Its density s more than that of air and heat dissipation in it is also much more than that in air. At the atmospheric pressure the dielectric strength is about 2.4 times that of air at about 3 kg/cm^2 it is same as that of oil.
- There is some decomposition of gas after the long periods of arcing. However such decomposition is very little and has no effect upon dielectric strength and interrupting capability. The solid arc product formed by arcing is metallic fluoride which appears in the form of fine gray powder. This powder has high

dielectric strength under dry condition as existing in the breaker. A good quality absorbent is used in the apparatus to remove most of the gaseous decomposed by-products so the level of this gaseous by-product is kept very low.

3.1 SF_6 MONITORING

As gas density is not an easily measurable physical quantity, the specific mass of gas in the compartment is replaced by pressure brought to a reference temperature of 200 C expressed in relative value and brought to an atmospheric pressure of 0.1013 MPa. The term "pressure" means "corrected pressure brought to a temperature of 200 C and to an atmospheric pressure of 0.1013 MPa and characterizes the specific mass of gas in the specific conditions of use. Gas pressure in the devices and GIS substation compartments determines breaking and insulation withstand.

Compartment pressure is normally monitored at two levels:-

1. The first level indicates an acceptable pressure drop. It is placed slightly above minimum operating pressure, the equipment retains its properties and normal operating conditions remain unchanged. At this stage the operator must check and top up the compartment.

2. The second level indicates the minimum operating pressure. Under this pressure the devices dot not retain their insulation properties and the circuit breaker does not retain the breaking properties. Appearance of the second level includes automatic change in operating conditions, and device locking or circuit breaker tripping. Operation conditions are then determined by the chosen priorities. At this stage operating personnel must check the monitoring circuits and if necessary place part of the substation out of operation and top up the compartment.

4. Advantages

4.1 Compactness

One of the biggest challenges utilities are facing as they seek to improve andexpand their physical infrastructure is acquiring land upon to which to build. Right ofway acquisition is among the most difficult, time consuming steps in getting a newproject completed. For that reason, utilities are trying to make the best use of thespace they already have when embarking on a project to upgrade the grid. Gas-Insulated substation provides a solution to the space problem. It is ideal indense urban areas where land for new facilities is limited and only available atprohibitive cost. The compact features of gas-insulatedswitchgear (GIS) makes it an ideal choice for areas where it is desirable to minimizethe aesthetics impact of utilities and it is proving to bea positive for utilities tight on space. In fact, thegeneral direction of switchgear development throughout the entire quarter centurywas towards producing more compact designs, fulfilling higher voltage operation andimproving gas seal integrity. GIS Substation also offers unique advantages over air-insulated applications. GISsubstations use SF6 gas that reduces the distance needed between active and nonactiveswitchgear parts, resulting in smaller overall space requirements.

4.2 Dielectric and Arc Quenching strengths

Switchgear and its components are a vital link in the transmission and distributionchain. Gas insulated switchgear (GIS) using Sulphur hexafluoride (SF6) has been inuse since the

1960s, at high voltage (HV) application first and medium voltage (MV)much later. Air is also used for insulation but SF6 has significant property advantages, notably its dielectric and arc quenching strengths. SF6 gas allows smaller dimensionsbecause the insulating properties are 2.5 times higher than air.

4.3 SF6 does not deplete

As the SF6 does not age or deplete, operators do not need to top-up gas levelsduring the equipment's lifetime, taken as 40 years. For that reason as well there is noneed for maintenance on any component within the switchgear. AIS has humidity,dust, and altitude to contented with.

4.4 High operational reliability

It offers a great operational reliability because inside the enclosed gascompartments the primary conductors have complete protection against all externaleffects. The SF6 insulation ensures complete freedom from oxidation for the contactsand screwed joints, which means that there is no gradual reduction in the currentcarrying capacity of the equipment as it ages. There is also no reduction in insulationcapacity due to external factors. The minimal use of synthetics reduces the fire load

4.5 Important contribution to the security of supply

Total enclosure also means that the equipment is almost completely independentfrom the environment. SF6 -insulated switchgear can also be used under difficultclimatic conditions, for example: in humid areas with frequent condensations fromtemperature changes, and even in places with flooding potential.

Where the reliability of the insulation might otherwise suffer from contamination,e.g. dust from industry or agriculture or saline deposits in coastal areas. Gas-insulatedswitchgear completely eliminates this possibility throughout the whole service life ofan installation.

In contrast to air insulation, whose insulating capacity reduces with increasingaltitude, SF6-insulated switchgear retains its full insulating capacity regardless ofheight above sea level. So larger and more costly special designs, or equipment withhigher insulation ratings - and therefore more costly - are avoided.

4.6 Local operator safety

SF6-insulated switchgear makes a substantial contribution to reduce the accidentrisk. The total enclosure of all live parts in earthed metal enclosures providesimmanent protection against electric shock and minimizes the risks associated with human errors. The high-grade switchgear remains hermetically sealed for its wholeservice life.

4.7 Installation & Maintenance requirement

For GIS simple as factory assembled equipment are delivered, whereas for conventional outdoor it is time consuming and in case of indoor it is not only time consuming but also require very large size enclosure which are difficult to construct. GIS requires negligible and normally limited to operating mechanism maintenance whereas conventional outdoor and indoor switch yard require continuous maintenance.

4.8 Cost

Fig. 4, 5 & 6 compare the respective cost ofthe AIS and the GIS variant (the figures forthe

different components and external servicesapply to the German market). An interestrate of 8% and an inflation of 3%were assumed for the calculation of thecash values. A load growth of 1.5 % peryear (linear) was set and the cash valuecalculated for a planning horizon of 10years. It should be noted that planningtimes of 20 years and more, which have often been used in the past to evaluate differentvariants, are not realistic in today'srapidly changing market environment.

5. Disadvantages

5.1 Green House Effect

Many resolute anti- SF6 voices are being raised over the impact of the gas on theatmosphere. At a meeting of the Inter-governmental Panel on Climate Change – Theinternational body recognized by the UN in these matters – it was reported that itseffect is 25 times that of Carbon Dioxide. SF6 has been identified as a "greenhouse gas" having a long atmospheric lifetime.

The Kyoto Summit on Climate Change held in December 1997 included SF6 in the"basket of greenhouse gases". [UNIPEDE Group of Experts NORM SF6. (1998,June)]

According to March Mahoney, vice president of Transmission Network Asset

Management of National Grid when they replace the outdoor 345 kilovolt Gas Insulated Substation at the Brayton Point generating station in Somerset, Mass, with anew indoor facility he mentioned that the project will reduce future emission of SF6gas into the environment. This is a project decision when the GIS substation that wasbuilt in the early 1970's approaches the end of its useful life.

5.2 Health Hazard

The gas has little or no odor, so under these conditions physical asphyxiation canoccur. When exposed to an arc, such as might happen when a fault develops inelectrical equipment, the gas molecule breaks down and harmful by-products arecreated. These consist of metal fluoride powders and various gases. The powderysubstances cause irritation to the skin and mucous membranes, which at least warnthe affected person that they have exposed.

5.3 Potential Insulation Coordination Problem

The insulation coordination of GIS connected to an overhead line through anunderground cable poses a particular problem. The compact nature of GIS, when coupled with short sections of cable,complicates insulation coordination practice. The impact of a fast front transient canbe worse, since a flashover in solid insulation or GIS can result in permanent faultswhich require long term outages before repairs can be made.financial position.

6. Tables, Figures and Equations

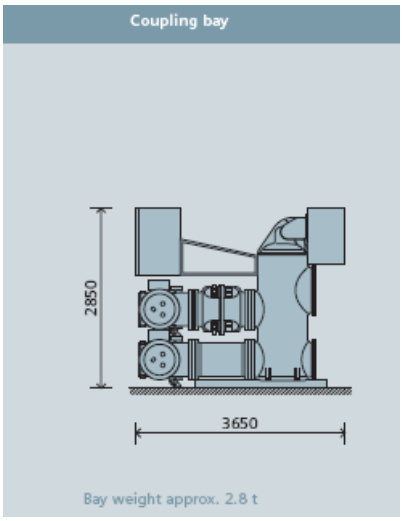


Fig. 1 Coupling Bay

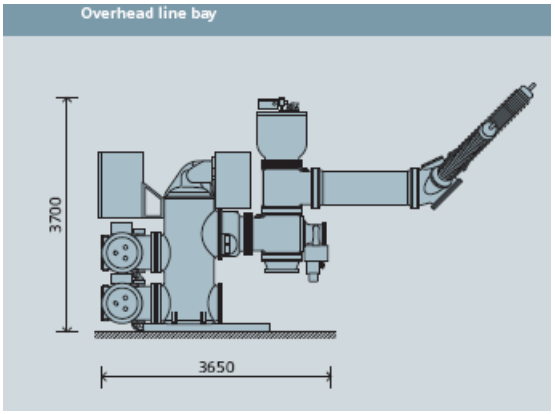
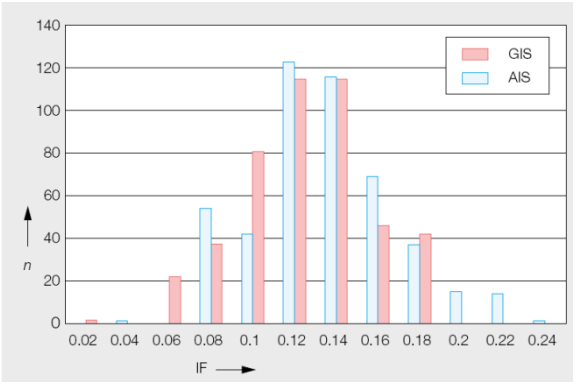


Fig. 2 Overhead line bay



n Number of MV nodes
IF Range of interruption frequencies (per year, upper value)

Fig. 5 Interruption frequency distribution

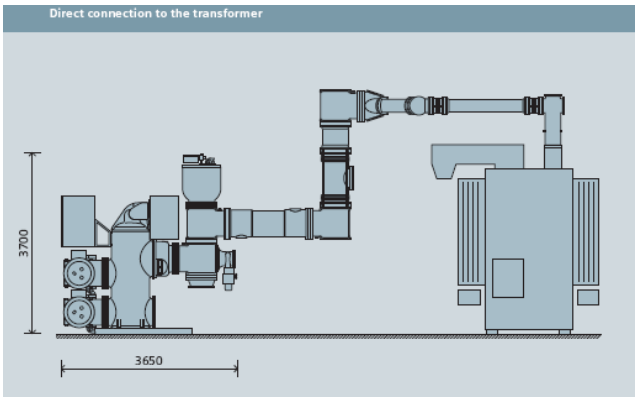


Fig. 3 Bay connecting Transformer

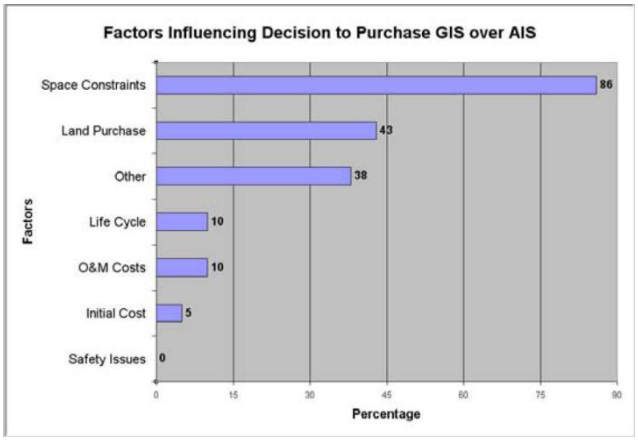


Fig. 6 Factors Influencing Decision to Purchase GIS over AIS

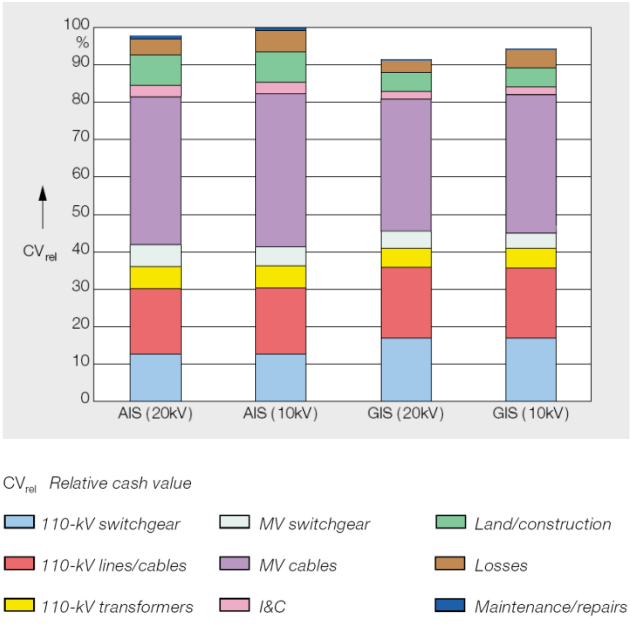
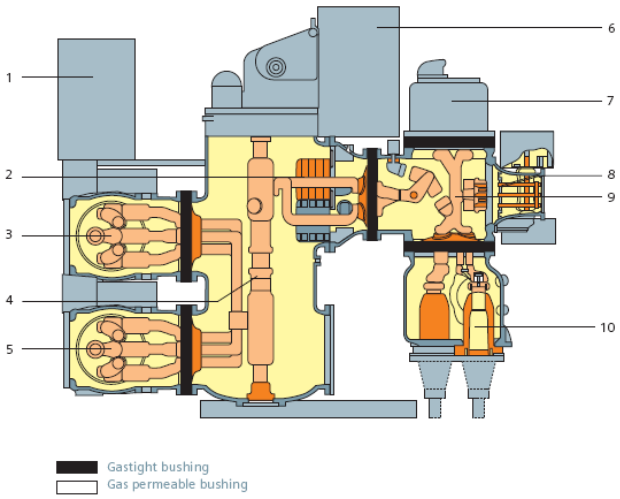


Fig.4 Comparison of life-cycle costs with GIS &AIS(over a period of 10 years)

Fig. 7 Three Phase Enclosure



1. Integrated Local Control Cubicle
2. Current Transformer
3. Busbar II With Disconnector & Earthing Switch
4. Interrupter Unit Of The Circuit Breaker
5. Busbar I With Disconnector & Earthing Switch
6. Spring-Stored Energy Mechanism With Circuit Breaker Control Unit
7. Voltage Transformer
8. High-Speed Earthing Switch
9. Outgoing Feeder Module With Disconnector & Earthing Switch
10. Cable Sealing End

Fig. 8 Interior Of GIS

7. Conclusions

Although the GIS solution appears initiallyto be the more costly, its flexibility allowsthe HV transformer substations to be sitedin optimum locations. The number of injectionsfrom the HV system can be optimizedand the transmission load of the MVnetwork reduced. This leads to a significantsaving in investment as well as operating costs which more than compensatesfor the additional cost of the GIS and HVcables.Another advantage of the GIS/cablecombination is that it offers better reliabilitythan the AIS/overhead line solution.Major customers linked to the HV substationvia parallel MV cables also experience this in everyday operation.And being inherent advantages of theGIS/cable variant, these benefits cost thenetwork operator nothing.GIS technology also offers furtherbenefits which are harder to quantify butwhich can be decisive for the realization ofa project. One example is the option ofcomplete integration of a GIS substation inan existing building when no extra sitearea is available. Summing up, GIS is acost-efficient, flexible and reliable solutionfor supply systems in regions with highload densities. The choice between GIS substation and AIS depends largely on the advantagesversus disadvantages of the two equipments. GIS being compact is the obvious choiceof many utilities because of its many technological advantages over AIS.And though most industry are getting conscious about global warming issues,until such time SF6 is banned, like those chlorofluorocarbons (CFCs) before for beingidentified as greenhouse gas, it is still worthy investment for a utility upgrade.

When it comes to financial aspect of an investment, overall performance measure,suggest GIS has significantly edges AIS. This can be attributed on the lesserinvestment as results to lesser footprint and operational cost requirement.

Acknowledgments

This review would not have been possible without the guidance and the help of several individuals who in one way or another contributed and extended their valuable

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References

[1] Metal-Enclosed SF6 Gas Insulated Switchgears

Rated Voltages 72.5 KV To 420 KV, Energoinvest Rasklopna Oprema A.D.

[2] Economics Between Conventional and Gas Insulated

Substation; A Project Decision, March Matienzo, William Laboguin & John Jucar.

[3] Comparison of GIS and AIS systems for urban supply networks,Werner Zimmermann, André Osterholt, Dr. Jürgen Backes, ABB Calor Emag Schaltanlagen AG.

[4] Laois-Kilkenny Reinforcement Project,

Technical Comparison of AIS v GIS Substation Options, Eirgrid.

[5]Gas-Insulated Switchgear up to 145 kV, 40 kA, 3150 A

Type 8DN8, Siemens.

[6]ABB Completes GIS Installation for SCPPA. (2005, April).Transmission & Distribution World, Retrieved December 11, 2007, from Business Source Corporate database.

[7]Abueg, R. (2005, April). Glendale Installs Its First GIS substation. Transmission &

Distribution World, Retrieved December 11, 2007, from Business Source

Corporate database.

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Impact of fiber nonlinearities in WDM communication system for all-optical functionalities

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Abstract

Nonlinear effects play a major role in optical fiber with respect to transmission capacity and performance of the system. This degrades the system performance in wavelength division multiplexing (WDM) systems, as many closely spaced channels propagate simultaneously, resulting in high optical intensities.These effects are interesting in themselves and can be detrimental in optical communications, but they also have many useful applications, especially for the implementation of all-optical functionalities in optical networks. Here, we briefly review the different kinds of optical nonlinearities encountered in fibers and importance of optical nonlinearities for developing various applications for all-optical functionalities. The paper simulates WDM optical communication system to analyze the effect of nonlinearities on the basis of bit error rate and Q factor.

Keywords:*All-optical functionalities, optical fiber nonlinearities, optical communication, optical fiber, wavelength division multiplexing.*

1. Introduction

Very high-capacity, long-haul optical communication systems are made possible by the extremely wide bandwidth of optical fibers, which is best exploited by wavelength division multiplexing (WDM) [1]. Fiber nonlinearity is the main destructive phenomena in high data rate optical communication systems. Because of limited low loss optical spectrum, WDM is an efficient technique to increase spectral efficiency [2]. To have more channels in the low loss optical spectrum, the channel spacing must decrease. As channel spacing decrease the fiber nonlinearity effects increase and cause to performance degradation of optical system. This degradation even is more critical for the long haul transmission where we need to supply high level of power to the fiber [6]. The system design engineers should not deploy high-bit-rate (>10Gbit/s per channel) multi-wavelength systems without considering the nonlinear effects and their impact on these systems.

On the other hand, optical nonlinearities can be very useful for a number of applications, starting with distributed in-fiber amplification and extending too many other functions, such as wavelength conversion, multiplexing and demultiplexing, pulse regeneration, optical monitoring, and switching [5]. In fact, the development of the next generation of optical communication networks is likely to rely strongly on fiber nonlinearities in order to implement all-optical functionalities. The realization of these new networks will therefore require that one look at the trade-off between the advantages and disadvantages of nonlinear effects in order to utilize their potential to the fullest [5].

Optical nonlinearities have become much more important since the development of the optical fiber amplifier. These amplifiers can

boost the power in a number of channels at different wavelengths simultaneously rather than having a separate repeater for each channel. This allows many more channels to be multiplexed into a single fiber than was economically viable with optoelectronic repeaters. Although the individual power in each channel may be below that needed to produce nonlinearities, the combined effects of all channels can quickly become significant. The combination of high total optical power and a large number of channels at closely spaced wavelengths is ideal for many kinds of nonlinear effects [3], including:

• Cross-Phase Modulation (XPM)

• Four-Wave Mixing (FWM)

• Stimulated Brillouin Scattering (SBS)

• Stimulated Raman Scattering (SRS)

Feeding the high power to the fiber not only increase the XPM and FWM effect but also cause to activate the effect of other fiber nonlinearity phenomena like SRS and SBS [4]. In multi-channel systems, FWM in optical fibers induces channel crosstalk and possibly degrades system performance.

Fiber nonlinearity is another technical challenge which limits the number of channel in WDM. The fiber nonlinearity causes to high interference and channel cross-talk between WDM channels. Therefore, Extra channel spacing is essential. In addition, the simplest approach to avoid fiber nonlinearity effects is keeping the light intensity low.

The system engineers should not deploy high bit rate (>10Gbps per channel) WDM systems without considering the nonlinear effects and their impact on these systems [2].

The paper discusses impact of these nonlinearities onWDM system. Also importance of nonlinear effects for developing various applications for all-optical functionalities has been presented.

2. Optical nonlinearities

Fiber-optic communication is a method of transmitting information from one place to another by sending light through an optical fiber. Fiber-optic communication systems have revolutionized the telecommunications industry and played a major role in the advent of the information age. The main benefits of fiber are its exceptionally low loss, allowing long distances between amplifiers or repeaters and its inherently high data-carrying capacity, such that thousands of electrical links would be required to replace a single high bandwidth fiber [5]. The huge bandwidth of optical fiber communication system can be utilized to its maximum by using multiple access techniques.So to be able to take the full advantage of the speed in optical fibers one of the basics concepts in fiber optic communication is the idea of allowing several users to transmit data simultaneously over the communication channel by simultaneously allocating the available bandwidth to each user.

When an optical signal is transmitted through long haul communication systems (the transmission of a light signal over fiber for distances typically longer than 100 km) of optical fiber, a significant distortion will be seen in the received signal. Distortion could be result of chromatic and polarization mode dispersion in Time Division Multiplexing (TDM) and fiber nonlinearity’s in Wavelength Division Multiplexing (WDM) impact

transmission performance. Nonlinear effects play a major role in optical fiber with respect to transmission capacity and performance of the system. To achieve maximum transmission rate, combination of TDM and WDM is used and optimized configuration of combination depends on few factors such as dispersion and optical signal power. There are upsides and downsides of using nonlinear effects in optical fiber [3, 4, 5].

2.1 Cross Phase Modulation (XPM)

XPM can be defined as a process in which intensity of one beam travelling in a nonlinear medium (Kerr medium) effects the phase of another beam [3].

In XPM, the intensity modulation of one of the beams results in a phase modulation of the other. As in SPM, the phase modulation translates into a frequency modulation that broadens the spectrum. However, because the total intensity is the square of a sum of two electric-field amplitudes, the spectral broadening caused by XPM is twice as large as in SPM

$$n = n_0 + n_2|E_1 + E_2|^2 \Rightarrow \emptyset_{NL}^{\omega 1}(z)$$

$$= \frac{2\pi n_2}{\lambda A_{eff}}[|E_1|^2 + 2|E_2|^2] \quad (1)$$

Because it is a nonlinear effect resulting from a two-beam interaction, XPM can be used for a number of all-optical applications in communication networks: wavelength conversion, demultiplexing, switching, and other optical-control applications. Being a very fast process, XPM is particularly attractive for wavelength conversion and can, in principle, scale to very-high bit rates and convert multiple wavelengths simultaneously with little or no degradation of the signal [7].

XPM can be used advantageously for control applications because, although it does not cause energy to be exchanged between optical beams, it can significantly alter the pulse shape and timing. In particular, one can use a "shepherd" pulse at a separate wavelength from the signal to manipulate and control the signal pulses. XPM has also been used to generate a comb of frequencies centered at an arbitrary wavelength by interacting a femtosecond pulse train with a CW beam. On the reverse side, XPM can create significant problems in WDM communication networks because of the crosstalk it can induce between nearby channels. This can affect the pulse shapes and amplitudes in different channels and lead to the time-dependent depolarization of nearby channels. One solution to mitigate this problem is to introduce a limited amount of dispersion in the system, sometimes by alternating the sign of the dispersion in successive fiber spans, keeping a small but finite residual dispersion (dispersion managed fiber)[8].

2.2 Four Wave Mixing (FWM)

FWM is a nonlinear process in optical fibers in which generally three signal frequencies combine and produce several mixing products. It originates from the weak dependence of the fiber refractive index on the intensity of the optical wave propagating along the fiber through the third order nonlinear susceptibility [6].

The number of the side bands use to the FWM increases geometrically, and is given by,

$$M = \left[\frac{N^3 - N^2}{2}\right] \quad (2)$$

Where, *N* is the number of channels and *M* is the number of newly generated side bands. For example, eight (8) channels produce 224 side bands. The Fig.1 shows the FWM products due to the channels increases [5].

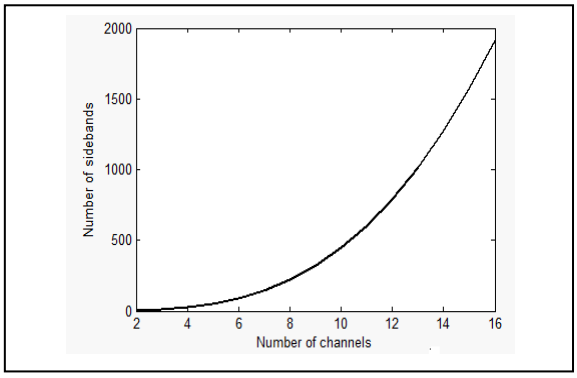


Fig 1: FWM products.

The most severe problems are imposed by Four-wave mixing (FWM), also known as four-photon mixing, is a parametric interaction among optical waves, which is analogous to inter modulation distortion in electrical systems. In a multi-channel system, the beating between two or more channels causes generation of one or more new frequencies at the expense of power depletion of the original channels. Since these mixing products can fall directly on signal channels, proper FWM suppression is required to avoid significant interference between signal channels and FWM frequency components. The power of FWM product is inversely proportional to the square of the channel spacing. The performance of an optical wavelength-division multiplexed system is analyzed taking the four-wave mixing (FWM) effect into account.

One of the two most common applications of FWM is wavelength conversion or wavelength exchange [9]. The conventional way of performing wavelength conversion is through phase conjugation of the signal to the idler, with ω_1 being the frequency of the pump, ω_3 the frequency of the signal, and ω_4 the idler frequency. Due to phase matching, ω_3 and ω_4 are symmetric with respect to the ZDW [9].

The other major application of FWM is parametric amplification, which is the basis for optical parametric amplifiers and lasers. Other dual-purpose applications are parametric amplification and demultiplexing in WDM systems, when the signal is composed of multi-wavelengths. The desired wavelength can then be isolated through filtering [6].

The theoretical comparison of XPM and FWM effect is given in Table 1.

2.3 Stimulated Brillouin Scattering (SBS)

In SBS, the Stokes wave is backscattered while the photo generated acoustic wave propagates collinearly with the incident pump beam. At the onset of SBS, the reflected light increases rapidly with incident optical power and the transmitted light eventually saturates [3]. The threshold for SBS is particularly low, because the gain coefficient is relatively high when compared to other nonlinearities such as SRS. The effective Brillouin gain coefficient is given by

$$g_B = \frac{\Delta v_B}{\Delta v_B + \Delta v_S} g_B(v_B) \quad (3)$$

Where $g_B(v_B)(\sim 5 \times 10^{-11}$ m/W) is the maximum Brillouin gain obtained for a perfectly monochromatic signal and Δv_B and Δv_s, the spectral widths of the Brillouin and signal beams respectively.

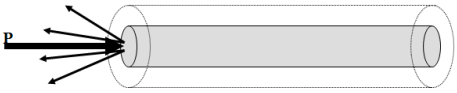


Fig 2: Stimulated Brillouin scattering.

The Brillouin gain can thus be reduced or, equivalently, the threshold raised by increasing the spectral width of the signal beam through dithering. Another technique used to mitigate SBS is the application of RF tones to the signal, which redistributes the power over several sidebands.

With the Stokes wave being backscattered, SBS can also be used for remote time-domain reflectometry [5]. In this latter application, a CW probe and a pulsed pump are counter propagated in the fiber, with the probe downshifted by the Brillouin frequency acting as the Stokes wave. Any mechanical change in the fiber can then be detected from the corresponding change noted in the Stokes signal, and the location of this change can be determined remotely by its arrival time.

Another common application of SBS is that for narrow line width amplifiers and lasers. An original implementation of a Brillouin laser has been proposed and demonstrated in an erbium-doped fiber. There, the combination of SBS and erbium gain leads to the appearance of strong higher order Stokes waves or a comb

TABLE1: COMPARISON OF XPM AND FWM

Nonlinear Phenomenon	XPM	FWM
Bit rate	Dependent	Independent
Origin	Nonlinear susceptibility	Nonlinear susceptibility
Effects	Phase shift is due to co-propagating pulses	New waves are generated
Shape of broadening	May be symmetric or asymmetric	---------
Channel Spacing	Increases on decreasing the spacing	Increases on decreasing the spacing

of frequencies with ~ 10GHz line spacing.

2.4 Stimulated Raman Scattering (SRS)

SRS differs from SBS in three ways. First, due to the lower Raman-gain coefficient $g_R \sim 1 \times 10^{-13}$ m/W, SRS occurs at much higher powers than SBS, which are typically greater than ~1 W. Second, the Raman shift, ~ 13.2 THz in silica, is much greater than the Brillouin shift. Thirdly, SRS generates a Stokes beam both forwards and backwards, although more efficiently in the forward direction [3].

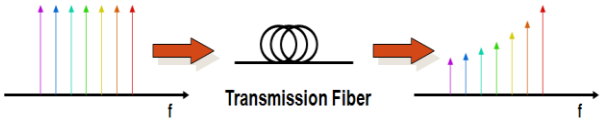


Fig 3: Stimulated Raman scattering.

A particular aspect of distributed Raman amplification in WDM systems is the transfer of energy from channels at shorter wavelengths (higher frequencies) to channels at longer wavelengths within the gain bandwidth. This introduces a positive tilt in the powers of successive channels. The gain in different parts of the spectrum must therefore be adjusted in order to compensate for this tilt and ensure equal channel power at the receiver input. This can be achieved by introducing, at an appropriate point in a fiber span, a broadband filter with a negative tilt, or a high-pass filter [5].

SRS gain is also being extensively used in a cavity configuration for laser applications. A Raman fiber laser consists of a Raman active fiber (usually a small-core HNLF) placed between two sets of cascaded Bragg gratings.

Each grating pair defines a cavity that lases at a particular Stokes wavelength, and successive gratings reflect light from increasingly higher Stokes orders.

3. Simulation and description

Here, we use the RsoftOptSim simulation software that gives us the environment almost the exact physical realization of a system. OptSim provides the users with laser diodes, filters, modulators and all the components which are essential to build an optical network.

The design model contains transmitter, receiver and fiber channel blocks. The transmitter contains Pseudo-random data generator which generates random bit sequences at the rate of 10Gbps. This bit sequence is fed to the NRZ coder that produces an electrical NRZ coded signal. The output of NRZ coder and CW laser are sent to amplitude modulator. It is an electro-optical modulator used to modulate the light wave with respect to transmitted electrical signal. The optical signal is fed into the single mode fiber**.** The fiber model in Optsim takes into account the unidirectional signal flow, Kerr nonlinearity and dispersion. Output of the fiber is sent to fiber grating, which is used to compensate the distortion of signal by reducing dispersion after each stage. Fibers grating compensator is used to reflect particular wavelengths of light and transmits others, achieved by varying refractive index (varying intensity of light). The output signal from fiber channel will be an input to raised cosine filter. Filter configuration is set to band pass filter. The band pass filter is used to transmit all the frequencies within the specified range. The sensitivity receiver is used to convert an optical signal into an electrical signal. Electrical scope is used to capture the output electrical signal, eye pattern. Eye pattern measurements are collected in time domain.

TABLE 2 :COMPARATIVE STUDY OF PARAMETERS OBSERVED USING OPTSIM

Parameters	**XPM**	**FWM**
Bit rate	10Gbps	10Gbps
Channels	2	2
Q factor (linear)	7.61813	10.37020
Q factor in db	17.63697	20.31574
Eye opening	0.14420E-03	0.23532E+01
BER	0.15540E-13	0.17043E-24

Two channel WDM is used for XPM and FWM as shown in Fig 4.

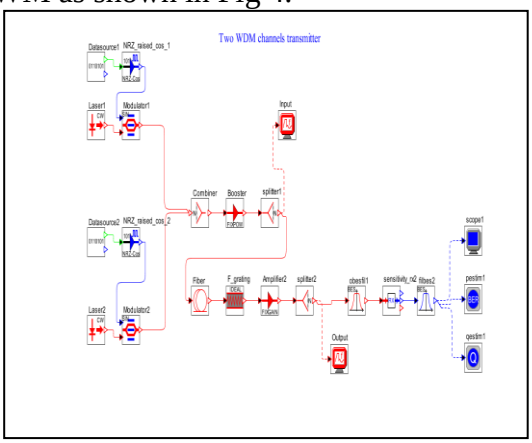


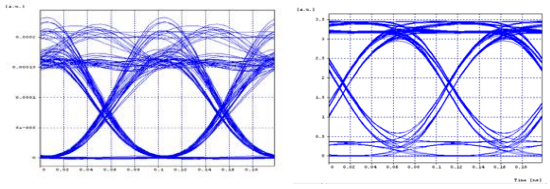
Fig 4: Simulation setup.

4. Results and discussion

Comparisons are based on eye pattern, BER and Q factor. A Q estimator, electric scope and BER estimator is placed at the end of each design (XPM and FWM) to assess the Q factor, BER and eye pattern features of the designs.

The eye pattern shown in Fig.5(a)for XPM has Q factor of 17.63697dB and has less value of eye opening. This is observed because of different amplitudes of signal with respect to power. XPM effect causes serious distortion in the signal. In FWM effect, high improvement

of Q factor is seen at the expense of eye opening, which is due to generation of new signal at a cost of power and can be observe in Fig.5 (b). Value of Q factor for FWM design is 20.31574, which ensures that the noise level present in the signal is negligible. The FWM dispersion effect achieves more than one WDM channel and better reception of signal with different power levels in the channels at receiver. The comparative study of all the measured parameters is given in Table 2below.



(a) (b)

Fig 5: (a) XPM eye pattern and (b)FWM eye pattern.

From the table and the related eye patterns, it is observed that XPM effect causes serious distortion in the signal. Whereas in FWM effect, high improvement of Q factor is seen at the expense of eye opening, this is due to generation of new signal at a cost of power.

TABLE 3: COMPARATIVE STUDY OF PARAMETERS OBSERVED FOR DIFFERENT NUMBER OF CHANNELS

Number of channels	2	4	8
Q factor in db	20.31574	16.74121	12.75
BER	0.1704E-24	0.1810E-12	0.8615E-05

As FWM is more effective and advantageous, it is necessary to analyze its effect on multichannel system for varying number of channels. The comparative study of all measured parameters for different number of channels is as shown in Table 3.It is observed that as number of channels increases FWM effect increases.

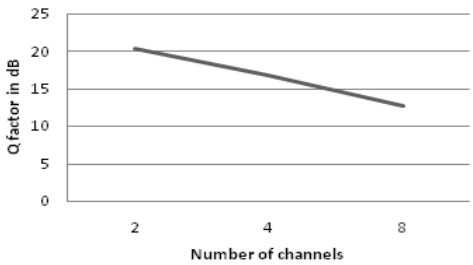


Fig 6: Q factor Vs. Number of channels.

5. Conclusion

Optical nonlinearities of the fibers play a detrimental role in the light propagation. Both XPM and FWM cause interference between channels of different wavelengths resulting in an upper power limit for each WDM channel. These nonlinearities can be managed through proper system design. FWM is of particular concern on account of its relatively low threshold power and rises very quickly as the number of channels increased. The efficiency of FWM crosstalk generation can be reduced by increasing the frequency separation between the various channels, increased channel separation would preclude dense WDM systems.

By appropriate system design, one can achieve trade off between advantages and disadvantages of optical nonlinearities. Hence it will be useful for many device and system applications.

References

[1] Gerd Keiser, "*Optical Fiber Communication*", McGraw-Hill Higher Education, 2000.

[2] G. P Agarwal, "*Fiber Optic communication systems"*, John Wiley and Sons, Inc., 1992.

[3] G. P. Agrawal, "*Nonlinear Fiber Optics"*, 3rd ed. San Diego, CA: Academic, 2001.

[4] G. P. Agrawal, Nonlinear fiber optics: its history and recent progress [Invited], Vol. 28, No. 12 / December 2011 / J. Opt. Soc. Am. B

[5] J. Toulouse, "Optical Nonlinearities in Fibers: Review, Recent Examples, and Systems Applications", *J. Lightw. Technol*, Vol. 23, no. 11, November 2005

[6] Kai Song, MalinPremaratne, "Effects of SPM, XPM, and Four-Wave-Mixing in L-Band EDFAs on Fiber-Optic Signal Transmission*", IEEE Photon. Technol. Lett.*, Vol. 12, no. 11, pp. 1630–1632, December 2000.

[7] Kumar, Dong Yang*J, "*Second-Order Theory for Self-Phase Modulation and Cross-Phase Modulation in Optical Fibers", *Lightw. Technol*, Vol. 23, no. 6, pp.2073-2081, June 2005

[8] S. Betti and M. Giaconi, "Analysis of the Cross-Phase Modulation in Dispersion Compensated WDM Optical Fiber Systems", *IEEE Photon. Technol. Lett.*, Vol. 13, no. 12, pp. 1304-1306, December 2001.

[9] Nazmi A. Mohammed, Mahmoud M. Ragab, Moustafa H. Aly, "Four wave mixing based wavelength conversion using different types of fibers",*International Journal of Engineering Science and Technology (IJEST)*, Vol. 4 , no.01, pp. 324-331 January 2012.

Information Security through Digital Watermarking by applying DWT Algorithm

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ABSTRACT

Digital watermarking is the newfangled idea in digital media. The replication and modification of digital media content is done frequently. The Digital watermarking using DWT algorithm can be one of the effective ways to secure authenticity and secrecy of digital media content with enhanced values of the PSNR, fusion image entropy, and standard deviation.In the information hiding community digital watermarking has achieved immense popularity due to its righteous stronghold against piracy and non-repudiation. Algorithms differ from each other according to the applications & the purpose they serve. In this paper we focus on digital watermarking technique & algorithm using DWT, its result & comparison with DCT.

Keywords— Digital Watermarking, DWT, authenticity, Secrecy of digital media, PSNR,fusion image entropy, and standard deviation, DCT.

I. INTRODUCTION

During the past decade, with the development of information digitalization and internet, digital media increasingly predominate over traditional analog media. However, as one of the concomitant side-effects, it is also becoming easier for some individual or group to copy and transmit digital products without the permission of the owner. The digital watermark is then introduced to solve this problem. Covering many subjects such as signal processing, communication theory and Encryption, the research in digital watermark is to provide copyright protection to digital products, and to prevent and track illegal copying and transmission of them. Watermarking is embedding information, which is able to show the ownership or track copyright intrusion, into the digital image, video or audio. Its purpose determines that the watermark should be invisible and robust to common processing and attack. Currently the digital watermarking technologies can be divided into two categories by the embedding position——spatial domain and transform domain watermark. Spatial domain techniques developed earlier and is easier to implement, but is limited in robustness, while transform domain techniques, which embed watermark in the host's transform domain, is more sophisticated and robust. With the development of digital watermarking, spatial techniques, due to their weakness in robustness, are generally abandoned, and frequency algorithm based on DCT or DWT becomes the research focus.

II. DIGITAL WATERMARKING

Digital Watermarking is a process of embedding unobtrusive marks or labels into digital content. These embedded marks are typically imperceptible (invisible) that can later be detected or extracted.

II.1 Purpose of Watermarking

The watermarks added to digital content serve a variety of purposes, as follows:

- Authentication & integrity verification
- Ownership assertion
- Fingerprinting
- Content Labelling
- Content Protection
- Usage Control- added to limit the number of copies created whereas the watermarks are modified by the hardware & at some point would not create any more copies like DVD.

II.2 Digital Watermarking Techniques

The most important properties of any digital watermarking techniques are robustness, security, complexity, imperceptibility & verification.

Robustness can be defined as if the watermark can be detected after media (normal) operations like filtering, lossy compression, geometric modifications, or colour correction. Security means the embedded watermark cannot be removed beyond reliable detection by targeted attacks. Complexity can be described as the effort & the time required for the watermark embedding & retrieval. Imperceptibility means the watermark is not seen by the human visual system (HVS). Verification is the procedure where there is a private or public key function is used.

Spatial & frequency domain watermarking are applied to the images & the text.

Spatial domain watermarking slightly modifies the pixels of one or two randomly selected subsets of an image. Modifications might include flipping the low-order bit of each pixel. But this technique is not reliable when subjected to normal media operations like Filtering or Lossy compressions.

Frequency domain watermarking is also called as transform domain technique. Values of certain frequencies are altered from their original frequency values. Typically, these frequency alterations are done in the lower frequency levels, since the alterations at the higher-frequencies are lost during compression. T he Verification can be difficult since this watermark is applied indiscriminately across the whole image.

III. WAVELET TRANSFORM

III.1 Theory

Wavelet transforms decompose a given signal into several scales at different levels of resolution. At each scale, the wavelet transform coefficients that correspond to a particular disturbance event are exclusively larger than those do not correspond to the event in the question. So, related coefficients used to be kept, while others are discarded.

Wavelet transforms consists of a pair of transformations from one domain to another domain. The original domain is the time domain in Wavelet transformations, while the transformed domain is called the time-scale domain. The transformation process from time domain to time-scale domain is a forward transform, because a given signal is decomposed into several other signals with different levels of resolution.

It's possible to recover the original time domain signal without losing any information. This reverse process is called as the inverse wavelet transform or signal reconstruction. These two processes compose the wavelet transform.

Let x(t) be the time domain signal to be decomposed or analysed. The dyadic Wavelet transform (DWT) of x(t) is then defined as,

$$DWT_{\psi}x(m,n) = 2^{\frac{-m}{2}} \int_{-\infty}^{\infty} x(t)\psi^{*}\left(\frac{t - n2^{m}}{2^{m}}\right)dt$$

Where * denotes a complex conjugate, m & n are scale & time- shift parameters $\psi(t)$ is a function of mother wavelet.

A. Methods

The spatial domain method & proposed discrete wavelet transform domain method are illustrated in figure1 & 2.

In this proposed algorithm for digital watermarking we are using discrete wavelet transform domain. In the transform domain analysis, replacement method and binary representation method have almost equal performance.

To validate the effectiveness of the algorithm, two images i.e. one is an original (cover) image & other is a logo image are taken, which are shown in figure 3 (a)&(b) respectively. Then the DWT algorithm is applied to the cover image & these two images are embedded. This will result in a watermarked image; &hence for the image extraction the IDWT needs to apply, which will give the original (reconstructed) image. The flowchart for the same process is shown in the figure 2.

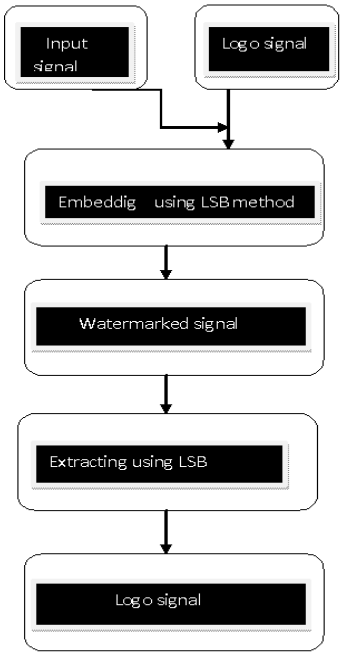

Fig. 1 Flow in the spatial domain technique

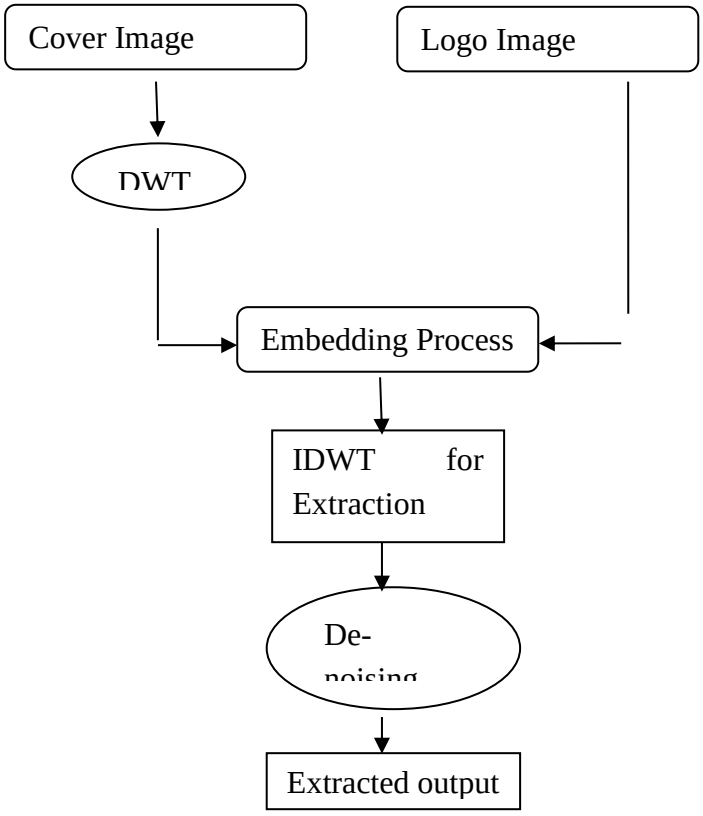

Fig. 2 Flow in the Proposed Discrete Wavelet Transform domain technique

Fig. 3 (a): A Cover Image

Fig. 3 (b): A Logo Image

IV. RESULT

For effectiveness of the algorithm, two images of the same scene have to be taken at different times & then these images should be tested by applying the proposed algorithm. For comparison purpose, the general clarity based algorithm without using wavelet enhancement can also be applied upon the same & results can be compared for the specific results. This comparison should be based on the following evaluation criteria: the image entropy, standard deviation and clarity. Image entropy and standard deviation reflects the amount of information contained in the image; the spatial resolutionperformance reflects the representation ability of the image.

The proposed algorithm uses the wavelet transformation technique; generally will give larger values of the PSNR, fusion image entropy, standard deviation than the general methods without using wavelet transformation.

Entropy and standard deviation is increasing, indicating that the integration based on wavelet enhancement. This can broaden the image intensity distribution, increase the amount of information and dig the hidden information into the fused image to the maximal extent. The wavelet enhanced fusion image is expected to give better overall result. From the aspect of objective criteria or visual effect, the proposed fusion algorithm based on wavelet enhancement will be better than the algorithm without enhancing the original images.

The obtained results are as follows;

Fig.4: Capturing cover Image

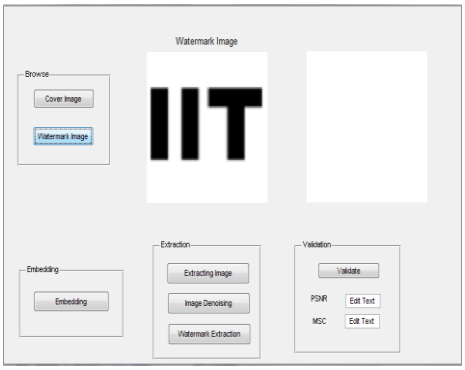

Fig.5: Capturing Watermark Image

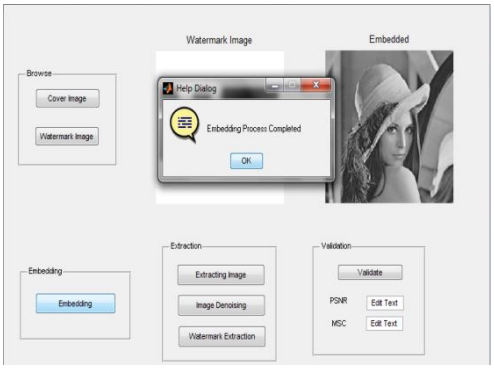

Fig.6: Embedding Process

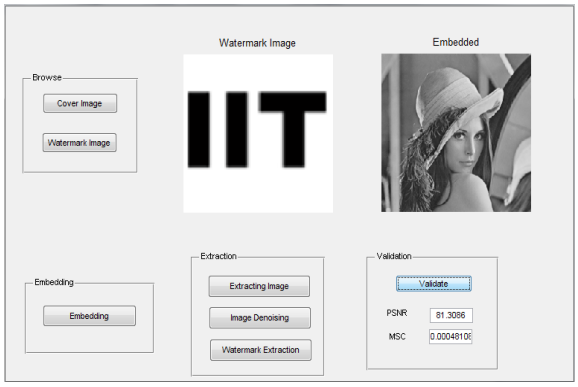

Fig.6: Result displaying PSNR & MSC values

Table 1: Comparative analysis of the result

Sr. No	Cover Image	Watermark Image	PSNR Value (DWT)	MSC Value (DWT)	PSNR Value (DCT)	MSC Value (DCT)
1			80.5038	0.0005790 2	68.4021	0.00 0982 04
2			81.3086	0.0004810 8	70.3054	0.00 0974 36
3			85.576	0.0001800 8	73.6483	0.00 0769 42
4			85.6842	0.0001756 5	73.7212	0.00 0768 63
5			81.3086	0.0004810 8	70.3054	0.00 0973 46
6			81.3086	0.0004810 8	70.3054	0.00 0973 46
7			80.5704	0.0005702 1	68.5621	0.00 0968 02

V. CONCLUSION

The proposed algorithm uses the wavelet transformation technique; generally will give

larger values of the PSNR, fusion image entropy, standard deviation than the general methods without using wavelet transformation e.g. DCT algorithm.

Entropy and standard deviation is increasing, indicating that the integration based on wavelet enhancement. This can broaden the image intensity distribution, increase the amount of information and dig the hidden information into the fused image to the maximal extent. The wavelet enhanced fusion image is expected to give better overall result. From the aspect of objective criteria or visual effect, the proposed fusion algorithm based on wavelet enhancement will be better than the algorithm without enhancing the original images.

This proposed method is reliable, highly secured compared to the spatial domain method.

As a future scope, the comparative results & comparative statistics is to prepare to validate the reliability, authenticity of the proposed algorithm.

REFERENCES

[1] Perez-Gonzalez, F.; Hernandez, J.R.;" A tutorial on digital watermarking" *Security Technology, 1999. Proceedings. IEEE 33rd Annual 1999 International Carnahan Conference on*. Oct. 1999 Page(s):286 – 292

[2] Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom "Digital Watermarking" Morgan Kaufmann Publishers ISBN: 1-55860-714-5.

[3] Yusnita Yusof and Othman O. Khalifa, "Digital Watermarking For Digital Images Using Wavelet Transform", Proc 2007 IEEE conference, pp 665-669.

[4] Santa Agreste, Guido, Daniela, Luigia "An image adaptive, wavelet-based watermarking of digital images", Journals of computer science and applied mathematics, 30 may 2006.

[5] S. Katzenbeisser and F.A.P.Petitcolas,, "Information Hiding Techniques for Steganography and Digital Watermarking", Artech House, 2000.

[6] H. Inoue, A. Miyazaki, T. Katsura "An Image Watermarking Method Based on the Wavelet Transform", Kyushu Multimedia System Research Laboratory.

[7] F.A.P. Petitcolas,, "Watermarking Schemes Evaluation" ", in IEEE Signal Processing Magazine, Vol 17, pp 58-64, September 2000.

[8] R. Dugad, K. Ratakonda, and N. Ahuja, "A new wavelet-base for watermarking image", *Proc. Int. Conf. Image Processing*, vol. 2, pp.419 - 423 , 1998.

[9] H. Inoue, A. Miyazaki, A. Yamamoto, and T. Katsura, "A digital watermark based on the wavelet transform and its robustness on image comression and transformation", *IEICE Trans. Fund. Electron., Commun., Comput. Sci.*, vol. E82-A, pp.2 - 10 , 1999.

[10] H.-J. M. Wang, P.-C. Su, and C.-C. J. Kuo, "Wavelet-based digital image watermarking ", *Opt. Express*, vol. 3, no. 12, pp.491 - 496 , 1998.

A modular and scalable VHDL implementation of Discrete Circular convolution of two finite length sequences using URDHWA TIRYAGBHYAM sutra in Vedic mathematics

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Abstract
A novel design approach for hardware implementation of discrete circular convolution of two finite length sequences (N×N) is presented in this paper. The proposed design replaces the conventional array multiplier by Vedic multiplier designed using URDHWA TIRYAGBHYAM sutra. This paper presents that the proposed method is fast and area efficient thereby consuming less power compared to conventional designs. The efficiency of the proposed method is tested by simulations and comparisons with different design approaches using XILLINX software and hardware description language (VHDL).The proposed design approach supports modularity, regularity and scalability which make it flexible to form different convolutions for any number of bits.
Keywords: discrete circular convolution, Vedic mathematics, Urdhva Tiryagbhyam, VHDL, XILINX

1. Introduction

The Ancient Vedic Multiplication technique has found to be effective for reducing delay of circuits where large number of multiplication operations is involved such as digital signal processing, image processing, data encryption techniques etc.
The paper deals with the implementation of circular convolution of two sequences of length N each. The method used for finding products in convolution is method explained in ancient Indian Vedas. IN *AtharvaVeda* general method of multiplication is explained using *URDHWA TIRAYGBHYAM* sutra.
The meaning of sutra is multiplying vertically and crosswise. In circular convolution a matrix method is used to calculate convolution output. The matrix multiplication is performed using U*RDHWA TIRAYGBHYAM* sutra.
As the number of multiplications increases speed of execution reduces. The hardware implementation of circular convolution is performed using SPARTAN-3E family of FPGA on XILLINX software.
Results of implementation show improvements in terms of speed and reduction in power and delay.
The organization of the paper is as follows: chapter 2 gives brief introduction about Vedic mathematics and URDHWA TIRYAGBHYAM sutra. Chapter 3 discusses the mathematical analysis for discrete circular convolution. In chapter 4, The proposed design and implementation is presented. In Chapter 5 results are obtained. Finally the conclusion is obtained.

2. Introduction to Vedic Mathematics

Vedic Mathematics is a knowledge related to mathematics as described in *Vedas.* This knowledge was rediscovered by Vedic Scholar Swami Bharathi Krishna Tirthaji Maharaj, a scholar from Banaras University. Swamiji wrote a book Vedic Mathematics explaining all Vedic mathematical knowledge in 16 *sutras* and *sub sutras* [1].

2.1 16 sutras in Vedic Mathematics

Pronunciation	***Meaning***
EKADHIKENA PURVENA	By one more than one before
NIKHILAM NAVATSHCHARAMAM DASHATA	All form 9 and the last from 10
URDHWAM TIRYAGBHYAM	Vertically and cross-wise
PARAVARTYA YOJAYET	Transpose and apply

SHUNYAM SAMYASAMUCHCHAYE	If the samuchchaya is same
ANURUPYE SHUNYAM ANYAT	If one is zero, the other is ratio
SANKALANA VYAVAKALANABHYAM	By addition and by subtraction
POORNAPOORNABHYAM	By the completion or non completion
CHALANAKALANABHYAM	Differential calculus
YAVADOONAM	By the deficiency
VYASHTISAMASHTIHI	Specific and general
SHESHANI ANKENA CHARAMENA	The remainders by the last digit
SOPANTYADAYAM ANTYAM	The ultimate and twice the penultimate
EKANYUNEN PURVENA	By one less than one
GUNITA SAMUCHCHAYAHA	Product of the sum
GUNAKA SAMUCHCHAYAHA	All the multipliers

2.2 URDHWA TIRYAGBHYAM sutra in vedic mathematics

The sutra which can be used for fast mathematical multiplication is URDHWA TIRYAGBHYAM. It means vertically and crosswise. The method can be explained with following example. Consider multiplication of 21*32

It can be performed as follows:

```
        2          1
*
        3          2
-----------------------------------------

        6   :  7   :   2
```

Step-1 2*1=2
Step-2 2*2+3*1=7
Step-3 2*3=6

Thus the product of 21*32 can be calculated in only 3 steps which make the calculation faster. This method becomes more advantageous with increase in number of digits.

3. Introduction to circular convolution

3.1 Mathematical analysis of circular convolution

Circular convolution is a basic mathematical operation in digital signal processing. It is used to convolve two periodic sequences. The mathematical formula of circular convolution of two finite length sequences is as follows:

$$y(m) = \sum_{n=0}^{N-1} x(n)_N . h(m-n)_N$$

Consider an example where x(n) ={1,2,3,4} and h(n)={2,1,2,1}

Thus the output y(n) is calculated as

Y(0)=x(0)h(0)+x(1)h(-1)+x(2)h(-2)+x(3)h(-3)

Because of the circular shifting property, with N=4,

H(-1)=h(N-1)=h(3)=1

H(-2)=h(N-2)=h(2)=2

H(-3)=h(N-3)=h(1)=1

Thus, y(0)=1*2+2*1+3*2+4*1=14 similarly,

y(1)=x(0)h(1)+x(1)h(0)+x(2)h(-1)+x(3)h(-2)

=1*1+2*2+3*1+4*2=16

y(2)=x(0)h(2)+x(1)h(1)+x(2)h(0)+x(3)h(-1)=14

y(3)=x(0)h(3)+x(1)h(2)+x(2)h(1)+x(3)h(0)=16

so, output y(n)={14,16,14,16}

3.2 Properties of circular convolution

As the convolution is one of the fundamental operations in signal processing, for the system analysis, the basic properties of circular convolution are explained in this section.

Commutative Property: a[n] © b[n] = b[n] ©a[n]

The order in which two signals are convolved makes no difference; the results are identical. In any linear system, the input signal and the system's impulse response can be *exchanged* without changing the output signal.

Associative Property:

{a[n]©b[n]}©c[n]= a[n]©{b[n]©c[n]}

Convolve two of the signals to produce an intermediate signal, then convolve the intermediate signal with the third signal. The associative property provides that the order of the convolutions doesn't matter. From the associative property, the order of the systems can be rearranged without changing the overall response of the cascade. Further, any number of cascaded systems can be replaced with a *single* system.

4. Design and Implementation of circular convolution

4.1 Hardware Implementation of 4*4 bit binary Vedic multiplier

The binary multiplier is based on vedic algorithm designed using URDHWA TIRYAGBHYAM sutra.consider two 4 bit binary number multiplication.

A3 A2 A1 A0

*

B3 B2 B1 B0

P7 P6 P5 P4 P3 P2 P1 P0

Where P7 to P0 are calculated as shown in steps

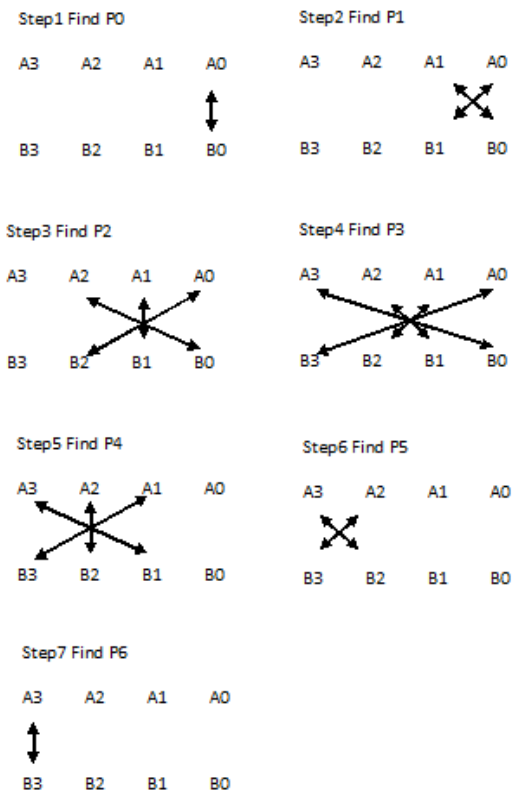

Fig 1shows steps for calculating output of Vedic Multiplier output.

Thus, the final product is

P0=A0*B0

P1=A0*B1+A1*B0+prevcarry

P2=A0*B2+A1*B1+A2*B0+prevcarry

P3=A0*B3+A1*B2+A2*B1+A3*B0+prevcarry

P4=A1*B3+A2*B2+A3*B1+prevcarry

P5=A2*B3+A3*B2+ prevcarry

P6=A3*B3+ prevcarry

P7= prevcarry

4.2 Hardware Implementation of circular convolution

The hardware implementation of circular convolution has two inputs x(n) and h(n) and ouput h(n). two inputs can be represented by bit vectors depending upon the number of samples in the sequence. The VHDL desin entity for the proposd algorithm is as shown in figure.

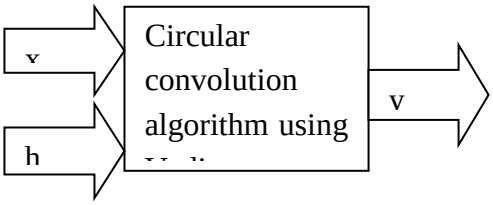

Fig.2 VHDL entity for circular convolution

4.2 Algorithm for Hardware Implementation of circular convolution

1. Take the inputs x and h as bit vectors.
2. Select the number of bits to represent every sample.
3. Form the arrays x and h by extracting sequence samples.
4. for I in 0 to 3 loop
5. sumfinal=0
6. for j in 0 to 3 loop
7.sumfinal=sumfinal+x(j)h(j)
8.end loop j
9.y(i)=sumfinal
10.form the array of output y.

5. Results of Testing of proposed algorithm

The proposed algorithm is coded using VHDL and XILINX 13.1 softwware.Testing is done using ISIM simulator. For the ease of testing x and h are considered to have 4 samples each. i.e. length of each sequence(x and h)is 4. Every sample in a sequence is represented by 4 bits. E.g. x={1,2,3,4} h={2,1,2,1} in VHDL,
x=0001 0010 0011 0100
h=0010 0001 0010 0001
the inputs x and h are stored internally in two different arrays and the output is calculated according to the algorithm. Output will have 4 samples of 8 bits each.Calculated output is also stored in an array and then assigned to the output pins as bit vector.
y={14,16,14,16}
y=00001110 00010000 00001110 00010000

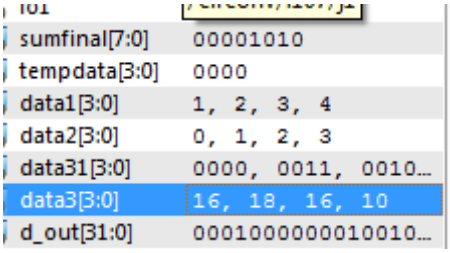

Fig.3 VHDL output of ISIM simulator

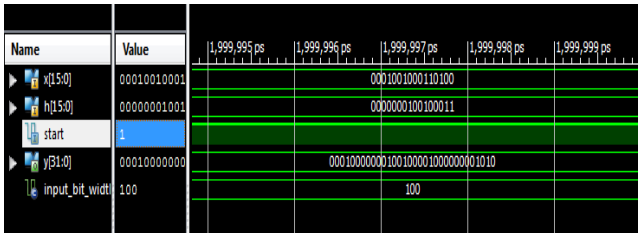

Fig4 waveform for circular convolution of ISIM simulator.
The code is synthesized using XILINX software. The proposed algorithm is compared with circular convolution using Booth's multiplier and array multiplier for synthesized parameters. The table shows comparison of circular convolution algorithm using Vedic, Booth, Array multipliers.

Circular Convolution	Array	Vedic	Booth
Number of Slices:	347 out of 4656 7%	290 out of 4656 6%	585 out of 4656 12%
Number of 4 input LUTs	613 out of 9312 6%	528 out of 9312 5%	1040 out of 9312 11%
offset	24.8ns	24.68ns	32.83ns
Levels of Logic	21	19	24
Total memory usage	195220 kilobytes	199316 kilobytes	201940 kilobytes

5. Conclusion

The paper presents successful implementation of circular convolution using Vedic multiplier. The algorithm is coded in VHDL and tested using ISIM simulator using XILINX software. The implementation gives 49% area reduction compared to Booth's multiplier implementation. The delay and levels of logic is reduced considerably when compared to Booth's algorithm. Thus the circular convolution and Vedic multiplications have been successfully integrated which has resulted in performance up gradation of the implementation in terms of area and delay reduction.

Acknowledgments

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References

[1] Jubin Hazra,An Efficient Design Technique of Circular Convolution Circuit using Vedic Mathematics and McCMOS Technique,2012 International Conference on Computer Communication and Informatics (ICCCI -2012), Jan. 10 – 12, 2012, Coimbatore, INDIA

[2] K.Mohammad, S.Agaian "Efficient FPGA implementation of convolution" IEEE International Conference on Systems, Man, and Cybernetics, san Antonio, TX, USA - October 2009

[3] R.k.Lomte,Bhaskar P.C. "High Speed Convolution and Deconvolution usingUrdhva Triyagbhyam", 2011 IEEE Computer Society Annual Symposium on VLSI.

[4] Jagadguru Swami, Sri Bharati Krsna Tirthji Maharaja," Vedic Mathematics",Motilal Banarsidas, Varanasi, India, 1986.

[5]J.G. Proakis and D.G. Monolakis, Digital Sigrial Processing. Prentice-Hall International, Inc., 1996.

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Hyperspectral Image Compression

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Abstract

This paper proposes low complexity codec for lossy compression on a sample hyperspectral image. These images have two kinds ofredundancies: 1) spatial; and 2) spectral. A discrete cosine transform (DCT)-based Distributed Source Coding(DSC) paradigm with Arithmetic code for low complexity is introduced.Here, Set-partitioning based approach is applied to reorganize DCT coefficients into wavelet like tree structure as Set-partitioning works on wavelet transform, and extract the sign, refinement, and significance bitplanes. The extracted refinement bits are Arithmetic encoded, then by applying low density parity check based (LDPC-based) Slepian-Wolf coder is implement to our DSC strategy.Experimental results for SAMSON(Spectroscopic Aerial Mapping System with Onboard Navigation) data show that proposed scheme achieve peak signal to noise ratio and compression to a very good extent for water cube compared to building, land or forest cube.

Keywords:Image compression; hyperspectral image; distributed source coding (DSC); discrete cosine transform (DCT); Arithmetic code; low complexity.

1. Introduction

Hyperspectral imaging is a powerful technique and has been used in large number of applications, such as geology,earth-resource management, pollution monitoring, meteorology, and military surveillance. Hyperspectral images are three-dimensional data sets, where two of the dimensions are spatial and the third is spectral. These images are acquired by observing the same object (area or target) in multiple narrow wavelength slices at the same time and reveal the reflection, transmission, or radiation features of the observed object in multiple spectral bands.

The 2D- DCT technique was proposed by Z. Xiong, O Guleryuz, M T Orchard[1], for transform coefficients coding. Owning to high correlation of hyperspectral image, in particular the correlation across frequency bands, DSC is applied into hyperspectral image to obtain a lowly complex and highly effective lossy compression. For DSC can shift the complexity between encoder and decoder, compared to traditional source coding. Slepian and Wolf have proved the feasibility of DSC scheme and ensure that such encoder can theoretically gain the same efficiency of the joint one as shown if fig 1[2].

In [3], Wyner and Ziv provide the lossy extension of Slepian-Wolf coding. The application of DSC theory to hyperspectral image has been widely used recently. Enrico Magli proposed two different lossless compression DSC-based ways [4][5][6]. N.-M. Cheung puts forth the DSC based lossy method in DWT domain, named set-partitioning in hierarchical tree with Slepian-Wolf coding (SW-SPIHT) [7,8]. It demonstrates that the presented application is very promising.

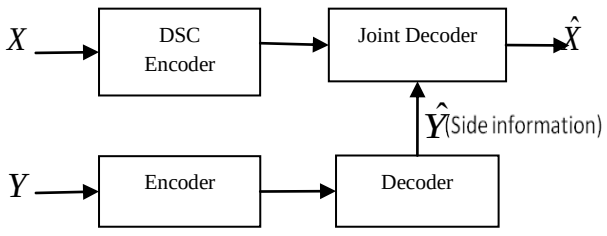


Figure 1 DSC based compression scheme.

In the above context, the present research work proposes low complexity hyperspectral image compression on the basis of DSC in DCT domain, rather than DWT domain. It is found that hyperspectral image is highly correlated not only in DWT domain but also in DCT domain. Moreover, the complexity of DWT is inferior to that of DCT. It is well known that DCT-based coder is much easier than DWT-based one. [9,10] show that the calculation quantity of DCT is much smaller. Jianrong Wang, Rongke Liu modifies the Zixiang Xiong's embedded zerotree discrete cosine transform (EZDCT) algorithm [11]. The proposed approach the zerotree quantizer in SPIHT and choose the SPIHT coder instead of EZW coder. It is used to extract bitplanes of reordered DCT coefficients. Arithmetic code is also introduced, arithmetic coding depends mainly on the estimation of the probability model that the coder use and the arithmetic coding approach the entropy of the source[12]. The smaller the entropy of the input data is, the higher the compression ratio is. According to DSC theory, the inter-band correlation of DCT domain can be exploited at the decoder side to attain the same compression ratio as the joint compression of the various bands. The refinement bitplanes are Arithmetic encoded. Afterwards, [6] LDPC-based Slepian-Wolf coder is adopted to the Arithmetic codes and sign bits in order to generate syndromes. These syndromes are conveyed to the decoder, while the significance bits are transmitted straightly.

2. Codec Design

It has been observed that DCT-based coder haslower complication than its DWT-based one. This paper, bringforth low complexity DSC-based hyperspectral imagecompression in DCT domain with Arithmetic code. For onething, the implementation of DCT is less expensive thanthat of WT. Besides, the regrouped DCT coefficients withwaveletlike tree structure and high dependency help us notmerely employ wavelet-based coder to obtain betterreconstruction quality than traditional DCT-based ones and

EZW coder, but also apply DSC technique at lower costthan most wavelet-based ones.

2.1 DCT-Based Subband Representation

Fig.2 states the process of regrouped 8×8 DCT coefficients [13]. First, an image ($N\times N$) is divided into $n\times n$ blocks. Second, each of the blocks is transformed to DCT domain and can be treated as an L (L=log2n) level tree. Third, the corresponding coefficients from all DCT blocks are rearranged together into a new wavelet like subband.

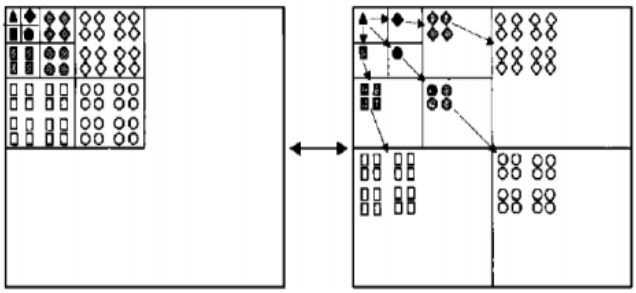


Figure.2 Process of DCT coefficients regrouping.

2.2 DCT-Domain Correlation Analysis

For close relationship between source and side information is the vital factor of DSC principle, therefore this paper discuss whether there is dependency in the reorganized DCT domain. The intra-band (i.e., spatial) and inter-band (i.e. spectral) correlation are analysed, the correlation coefficient with normalization and discretization are defined as follows.

$$R(l,k)=\frac{\sum_{x=1}^{M}\sum_{Y=1}^{N}\left[f(x,y)-u_f\right]\times\left[f(x+1,y+k)-u_f\right]}{\sum_{x=1}^{M}\sum_{y=1}^{N}\left[f(x,y)-u_f\right]^2}$$

Where,

$R(l,k)$ = intra-correlation value;$M\times N$ = *size*,$f(x,y)$ = pixel grey value labeled with space coordinate (x,y); uf = the image's average grey value;l and k = the distance of analyzed pixels.

$$H(l,k)=\frac{\sum_{x=1}^{M}\sum_{y=1}^{N}f(x+l,y+k)g(x,y)}{\sqrt{\left\{\sum_{x=1}^{M}\sum_{y=1}^{N}\left[f(x,y)\right]^2\right\}\left\{\sum_{x=1}^{M}\sum_{y=1}^{N}\left[g(x,y)\right]^2\right\}}}$$

Where,

$H(l,k)$ = inter-correlation value;$f(x,y)$ and $g(x,y)$ = the pixel grey value of two different bands; l and k = the relative distance of analyzed pixels between the two bands.

The inter band correlation results are shown in Fig.3. The x-axis represents band number of hyperspectral image and y-axis represents correlation coefficient. Fig.3 illustrates that most bands have a correlation coefficient close to one, except those noisy bands. The relationship at the corresponding point is much closer than that of other positions. This suggests the feasibility of DSC principle.

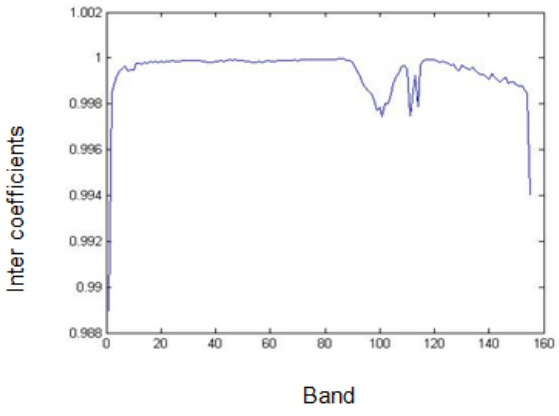


Figure 3 Spectral correlation curve of hyperspectral SAMSON image

From the above graph, it is observed that the first few bands have low spectral correlations. Whereas, the bands after 11th band are highly correlated with each other.

3. The proposed Architecture

The hardware (or software) implementation of DCT transform is less expensive compared to that of DWT. Zixiang Xiong's EZDCT[14] algorithm is better than most DCT-based coder like baseline JPEG and improved JPEG, and even better than Shapiro's wavelet-based EZW coder [8]. Moreover, it is available of Arithmetic code to exploit bit level's correlation and reduce the corresponding error bit rate. Hence, referring to EZDCT, DSC-based method in DCT domain with Arithmetic code is applied to satisfy our compression requirement.

The scheme is composed of transforming, estimation, bitplanes extraction via set partitioning algorithm, Arithmetic encoding, LDPC-based Slepian-Wolf coder and reconstruction. Three crucial procedures are DCT transform instead of Wavelet transform, improvement of side information by estimation, and bitplane technique with Arithmetic code. The following describes in detail about the proposed paradigm showed in Fig.4. Take into consideration two adjacent highly correlated hyperspectral bands, the current band to be coded and the previous band coded already, symbolized as $X_i$and X_{i-1} respectively.

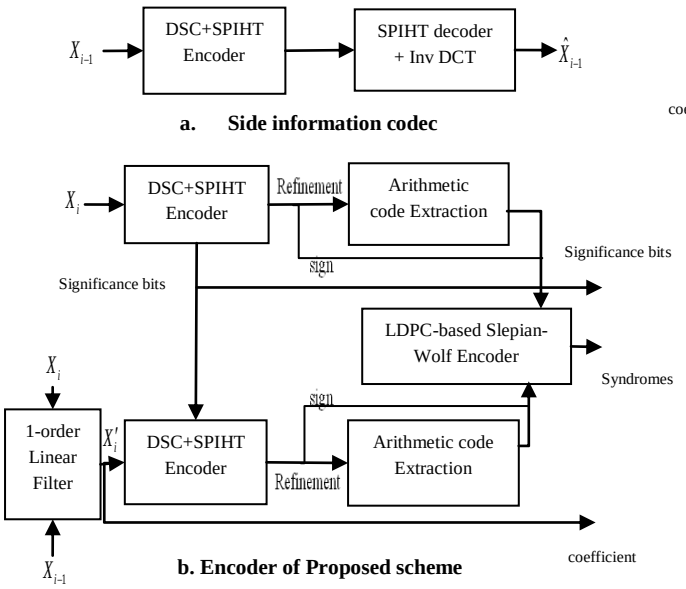


Figure 4 Encoder block diagram of proposed scheme

Fig.4.a diagrammatically stated that the reference band X_{i-1} is transmitted by modified EZDCT, and its reconstructed image $\hat{X}_{i-1}$ is generated and offered at the decoder. More particularly about the modification, zerotree quantizer in SPIHT algorithm is use and substitute SPIHT coder for EZW coder.

Fig.4.b shows the model of the encoder, which is applied to the band $X_i$to be coded by DSC approach in DCT domain. First, set-partitioning method is adopted to extract bitplanes of regrouped DCT coefficients, generating significance, sign and refinement. Then, Arithmetic code is introduced to encode refinement bits. Arithmetic code is then applied directly to extract all bitplanes in conventional approach. So as to realize the DSC strategy, LDPC-based Slepian- Wolf coder is then employed to encode sign and refinement bits to yield syndromes. The compression ratio relies on the value of crossover probabilities. The crossover probabilities are considered in the corresponding bitplane location of $X_i$and X_i', representative of the predicted *Xi* obtained by coefficient inear filter. So the significance tree of X_i*is applied* to the regrouped DCT coefficients of X_i' to extract sign and refinement bitplanes. These generated sign and refinement bits are compared to those of $X_i$and calculate the rate. The need to transmit the coefficients of the one-order linear filter is required because it is unknown to the decoder. Along this way, more precise version of band X_i, i.e. $\tilde{X}_i$ can be generated.

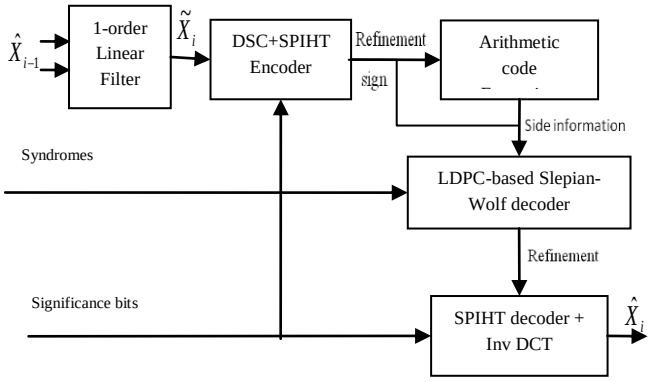


Figure 5 Decoder block diagram of proposed scheme

As is showed in Fig.5, at the decoder side, the estimated value $\tilde{X}_i$ is adopted, instead of directly using $\hat{X}_{i-1}$. This is useful in DSC method because the quality of the side information decides the compression ratio to a degree. Once the significance bits produced at the encoder are passed to the decoder, the $\tilde{X}_i$'s sign and refinement bits are reconstructed and are available as side information. Then, with the precise side information and conveyed syndromes, LDPC-based Slepian-Wolf decoder is introduced to reconstitute sign and refinement bits.

4. Techniques used in DSC-based coder

Hyperspectral image exhibit a significant amount of dependency, and one-order liner filter, i.e. $X_i^{'} = a \times X_{i-1} + b$ provides an approximate version of $X_i$at the encoder, so that the difference between $X_i$and X_{i-1} can get smaller. By this means, the Slepian-Wolf coder can obtain better performance due to DSC theory. Pixels between the $X_i$and X_{i-1} are applied to calculate the coefficient *a* and*b* that fits the data best in a least squares sense.

For our DSC-based strategy, the bitplanes are extracted to reorganized DCT coefficients into binary data because the using LDPC-based coder performs best for binary form. This process generates sign and refinement bitplanes, and significance bitplanes which represent the waveletlike tree structure. Besides the coefficients' correlation at the corresponding location between the two bands is the highest. Therefore the significance bits of $X_i$are use to index the structure of X_{i-1} and generate sign and refinement bits of X_{i-1}.Particularly $\tilde{X}_i$,the estimated reconstructed X_{i-1}, as substitute of X_{i-1}, is applied at the decoder. These produced sign and refinement bits are provided as side information of DSC-based framework.

Moreover, the Arithmetic encoding is use to enhance the relationship of source and side information. In DSC system, higher correlation between source and side information can achieve better coding efficiency. In most cases, natural binary code is employed. However, this natural binary code is inappropriate when the values of source and side information are very close but the binary representations are remarkably diverse. Hence natural binary code potentially degrades the correlation, and Arithmetic code is obviously used to replace natural binary code. So as to further fulfill the scheme's requirement for easily implementation, Arithmetic encoding is adopted to all DCT coefficients directly. It is merely applied to represent the refinement bits rather than all bitplanes, which can not only significantly reduce the amount of Arithmetic codes, but also make full use of the advancements of Arithmetic code. It is noticed that the sign bits are not Arithmetic encoded. Because sign bitplane is merely one bitplane, and the difference between source and side information hardly exists, Arithmetic encoding is not essential.

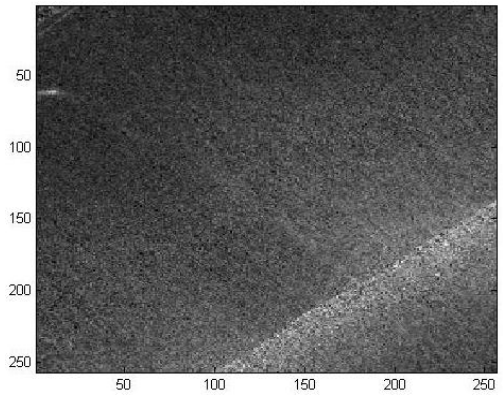
5. Results and discussion

The software implementation of the algorithm is written in a Matlab environment using Matlab7.7 software. The hyperspectral dataset used, is generated by the SAMSON sensor. It covers the spectral range of 400nm-900nm with a band width of 3.2nm. The data was collected by the Florida Environmental Research Institute as part of the GOES-R sponsored experiment.

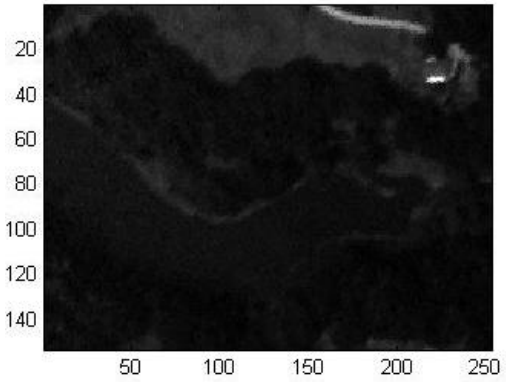
The instrument flown during the collect is the SAMSON, a push-broom, visible to near IR, hyperspectral sensor. This sensor was designed and developed by FERI [15]. They have 156 contiguous bands and 952X952 pixel resolution. The 256X256 up left corner is extracted for the experiments. Each pixel in each band has 8 bits of radiometric information.

Four HIC's are shown below. While the land image was utilized as test data. All the scenes consist of 156 spectral bands covering the visible and near-infrared spectral window (wavelengths from 400nm to 700nm). Band 1

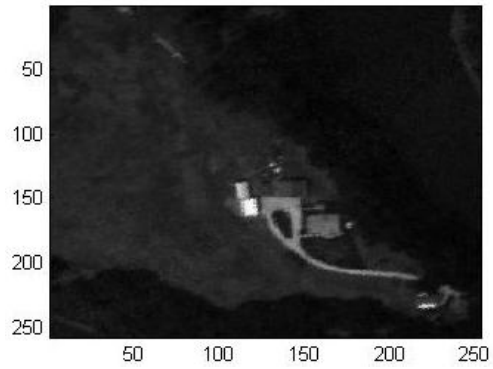
of each scene is shown in Figure 5.4. The scene are of different spatial sizes- 257×256, 153×253, 257×157, and 151×257 for "water", "forest", "building" and "land" images, respectively. Each pixel in each band has 8 bits of radiometric information.



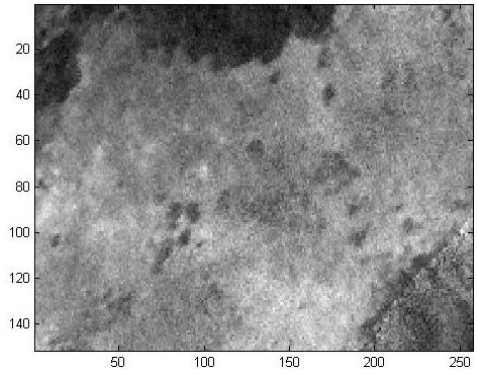
(a)"Water" cube



(b)"Forest" cube



(c)"Building" cube



(d)"Land" cube

Figure 6 Examples of different scenes or cube(band 1).

5.1 Quality Measurement Definitions

There exist different performance measures for verification of coding algorithms. In order to make a fair comparision between the techniques, the same performance measure must be used, preferably on the same hyperspectral data. It is known that this type of imagery is not necessarily viewed by human visual system (HVS). Although the reconstructed cubes were examined also by a subjective quality criterion (visual quality, artifacts like blockiness, smoothness etc.), it is obvious that the true quality can be measured mainly according to the specific application the encoding is used for.

In this paper it was decided to measure the performance with the following performance measures:

Peak signal-to-noise ratio (PSNR): This is a commonly used quantitative fidelity criteria (in image processing applications). Let X_i be the original pixel in spatial position of the spectral band b (of size N×M) and $\hat{X}_i$ the respective reconstructed pixel, then for each spectral band $1 \leq b \leq 156$, $PSNR_b$ is defined by

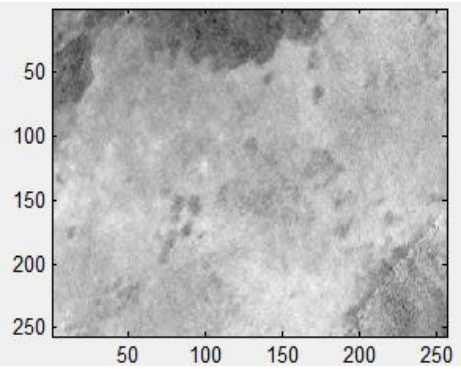
$$PSNR_b = 10\log_{10}\left(\frac{255^2}{\frac{1}{NM}\sum_{x=1}^{N}\sum_{y=1}^{M}\left[X_i - \hat{X}_I\right]^2}\right) \quad (3)$$

An average PSNR is obtained as the quality measure, where the averaging is performed over B spectral bands:

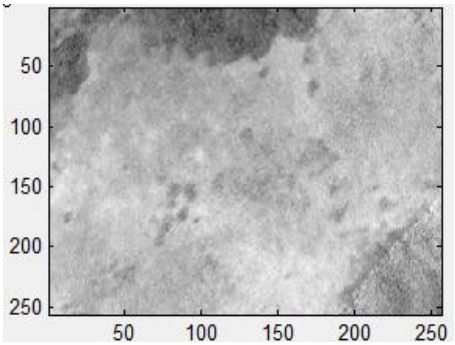
$$\overline{PSNR} = \frac{1}{B}\sum_{b=1}^{B} PSNR_b \quad (4)$$

(B=156 in our image).

The higher PSNR would normally indicate that the reconstruction is of higher quality. It is measured in decibels (dB).



(a) Original land cube band 1

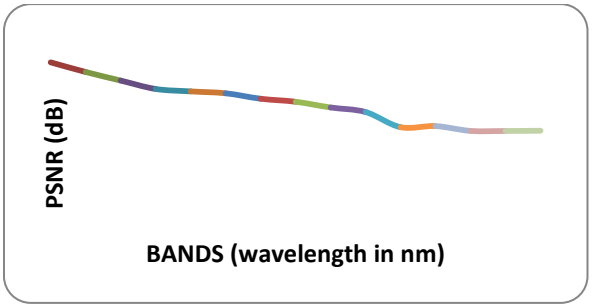


(b)Reconstructed band 1(PSNR= 51.0184dB, at 0.2bpp,CR= 49.45%)

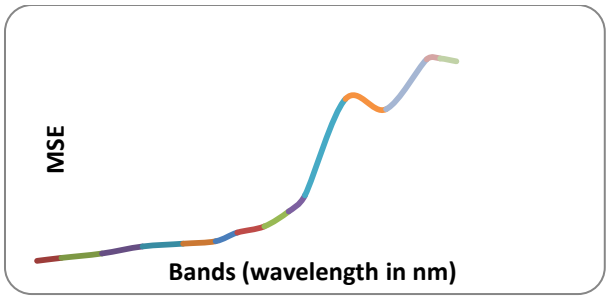
Figure 7 Examples of the algorithm used for performance measurement of land cube.

Fig.8 shows the average PSNR for hyperspectral SAMSON image as 42.66dB.

This figure shows PSNR obtained by the implemented algorithm on land image.

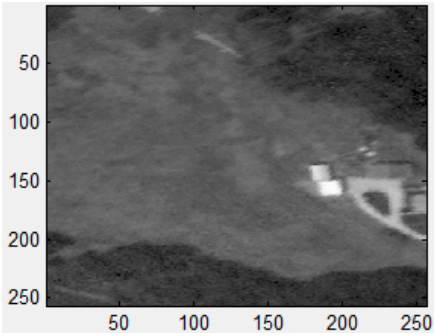


(a) PSNR of hyperspectral land image at different wavelengths

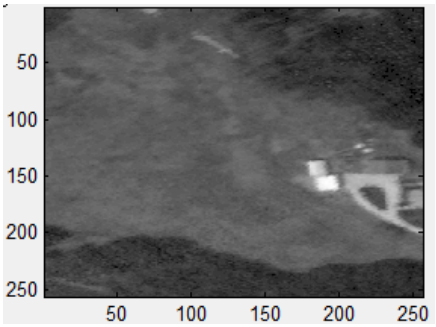


(b) MSE of hyperspectral land image at different wavelengths

Figure 8 PSNR and MSE at different wavelength(400nm to 900nm)

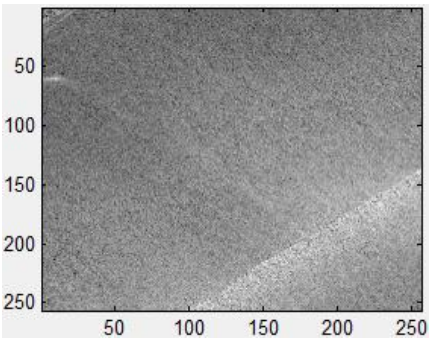


(a) Original building cube band 1

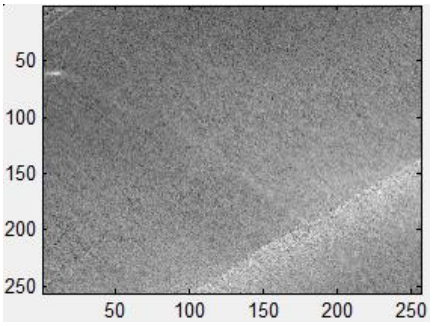


(b)Reconstructed band 1(PSNR= 48.3266dB, at 0.2bpp,CR= 35.09%)

Figure 9 Examples of the algorithm used for performance measurement of building cube.



(a) Original water cube band 1

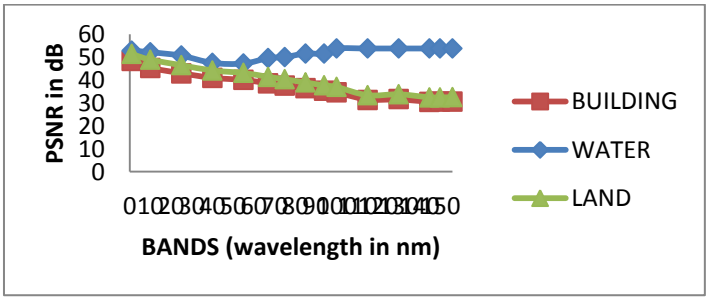


(b)Reconstructed band 1(PSNR= 52.7722dB, at 0.2bpp,CR= 52%)

Figure 10 Examples of the algorithm used for performance measurement of water cube.

Table 1: PSNR of different image cubes at different wavelengths(bands)

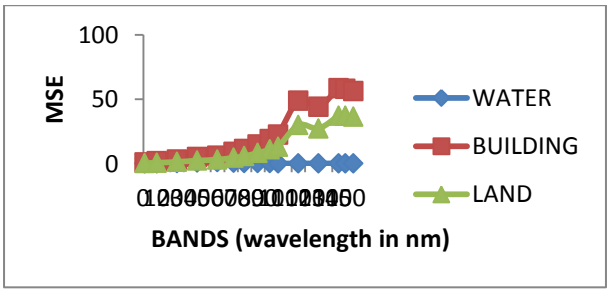
BAND	***PSNR***		
	WATER	***BUILDING***	***LAND***
1	52.7722	48.3266	51.2961
10	52.1164	45.1874	48.8515
25	50.5957	42.8504	46.4606
40	47.4585	40.8409	44.1433
55	47.1728	40.0821	43.0656
67	49.546	38.5117	41.3444
75	50.0125	37.4868	40.3314
85	51.534	36.3623	38.8738
94	51.4536	35.2795	37.6516
100	53.7355	34.5676	36.9302
115	53.7355	31.2275	33.3583
130	53.7355	31.6653	33.755
145	53.7355	30.4444	32.4173
150	53.7355	30.4901	32.4041
156	53.7355	30.6178	32.4969



(a) PSNR of hyperspectral land image, water image and building image at different wavelengths.

Table 2: MSE of different image cubes at different wavelengths(bands)

BAND	MSE		
	WATER	BUILDING	LAND
1	0.34345	0.95591	0.48247
10	0.39943	1.9695	0.84708
25	0.56691	3.3732	1.469
40	1.1674	5.3579	2.5046
55	1.2468	6.3808	3.2101
67	0.72191	9.1604	4.7713
75	0.64838	11.5984	6.0248
85	0.45675	15.0263	8.4275
94	0.46529	19.2811	11.1666
100	0.27512	22.7155	13.1843
115	0.27512	49.0156	30.0091
130	0.27512	44.3154	27.3895
145	0.27512	58.7	37.2692
150	0.27512	58.0857	37.3827
156	0.27512	56.4023	36.5924



(b) MSE of hyperspectral land image, water image and building image at different wavelengths

Figure 11 PSNR and MSE of different image cubes at different wavelength(400nm to 900nm)

6. Conclusions

Discrete cosine transform is a versatile tool in hyperspectral remote sensing which is utilized for various applications such data compression. DCT and SPIHT are the most widely used methods for compression of hyperspectral image. In this paper, DCT based DSC technique using arithmetic code was conducted in order to estimate their performance on hyperspectral imagery.

The DCT based DSC using arithmetic code were examined using SAMSON hyperspectal sample data.The performance of these algorithms is evaluated based on PSNR of the compressed image and compression ratio.

PSNR= 42.66152 dB, CR = 48%
From MSE, it is observed that the difference between original and reconstructed image is very small. A higher PSNR indicate that the reconstruction is of higher quality. It can also be stated from the observation that PSNR is good for Water cube as compared to building cube may be due to spectrometer range.

References

[1]Z. Xiong, O Guleryuz, M T Orchard, "A DCT-based embedded image Coder," *IEEE Signal Processing Letters*,1996,3(11):289-290.

[2] D. Slepian, and J. K. Wolf."Noiseless coding of correlated information sources", IEEE Trans. on Inform. Theory, IT-19(4): 471–480, July 1973.

[3] D. Wyner, J. Ziv. The rate-distortion function for source coding with side information at the decoder. IEEE Trans. on Information Theory, 1976, 22(1): 1–10.

[4] A. Nonnis, M. Grangetto, E. Magli. Improved low-complexity intra-band lossless compression of hyperspectral images by means of Slepian-Wolf coding.Proc. of IEEE International Conference on Image Processing, 2005: 29–32.

[5] E. Magli, M. Barni, A. Abrardo. Distributed source coding techniques for lossless compression of hyperspectral images. EURASIP Journal on Applied Signal Processing,2007.

[6] A. D. Liveris, Z. Xiong, C. N. Georghiades. Compression of binary sources with side information at the decoder using LDPC codes. IEEE Communication Letters, 2002, 6(1): 440–442.

[7] C. Tang, N. M. Cheung, A. Ortega. Efficient interband prediction and wavelet-based compression for hyperspectral imagery: a distributed source coding approach. Proc. of IEEE Data Compression Conference, 2005: 437–446.

[8] N. M. Cheung, C. Tang, A. Ortega. Efficient wavelet-based predictive Slepian-Wolf coding for hyperspectral imagery. Signal Processing, 2006, 86(11): 3180–3195.

[9] Z. Xiong, K. Ramchandran, M. T. Orchard, and Ya-Qin Zhang, "A comparative study of DCT- and wavelet-based image coding," *IEEE Transactions on Circuits and Systems for Video Technology*, VOL. 9, NO. 5, August 1999: 692-695.

[10] J. Chen, C. WU, "An efficient embedded subband coding algorithm for DCT image compression," *Proceedings of SPIE*, Vol. 4551 (2001):44-48.

[11] Jianrong Wang,& Rongke Liu. Low Complexity DCT-Based Distributed Source Coding for Hyperspectral Image. National Natural Science Foundation of China (No. 60702012)

[12] Todd Owen, Scott Hauck. Arithmetic Compression on SPIHT Encoded Images. University of Washington, Dept. of EE, UWEETR-2002-0007 May 2002

[13] E. Baccaglini, M. Barni, L. Capobianco, et al. Low-complexity lossless compression of hyperspectral images using scalar coset.

[14] J.Lee, "Optimized quadtree for Karhunen-Loeve transform in multispectral image coding", IEEE Trans. On Imege Processing, Vol.8, No. 4, pp.453-461, April 1999.

[15] www.opticks.org/confluence/display/opticks/sample+data

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Different Approaches of Feature Extraction Offline Signature Verification

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Abstract

Signature identification and verification is considered among the most popular biometric methods in the area of personal authentication. Offline signature verification deals with extracting features from an already acquired signature image. Robustness of algorithm majorly depends on features which are extracted from signature. This paper deals with different types of feature extraction methods like modified direction feature, four speed stroke angle method and statistical features and comparing their performance.

Keywords:Signature verification, Feature Extraction, Four Stroke Speed, Modified Direction Feature, Global Feature.

1. Introduction

Biometric is the utilization of physiological characteristics or behavioural traits for identity verification of individual. Biometric authentication is gaining popularity as a much more trustable alternative to password based security system since it is almost impossible to reproduce biometric properties.

Signature is behavioural biometric it is not based on physiological properties of the individual, such as fingerprint or face, but behavioural ones. As ones signature may change over time and it is not nearly as unique or difficult to forge as iris patterns or fingerprints, however signature's widespread acceptance by the public makes it more suitable for lower authentication needs. Use of signature as an authentication method has already become a tradition in the western civilization and is respected among the others. The signature is an accepted proof of identity of the person in a transaction on his or her authentication method.

Signature verification system can be generally divided into two categories: a static Method that extracts shape related information and dynamic method with time related information. Since offline signature verification system extracts shape related information which can be imitated therefore it is generally used for lower authentication needs. On the other hand online signature verification system extracts dynamic feature such as speed, pressure, time information which cannot be limited therefore it is used for higher authentication.

1.1 Types of Forgery

The objective of the signature verification system is to discriminate between two classes: the original and the forgery, which are related to intra and interpersonal variability [2]. There are three different types of forgeries to take into account. The first, known as random forgery, is usually represented by a signature sample which belongs to a different writer of the signature model. The second, called simple forgery, is represented by a signature sample which has the same shape as the genuine writer's name. The last type is so-called skilled forgery, represented by a suitable imitation of the genuine signature model.

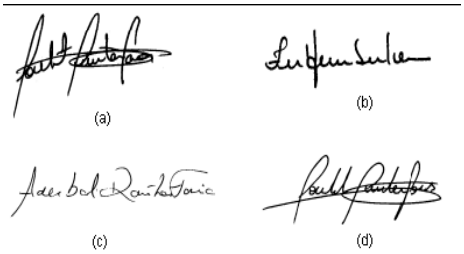


Figure 1 Types of forgeries: (a) genuine signature; (b) random forgery; (c) simple forgery; (d) skilled forgery.

Each type of forgery requires a different verification approach. Methods based on the static approach are generally used to identify random and simple forgeries. The reason for this is that thesemethods have proven to be more suitable fordescribing characteristics related to the signatureshape. A skilled forgery has practically the same shapeas the genuine signature. Therefore, methods based ondynamic (online) or pseudodynamic approaches havebeen shown to be more robust for identifying this kindof forgery.For many years the problem of signature verificationhas generally been solved by some authoritiesorclerical employee, however with the invention ofcomputers and scanning devices the trend has beentowards automation of the whole process.

2. Feature Extraction

Theaccuracy of offline signature verification systemdepends upon the robustness of feature vector. As aconsequence more andmore researchers have lookedinto the feature extractionmethodology of offlinesignature recognition and verification. Thismethodology can be based on one of the following

- Global features
- Statistical features
- Geometrical and topological features

Various types of classifier modules are usedlike neural network [3,4], Hidden Markov model(HMM) [5,6], Euclidean distance classifier[7,8]support vector machine and many more.Global features describe an entire signatureand include the discrete wavelet transform, Houghtransform [3], discrete radon transform [4], horizontaland vertical projections. The global features are

extracted from every pixel that lies within a rectanglecircumscribing the signature.

2.1 Based on Modified Direction Feature[9]

In this method signature contour is first determine from its binary representation. Unique structural features are subsequently extracted from the signature contour through the use of novel combination of the modified direction feature in conjunction with additional distinguishing features to train & test two neural network based classifier.

This technique employs a hybrid of two other feature extraction techniques, direction feature and transition feature. TF records the location of transition between foreground (1s) and background (0s) in binary digital image. The image is traversed from following direction from left to right, right to left, top to bottom and bottom to top. Each time a change from ‘o’ to ‘1’ or from ‘1’ to ‘0’ occurs, the ratio between the location of transition and the length/width of the image traversed is recorded as feature.

Another features considered are centroid and trisurface. In centroid feature signature image was separated into two equal part, the position of the center of center of gravity was feature added. The reason for calculating trisurface feature is because surface area of two visually different signatures could be the same. For the

purpose of increasing the accuracy of a feature describing the surface area of signature trisurface feature is calculated in which the signature is separated into three equal parts, vertically. The surface area feature is the surface covered by signature including the holes contained in it. The number of black pixels in the surface was counted and the proportion of the signatures surface over the total surface of the image is calculated.

Two neural network classifier were used to classify the signatures, the resilient backpropagation neural network and the radial basis function network, the database consist of 1560 signatures for training and 546 signatures for testing. The database is partitioned into four section depending upon their related type. The average verification rate ranges from 85.35 to 91.12%

2.2 Based on Four Stroke Speed[10]:

In this method stoke speed which is considered to be dynamic feature is extracted from static signature. In order to obtain the speed of the stroke, intensity of the stoke is considered. This is because intensity is directly proportional to speed of stroke. Faster the stroke speed, higher is its intensity value.

Algorithm: Signature strokes do not change from slow strokes to fast strokes, or fast to slow abruptly. As the strokes are continuous in nature, there will be a smooth transition from one speed to another. So this method takes into account four speed levels – fast, fastest, slow and slowest.

Steps to divide the signature into four speed Levels:

1. The binary – thinned and the gray – scale imageobtained by preprocessing are multiplied to get athinned gray scale image.

2. The histogram of this thinned gray – scale image isconsidered.

3. The histogram of the background information, whichis dominant in the image is now made zero. Theresulting histogram is now the histogram of only thesignature.

4. This histogram is normalized and equalized. Acumulative count is taken as shown in following figure2

5. The points at which the cumulative sum is 0.25, 0.5 and

0.75 are considered as threshold points.

6. A mapping function using sigmoidal function isgenerated. The intensity levels are mapped accordingly.

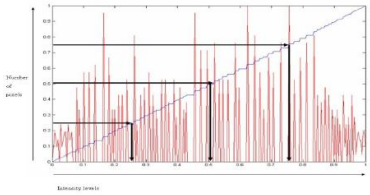


Figure 2 :Equalized Histogram of Signature

False Acceptance Rate (FAR): Accepting the forgery signature thinking it is a genuine signature. It is given by an equation (1)

$$FAR = \frac{Number\ of\ frogery\ signatures\ accepted}{Number\ of\ Forgery\ signatures\ tested} \text{------} \quad (1)$$

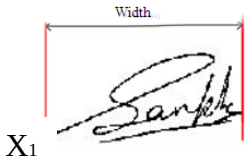
False Rejection Rate (FRR): Rejecting a signature even though it is genuine signature thinking it is a forgery signature. It is given by equation (2)

$$FRR = \frac{Number\ of\ genuine\ signatures\ rejected}{Number\ of\ genuine\ signatures\ tested} \text{-------} \quad (2)$$

Increase in FAR, increases the acceptance of forgeries, and increase in FRR increases the rejection of genuine signature. A good system should have a balanced FAR and FRR values. A good system should have minimum FAR and FRR. This method gives an average FAR of 13.78 and FRR of 14,27

2.3 Based on Global Features[11]:

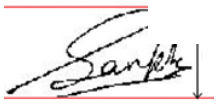
1. Area (A): Signature area is the number of pixels which belong to the signature. This feature provides information about the signature density. In this phase we only calculate the total number of the black pixels (0) in black and white image.
2. Width (W):It is defined as the distance between two points from either ends in the horizontal projection which contain more than one pixels of the binary image. We can calculate the width by following formula $W=X_2-X_1$



X_1 X_2

3. Height t is defined as the distance between two points from either ends in the vertical projection which contain more than one pixels of the binary image. We can calculate the width by following formula $H=K_2-K_1$

K_1



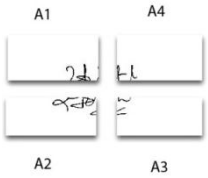
Height

K_2

4. Height/Width Ratio: Signature height-to-width ratio is obtained by dividing signature height to signature width. Signature height and width can change. Height-to-width ratios of one person's signatures are approximately equal. Ratio=H/W.

5. Centroid: In is means that calculating the centre of the signature. We use centre x and centre y. We take x for Horizontal projection and y for vertical projection.

6. Four Area: The last feature that we implemented in our project is that dividing the image in four equal parts. Identifying them as a1, a2,a3 and a4.After that we only calculate its black pixel (0) area in the each part of image which we divided equally



We have taken 15 signatures of 20 persons. Among them we use 10 for training the signatures and 5 for testing. Database has of 200 signatures for training that is for feature vector calculation. Remaining 100 signatures are for testing.

So we calculate the recognition rate of system by following method,

$$\text{Recognition rate} = \frac{Identified\ signatures}{total\ signatures} \times 100$$

$$= \frac{89}{100} \times 100$$

$$= 89\ \%$$

3. Conclusions

In this paper we have presented three different types of feature extraction process. In first method efficiency of feature extractor MDF is investigated. The verification rate varies from 86.08 to 91.12%. In second method two different features stroke angle and stroke speed is used. The system works well with all types of forgeries and gives FAR of 13.78 and FRR of 14.28. The third method extracts global feature from signatures and does not deal with any forge signature, gives recognition rate of 89%.

References

[1] Diana Kalenova, Personal Authentication Using Signature Recognition. department of Information technology, Lappeenranta University of technology.

[2] Edson J. R. Justino, F. Bortolozzi, R. Sabourin, The Interpersonal and Intrapersonal Variability Influences on Offline signature Verification Using HMM., Proceedings of 15th Brazilian symposium on computer graphics and image processing, pp. 197-202, 2002

[3]] Kaewkongka T, Chamnongthai K, Thipakorn B. Off-Line Signature Recognition using parameterized Hough Transform.5th International Symposium on Signal Processing and its Applications, Volume 1, August 1999, pp. 451-454.

[4] S. Armand, M. Blumenstein and V. Muthukkumarasamy, Off-Line Signature Verification based on the Modified Direction Feature., 18th International conference on pattern recognition, vol. 4, pp. 509-512, 2006.

[5] J. Coetzer, B.M.Herbst, J.A. du Preez,. Offline Signature

Verification Using the Discrete Radon Transform and a Hidden Markov Model., EURASIP Journal on Applied Signal Processing 2004:4, pp 559-571.

[6] Edson J. R. Justino, A. El Yacoubi, F. Bortolozzi, R Sabourin, An Off-line Signature Verification System Using HMM and Graphometric Features., 2002.

[7] M. A. Ferrer, J. B. Alonso, C. M. Travieso,. Offline Geometric Parameter For Automatic signature Verification Using Fixed-Point Arithmetic., IEEE Transaction On Pattern Analysis and Machine Intelligence, vol. 27, No.6, pp 993- 997, June 2005.

[8] B. Majhi, Y. S. Reddy, D.P. Babu, Novel Features for Off-line Signature Verification, International Journal of computers, communication and control, Vol. 1(2006), No. 1, pp. 17-24.

[9] Stephane Armand, School of Information and Communication Technology,Michael Blumenstein and Vallipuram MuthukkumarasamyGriffith University, Queensland, Australia, "Off-line Signature Verification based on the Modified Direction Feature

10 "L.Basavaraj and R.D Sudhaker Samuel, "Offline-line Signature Verification and Recognition: An Approach Based on Four Speed Stroke Angle", International Journal of Recent Trends in Engineering, Vol 2, No. 3, November 2009

11 Pallavi Patil and Archana Patil, "Offline Signature Recognition Using Global Features",International Journal of Emerging Technology and Advanced EngineeringVolume 3, Issue 1, January 2013

IMAGE DETECTION FOR 3D OBJECT MODELING

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ABSTRACT

3D models represent a 3D object using a collection of points in 3D space connected by various geometric entities such as triangles, lines, curved surfaces, etc. Being a collection of data (points and other information), 3D models can be created by various algorithms or they can be scanned. Today, 3D models are used in a wide variety of fields like the medical industry uses detailed models of organs, movie industry uses them as characters and objects for animated and real-life motion pictures, video game industry uses them as assets for computer and video games, science sector uses them as highly detailed models of chemical compounds. The architecture industry uses them to demonstrate proposed buildings and landscapes through Software Architectural Models. The engineering community uses them as designs of new devices, vehicles and structures as well as a host of other uses.

1.INTRODUCTION

3D object modeling is one of the excellent topic for studying and research. It is an approach to providing detailed 3D images consisting of taking a series of pictures of the object to be modeled and then using various image processing techniques to reconstruct a 3D image from the 2D images. 3D images came into existence with introduction of holography. Holograms were the most primitive form of this technology. Holography is a technique that allows the light scattered from an object to be recorded and later reconstructed so that it appears as if the object is in the same position relative to the recording medium as it was when recorded. The image changes as the position and orientation of the viewing system changes in exactly the same way as if the object were still present, thus making the recorded image (hologram) appears three dimensional. The next widely used technique s called Stereoscopy. Stereoscopy is the enhancement of the illusion of depth in a photograph, movie, or other two-dimensional image by presenting a slightly different image to each eye.3D object modeling has vast use in various fields such as animation, reverse engineering,medical[4]CAD/CAM[1],factories.(enter references). The main tool for 3D modeling is edge detection. Edge detection is identifying points in a digital image at which the image brightness changes sharply. The technique used for edge detection is Canny Edge Detection.

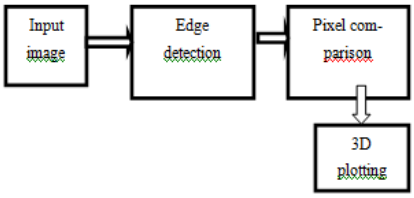
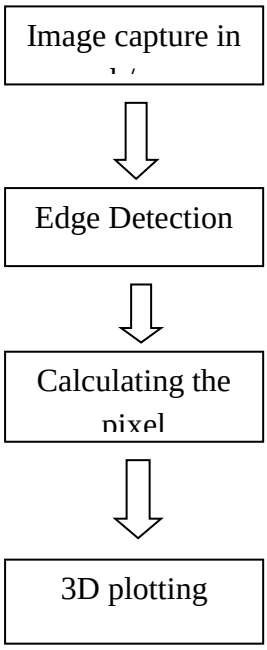


Figure 1- Block diagram

The input to our system is an image. Canny edge detection is done on that image. Pixel comparison is done in canny edge detection. After the

detection image processing is done where the resultant output is 3D image.

2.ALGORITHM:



1. Specify two starting points A and B. Specify a threshold T and two empty stacks, OPEN and CLOSED.
2. If we deal with a closed curve, put A OPEN and into CLOSED. If we deal with a open curve put A into OPEN and B into CLOSED.
3. Compute the line passing from the last point in CLOSED and the last point in OPEN.
4. Compute the distance from that line to all the points in P whose sequence place them between the two points defining the line. Select the point Vmax with the maximum distance Dmax.
5. If Dmax >T ,place Vmax at the end of the OPEN stack.Go to Step3.
6. Else,remove the last vertex from OPEN and insert it as the last vertex of CLOSED.
7. If OPEN is not empty, go to Step3.
8. Exit. The vertices in CLOSED are the vertices of the polygon.[3]

3.Proposed Idea:

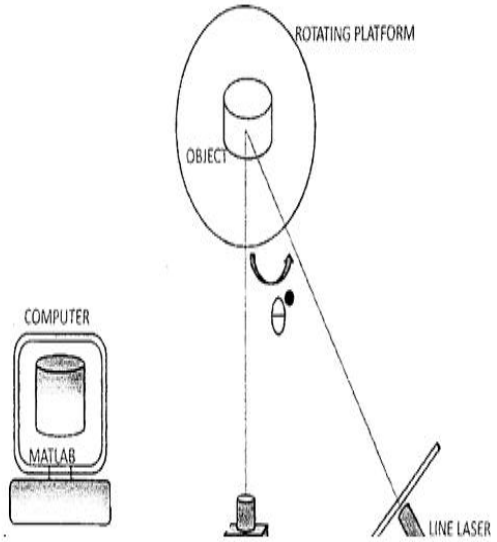


Figure 2- Block Diagram of hardware setup

The object to be scanned is mounted on a rotating platform. A 12V de motor is used to rotate this platform. A line laser is used to illuminate one side of the object. This line laser is placed at a pre determined angle with respect to the axis along which the camera is placed. This angle 0 is used to calculate the distance of a point on the surface of the object from the vertex. The camera then captures an image of the illuminated surface. Since the whole apparatus is placed in a dark room, only the red laser is captured and the rest of the object appears dark. The disc is then rotated and another image captured. The degree by which this object is rotated between consecutive images determines

the resolution of the 3D scan. All these images are stored in a computer via theUSB port. These images are then stitched together using a MATLAB program and form a seamless 3D model.

4.Implementation:

The code of this project has been written in MATLAB 2010 but it is compatible even with the earlier versions of MATLAB starting from MATLAB 7.11s if they have the following toolboxes.

Image Acquisition Toolbox.
Image Processing Toolbox
Data Acquisition Toolbox
Processor-AMD Athlon(tm)I IX3 425 processor,2700Mhz,3cores(3),3logical processor.
Version-6.1.7601 service pack 1 Build 760,system type-X86-based PC

4.1CANNY EDGE DETECTION FORMULA

Because the Canny edge detector is susceptible to noise present in raw unprocessed image data, it uses a filter based on a Gaussian (bell curve), where the raw image is convolved with a Gaussian filter. The result is a slightly blurred version of the original which is not affected by a single noisy pixel to any significant degree.

Here is an example of a 5x5 Gaussian filter, used to create the image to the right, with σ = 1.4. (The asterisk denotes a convolutionoperation.)

$$\mathbf{B} = \frac{1}{159}\begin{bmatrix} 2 & 4 & 5 & 4 & 2 \\ 4 & 9 & 12 & 9 & 4 \\ 5 & 12 & 15 & 12 & 5 \\ 4 & 9 & 12 & 9 & 4 \\ 2 & 4 & 5 & 4 & 2 \end{bmatrix} * \mathbf{A}.$$

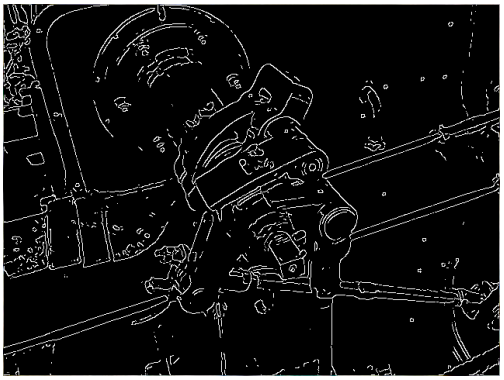


Figure 3-Finding Intensity Gradient Of Image

An edge in an image may point in a variety of directions, so the Canny algorithm uses four filters to detect horizontal, vertical and diagonal edges in the blurred image. The edge detection operator returns a value for the first derivative in the horizontal direction (Gx) and the vertical direction (Gy). From this the edge gradient and direction can be determined:

$$\mathbf{G} = \sqrt{\mathbf{G}_x^2 + \mathbf{G}_y^2}$$
$$\mathbf{\Theta} = \arctan\left(\frac{\mathbf{G}_y}{\mathbf{G}_x}\right).$$

The edge direction angle is rounded to one of four angles representing vertical, horizontal and the two diagonals (0, 45, 90 and 135 degrees for example).[7]

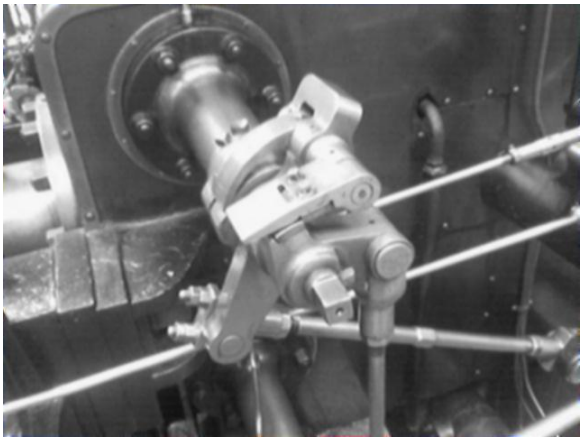


Figure 4-Image After Canny Edge Detection

5.CONCLUSION AND DISSCUSSION

3D object edge detection is done successfully . And after edge detection step , image processing will be done and 3D object modeling will be completed. Our output is in black and white format but in future colored output can be obtained .

6.REFERENCE

[1]B.Starly,Z.Fang,W.Sun,A.Shokoufandeh,W. Regli,"Three-Dimensional Reconstruction for CAD-Modeling "Author manuscript, published in, Computer-Aided Design & Applications, Vol. 2, pg 431-438-2005 .

[2] Fabio Ramondino, Sabry El-Hakim, Image Based 3-D modeling 2006.

[3]O.Stasse,D.Larlus,B.Lagarde,A.Escande" Towards Autonomous Object Reconstruction for Visual Search by the Humanoid Robot HRP-2 "Author manuscript, published in "7th IEEE RAS/RSJ Conference on Humanoids Robot (ICHR '07) ,151—158-2007 .

[4]Chiao-YingChou, BoSong,T hommas Williams,RoyHedden,JosephCulin, Christopher Post3-dimensional Landscape Visualizations of Forest Restoration Scenario For Southern Pine Bettle Infected Forest Feb-2011.

[5] Michael Krainin, Brian Curless, and Dieter Fox are with the Universityof Washington, Department of Computer Science & Engineering, Seattle,WA 98195. Dieter Fox is also with Intel Labs Seattle, Seattle, WA 98105.Autonomous Generation of Complete 3D Object Models Using NextBest View Manipulation Planning ,May 2011.

[6]DigitalImageProcessing, 2nd edition-RafaelC.Gonzalez&Richard E.Woods

[7] Digital Image Processing-S Jayaraman, S Esakkirajun,TVeerkumar

Analysis and implementation of digital communication system

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Abstract

In digital communication system design, the main objective is to receive data as similar as the data sent from the transmitter.It is important to analyze the system in term of probability of error to view the system's performance. Each modulation technique has different performance while dealing with signals, which normally are affected with noise. General explanation for probability of error is explained and simulated in this paper. It focuses on comparative performance analysis of basic M-ary PSK modulation schemes like BPSK, QPSK and 8-PSK. To better understand the M-ary PSK system, a Simulink-based simulation system is designed for M-ary PSK for M=2, 4 and 8 using communication toolbox in Simulink. This paper indicates that increasing of M results in increase of BER. Error rates of M-ary PSK system versus the signal-to-noise ratio (SNR) are used to evaluate the performance of M-ary PSK system. The BER curves for MPSK obtained after simulation are compared with theoretical curves.

1. Introduction

In telecommunication, a communication is a collection of individual communication networks, transmission systems, relay stations, tributary stations and data terminal equipment (DTE) usually capable of interconnection and interpolation to form an integrated whole.The components of a communications system serve a common purpose, are technically compatible, use common procedures, respond to controls, and operate in unison.

Telecommunications is a method of communication (e.g., for sports broadcasting, mass media, journalism, etc.)

The analysis and design of digital communication system involves the transmission of information in digital form from a source that generates the information to one or more destinations. The project aims at evaluating the error-rate performance of digital communication systems. For a combination of communication (modulation/detection) type the average bit error rate (BER) or symbol error rate (SER) of the system can be evaluated in MATLAB. Also the evaluation of performance measures of source coding & channel coding can be done in MATLAB.

The coverage is extremely broad in that coherent, differentially coherent, and non-coherent communication systems are all treated, as well as a large variety of fading channel models typical of communication links of practical interest. For each combination of communication (modulation/detection) type and channel fading model, the average bit error rate (BER) or symbol error rate (SER) of the system can be described and evaluated..

2. Basics of communication system

Fig. 1 illustrates the functional diagram and the basic elements of a digital communication system.

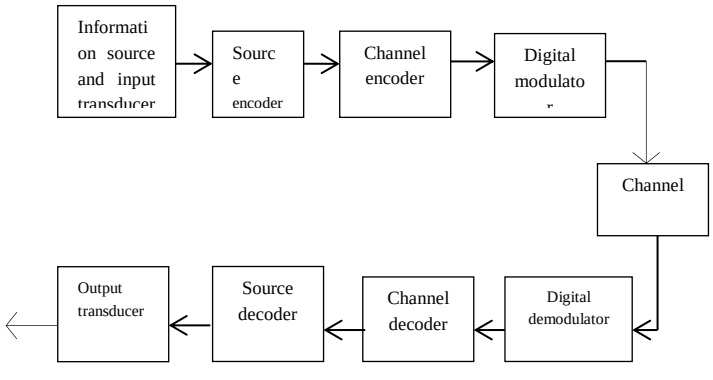

Fig. 1 Basics of communication system.

2.1 Source coding

In computer science and informationtheory, data compression, sourcecoding,or bit-rate reduction involves encoding information using fewer bits than the original representation.Compression can be either lossy or lossless. Lossless,compression reduce s bits by identifying and eliminating statistical redundancy. No information is lost in lossless compression. Lossy compression reduces bits by identifying marginally important information and removing it. The process of reducing the size of a data file is popularly referred to as data compression, although it's formal name is source coding (coding done at the source of the data, before it is stored or transmitted).

2.2 Digital modulation

In digital modulation, an analog carrier signal is modulated by a discrete signal. Digital modulation methods can be considered as digital-to-analog conversion, and the corresponding demodulation or detection as analog-to-digital conversion. The changes in the carrier signal are chosen from a finite number of M alternative symbols.

The most fundamental digital modulation techniques are based on keying:

- In the case of PSK (phase-shift keying), a finite number of phases are used.
- In the case of FSK (frequency-shift keying), a finite number of frequencies are used.
- In the case of ASK (amplitude-shift keying), a finite number of amplitudes are used.
- In the case of QAM (quadrature amplitude modulation), a finite number of at least two phases, and at least two amplitudes are used.

2.3 Channel coding

Channel codes are made up of two main types:

a) Convolutional codes.
b) Block codes.

In practical communication systems, convolutional codes tend to be one of the more widely used channel codes. These codes are used primarily for real-time error correction and can convert an entire data stream into one single codeword. The Viterbi algorithm provided the basis for the main decoding strategy of convolutional codes. The encoded bits depend not only on the current informational k input bits but also on past input bits. Block codes tend to be based on the finite field arithmetic and abstract algebra. Block codes accept a block of k information bits and return a block of n coded bits. Block codes are used primarily to correct or detect errors in data transmission. Commonly used block codes are Reed-Solomon codes, BCH codes, Golay codes and Hamming codes.

2.4 Eye diagram

Eye pattern is called Eye diagram, since visual representation of pattern is in the shape of an eye. Eye-pattern technique is a method, which is used to asses maximum transmission rate of a system.Major application of eye pattern is in the optical fiber data links. Eye pattern is measured in time domain and an oscilloscope is used to view the effects of distorted signal. Eye pattern is combination of repeated signals samples generated at output. Typical eye diagram is shown in Fig 2.

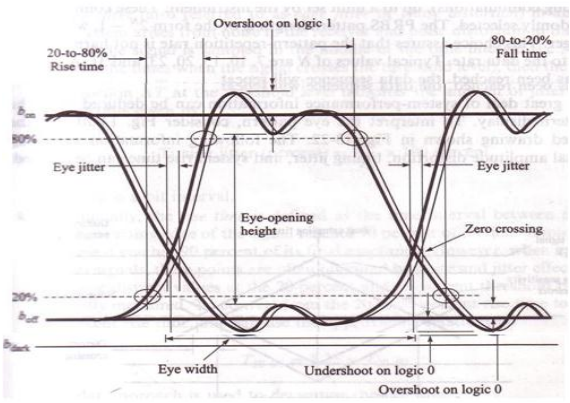

Fig 2. Eye pattern.

Important features of an Eye pattern are

1) Height and width of eye
2) Overshoot logic zeros and ones
3) Jitter in eye pattern
4) 20-80% rise and fall time

Width of eye opening defines sampling of received signal without distortion. Higher width explains less distortion of signal at receiver. Height (opening) of eye explains distortion of the amplitude in the signal. If height of eye is small, then signal with asymmetric amplitude is received at receiver. Jitter in the eye pattern occurs due to phase distortion and noise in the system. Eye pattern is displayed with boundaries named logic 1 and logic 0. If the eye pattern is observed above or below, the logic levels called as overshoot of logic 0 and 1. These are studied as signals with amplitude higher than amplitude of input signal. Rise time indicates time taken by a signal to reach from 10% to 90% of its amplitude and Fall time indicates time taken by a signal to reach from 90% to 10% of its amplitude. In Fig 2 and Fig. 3, difference between a degraded and ideal eye pattern is shown.

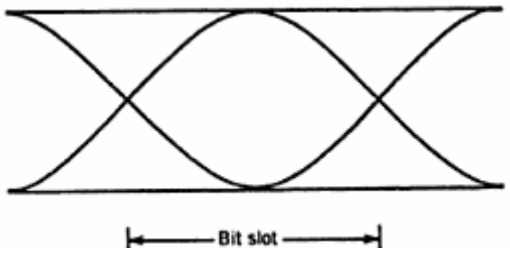

Fig. 3 Ideal eye pattern.

2.4 Bit error rate

Bit error rate is defined as "number of errors occurring over a certain period of time by total number of pulses transmitted during this interval" and given by(1)

$$BER = \frac{N_{error}}{N_{total}} \quad (1)$$

The error rate depends on signal to noise ratio determined by Q factor. The relation between BER and Q factor is given by (2)

$$BER = \left(\frac{1}{\sqrt{2\pi}}\right)\left(\frac{e^{-\frac{Q^2}{2}}}{Q}\right) \quad (2)$$

If Q factor of the system or design increases then BER decreases (BER and Q factor is inversely proportional), means signal received with small noise factor at receiver.

PSK, phase shift keying is a phase modulation algorithm that carries digital data by modifying the phase of a carrier wave.

The three variants of PSK are BPSK,QPSK and MPSK. The difference between each of these is as stated below in table no.

	BPSK	QPSK	MPSK
No. of bits per symbol	1	2	N
Minimum bandwidth	2f	2f	2f/N
Symbol duration	T	2T	N*T
No. of phase shifts(2^N)	2	4	2^N

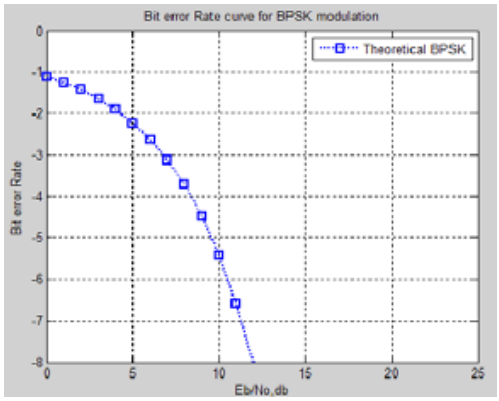

Fig.4 Bit error rate probability for BPSK over AWGN channel

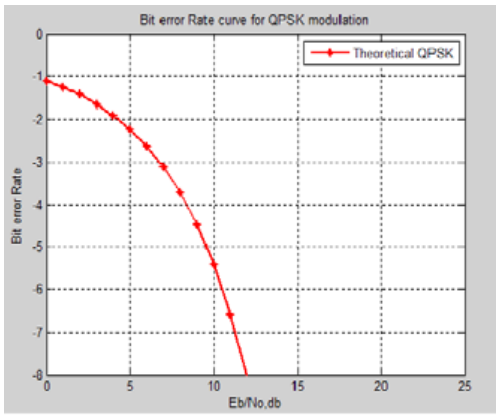

Fig .5 Bit error rate probability for QPSK over AWGN channel

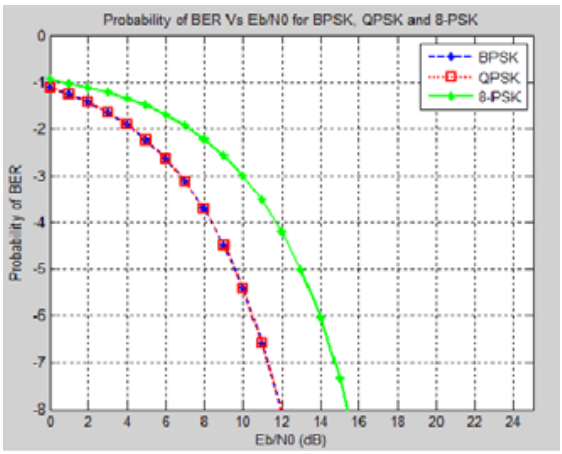

Fig .6 Comparative performance analysis of bit error rate probability for MPSK for M= 2, 4, 8 over AWGN channel.

3. Future Scope

The coverage is extremely broad in that coherent, differentially coherent, and non-coherent communication systems are all treated, as well as a large variety of fading channel models typical of communication links of practical interest. For each combination of communication (modulation/detection) type and channel fading model, the average bit error rate (BER) or symbol error rate (SER) of the system can be described and evaluated.

4. Conclusion

The mathematical analysis and simulations using SIMULINK tool shows that the BER for all the M-ary PSK based digital modulation schemes decrease monotonically with increasing values of Eb/No. A QPSK system transmits information at twice the bit rate of a BPSK system for the same channel BW due to which QPSK is mostly used in practice. In case of 8-PSK the probability of error is greater as constellation points come closer, but BW of 8-PSK is one third of the BW of BPSK. So, a 8-PSK system transmits information at thrice the bit rate of a BPSK system. It is observed from the simulation curves and the mathematical analysis of the signals that as the number of signals or number of M increases, the error probability also increases over AWGN channel. It is seen that higher-order modulations exhibit higher error-rates; in exchange however they deliver a higher raw data-rate. Increasing the data rate will increase the SNR, however, increasing Rb (Bit rate in bits/second) will also cause more noise and noise term also increases, since more bits are packed closer and sent through the channel. So, we cannot increase SNR by simply increasing Rb. We must strike a compromise between the data rate and the amount of noise our receiver can handle.

References

[1] Digitalcommunications-Simon Haykin, John Wiley &Sons publications.

[2] CodingTechniques: An introduction to Compression to compression and error control-Graham Wade, Palgrave.

[3]Digital Communication (2nd edition)-Bernard Sklar Pearson Education Asia Publication

[4] CommunicationSystems-BP.Lathi, BS Publications

[5] Marvin K. Simon, Mohammad-Salim Alouini-"A Unified Approach to the Performance Analysis of Digital Communication over Generalized Fading Channels" (PROCEEDINGS OF THE IEEE, VOL. 86, NO. 9, SEPTEMBER 1998).

[6] "Comparative Performance Analysis of M-ary PSK Modulation Schemes using Simulink" 1.Harjot Kaur, 2.Bindiya Jain, 3.Amit Verma 1,2.Dept. of ECE, DAVIET, Jalandhar, Punjab, India3.Dept. of ECE, Rayat and Bahra Institute of Engg. and Technology, Mohali, Punjab, India.(IJECT Vol. 2, Issue 3, SEPT. 2011)

Streamlining the process of Medical Representative in Pharmaceutical Industry using GPS Technology

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Abstract

Android is on its way to become de-facto Mobile Operating System of choice in all Non-i Phone markets. With a choice of handsets and price range from INR 4500 to INR 35000, Androidoffers a Smart Phone for all. Google predicts that total number of users on Android Smartphone will be over 750 million by 2014. With an intend to offer a solution on Android platform to make a company Smarter with relevant, timely and digestible information is the objective.

The paper presented focuses on development of an Android App which is an integrated GPS/portal solution with an objective of enhancing control and visibility of the user using this application thus improving the productivity of the company to a great extend without increasing the cost.

Keywords: Real-time tracking, mobile technologies, Android OS.

I. Introduction

Mobile technologies such as Global Positioning Systems (GPS), General Packet Radio Service (GPRS) and Geography Information Systems (GIS) coupled with advanced Internet solutions provide transparency and more specific information in terms of instant localization and traceability [1].

GPS are space-based radio positioning systems that provide 24-hour, 3-dimensional position, velocity and time information to suitably equipped users anywhere on the surface of the Earth [2].The impact of these mobile technologies can be seen in logistic companies to track their fleets. However the same technology can also be used in Pharmaceutical sector.

The Pharmaceutical Industry is facing a difficult time due to following issues.

- Lack of Real Time Location of On-Field Staff.
- Keep a track on the number of visits made by the MR per day.
- Lack of tools to verify attendance of On-Field Staff.

Pharmaceutical marketing, sometimes called medico-marketing or pharma marketing is the business of advertising or otherwise promoting the sales of pharmaceuticals or drugs. Medical Representatives are the sales channel of the product of the pharmaceutical company. On behalf of the company, they visit a wide range of people and organizations like pharmacists, doctors, nursing homes and hospitals. Their job may involve extensive travelling to small towns and villages. In short, their physical presence in the company is limited.

II. Research Problem and Aims

From the literature review, we can summaries a Medical Representatives (MRs) makes routine trips to the doctors, medical shops daily 5 to 8 visits.

Using Geofencing we can define geographical boundaries to each and every location to be visited by the MRs on the particular day.

Geofence can be in any complex shapes like polygon or circle. With the help of Web based maps a manager for the particular MR can create geofence according to the location of their clients[3]. The MR thus can view number of locations on the map available on its application knowing the trip to be made on that day. Thus an optimized schedule is created for each MR,that can help in streamlining the process and efficiency of each Medical representative knowing the exact route to travel to the next closest location from his current location. Once the MR device crosses a geofence and enters (or exits)the boundaries defined by the administrator, an SMS or email alert is sent.Thus having a proof that the MR visited the client.

The important technology features which can be used in the system to solve the above problems are

Placemarks: They are the location markers on Google maps. This placemarks can highlight the current location of the user which can be reflected on the web portal.

Geo Fencing: Virtual Boundary of any shape and size which can trigger an alert on entry / exit of boundary. A utility which is made available on the Web Portal to Geo Fence all the pharmacy's and Doctor clinic. Alerts can be generated in the form of SMS's when the user enters or exit the geo fence area. For e.g. Mr. ABC entered Dr. ABC clinic at 12.00 p.m. on 21st Feb.

Battery Percentage: The application can on/off the GPS receiver active on the mobile phone to reduce the drainage of the Battery. And also the operator available on the Web Portal can monitor the battery percentage of the user and can send him alerts if the battery level is below critical level e.g. 20%.

Automatic Start/Stop: Integrating the application with the phone time the application can implicitly resume its service at the start of work hours of the day and stop it service at the end of work hours e.g. 10 to 7 p.m.

Alert/Travelling Expense: As GPS technology can provide real time data on the current location and distance travelledof the user enabled with GPS device. The application can give on timely alerts to the client to provide the Estimated Time of Arrival (ETA) at the client location. The distance travelled by the user in terms of KMs can help the company to give travelling allowances to their employees.

Daily Reports: The raw data available on the data center can be mined into useful reports for analyze and visualization of routes of users.

III. Application in Other Domain

Another interesting application of Real Time Tracking can be found immensely in the field of logistics. Currently the, Logistic Supplier Providers (LSP's) make use of GPS device to track their thousands of fleets. This application can be a replacement to the high cost GPS device which can serve the same purpose in minimal cost. Thus the information on the latest delivery status, the expected time for the arrival (ETA), the velocity of the fleets on their way and many other features related to their needs can be integrated and achievedthrough this application as well.

IV. Real-time tracking Solution

Harnessing the inbuilt GPS feature of Android phones along with the web portal can address the issues faced by the Pharmaceutical sector. The system is based on an application which is running on any android phone and transmits regular status updates back to web portal (figure 1). This application after regular specified intervals will hit the data center to populate the current location of the user through web service. The logic implemented either on the web portal or on in the application to check whether the user has entered the geo fence so that timely alerts can be send.

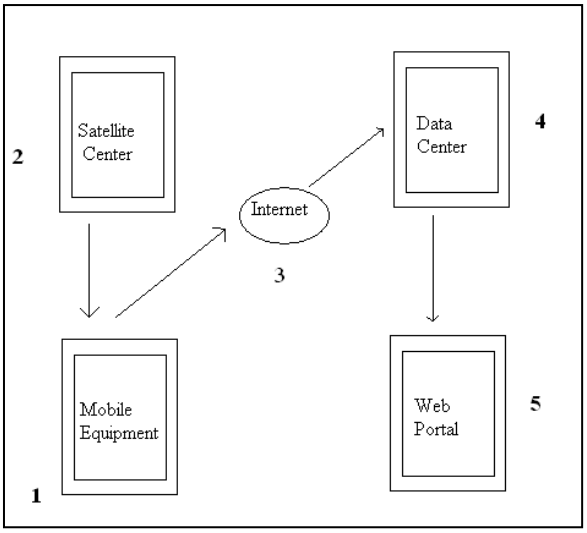

Figure 1: Real Time Tracking Solution.

The mobile tracking application as well as the web-portal is based on the SaaS concept (Software as a Service) which means that the application is hosted as a service provided to customers across the Internet.

The advantage of using SaaS is that it eliminates customer effort of software maintenance, security updates and support as the actual application is installed on a service host. In addition to the above, the company incurred no up-front cost and benefited from virtually unlimited computing power with a reasonable monthly service cost.

V. Conclusion

The paper helped to gain an understanding of the challenges involved in a pharmaceutical operation and to interpret these in a real-life setting. Furthermore, through this the benefits of using GPS tracking and integration portal technologies within the context of the pharmaceuticaland

logistic industry have been demonstrated. New business contracts could be won from the client market that demand tracking systems to be in place for security as well as customer services purpose.

Future research will focus on enhancing tracking functionality in where live notification can be send to the application user for change in today's route, dynamic allocation of new client on the trip, optimization on the routes to reach the nearest client first and so on etc.

VI. References

[1] Dr ROULA MICHAELIDES (2010),Case Study -OPTIMISATION OFLOGISTICS OPERATIONS USINGGPS TECHNOLOGY SOLUTIONS.

[2] Malladi R. and Agrawal D.P. (2002), Current and Future Applications ofMobile and Wireless Networks,*COMMUNICATIONS OF THE ACM*,October 2002/Vol. 45, No.10

[3]http://whatis.techtarget.com/definition/geofencing

Study of Bio-Nano Antenna for Measurement of Ionospheric Disturbanceduring Solar-Eclips*e*

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4) Retd. Scientific Officer B.A.R.C., Mumbai, India.

Abstract:

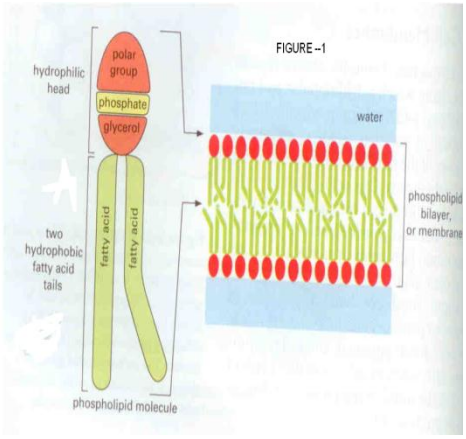
Aim of the study is to relate the ionosphere disturbance with bio Nano antenna of Yeast cell (Saccharomyces Cerevisias) during solar eclipse.

Introduction: It was the rare opportunity to observe the total solar eclipse on 11 August 1999 at a small village Hriyudre located about 10 km north of Bhuj city in Gujrat state of India. Due to complete overcast of sky, the glorious corona and celestial diamond ring were not visible. However rapid changes in diffused light due to eclipse were quite spectacular.

The aim of the experiment was to see the effect of solar eclipse on living creatures. For easy understanding of the bio nano-antenna signaling, a unicellular and autotrophic fungi (Yeast) was taken for experimental study. The outer surface of its cell membrane having a large number of proteins serves as receptors which receive the signal from environment and change the metabolism and growth (Ref. 11 &12). A number of properties of a material composed of micrometer size as well as these composed Nano sized particle depend strongly on the surface area of the surface of micro-organism cell which contain several proteins which acts as a Nano antenna.

PHYSICAL ANALYSIS OF BIO NANO-ANTENNA AND ITS EQUIVALENT CIRCUIT:-

The cell membrane provides a selective barrier, allowing certain substances and chemicals to move into and out of the cell. The membrane is a bilayer of phospholipids that has polar and no polar parts which is referred to as being amphipathic. (Fig 1) The non-polar parts share electrons of atoms equally. The polar parts share electrons unequally. Each polar part has a head that contains phosphate and is hydrophilic (water-loving). Each non polar part has two tails composed of long fatty acids that are hydrophobic (‘water fearing’). The heads always face a watery fluid such as the extra cellular fluid on the outside of the cell and intra1cellular fluid inside the cell. Tails align back to back preventing the watery fluid from crossing the cell membrane.



The Fluid Mosaic Model describes the structure of cell membrane It is called mosaic because proteins within the cell membrane are arranged like tiles in a mosaic artwork. The term mosaic is used to imply that membrane proteins and lipids flow freely within the cell membrane, as fig .2

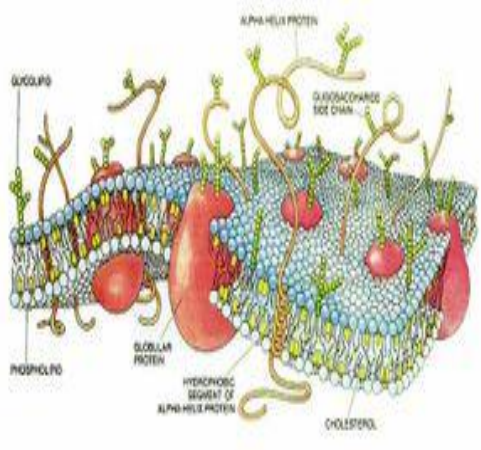


FIGURE ---2

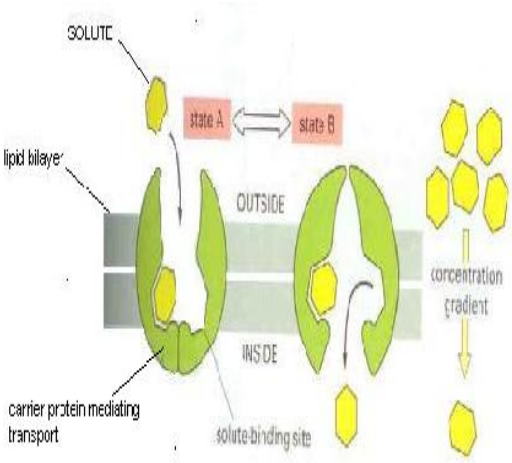
There are two kinds of proteins within the cell membrane. These are:
Integral proteins: - An integral protein extends into the lipid bilayer. Integral proteins are typically glycoprotein's that act like a molecular signature that cells use to recognize each other. Glycoprotein's have a carbohydrate group attached to them. Two examples are:

Trasmembrane protein: - A transport protein that regulates the movement of molecules through the cytoplasmic membrane.
Channel protein: - A channel protein forms pores or channels in the cytoplasmic membrane that permit the flow of molecules through the cytoplasmic membrane.
Peripheralproteins. Peripheral proteins are on the inner and outer surface of the cytoplasmic membrane and have the characteristics of polar and non-polar regions.

The function of the Cell Membrane:-

The cell membrane regulates the flow of molecules (such as nutrients) into the cell and removes waste from the cell by opening and closing passages called channels. In photosynthetic prokaryotes, the cell membrane functions in energy production by collecting energy in the form of light.
The cell membrane is selectively permeable because it permits the transport of some substance and inhabits the transport of other substances. Two types of transport mechanisms are used to move substances through the cell membrane. There are passive and active transport.

Passivetransport:-



Passive transport moves substances into and out of the cell down a gradient similar to how a rock rolls downhill, following the gradient.

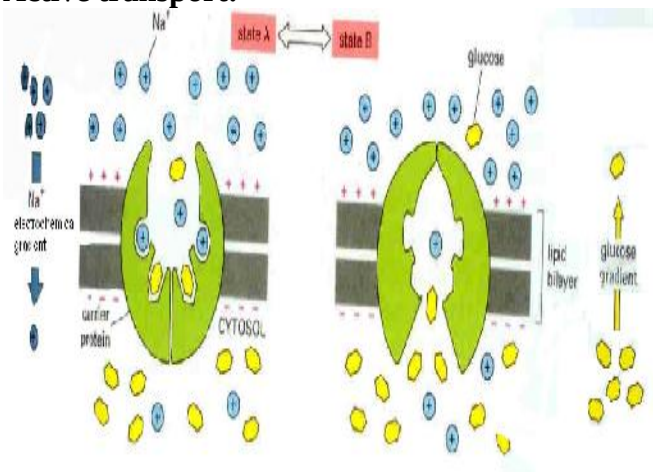
There are three types of passive transport. These are:

Simple diffusion: - Simple diffusion is the movement of substances from a higher-concentration region to a lower-concentration region (net movement).Only small chemicals (oxygen and carbon) or lipid-soluble chemicals (fatty acids) diffuse freely through the cytoplasm membrane, using simple diffusion.

Facilitated diffusion: -Facilitated diffusion is the movement of substances from a higher-concentration region (net movement) with the assistance of an integral protein across a selectively permeable membrane .The phospholipids bilayar prevents the movement of large molecules across the membrane until a pathway is formed using facilitated diffusion. The integral protein acts as a carrier by changing the shape of large molecules so the protein can transport the large molecules across the membrane.

Osmosis .Osmosis is the net movement (diffusion) of a solvent (Water in living organisms) from a region of highwater concentration to a region of lower Concentration.

Active transport:-



One of the most characteristic features of a living membrane is the process of active transport. An active transport refers to transport of substances across cell membranes in the absence of any electrochemical potential gradient. The bio membranes are capable of transporting molecules or ions not only between identical extra and intracellular fluids, having no pressure, or electric-potential differaceces among them but also against potential gradient .Such transport is carried through metabolic energy expenditure and is called active transport .Active transport is a deliberate activity; membrane maintains a definite concentration gradient of several molecules and ions across itself by actively transporting these substances . For example , in case of all vertebrates and many invertebrates , a differential concentration of Na+,Ka+,Ca++,Cl-,etc. Ions is found across cell membrane in normal steady conditions .while passive ion flux from high concentration to low concentration regions does take place , concentration gradient is maintained by pumping out the ions back from low to high concentration regions.

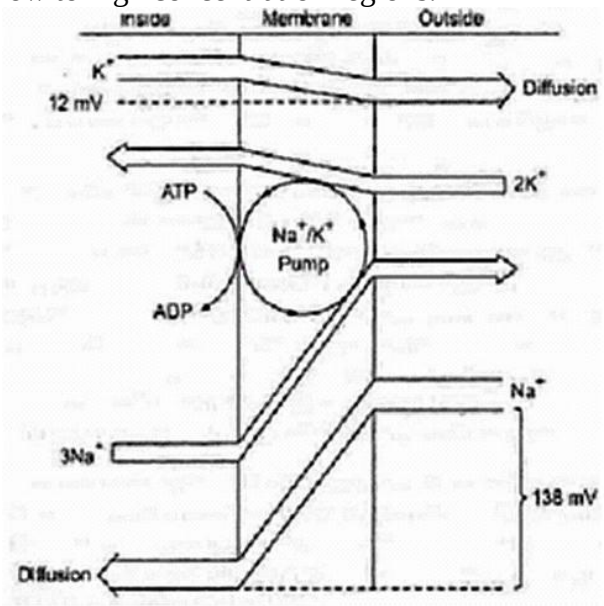


FIGURE----- 3

Transport against potential gradient requires expenditures therefore as long as metabolism remains operative, active transport characteristic gradients.

The process active transport, therefore, requires a coupling between an exegetic chemical reaction and transport mechanism. It has been found that an energy producing chemical reaction occurs inside (I .e, in the interior of) the membrane with which the transport system associates itself to drive the necessary energy .It is the hydrolysis of ATP into ADP in the cell membrane that supplies

the energy. The couplings of active transport system to the chemical reaction are of various nature and varying complexity. Energy for active transport comes from hydrolysis of ATP molecules. ATP is produced in mitochondria and from there it diffuses to the inner surface of cell membrane. The hydrolysis of one ATP molecule drives the pump through one complete cycle, taking $2k^+$ ions in and $3Na^+$ions out.

The Na^+/K^+transport system is mediated by a channel protein which works in the presence of Na^+/K^+ ions and couples with ATP hydrolysis. The channel is trasmembrane protein which neither rotates nor shuttles back and forth within the membrane. It probably provides an ions channel and also simultaneously undergoes conformational changes. The region of the protein which faces in cytoplasm has a site for binding ATP and three high affinity sites for binding Na^+ions .On the outer face ,it has two high affinity binding sites for K^+ ions . At the inner surface, in presence of Na^+, the conformation of protein (enzyme) C binds 3Na+, chemically reacts ATP and gets phosphorylated.

ATP + (C+3Na+) -------- C~ P(Na+) 3+ATP-------- (1)

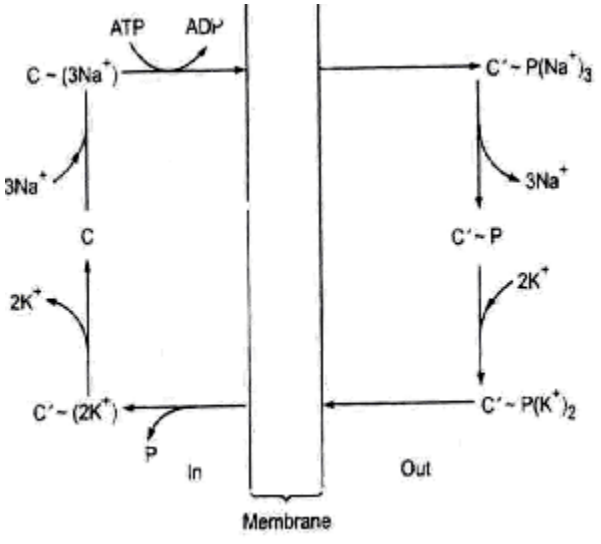


Figure --- (4)

Phosphorylation changes the enzyme C to conformation C' .ATP is left behind in intracellular fluid. The phosphorylated enzyme, transport 3Na+ ions to out surface of the membrane. In C' conformation, enzyme has great affinity for K+ then for Na+ .Hence , on the outer surface o, it loose 3Na+ and pickup 2K+

C'~ P $(Na^+)_3$ +$2K^+$ ---------- C' ~P (K+) +$3Na^+$ -------- (2)

The enzyme then transports $2K^+$ ions to inner surface of the membrane.

One enzyme C' binds itself with K^+, it favors to loose its bond with phosphate group .Therefore, it undergoes dephosphorylation and consequently falls back to its initial conformation C.

C' ~P $(K^+)_2$ ---------- C+P +$2K^+$ ------- (3)

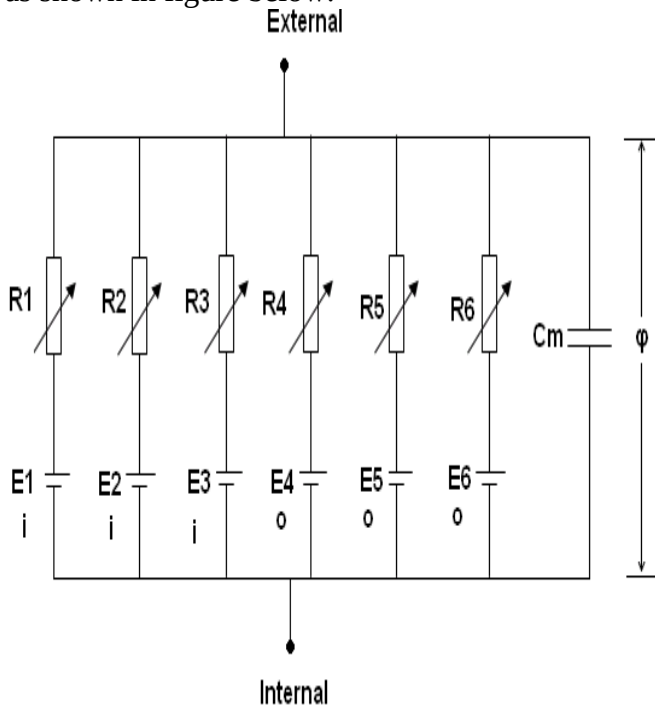
On the inner surface , therefore , enzyme releases $2K^+$ ions and one phosphate group to intracellular fluid .The conformation C having great affinity for Na^+ , again goes through reaction (1) ---- (3) .

In this study Yeast *(saccharomyces crevice*) is use as a biological system. It is a unicellular eukaryotic microorganism. Yeast *(saccharomyces crevice*)cells absorb the food to obtain energy for metabolism and growth. Their favorite food is sugar in various forms (sucrose, fructose, glucose and maltose). The cell membrane of Yeast receives signal through receptors from out side environment and transmits a signal to organelles within the cell. If any environmental changes (temp, press, humidity, light intensity, earth magnetic field, etc) occur then the metabolism of yeast will change

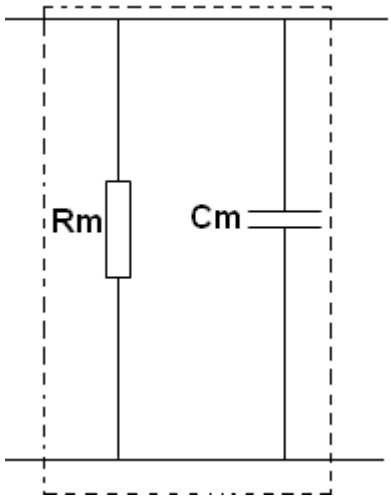
Therefore the effect of solar eclipse on this biological system has been examined with aid of an experimental arrangement (BIOSENSER) in this experimental set up Yeast (*saccharomyces crevice*)is in nutrient medium generates variation in potential gradient, this variation in potential gradient produce electric signal which is monitored with help of Multi-meter or Data logger.

ELECTRICAL ANALOG OF BIO NANO-ANTENNA

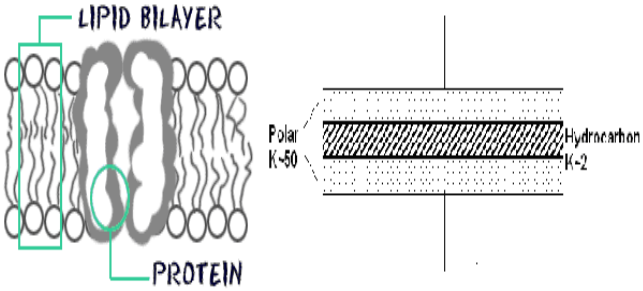
An extensive study of electrical properties of cell membrane was done by COLE and CURIT, and also Hodgkin and Huxley. According to them an element of cell membrane at any local region can be regarded electrical equivalent to a parallel combination of a capacitor C_m and several resistance (R_1,R_2,R_3,,R_4,R_5,R_6) with net resistance Rm as shown in figure below.



Equivalent Circuit (Figure No.)



The two surface of cell membrane element are supposed to form the two plates of parallel plate capacitor, separated by membrane thickness (d), and raised to a potential V across the plates. Lipid constitutes the dielectric filled within the plates. The conduction path for ionic currents is presented by resistors lying across the membrane. Each resistor has its own resistance and is driven by a combination of two batteries: one battery representing Nernst potential for respective ions and other presenting (instantaneous) membrane potential φ as given below;



We have said earlier that mobile ions from intra and extra –cellular fluids assemble to from charge-layers on the outer face of the two surface of the membrane. These layers constitute the charged plates of membrane capacitor. Considering slab-like model of the membrane, we get a parallel plate capacitor. In between, the lipid medium has three distinct region; polar heads on the two sides and hydrocarbon tails in the middle. If we take the membrane thickness as 7nm, hydrocarbon region is about 2nm thick, while polar heads from a sheet of total thickness 5nm. Linear aliphatic hydrocarbons have a bulk dielectric constant of about 2.Polar heads have a much higher dielectric constant, probably about 50. Thus we have a capacitor which is filled whit two layers of dielectric constant K1 and K2, and thickness d1 and d2 respectively. If the total thickness of capacitor is d,

When membrane potential changes, the charge on the capacitor also changes according to relation $Q = C_m \varphi$ so that we have

$$Q\Delta/\Delta t = C_m \Delta\varphi/\Delta t$$

The charge of the capacitor plate leaks through the membrane, i.e. through the resistor R_m. (The possibility of a charge leak along the length of membrane surface will be discussed

in Box 11.3) that is, the ionic current across membrane is equal to rate of change capacitor charge:

$$\Delta Q/\Delta t = j_{ion}$$

$$C_m \Delta\varphi/\Delta t = \varphi/R_m$$

Solving the about equation, we get,

$\Phi(t) = \varphi(0) \exp(-t/\tau)$.

Where $\tau = R_m C_m$ is called the time constant of the equivalent RC circuit:$\varphi(0)$ is the initial potential (at t =0) across membrane.

Experimental Results:-

With a pair of dissimilar electrodes dipped in nutrient solution loaded with yeast cells, one can observe appreciable electric current generated during fermentation process. If a resistance load, comparable with equivalent internal resistance of this electricity generating biological cell, is connected across the electrodes one can measure ≈ 400 mV across the cell sustained with ≈ 100 micro ampere current through a load of 4.07 kohm external resistance. This voltage is also a measure of overall metabolic activity of the yeast colony.

Two identical cells of the above description were fabricated one cell was exposed to natural ambient condition and natural earth magnetic field. The other cell was subjected to horizontal magnetic field (0.4 Tesla) provided by a pair of strong magnets. Thus the pair was identical in every respect except high magnetic field for one cell.

The nutrient solution was prepared by mixing two table spoons of rice powder in 0.5 liter of water and loaded with 0.00025 kgm of yeast. The well mixed solution was poured in both cells to get identical performance.

EXPERIMENTAL ARRANGEMENT

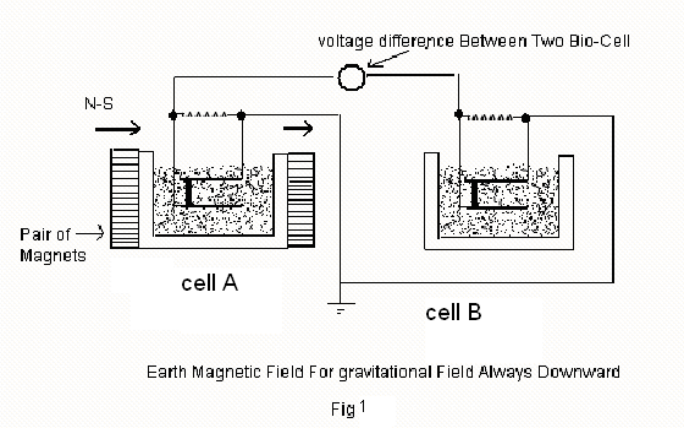


Fig 1

GRAPH SHOWING OBSERVATIONS TAKEN IN 11th AUGUST 1999 UNDER CENTRAL LINE OF TRESSTRIAL SHADOW

VOLTAGE DIFF. BETWEEN CELL A AND CELL B VS. G.M.T. TIME

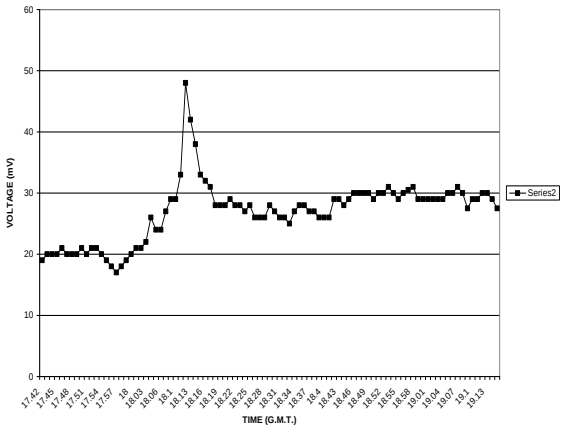
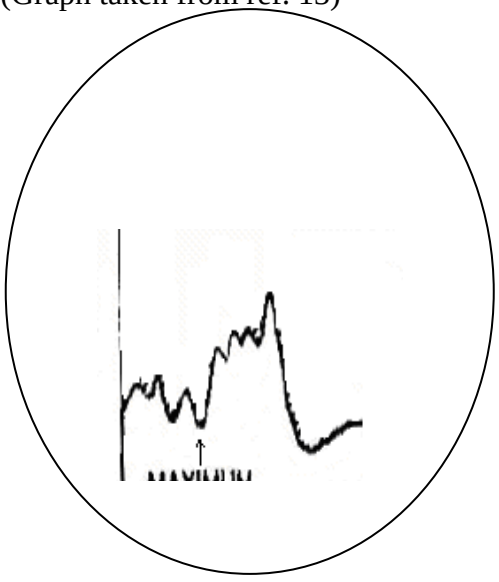


Fig.2(Graph taken from ref. 13)



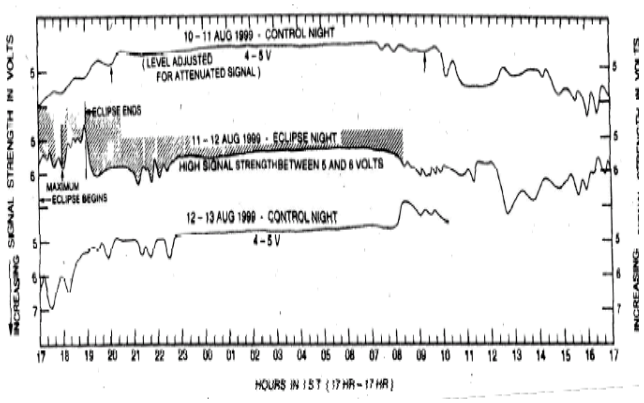


Fig.4

DISCUSSION-

The biomolecular sensing record of yeast is similar to Rio meter signal strength recording[13] during solar eclipse(As clear from Fig.2 and 4). Ionspheric absorption showed minimum absorption during solar eclipse.[4] ,[9],[10]similarly Yeast sensing curve showed minimum value minimum voltage amplitude at the Time of maximum Eclipse as clear in graph(VOL –TIME)

REFERENCES

1 H. Rishbeth, Solar Eclipses and Ionospheric Theory, *Space Sci. Re*v, vol. 8, pp.543, 1968.

2 H. Chandra, G. D.Vyas and S. Sharma, Ionospheric effects the total solar eclipse of 24 October 1995 over Ahmedaba*d, Ind. J of Radio & Space Phys.,* vol. 26, pp. 30-35, 1997.

3 H. Chandra, G. Sethia, G. D. Vyas, M. R. Deshpande and H. O. Vats, Ionospheric effects of the total solar eclipse of 16 February 1980 observed over Ahmedabad, *Ind. J of Radio & Space Phy*s., vol. 10, pp. 45-48, 1981.

4 R. G. Rastogi and R M Sheriff , A note on radio field strength observations made at Ahnmedabad during the total solar eclipse on 30 June 1954, *J. Sci. Industr. Re*s., vol. 14 A, pp. 159-161, 1955.

5 K. G. Jani, G. Datta, D. B. Patel and K. M. Kotadia, Ionospheric radio effects of the solar eclipse on 16 February 1980, *Proc. Ind. Natn. Acad. Sci.,* vol. 48A,pp. 316-324, 1982.

6 D. B. Patel, K. M. Kotadia , P. D. Lele and K. G. Jani , Absorption of radio waves during a solar eclipse, *Proc. Ind. Acad. Sc*i., vol. 95, pp. 193-200, 1986.

7 P. S. Dixit, P. K. Rao, R. V. Bhonsle, G. Sethia, M. R. Deshpande and H. Chandra , Phase and field measurements at VLF, LF and HF during the solar eclipse of February 16, 1980 – Preliminary

results, *Bull. Astr.Soc. Indi*a, vol. 8, pp. 145-148, 1980.

8 P. D. Lele, K. G. Jani and A. P. Patel, Multifrequency vertical incidence (A-1 method) absorption

measurements at Ahmedabad during total solar eclipse of October 1995, *Kodaikanal Obs. Bul*l.,vol. 13, pp. 209-212, 1997.

9 P. D. Lele, K. G. Jani and A. P. Patel, Field strength measurements A-3 method (Oblique incidence)

absorption at Ahmedabad during total solar eclipse of October 1995, *Kodaikanal Obs. Bul*l., vol. 13, pp. 213-216, 1997.

10 S. Abraham , S. K. Dhaka , N. Nath and K. L. Baluja, Ionospheric absorption on October 24, 1995 solar eclipse, *Geophy. Res. Let*t., vol. 25, pp. 2945-2947, 1998.

11. David, E.Metzler, BioChemistry Chemical reaction of living cell, Acaemic Press USA. Vol. I and II

12. Gerald karp, Cell And Molecular Biology,

Concepts and experiments (4th Edition), John Wiley & sons Inc.
13. H.Chandra, Som Sharma, P D Lele, G Rajaram and Arun Wanchinal, Inospheric measurements during total solar eclipse of 11th August 1999, Earth, Planets and Space, Japan.
14. Archut and F. Vögtle, "Dendritic Molecules—Historic Development and Future Applications" in Nalwa (2000), Vol. 5, Chapter 5.
15. A. Haque and Dr. S. Kumar, "Yeast Cell Under the influence of Solar Eclipse", Journal of Puravanchal Academy of Science, Jaunpur-Vol 17 (2011).

The Effect of Non- Identities in PFD on Reference Spur Levels in PLL

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ABSTRACT

Phase Lock Loop (PLL) is an important model used in various communication applications such as frequency synthesizer, radio, computer, clock generation, clock recovery, global positioning
system, etc. .it is integral part of digital system used in telecommunication. TheSimulating these modules is very time consuming. Therefore, a number of approaches to evaluate the performance of these modules through high level behavioral modeling are developed. In this paper, the effect of Phase/Frequency Detector (PFD) non-idealities in PLL behavioral model to estimate the periodic noise, which is also known as reference spurs levels is introduced. The proposed model was implemented in Simulink

Keywords

Simulink, Charge pump PLL, spurs

1.INTRODUCTION

Phase locked loop is an excellent research topic as it covers many disciplines of electrical engineering such as Communication Theory, Control Theory, Signal Analysis, Noise Characterization, Design with transistors and op-Amps, Digital Circuit design and non-linear circuit analysis. Later on with the development of integrated circuits, it found uses in many other applications. The first PLL ICs came in existence around 1965, and was built using purely analog devices. Recent advances in integrated circuit design techniques have led to an increased use of the PLL as it has become more economical and reliable. Now a whole PLL circuit can be integrated as a part of a larger circuit on a single Chip i.e SoC[1][9][13][14]. MATLAB Simulink[12][15][16]is effective tool to get prior idea about PLL parameters, its performance to fulfill requirements before actual chip design.

Phase Locked Loops are used in almost every communication system. Some of its uses include recovering clock from digital data signals[3], performing frequency, phase modulation and demodulation, recovering the carrier from satellite transmission signals and as a frequency synthesizer[2]. There are many designs in communication that require frequency synthesizer to generate a range of frequencies; such as cordless telephones, mobile radios and other wireless products. The accuracy of the required frequencies is very important in these designs as the performance is based on this parameter [1] [13] [4].

A Phase Locked Loop is a feedback control circuit. As the name suggests, the phase locked loop operates by trying to lock to the phase of a very accurate input signal through the use of its negative feedback path. A basic form of a PLL consists of three fundamental functional blocks namely Phase Detector (PD), Loop Filter (LF), Voltage Controlled Oscillator (VCO).The block diagram of PLL is shown in the figure 1.The different types of PLL can broadly categories as Analog PLL, Digital PLL and Hybrid PLL. PLLs have several unique characteristics when viewed from a control systems perspective. First of all

their correct operation depends on the fact that they are nonlinear. The loop does not exist without the presence of two nonlinear devices, namely the phase-detector and VCO[3].

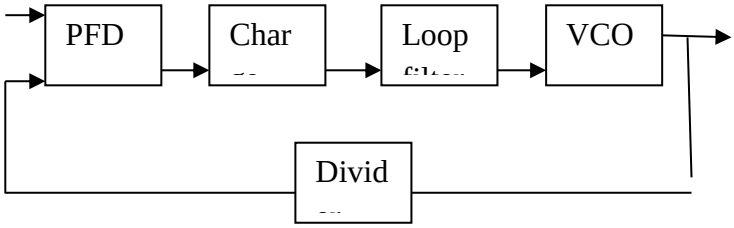

Figure 1. The block diagram of Charge pump PLL

The PLL performance is based on the noise seen at its output.There are two types of noise, random noise and periodic noise. Random noise is also known as phase noise, while periodic noise is called reference noise, which at a specified offset frequency from a carrier frequency. The Reference spurs are a serious issue in communication. A spur can degrade the signal-to-noise-ratio in data reception and transmission. This spur is caused by non-idealities in the PFD and charge pump circuits[8]. Here the non-idealities in PFD are discussed in Section I Many research are going on to eliminate or minimize the non-idealities in these circuits to minimize the reference spurs [2]–[5]. In Section II, the reference spurs and its sources are discussed, in Section III the PLL linear model and its implementation in Simulink are discussed in IV.

2. SOURCES OF REFERENCE SPURS

The main contributions to the reference spurs in PLL are PFD delay, charge pump switching delay, charge pump current leakage, charge pump current mismatch, charge injection and charge sharing [6], [7]. Figure 2 shows commonly used PFD circuits in PLL design and charge pump circuit.

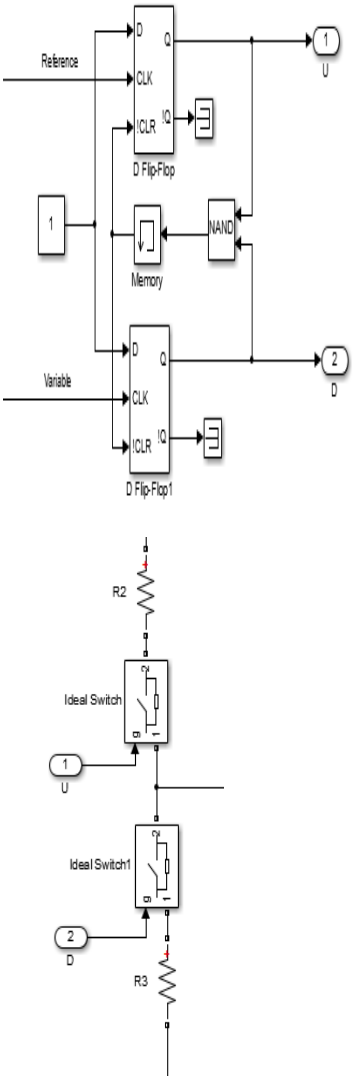

Figure 2. Phase/Frequency Detector (PFD) and charge pump circuits

The two PFD output signals, labeled as UP and DOWN signal in the diagram, control the charge pump switching. The UP switch is using a PMOS, while the DOWN switch is using an NMOS. An equal amount of delay on both these signals is needed to eliminate dead zone problem. So, the PFD delay itself does not contribute to reference spurs. On the other hand, a differential delay between these signals introduce reference spurs, as this will cause either the Iup or Idn to be on for a longer period of time. When UP and DOWN switches in charge pump are OFF, there should be zero net current flow to the filter circuit. However, there is still a very small current due to leakage current in the UP and

DOWN transistors of the CP circuit. The amount of this current depends on the used technology

Ideally, Iup should equal Idn in a charge pump However, because of the process variation and channel length modulation effect on the current mirror structures, Iup and Idn are slightly different. This mismatch can be as large as 10%-20% between these currents, depending on the current source structure, transistor sizes and used fabrication technology.

3. PLL MODEL

The developed PLL Simulink model is shown in Figure 3.and figure 4 ie charge pump PLL with transport delay of 10e-6 sec between PFD and charge pump circuit which introduced non-identities in PLL.

The VCO was modeled using a continuous time VCO block running at quiescent frequency 450 MHz with a 166.48 MHz/V gain. The VCO output is divided by 10 using a frequency divider, then feed to the second input of the PFD. A 450 MHz signal was used as a reference frequency. This simulation results obtained using matlab2012, version 8.0.0.783

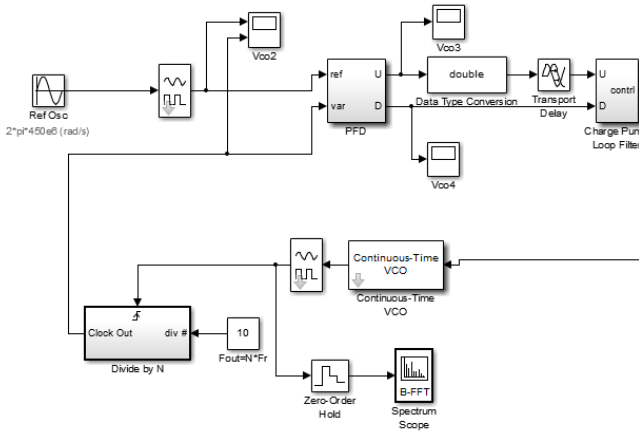

Figure. 3. PLL Simulink model

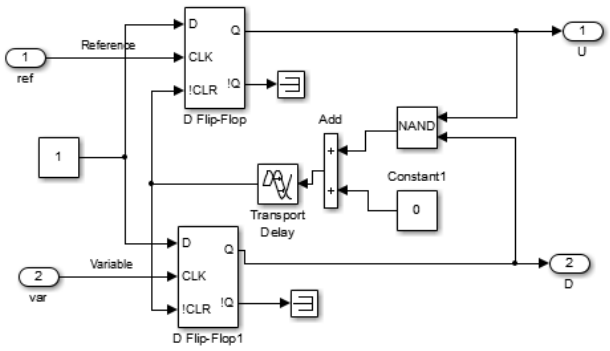

Figure: 4PFD with internal delay

4. MODELLING RESULTS

The reference spurs level was measured from the Simulink model simulation and was compared to reference spurs levels measured from ideal PLL model without delay , as shown in Figure 5.The simulated output obtained on FFT Spectrum scope.

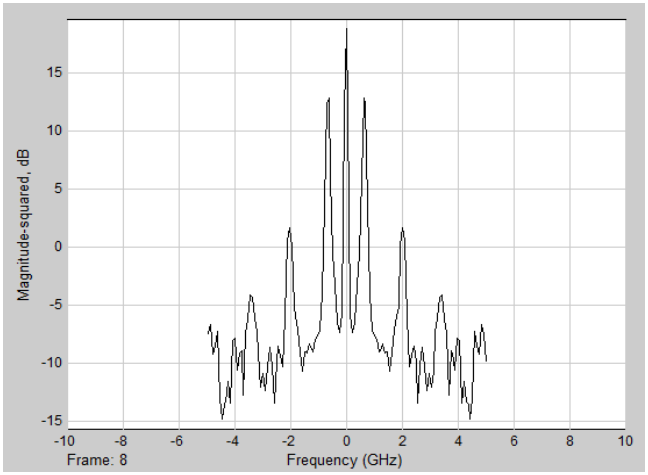

Figure: 5 Spectrum output for PLL system without delay

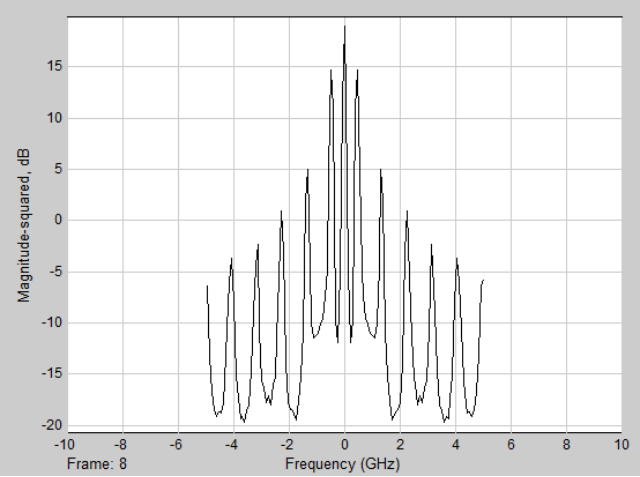

Figure: 6 Spectrum output for PLL system with delay

From figure 6 it was clear that due to the non-identities in PDF the PLL system performance will get affected which results in increasing spurs levels in outputs. The comparative study for spurs level is given in table 1.

Table 1: Comparative study in spurs levels

Model	No of spurs levels
PLL without delay	3
PLL with delay	6

5. CONCULSION AND DISSCUSSION

Simulink model of PLL has been developed. The model allows the investigation of PFD delay, charge pump current mismatch effects on the reference spur level .Due to this non identities the spurs levels are get doubled. These non-identities are very important consideration of PLL design.[10][11]

6. REFERENCES

[1] A. B. Grebene, *The monolithic phase-locked loop - a versatile building block,* IEEE Spectrum, vol. 8, pp.38-49, March 1971.

[2] B. Razavi ,*Monolithic Phase-Locked Loops and Clock Recovery Circuits*, IEEE 2003.

[3] Gursharan Reehal, *A Digital Frequency Synthesizer Using Phase Locked Loop Technique"* 1998

[4] F. M. Gardner, *Charge-Pump Phase-Lock Loops*, IEEE Trans. On Communications, vol. 28, pp. 1849-1858, November 1980.

[5] F.M Gardner, *Phaselock Techniques*, 2nd ed., John-Wiley & Sons, Inc., NY, 1979.

[6] K. H. Cheng, W. B. Yang, and C. M. Ying,*A dual-slope phase frequency detector and charge pump architecture to achieve fast locking of phase-locked loop*, IEEE Trans. Circuit and System II, vol. 50, pp. 892-896, Nov. 2003.

[7] Liu yu-zhen, *Design of phase-Locked loop based on SIMULINK,* Liaoning Technical University's Transaction,vo. 23, no. 2, pp. 236–237, 2004.

[8] Noorfazila Kamal, Said Al-Sarawi, Neil H. E. Weste and Derek Abbott"A Phase-Locked Loop Reference Spur Modelling using Simulink"international conference in electronic devices and application,pp279-283,2010

[9] P.E. Allen ,*PLL Design Equations & PLL Measurement*" ECE 6440 - Frequency Synthesizers

[10] R. E. Best, *Phase-Locked Loops: Theory, Design and Applications.* New York McGraw-Hill, 1984

[11] R.E. Best, *Phase-Locked Loops: Design, Simulation, and Applications,* 4th edition, McGraw-Hill, 1999 (4th edition)

[12]]T. A. Telba and Abdulhameed Al-MazrooA ,*Wideband Low Jitter Frequency Synthesizer Modeling and Simulation,* IJCSNS International Journal

of Computer Science and Network Security, VOL.10 No.1, January 2010

[13]] Ms. Ujwala A. Belorkar and Dr. S.A.Ladhake ,*Dssign of loe power phase Locked Loop (PLL) using 45NM VLSI TECHNOLOGY,*International journal of VLSI design & Communication Systems (LSICS), Vol.1, No.2, June 2010

[14] F. You, and S. He, "Analysis of Third-order Charge Pump PLLs,"IEEE conf., 2004, pp. 1372-1376

[15] A.Carlosena, A.M. Lazaro, "A Novel Design Method for Phased-Locked Loops of any Order and Type," IEEE conf., 2006, pp. 569-573.

[16] Yunfei Ye ,Ming Zhang "Analysis and Simulation Three Order Charge Pump Phase Locked Loop" 978-1-4244-2108-4/08/$25.00 © 2008 IEEE

Comparative analysis and Optimal selection of Binary Codes for Pulse Compression in Surveillance Radar

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ABSTRACT

The papers aim to make a comparative study of binary phase codes in Radar pulse compression. Pulse compression allows radar to use long waveforms in order to obtain high energy and simultaneously achieve the resolution of a short pulse by internal modulation of the long pulse. This technique increases signal bandwidth through frequency or phase coding. This paper does a comparative analysis of binary codes based on the simulation results of their autocorrelation function and identifies 13 bit Barker code as the most optimal binary code for surveillance radar.

Keywords

Pulse compression, Range resolution, Peak side lobe level (PSL), Barker Code, Golay Code

7. INTRODUCTION

RADAR is an acronym of Radio Detection and Ranging. There was a rapid growth in radar technology and systems during World War II. The major areas of radar applications includes military, remote sensing, air traffic control, law enforcement and highway safety, aircraft safety and navigation, ship safety and space [1][4]. Simple pulsed radar is limited in range sensitivity by the average radiation power and, in range resolution by the pulse length. The pulse compression theory has been introduced in order to get a high range resolution as well as a good detection probability[2]. Pulse compression allows the use of long waveforms to obtain high energy and simultaneously achieve the resolution of a short pulse by internal modulation of the long pulse. The resolution is the ability of radar to distinguish targets that are closely spaced together in either range or bearing. The receiver matched filter output is the autocorrelation of the signal. If matched filter is not able to give satisfactory PSL, a mismatch filter can be used so as to reduce the side lobes further at a cost of introducing SNR mismatch loss. Low autocorrelation side lobes are required to prevent the masking of weak targets that occurs in the range side lobe of strong target the internal modulation may be binary phase coding, polyphase coding, frequency modulation, and frequency stepping. There are many advantages of using pulse compression techniques in the radar field. They include reduction of peak power, relevant reduction of high voltages in radar transmitter, protection against detection by radar detectors, significant improvement of range resolution, relevant reduction in clutter troubles and protection against jamming coming from spread spectrum action[1][4].

8. PULSE COMPRESSION

High energy (Power * Time) Transmit signal is required to improve detection threshold.

$$E = P_t * T \quad (1)$$

So to detect the received echo and for long-range detection application, energy should be high .This achieved by either increasing the transmitted power or increasing interval time. High-power transmitters present problems because it requires high-voltage power supplies (kV) beside reliability problems and safety issues, big size, heavier, more

expensive. Radar provides the good range resolution as well as long detection of the target. By definition, Range Resolution is the ability to detect targets close proximity to each other as distinct objects only by measurement of their ranges (distances from radar) which usually expressed in terms of the minimum distance by which two targets of equal strength at the same azimuth and elevation angles must be spaced to be separately distinguishable. The most common radar signal or waveform is a series of short duration, somewhat rectangular-shaped pulses modulating a sine wave carrier. Increasing the interval time $\boldsymbol{\tau}$ contradicts with range resolution[3].

$$\Delta R = \frac{c\tau}{2} = \frac{c}{2*B} \; as \; \tau = 1/\mathrm{B} \qquad (2)$$

Short pulses are better for range resolution, but contradict with energy, long range detection, carrier frequency and SNR. Long pulses are better for signal reception, but contradict with range resolution and minimum range. At the transmitter, the signal has relatively small amplitude for ease to generate and is large in time to ensure enough energy in the signal as shown in Figure 1. At the receiver, the signal has very high amplitude to be detected and is small in time.

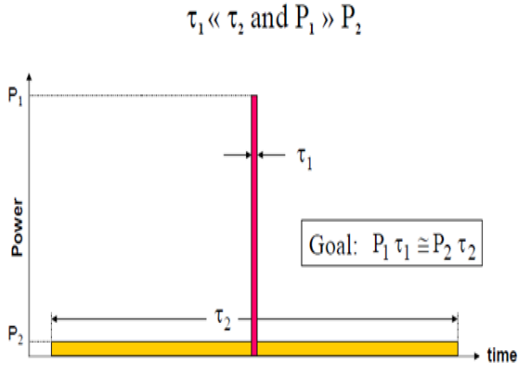


Fig 1 Concept of Pulse Compression

Frequency or phase modulation can be used to increase the spectral width of a long pulse to obtain the resolution of a short pulse. This is called "pulse compression".

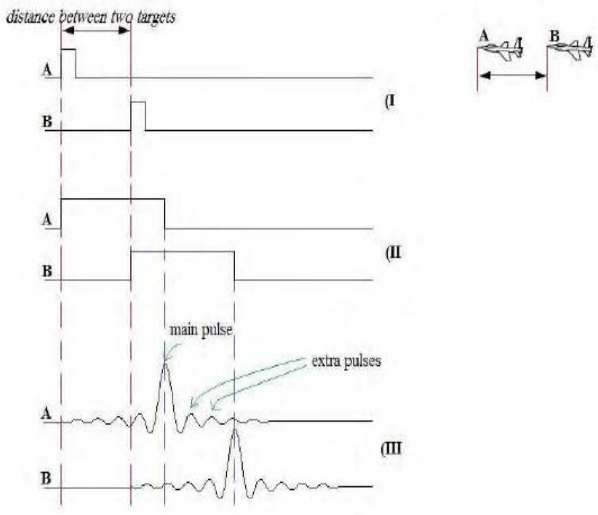


Fig 2: Increase in Resolution due to Pulse compression

This technique can increase signal bandwidth through frequency or phase coding. Although, amplitude modulation is not forbidden but usually is not used. The received echo is processed in the receiver matched filter to produce a short pulse with duration 1/B, where B is bandwidth of compressed pulse. This technique is of interest when the radar is not able to generate enough required power. So, a concise summary for pulse compression is gathering two opposite benefits "High Range Resolution" and "high detection probability" concurrently. A long pulse is modulated or coded to increase its bandwidth .On reception the modulated long –pulse echo signal is passed through the matched filter which performs the cross-correlation between transmit reference and received echo. However, the limitation is that it has range doppler cross coupling, resulting in measurement errors unless one of the coordinates (range or doppler) is determined.

Range side lobes are high, compared with nonlinear FM and phase-coded waveforms.

9. Binary Phase coding

This waveform is one in which intra-pulse modulation is obtained by subdividing the pulse into sub pulses of equal duration, each having a particular phase. The phase of each sub pulse is set in accordance with a given code or code sequence.. They are preferred in jamming conditions, as the coding of the transmitted signal gives an additional degree of protection against ECM. In this form of pulse compression, a long pulse of duration T is divided into N sub pulses each of width τ. The code or sequence is used to describe the phases of the individual sub pulses of a phase coded waveform[1][4]. Each has certain desirable properties and the choice often depends on the application.

An increase in bandwidth is achieved by changing the phase of each sub-pulse. The phase of each sub-pulse is chosen to be either 0 or π radians. The output of the matched filter will be a spike of width τ with an amplitude N times greater than that of long pulse. The pulse compression ratio is N = T/τ ≈ BT, where B ≈1/τ = bandwidth. The output waveform extends a distance T to either side of the peak response, or central spike. The portions of the output waveform other than the spike are called time side-lobes.

9.1 Auto/Cross Correlation in Pulse Compression:

The performance of range resolution radar depends on the autocorrelation pattern of the coded waveform which is the matched filter compressed output. The binary sequences having ±1 as elements find more importance in pulse compression as they have good aperiodic autocorrelation function and ideal energy efficiency. The Energy efficiency is defined as the ratio of energy in the actual energy in the sequence to the energy if every element in the sequence had the maximum amplitude. The Binary sequences can be easily generated, processed and stored in digital circuitry. But the limitation comes when longer length sequences with lower Peak Side Lobe Ratio (PSLR) are needed. The Peak Side Lobe Ratio is defined from the autocorrelation pattern as the ratio of the peak side lobe amplitude to the main lobe peak amplitude and is expressed in decibels. The aperiodic autocorrelation r(k) of a sequence of length N which is nothing but the output of the matched filter or the matched filter compressed output is given as

$$r(k) = \sum_{i=0}^{N-1-k} y_i y_{i+k}, k = 0,1,2....N-1 \qquad (3$$

For best performance, the autocorrelation pattern of the optimum coded waveform must have a large peak value for zero shift (main lobe) and zero value for non-zero shifts.

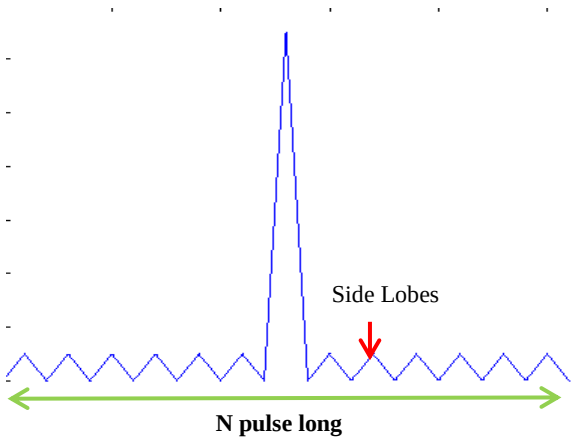


Fig 3 Auto-correlation of the binary phase code.

9.2 Types of Binary codes

3.2.1 Linear Recursive Sequences, or Shift-Register Codes

One method for obtaining a set of random-like phase codes is to employ a shift register with feedback and modulo 2 addition that generates a pseudorandom sequence of zeros and ones of length 2n- 1, where n is the number of stages in the shift register. An n-stage shift register consists of n consecutive two-state memory units controlled by a single clock. The two states considered here are 0 and 1. At each clock pulse, the state of each stage is shifted to the next stage in line.

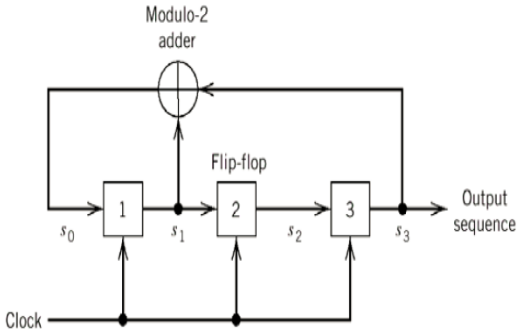


Fig 4: Three Stage PN Sequence Generator

An n-stage binary device has a total of 2n different possible states.Thus an n-stage shift register can generate a binary sequence of length no greater than 2n- 1 before repeating. The actual sequence obtained depends on both the feedback Connection and the initial loading of the shift register. When the output sequence of an n-stage shift register is of period 2n- 1, it is called a maximal length sequence, or m-sequence.This type of waveform is also known as a linear recursive sequence (LRS), pseudorandom sequence, pseudo noise (PN) sequence, or binary shift-register sequence. They are linear since they obey the superposition theorem. When applied to phase-coded pulse compression, the zeros correspond to zero phase of the sub pulse and the ones correspond to π radians phase. There can be more than one maximal length sequence, depending on the feedback connection. With the proper code, the highest (power) side lobe can be about l/2N that of the maximum compressed-pulse power. Linear recursive sequences have an advantage that they can be long, giving high compression ratios and there are many of them allowing secure enciphering of waveforms. Their disadvantage is that their auto correlation functions contain partial sums with values greater than one so that windowing must be used to reduce range leakage.

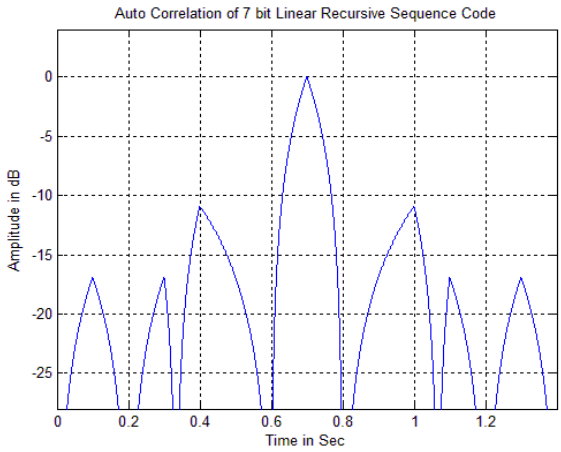


Fig 5: Simulation of 7 bit Linear Recursive Sequence

3.2.2Complementary Codes

Golay complementary codes have properties that are useful in radar and communications systems. The sum of autocorrelations of each of a Golay complementary code pair is a delta function. This property can be used for the complete removal of side lobes from radar signals, by transmitting each code, match–filtering the returns and combining them[4].

Table 1: Side/Main Lobe ratio of Binary Phase Codes[3]

Type of code	**Ratio In dB(Side lobe / Main Lobe)**
13 bit Barker code	-22.27
16 bit Complimentary	-24.08
32 bit Complimentary	-30.10
64 bit Complimentary	-36.12
128 bit Complimentary	-42.14

Theoretically, there are no side lobes on the time axis when complementary codes are employed. Complementary codes can be obtained with either binary or polyphase sequences[1].

There are two problems, however, that limit the use of complementary codes. The first is that the two codes have to be transmitted on two separate pulses, detected separately, and then subtracted. Any movement of the target or instability in the system that occurs during the time between the two pulses can result in incomplete cancellation of the side lobes. Transmitting the two codes simultaneously at two different frequencies does not solve the problem since the target response can vary with frequency. The second problem is that the side lobes are not zero after cancellation when there is a doppler frequency shift so that the ambiguity diagram will contain other regions with high side lobes. Thus this method of obtaining zero side lobes has serious practical difficulties and is not as attractive as it might seem at first glance.In a practical application, the two sequences must be separated in time, frequency, or polarization, which results in de-correlation of radar returns so that complete side lobe cancellation may not occur. Hence they have not been widely used in pulse compression radars.

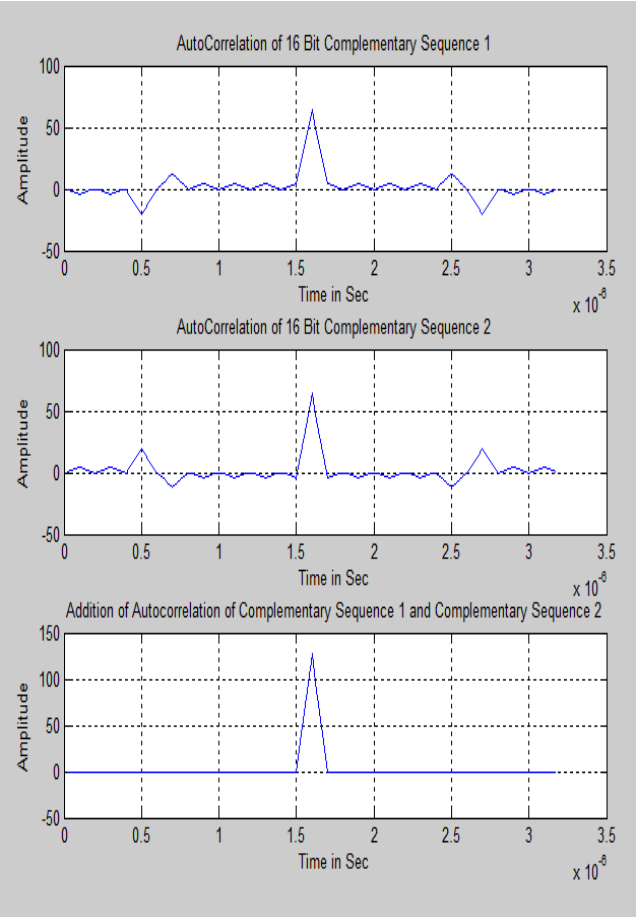


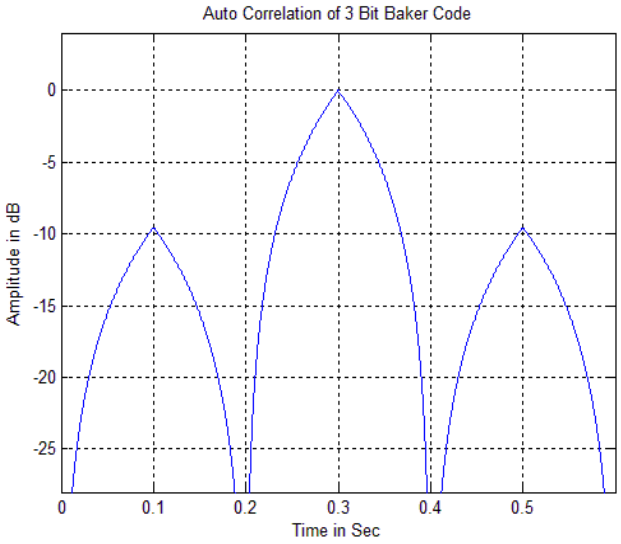
Fig 6: Simulation of 16 bit complimentary code

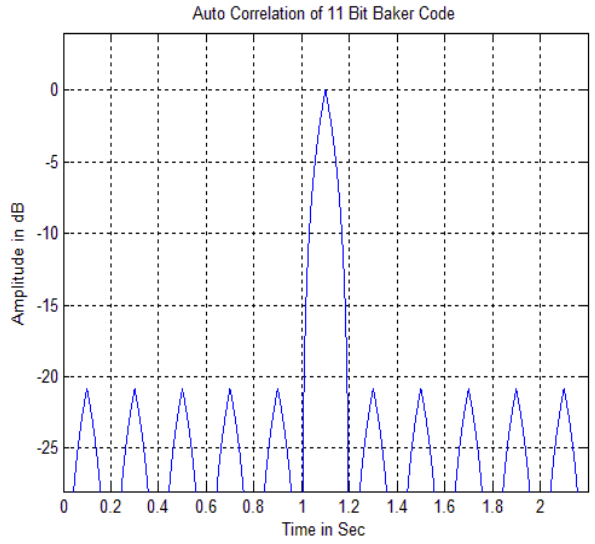
3.2.3 Barker codes

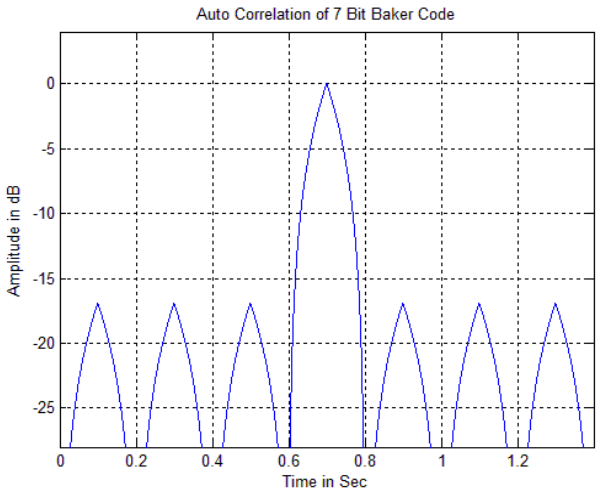
The binary choice of 0 or π phase for each sub-pulse may be made at random. However, some random selections may be better suited than others for radar application. The binary phase-coded sequence of 0, π values that result in equal side-lobes after passes through the matched filter is called a Barker code. The barker codes are listed in Table 2. Autocorrelation simulation results are shown in fig8. These simulation results match with the calculated PSL shown in table 2. It can also be observed that with increase in bit length, the PSL improves.

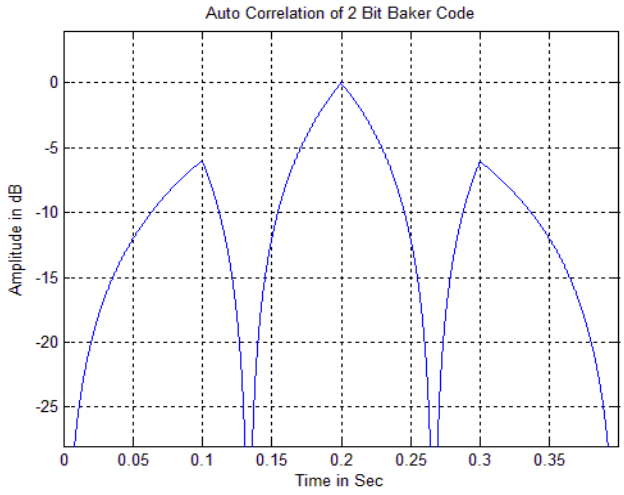
. Table 2 Side / Main Lobe ratio in Barker codes[1]

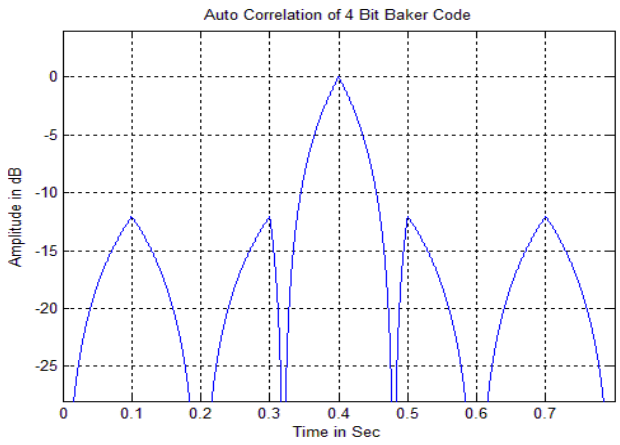
Code Length	**Code Elements**	**Side lobe level, dB**
2	+ −, + +	−6.0
3	+ + −	−9.5
4	+ + − +, + + + −	−12.0
5	+ + + − +	−14.0
7	+ + + − − + −	−16.9
11	+ + + − − − + − − + −	−20.8
13	+ + + + + − − + + − + − +	−22.3











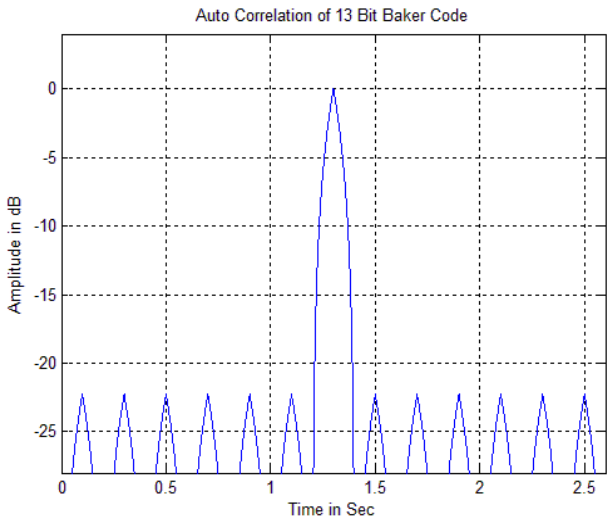


Fig. 7 Auto-correlation Simulation Results of 2-bit, 3-bit, 4-bit, 7-bit, 11-bit, 13-bit barker code

3.3 Simulation results of Pulse Compression for 13 bit Barker code

From the simulations results in fig 9, we can observe that the transmitted 13 bit barker pulse is compressed into narrow peak pulse. Low amplitude of Side lobes enables detection of weak targets in the nearby vicinity.

10. Comparative Analysis and Optimal Selection of Binary Phase Codes

There are two criteria for the selection of optimal phase codes:

a) Auto-correlation function of the phase codes should have uniform side-lobes.
b) They should have high peak to side lobe ratio (PSL).

Fig 10. Shows a scenario where a strong target & weak target are in the nearby vicinity. If the selected binary phase code does not have high PSL & uniform side lobes then the weak target will be masked under side lobes of strong target and thereby goes undetected.

Based on the simulation results in Fig 8, we can conclude that although higher length of linear sequence code or complimentary codes will yield higher PSL unlike barker codes they do not possess uniform side lobes. Based on empirical data of surveillance radar, the radar cross section (RCS) for heavy vehicle is 20 & crawling man is 0.05. Thus, range side lobes of strong target should be below $10\log(\frac{0.05}{20}) = -26dB$ to detect weak target. This is an extreme case wherein it is assumed that a crawling man and a heavy vehicle are co-located (within same antenna beam). Practically, 22dB PSL may be sufficient which is obtained using 13 bit barker code.

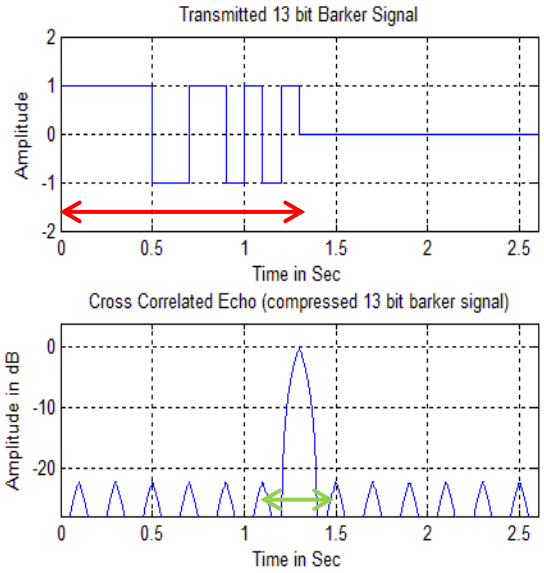


Fig 8 .Simulation result of Pulse Compression

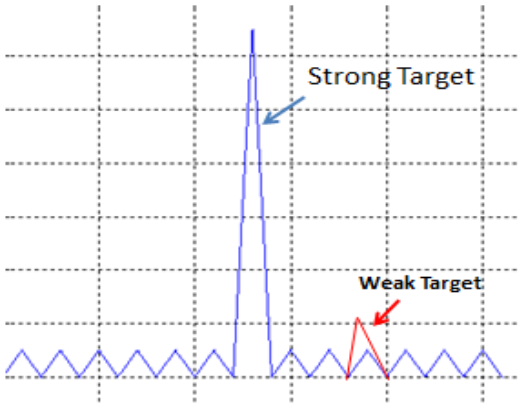


Fig 9 Need for high PSL & uniform side lobes

5. Conclusion:

The need for pulse compression is established in section 1 & 2. Different types of binary

phase codes used for pulse compression are introduced and simulated results of autocorrelation function of each of the binary phase codes are presented and compared. Based on the comparative analysis, it was concluded that 13 bit barker code is the most optimal binary phase code for surveillance radar and offers a pulse high compression ratio of 13.

6. REFERENCES

[1] Merrill I. Skolnik, Introduction to radar systems, McGraw Hill Book Company Inc.,1962.

[2] Carpentier, Michel H., "Evolution of Pulse Compression in the Radar Field," Microwave Conference, 1979. 9th European, vol., no., pp.45-53, 17-20 Sept. 1979

[3] Prasad, N.N.S.S.R.K.; Shameem, V.; Desai, U.B.; Merchant, S.N.; , "Improvement in target detection performance of pulse coded Doppler radar based on multicarrier modulation with fast Fourier transform (FFT)," *Radar, Sonar and Navigation, IEEE Proceedings* - , vol.151, no.1, pp. 11- 17, Feb 2004doi: 10.1049/ip-rsn:20040119

[4] Bassem R. Mahafza,"*Radar Signal Analysis and processing using MATLAB",* CRC Press 2009

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Portable glove-based Sign Language Translation

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Abstract

Every human wants to communicate and get everything there is to it. This is simply our nature. But there are certain people with hearing and speech disabilities, many of them completely unable to engage in verbal communications. Problems like these have huge and obvious influence on everyday life and general opportunities for self-fulfillment of the disabled people. This idea aims at solving the problem of limited communication abilities for the disabled people who know sign language and to transform it into a form of verbal communication. Our goal is to remove the barrier by providing a universally recognized format of sign language i.e. ASL. By using flex sensors the signs were give a new feel in technology by efficiently understanding them using the glove, coding them and then make it appear on the LCD screen. We have made a sincere effort in understanding the difficulty of the signers and the problems faced by them in day to day life which itself is a motivational feeling for us to get through all the barriers of communication and make it possible to interact effectively.

1. Introduction

Sign language is a language through which communication is possible without the means of acoustic sounds. Instead, sign language relies on sign patterns, i.e., body language, orientation and movements of the arm to facilitate understanding between people. It exploits unique features of the visual medium through spatial grammar.It is the sixth most spoken language in America.

2. Principle and Objectives

2.1. Principle

The apparatus includes a number of sensors such as flex and contact sensors on the hand, to measure dynamic and static gestures. The sensors will be connected to a microprocessor to search a library of gestures and send a proper code via the wireless base transceiver station to generate output signals that can then be used to produce a synthesized voice or be displayed on a screen.

Fig1.American Sign Language

2.2 Objectives

1. The main objective is to facilitate the signers a common and solid platform which is universally accepted language i.e. ASL.
2. To communicate by using glove which is the basic requirement of the hand based gestures, we planned to implement the ASL using a specific gesture for every alphabet.
3. Glove based sign language translator would also be mobile and hence making it comfortable for signer.

3. Working

In the sign language translation process, we as a group are developing a glove fitted with sensors that can interpret the 26 English letters in American Sign Language (ASL). The glove uses flex sensors and contact sensors, to gather data on each finger's position to differentiate the letters. The translation is transmitted to the base station, which displays as well as pronounces the letter and also interfaces with the computer. We are also planning to make a game on the computer which will test the user's ability to sign, which can be used for sign language education.

To explain it in a nutshell, a sign language recognition apparatus and method is being developed by us for translating hand gestures into speech or written text. The apparatus includes a number of sensors(currently we are planning to use four) on the hand along with metal contact strips to measure dynamic and static gestures. The sensor will transmit the data to the microprocessor to determine the shape, position and orientation of the hand relative to the body of the user. The glove circuit willbe connected to a microprocessor base station wherein we are using wireless transmission to transmit the digital signals from the glove microcontroller yo the portable base microcontroller where we are coding it as to search a library of gestures and generate output signals that can then be used to produce a synthesized voice or written text on the LCD screen.

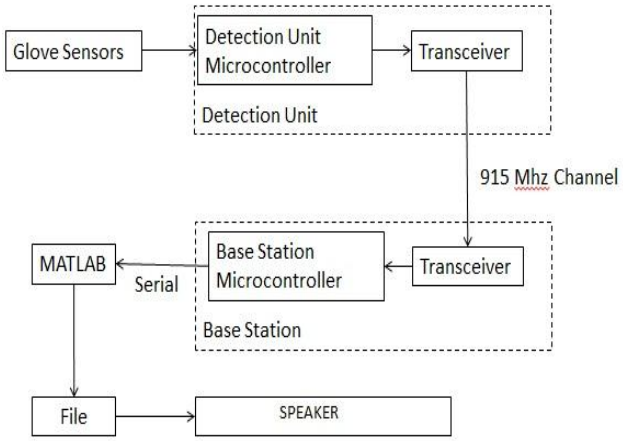

Fig.2Block Diagram(Sign Language Translator)

4.Additional Sign Recognition Methods

Still other types of machine learning have been calledupon to tackle the task of sign recognition. Kadous(1996) designed the GRASP (Glove-based Recognitionof Auslan using Simple Processing) system usinga simple PowerGlove from a Nintendo game unit asthe capture device and then a combination of instancebasedand decision-tree learning to recognize the isolatedsigns. Kadous noted that ''Sign segmentationproblem is one that remains difficult, since decidingwhen one sign finishes and the next starts is not easy''. (Kadous, 1996, Auslan section). The program thus wasdesigned to learn by example rather than by trying tomatch signs to a dictionary due to the variability betweensigners. Bowden, Zisserman, Kadir, and Brady(2003, p. 2) explained: ''Recognition [of signs] is performed using Markov chains to explain the temporalsequence of events at a word level. Unlike HMMs,the chains can be built from as little as a single trainingexample''. It is important to note that whichevermethod is used, the result is only recognition of individualwords—not a translation between languages

5.Conclusion

We are currently working on this idea as our BE project and it has given us an opportunity to make a device that could ease the daily communication of the speech and hearing impaired people. The use of flex sensors and the newly implied concept is prominent in the initial stage of the project. This project gave us an opportunity to learn the sign language with its effective use in the project and outside it by providing a globally accepted form(ASL). We have implemented new concepts with effective cost cutting and are trying to make it more affordable for the users considering the practical implementation of the project.

Acknowledgment

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References

[1]IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART C: APPLICATIONS AND REVIEWS, VOL. 38, NO. 4, JULY 2008 461, A Survey of Glove-Based Systemsand Their Applications, Laura Dipietro, Angelo M. Sabatini, *Senior Member, IEEE*, and Paolo Dario, *Fellow, IEEE*.

[2] Brashear, H., Starner, T., Lukowicz, P., & Junker, H. (2003, October).Using multiple sensors for mobile sign language recognition.

Paper presented at the Seventh IEEE International Symposium on Wearable Computers, White Plains, NY.

Retrieved June 20, 2005, from http://www.cc.gatech.edu/ccg/publications/iswc2003-sign/iswc2003-sign.pdf

[3] U. A. Bakshi,Analog and digital Integrated circuits.

Image Hiding Techniquein Compressed Video

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Abstract

This paper deals with data hiding in compressed video which is accomplished by targeting the motion vectors used to encode and reconstruct both the forward predictive (P)-frame and bidirectional (B)-frames in compressed video. The motion vectors are chosen by their associated macroblock prediction error. The secret image is embedded using singular value decomposition method. SVD is implemented for hiding different size images in different frame numbers which gives noticeable results. Reconstruction in all cases is also achieved with minimum distortion. Results are also compared with images of more zero pixel values to less, which helps analyzing the threshold.

Keywords:*Data hiding, motion vectors, Macroblocks, steganography, Singular Value Decomposition (SVD), Candidate motion vectors.*

1. Introduction

A lot of research work has been done in Information hiding and watermarking in digital images and raw video. In this paper the internal dynamics of video compression and motion estimation has been targeted. Here motion estimation stage is chosen as during video encoding and decoding its contents are processed internally. This does not allow the detection by image steganalysis methods. The method provides lossless coding, and makes it free from quantization distortions. The secret image is hidden in some of the motion vectors whose magnitude is above a predefined threshold, and is called candidate motion vectors.

In this paper work done on data hiding in motion vectors relies on changing the motion vectors such as there magnitude phase angle based on the parameters such as magnitude and phase angle. In [1] a single bit is hidden in the least significant bit of the larger component of each CMV, the data is encoded as a region where the motion estimation is only allowed to generate motion vectors in that specified region. Using the variable macro block sizes (16x16,16x8,8x16,8x8) of H.264. Every 2 bits are being used from the message bit stream to select one of the four sizes for the motion estimation process.

In [3] the authors embedded the data in video using the phase angle between two consecutive candidate motion vectors. Based on the magnitude of the motion vectors these candidate motion vectors are chosen. In [4] the method highlights a direct reversible approach to find the candidate motion vector at decoder side. This literature targets minimum distortion to the prediction error.

2.Proposed Method

2.1 Digital Video

Digital video refers to the capturing, manipulation, and storage of moving images that can be displaced on computer screens. This requires that the moving images be digitally handled by the computer. The word digital refers to a system based on discontinuous events, as opposed to analog, a continuous event. Computers are digital systems; they do not process images the way the human eye does.

Before the Digital Era, to display analog video images on a computer monitor, the video signal had to first be converted from analog to digital form. A special video digitalizing overlay board or hardware on the motherboard had to be installed in your computer to take the video signal and convert it to digital information. To do this, however, required a very powerful computer to be able to read and digitalize every frame repetitively. So the next step in digital video evolution was to eliminate the analog videotape. Thus, the entire procedure, including the capturing of video, is in digital form. First, a camera and a microphone capture the picture and sound of a video session and send analog signals to a video-capture adapter board. The board only captures half of the number of frames per second that movies use in order to reduce the amount of data to be processed. Second, there is an analog-to-digital converter chip on the video-capture adapter card, and it converts the analog signals to digital patterns (0s and 1s). Third, a compression/decompression chip or software reduces the data to a minimum necessary for recreating the video signals. In this procedure, no analog was involved, making the process more efficient.

2.2 Frame Separation

Frame processing is the first step in the background subtraction algorithm, the purpose of this step is to prepare the modified video frames by removing noise and unwanted object's in the frame in order to increase the amount of information gained from the frame and the

sensitivity of the algorithm. Pre-processing is a process of collecting simple image processing tasks thatchange the raw input video info a format. This can be processed by subsequent steps. Pre-processing of the video is necessary to improve the detection of moving object's.

The flow chart in figure 1 gives the brief idea of the method.

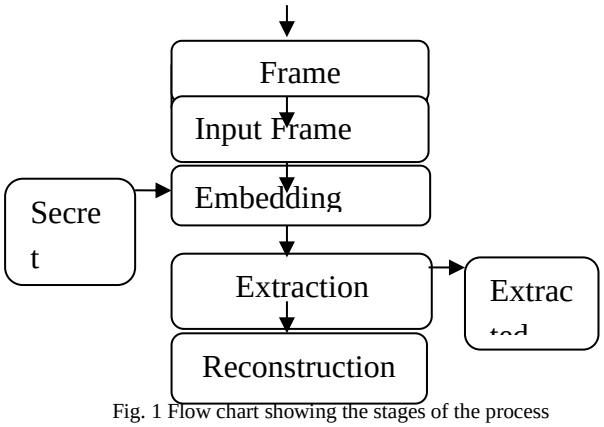


Fig. 1 Flow chart showing the stages of the process

3. Singular value decomposition

Singular value decomposition (SVD) can be looked at from three mutually compatible points of view. On the one hand, we can see it as a method for transforming correlated variables into a set of uncorrelated ones that better expose the various relationships among the original data items. At the same time, SVD is a method for identifying and ordering the dimensions along which data points exhibit the most variation. This ties in to the third way of viewing SVD, which is that once we have identified where the most variation is, it's possible to find the best approximation of the original data points using fewer dimensions. Hence, SVD can be seen as a method for data reduction. As an illustration of these ideas, consider the 2-dimensional datapoints in Figure 2. The regression line running through them shows the best approximation of the original data with a 1-dimensionalobject (a line). It is the best approximation in the sense that it is the line that minimizes the distance between each original point andthe line. If we draw a perpendicular line from each point to the regression line, and took the intersection of those lines as the approximation of the original data point, we would have a reduced representation of the original data that captures as much of the original variation as possible. Notice that there is a second regression line, perpendicular to the first, shown in Figure 3. This line captures as much of the variation as possible along the second dimension of the original data set.

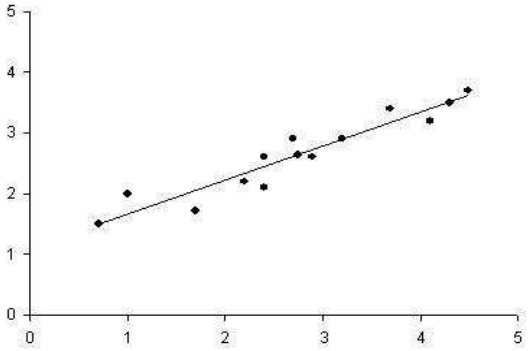


Fig. 2 Best-fit regression line reduces data from two dimensions into one

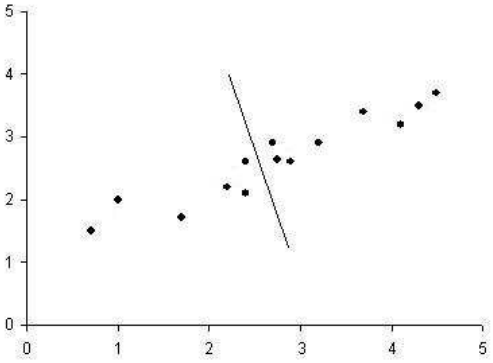


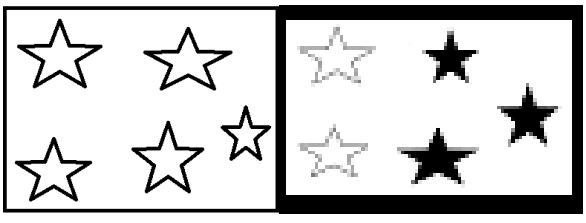
Fig.3 Regression line along second dimension captures less variation in original data.

4. Experimental results

As can be seen that there is very slight difference in the original frame and the frame after embedding logo, this difference is not easily distinguishable. Furthermore results can be shown using MatLab commands screening the difference in pixel values. We got very little difference in the pixel values of the frame after embedding the logo, thus preserving the video quality. The secret data (images shown in figure 5) of different sizes are embedded in the test video shown in figure 4. The results are compared as shown in table 1. Implementing the algorithms in MatLabR2012b the secret images shown in figure 5 are embedded in compressed video shown in figure 4.

The test sequence is of 8.9Mb of AVI type. After frame conversion total number of frames is 72. The images shown in 5 are embedded in one frame in experiments. The comparisons are shown in the table 4. The images with more number of black pixels are giving good results.

Fig 4. Compressed Video



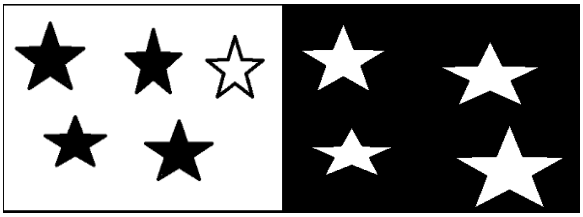


Fig 5. Different Images with Different Pixel Values

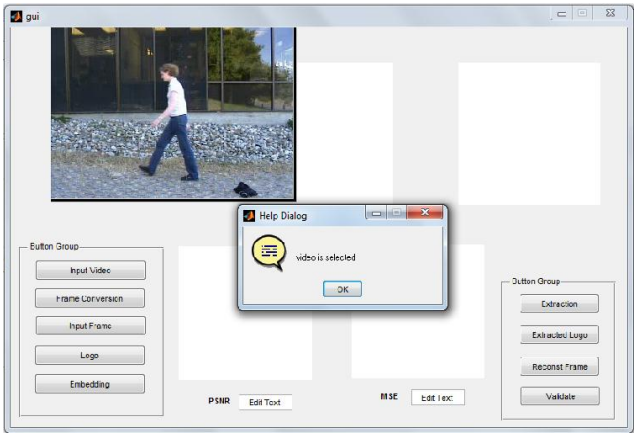


Fig. 6 Showing Selection of compressed Video

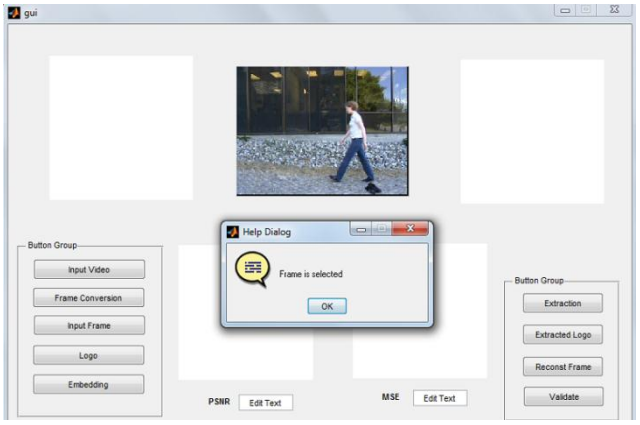


Fig 7 Frame sepration process

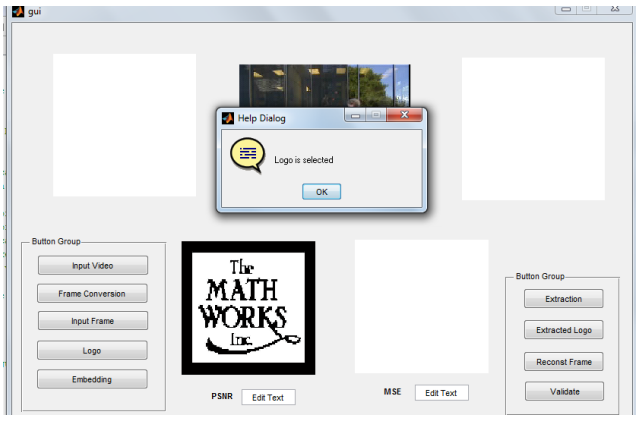


Fig8. Selecting the Secret Image

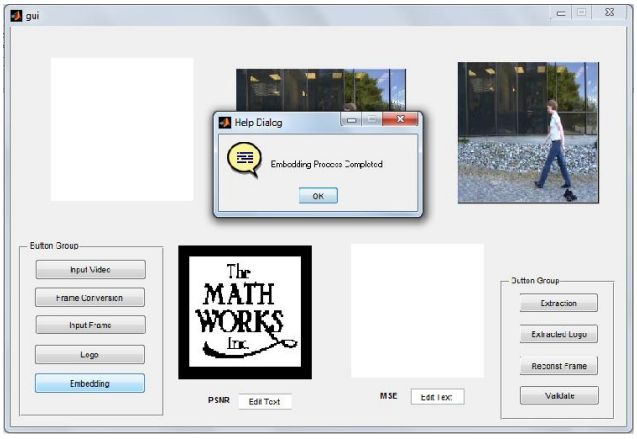


Fig. 9 Embedding of secret data in the selected sequence

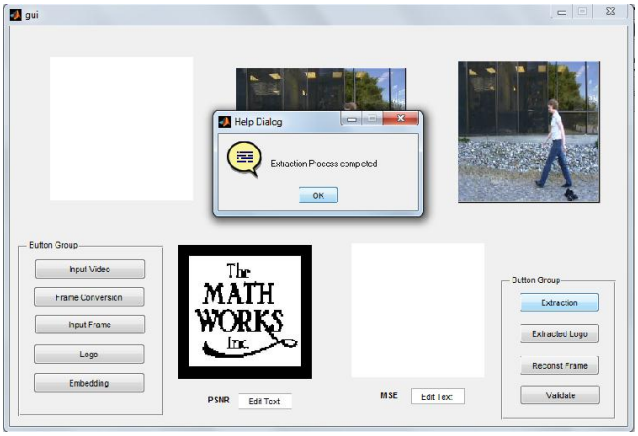


Fig. 10 Extraction

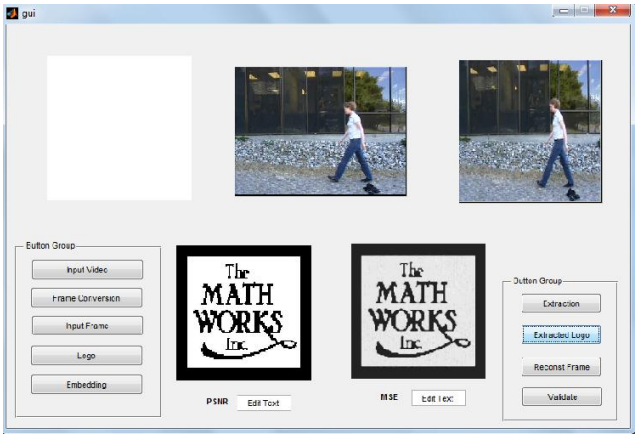


Fig.11 Extracted Logo

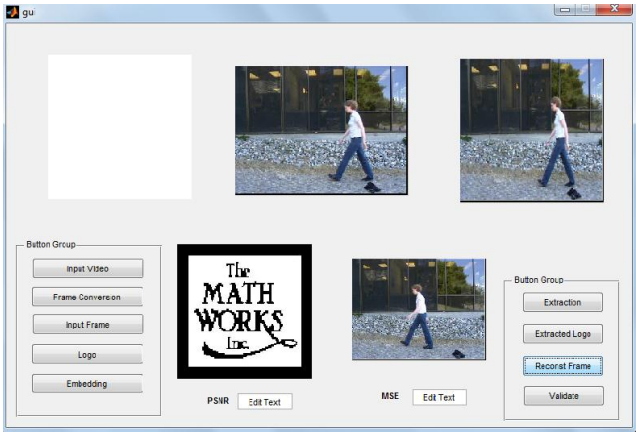
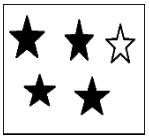
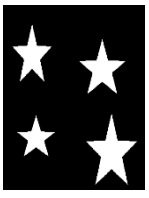


Fig.12 Reconstructed Video

Table1 Comparisons

Compressed video	DifferentTest Images	Priority on the basis of more number of black pixels	PSNR	MSE
		4	43	1.31
		2	50	1.16
		3	47	1.22
		1	58.313	0.30

5. Conclusion

In this paper, a data hiding method by simple SVD calculation with an optimal pixel adjustment process is proposed. The image quality of the stego-image can be greatly improved with low extra computational complexity. Extensive experiments show the electiveness of the proposed method. The results obtained also show significant improvement than the method proposed with respect to image qualityand computational efficiency.

References

[1] Hussein A. Aly ―Data Hiding in Motion Vectors of Compressed Video Based on Their Associated Prediction Error, IEEE Trans On Information Forensics And Security, Vol. 6, No. 1, Mar 2011.

[2] S. K. Kapotas, E. E. Varsaki, and A. N. Skodras, "Data hiding in H.264 encoded video sequences," in IEEE 9Skodras, "Data hiding in H.264 encoded video sequences," IEEE 9th Workshop on Multimedia Signal Processing (MMSP07), Oct. 2007, pp. 373–376.

[3] D.-Y. Fang and L.-W.Chang, "Data hiding for digital video with phase of motion vector," in Proc. Int. Symp. Circuits and Systems (ISCAS), 2006, pp. 1422–1425.

[4] J. Zhang, J. Li, and L. Zhang, "Video watermark techniqueinmotion vector," in Proc. XIV Symp.Computer Graphics and Image Processing, Oct. 2001, pp. 179–182.

[5] P.Wang, Z. Zheng, and J. Ying, "A novel videowatermark technique in motion vectors," in Int. Conf. Audio, Language and Image Processing (ICALIP), Jul. 2008, pp. 1555–1559.

[6] X. He and Z. Luo, "A novel steganographic algorithm based on the motion vector phase," in Proc. Int. Conf. Comp. Sc. and Software Eng., 2008, pp. 822–825.

[7] C. Xu, X. Ping, and T. Zhang, "Steganography in compressed video stream," in Proc. Int. Conf. Innovative Computing, Information and Control (ICICIC'06), 2006, vol. II, pp. 803–806.

[8] Melih Pazarci, Vadi Dipcin, "Data Embedding in Scrambled Digital Video", Proceedings of the 8th IEEE International Symposium on Computers and Communication, 2003, pp. 498-503.

[9] Saraju P. Mohanty, "Watermarking of Digital Images", A Master Degree's Project Report, Dept. of EE, Indian Institute of Science, Bangalore - 560 012, India, Jan. 1999.

[10] F. A. P. Petitcolas, R. J. Anderson, and M. G. Kuhn, "Information hiding—A survey," Proc. IEEE, vol. 87, no. 7, pp. 1062–1078, Jul 1999.

ROLE OF SOFT SKILLS IN REENGINEERING OF HUMAN MIND

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Abstract:

Inpresent scenario, it is observed that people have progressed tremendously in the physical world. Even then, people are at revert. They are not happy from within and with their surroundings. Knowingly or unknowingly, they feel more comfort in developing negative thoughts and get temporary pleasure. We must do systematic analysis of root for development of thoughts. This paper highlights the importance of well education and using it to keep human mind away from negativity. Brahmgyan, common sense, ethical values, positive attitude, flexibility, listening skills, etiquettes, interpersonal skills, etc. can help reengineering of human mind. Apart from hard skills, Sports skills are very much essential to make people happy, constructive and successful.
Passion is integral to one's daily dose of happiness. But most of the time, passion lies dormant within most of us. It serves as a driving force for many a supposedly impossible dream to take flight. It strikes to empower you with the key to open the doors of an unlock mind.

Introduction:

In present scenario, most of the people at workplace in various organizations live unstructured life due to lack of soft skills. They may be working at top level, getting good salary, but may not lead a good team for longer time in an organization. Because of lack of soft skills, people at work place may not be productive. Unstructured life leads to tension, stress and turmoil. People lose social values. They face difficulty in developing healthy relationship among team members and most of the time they fail to have sound interaction with team members. They do not respect the views and sentiments of others.

People at manager level are often challenged by issues like:

1. How to improve self-retention, especially howto keep top performers.
2. How to achieve a corporate success culture that guarantees long term success.
3. How to create new levels of excellence through high employee engagement.

Problems:

Lack of soft skills has following major consequences:

Lack of soft skills robs people of jobs. To site an example, about 20% of the most educated in the UAE population have no jobs & in some countries such as Saudi Arabia the figure is double.

While your technical skills may get your foot in the door, your people skills are what open most of the doors to come.

Some students think, "All I need for success at work is the special knowledge of my chosen career". All that nurses need, they believe, are good nursing skills. All that accountants needs are good accounting skills. All that lawyers need are good legal skills. These skills are called hard skills, the knowledge needed to perform a particular job. Hard skills include knowing where to insert an intravenous feeding tube, how to write an effective business plan and what the current inheritance laws are. These are the skills you will be taught in courses in your major field of study. They are essential to qualify for a job. Without them you won't even get an interview.

But most people who have been in the work world a while will tell you this: Hard skills are necessary to get a job but often insufficient to keep it or advance. That's because nearly all employees have the hard skills necessary to do the job for which they are hired. True, some may perform these skills

a little better or a little worse than others, but some estimate suggests that only 15% of workers who lose their jobs are fired because they can't do their jobs. That's why career success is often determined by soft skills.

"Having hard skills gets you hired; lacking soft skills get you fired".

To get and keep a job, you finally need technical skills. Dentists need to know how to fill cavities. Secretaries need to type 100+ words per minute. Accountants need to be certified.

Beyond the technical skills, though, which dentist do you go to? The one who is pleasant and takes time to answer your questions; or the one who treats you like a number in a long line of numbered mouths? Which secretary do you retain when times are lean? The one whose attitude is positive and who is always willing to help; or the one who is inflexible and has a hard time admitting mistakes?

In these situations, and all the others like them, it's the soft skills that matter. Why soft skills matter? Because they make sure your hard skills shine.

Soft skills:

Soft skills can be defined as desirable qualities for certain forms of employment that do not depend an acquired knowledge; they include common sense, the ability to deal with people, and a positive flexible attitude.

Some of the important soft skills are listed below:

1. Taking responsibility
2. Making effective decisions
3. Setting Goals
4. Managing time
5. Task Priority
6. Persevering
7. Giving strong efforts
8. Working well in teams
9. Communicating effectively
10. Having empathy
11. Knowing how to learn
12. Exhibiting self control
13. Believing in one's own self worth
14. Managing expectations
15. Leading
16. Decision making
17. Influencing
18. Negotiations
19. Interpersonal Skills
20. Ethics
21. Revolving Conflicts
22. Problem solving
23. Motivating
24. Communications
25. Presentations Skills
26. Body Language
27. Honesty
28. Listening
29. Collaboration
30. Creativity
31. Optimism
32. Friendliness
33. Social Capital
34. Eye Contact

Soft Skills – Self Management Skills:

Self-awareness – knowing what drives, angers, motivates, embarrasses, frustrates, and inspires you.

Emotion management –being able to control unexpected emotions like anger and frustration so you can think clearly and at your optimum.

Self-confidence – those who believe in themselves have access to "unlimited power" (wisdom from KungFu Panda)

Stress management – Being able to stay calm and balanced in stressful, overwhelming situations.

Resilience – Ability to bounce back from a misstep in your job or career.

Skills to forgive and forget - Ability to move on without baggage from a past mistake or something in your career that wronged you

Persistence and Perseverance – Ability to overcome challenging situations and obstacles and maintain the same energy

Patience – ability to step back in an emergency to think clearly or the ability to pause and wait when you are in a rush or want to rush others.

Soft Skills – People Skills.

Communication skills - skills to listen and

articulate your ideas in writing and verbally to any audience in a way where you are heard and you achieve the goals you intended with that communication. This is also known as interpersonal communication skills.

Presentation skills – ability to maintain attention and achieve your desired outcome from presenting to an audience.

Facilitating skills - ability to coordinate and solicit well represented opinions and feedback from a group with diverse perspectives to reach a common, best solution.

Interviewing skills – ability to sell your skills as an interviewee or accurately assess other's ability or extract the needed information as an interviewer.

Selling skills – this is not just for people in sales. This is the ability to build buy-in to an idea, a decision, an action, a product, or a service.

Meeting management skills – at least 50% of meetings today in corporate america are a waste of time. This is the skill to efficiently and effectively reach productive results from leading a meeting.

Influence / persuasion skills - ability to influence perspective or decision making but still have the people you influence think they made up their own mind.

Team work skills - ability to work effectively with anyone with different skill sets, personalities, work styles, or motivation level

Management skills – ability to motivate and create a high performing team with people of varied skills, personalities, motivations, and work styles.

Leadership skills – ability to create and communicate vision and ideas that inspires others to follow with commitment and dedication.

Skills in dealing with difficult personalities – Ability to work well or manage someone whom you find difficult.

Skills in dealing with difficult situations – Ability to stay calm and still be effective when faced with an unexpected difficult situation.

Ability to think / communicate on your feet (under pressure) –ability to articulate thoughts in an organized manner even when you are not prepared for the question or situation you are in.

Networking skills – ability to be interesting and interested in business conversations that motivates people to want to be in your network.

Interpersonal relationship skills – ability to build trust, find common ground, have empathy, and ultimately build good relationships with people you like or in positions of power/influence.

Negotiation skills – ability to understand the other side and reach a win-win resolution that you find favorably, satisfies both sides, and maintains relationships for future dealings

Mentoring / coaching skills – ability to provide constructive wisdom, guidance, and/or feedback that can help others further their career development.

Organizing skills – ability to organize business gatherings to facilitate learning, networking, or business transactions.

Self-promotion skills - ability to subtly promote your skills and work results to people of power or influence in your organization. This will build your reputation and influence.

Savvy in handling office politics - office politics is a fact of life in corporate america. This is the ability to understand and deal with office politics so you can protect yourself from unfairness as well as further your career.

Importance of soft skills :

Soft skills is a sociological term relating to a person's "EQ" (Emotional Intelligence Quotient), the cluster of personality traits, social graces, communication,language, personal habits, friendliness, and optimism that characterize relationships with other people. Soft skills complement hard skills (part of a person's IQ), which are the occupational requirements of a job and many other activities.

Soft skills are personal attributes that enhance an individual's interactions, job performance and career prospects. Unlike hard skills, which are about a person's skill set and ability to

perform a certain type of task or activity, soft skills relate to a person's ability to interact effectively with co-workers and customers and are broadly applicable both in and outside the workplace.

Studies by Stanford Research Institute and the Carnegie Mellon Foundation among Fortune 500 CEOs found that 75% of long term job success depended on people skills and only 25% on technical skills.

This is true at other levels as well. For effective performance in the workplace, companies need their employees to have not only domain knowledge, technical and analytical skills, but also the skills to deal with the external world of clients, customers, vendors, the government and public; and to work in a collaborative manner with their colleagues.

The annual rankings of MBA colleges often place communication and interpersonal skills as the most critical skills needed for success in the corporate world.

Noted academic Prof. Henry Mintzberg while speaking on the importance of soft skills for MBAs, refers to the crucial "soft" skills - leadership, teamwork, communication, and the ability to think "outside the box" of a discipline - that separate the best from the rest in the management world."

Companies in India are finding that they have to promote people faster than ever before to meet their growth needs. At the same time, they are finding that the candidates do not have the necessary skills to make the transition from a technical or functional specialist to a team leader, supervisor or manager. Companies in the IT, BPO, KPO, Biotech, and Pharmaceuticals industries have found that their people need soft skills to work effectively in cross-functional or project teams, local teams or global teams.

Methodology to inculcate Soft Skills:

There is no well-defined, ready-made and scientific method to obtain soft skills. But there are many approaches, steps, practices to develop soft skills. Getting soft skills more depends on individual's effort. The degree of achievement of soft skills depends upon the nature of friend circle, surroundings, work place, type of leadership, involvement and positive thinking of individuals**.** The time you spend developing your soft skills will never be wasted. Even if you change careers five times, the soft skills you learn today can always be used to set you apart in whatever you do with your life.

Here are some simple ways to start getting soft skills

1. Start doing the little things you already know you should do: You know many of the things you should be doing to develop better relationships, increase your productivity, and be more responsible. So do them.

2. Become a keen observer of others: If one gets the promotion over other, identify the reasons. When you are drawn to someone, ask yourself why. When you begin to trust someone, pinpoint the reasons. If you received excellent service from someone, think about what this person did that impressed you. There is a lot you can learn by watching others.

3. Start living in a state of awareness: Turn off autopilot and start making conscious decisions as you move through your day, especially when interacting with other people. Positive change begins with awareness.

4. Become a student of personal and professional success: If you have a genuine desire to improve your soft skills, start consuming content on the subject.

5. Be intentional every day: Getting better won't come without effort. While some of the things will come naturally to you, others will require an intentional effort.

6. **Developing willingness to work**: Each and every individual has hidden potential to do the work but due to lack of soft skills, their willingness to work comes down. Therefore, one should develop willingness to work gradually.

7. **Self-discipline and control**: One should not expect to be controlled by others, rather one must involve in the positive work ethically. This helps the person to press the right button to get the right things done in right time at right place. Generally an effective person is influenced by few colleagues with negative mind-sets. This spoils the effective

person, but if people are self-disciplined and controlled, the negative effects will be almost zero. Soft skills help to protect from negative mind-sets.

8. **Ability to judge right or wrong**:One should inculcate habit to identify the things scientifically,logically and understand what to do and what not to do.

9. **Humility and self-confidence**: Humility is looking at life with different perspectives, it will allow you to see what others cannot. It gives you a perspective to do what needs to be done to make your effort successful. Arrogance can blind you. When you see yourself superior to other founders, smarter than your employees and directors and more capable than professional executives you and your company lose.It is that simple.

10. **Learning attitude:**If a person has learning attitude he or she can learn from a child also.Therefore one should inculcate the habit of learning new things always.

11. **Responsibility**: One should be responsible for their actions.

12. **Problems and persons**: One should always keep in mind to attack the problems not the persons.

13. **Gratefulness:** Be grateful to others.

14. Share and stay together.

The great thing about building your soft skills is that you can acquire them on your own. Regardless of your background, gender or education, developing your soft skills will make you stand out from the crowd in whatever you choose to do.

To advance your life personally or professionally, you must put an emphasis on developing your soft skills.

Some other approaches:

Follow these ten golden rules and enjoy every moment of living.

1.Greet your family members first thing in the morning. If you are not used to this, they will be surprised with your sudden and nice gesture.

2.Greet your peers, subordinates and boss once you enter the office. Smile at even the 'security' personnel standing at the gate, who takes care of your safety.

3.Greet your friends along the way and do not ignore them.

4.Continuously reciprocate to breed communication. If you do not reciprocate at least with a 'thanks' when you get information or a source on your online network or your offline network, you will not be remembered for a long time. If you are not remembered, you are out of your network.

5. Be a proactive listener and empathise with others to command respect.

6.While talking to others, your voice, tone and tenor must be audible and soothing. It should not be aggressive or in a shouting mode.

7.Dress well to suit your profession and to create positive vibes in your workplace. If you are a sales representative, do not go out with printed shirts and jeans, which may turn down your customer.

8.Political and religious comments must be avoided at all costs in the workplace, when you are in a group.

9.Your communication should not provoke others.

10.Do not speak ill of others.

Scientific discussion:

Business is about people. It is about communication, relationships and about presenting yourself, your company and your ideas in the most positive and impactful way. Many business people like to think that success is based on logical, rational thoughts and acts, but the human element should never be ignored. Which is why a strong soft skills set is vitally important. Today, employers crave managers with the critical soft skills. These skills tend to be more generic in nature. In other words, these are skills key to effective performance across all job categories. And

these soft skills have come to play an even more crucial role in management positions in today's environment. As the world has changed and the nature of work has changed, the skill set required of managers has changed. Soft skills are personal attributes that enhance an individual's interactions, job performance and career prospects. Unlike hard skills, which tend to be specific to a certain type of task or activity, soft skills are broadly applicable. Soft skills are sometimes broken down into personal attributes, such as: Optimism, common sense, responsibility, a sense of humor, integrity, time-management and motivation. The interpersonal abilities also are a part of soft skills which includes: empathy, leadership, communication, good manners, sociability and the ability to teach. It's often said that hard skills will get you an interview but you need soft skills to get (and keep) the job "In today's highly competitive employment market, jobs and roles are often described in terms of competencies which are a combination of behaviors that lead to superior performance in a job. The two major concerns of employers are finding good workers and training them. The skills-gap, which is thedifference between the skills needed on the job and those possessed by applicants, is of real concern tomanagers and business owners looking to hire competent employees. India currently has 600 millionyouth below 25 years of age of which 320 million are in schools and colleges. Less than 25% of theseare employable due to the skills gap!" - India Employability Skills Survey (2009 - 10) by SeemaMenon, Head Assessment, AspireSoft skills training can make the difference between closing the deal and losing it, creating a cohesive,efficient team or a malfunctioning one, getting that promotion or missing out. Great people skills giveyou a competitive edge, helping you to create positive relationships that mean you can get more frompeople, both internally and externally.

Balancing of soft skills and hard skills:

While seemingly an exclusively soft skill, communicating in the context of a project or program can be improved with tools and techniques.

- Information fails to get to the people who need it in time for them to use it.
- False or incomplete information is distributed and used as the basis for decision-making.
- Assumptions are confused for facts.
- Information distributed becomes a spark that ignites politics and conflict.
- Crucial information is withheld.
- Huge amounts of time are spent in unfocused, ineffective meetings.

Let's approach the creation of an effective communications infrastructure as a key component of our project management tasks. We can assess our stakeholders and their communication needs.

- Are they a key part of the project or are they peripherally involved?
- What types of information do they need to receive, with what frequency?
- What are they most concerned about?
- What is the most appropriate way to communicate the various project outputs theyshould receive?

Conclusion

After focusing on various dimensions of soft skills, it can be perceived that soft skills are ornaments of human beings.These skills have lot of impact on the personality of human beings. It can convert unstructured life into structured one. Gradually if one inculcates soft skills, a day will come human mind will be reengineered.Every entrepreneur thinks that his/her product, services will change the world.They might but the change has to begin closer to home. By focusing on your behavior, knowing doing gap, attitude and soft skills,

you begin to inspire others to pay attention too. When your team and key people in the company learn to pay attention to soft skills in addition to hard skills, your chances for success go up exponentially. Soft skills alone won't make you successful either. They have to be balanced with having the management team with right hard/professional skills, creating a human resource management system that supports your team would multiply your chances ofsuccess. When you have all the three factors optimized, the human capital in your
company begins to pay rich dividends. Mentors and good consultants can accelerate your journeyconsiderably because
they can mirror your behavior and help you identify holes below the waterline quickly.
Don't wait till you have a crisis on hand to work with them. Remember that you cannot
do anything to improve your IQ but EQ can be significantly altered as one can learn anddevelop soft skills over time.There are now Internet based soft skills training courses that allow you to workwith simulations, what-if scenarios and adventure games to learn soft skills. Of courseface to face training could be more effective if you can find trainers who can customizetheir courses to suit your needs. Finally, focus on long term development approach fordeveloping soft skills rather than event based approach. With regular coaching,mentoring, action learning sessions supplemented by trainings and workshops, you canget your entire team effective in making presentations, supplier negotiations, buildingteams and innovating products.Finally, developing a shared appreciation for the enterprise reality is not an easytask. It has to do more with mental models and developing competencies and capacity inaddition to skills and behavior. You have to examine your point of view that is shapingeverything you do. Senge believes that basic inquiry skills, the ability to distinguishinterpretations from data, and the ability to pose questions that really help others to learnmore from the current context are critical in making you and your company successful.

A ship not only needs a map for its journey, it also needs theories about how thecurrents work, wind and weather, and theories about the meaningfulness of the journeyitself. Members of the enterprise need mental models of how it all fits together.

According to Senge, without a theory of business (a la Peter Drucker) the companydoesn't last long. The entrepreneur, as well as other members, must ask (and beencouraged to do so) a series of questions e.g. what is our theory, where are we, how dowe generate value, what are our key sources of distinctiveness are we sophisticated inbuilding shared understanding, how do we look for disconfirming evidence that identifieswhat is wrong with our theory. It in this process that the gaps between knowing anddoing are discovered.

Senge found a tremendous alignment between the basic ideas of organizationallearning and Asian cultures. There is room for an Asian approach that respects naturalcapital, social capital and human capital. Shaping the human capital the Asian way couldbe a "discontinuous, big opportunity for the 21st century" and we hope that you can takeadvantage of this opportunity to make a difference.

References:

1. Peter Senge, The Fifth Discipline: The Art anScience of Learning Organizations,Doubleday:New York, 1990.
2.ArtKliener, Climbing to Greatness with Jim Collins, Strategy and Business, Jan.20023.DanielGoleman, Annie McKee, Richard Boyatzis, Primal Leadership: Realizing thePower of Emotional Intelligence, Harvard Business School Press: Cambridge,2002.
4. Robert Cooper, AymanSawaf, Executive EQ: Emotional Intelligence in Leadershipand Organizations, Putnam Group: New York, 1997.

USB To USB Data Transfer Device

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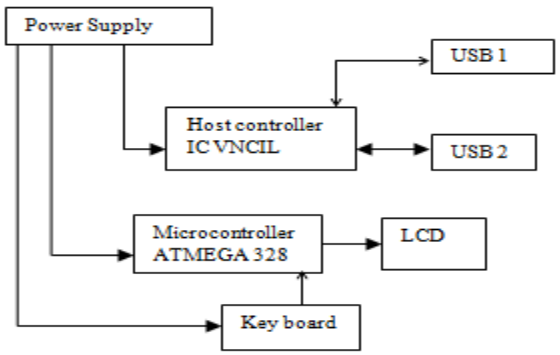
Abstract
In 21'st century, where every day the new electronic gadgets are coming, it is very much disgusting to depend on the computer or laptop for the purpose of the data transfer. The device specified here will be able to transfer the data between two more USB devices. It uses it the host controller and input and output peripherals

1. Introduction

Now days we use computer or laptop to transfer the data which consumes power only for such small purposes. To switch on the computer or laptop for these purpose feels tedious sometime. This device provides an easy way to transfer the data at anytime, anywhere. This device uses one host controller IC, microcontroller, peripheral devices and USB drivers. This device helps user to select any file copy that file and paste it in to another USB which will acts as slave at that time. The selection of operation such as copy, paste or any else can be performed with the help of keypad and LCD screen. These peripherals will create user friendly environment and will help to hide the complexity of the device.

2. Proposed system



Figl. Architecture of the device

2.1 Working of the system

As shown in Fig. 1 it consist of seven components. Power supply provides power to the peripherals and controller. When the board is intialised it shows a welcome note, when the usb is get connects with the port it gets dected by host controller.the Host controller sends the response to the microcontroller,then the microcontroller shows the name of that usb on the screen. When the user selects the particular file and then selcts various commands such as copy or paste,then the data transfer takes place. After the datatransfer the process terminates.

2.2 Hardware

The main hardware requires for this device is microcontroller and host controller IC. The other peripherals require are keypad, LCD and two or more usb peripherals.

2.2.1USB 2.0

This devices are used to store data and this devices can be used to transfer the data .this device consist of four pins VCC,ground, D+, D-. The VCC and Ground are the power supply signals, and D+ and D- are the data lines through which actual data transfer takes place. Both D+ and D- are bidirectional lines, both carrying data in a single direction at a time and data is modulated into deferential voltage levels to be transferred over them. The directions of D+ and D- are reversed in TDM manner to transmit and receive data. USB signals are transmitted on a twisted-pair data cable with 90Ω ±15% characteristic impedance, labeled D+ and D- [1]. These collectively

use half-duplex differential signaling to reduce the effects of electromagnetic noise on longer lines.The data transfer is having four types:

1. *Interrupt transfers:* for the devices needing quick but guaranteed response(e.g. pointing device)
2. *Isochronous transfers*: For some fixed data rate but data loss may take place(e.g. audio, video)
3. *Control transfers*: used for simple status check.
4. *Bulk transfers*: uses available bandwidth with no fixed data rate (e.g. file transfer).

Depending on the type of data transfer, there are two types of pipes: stream and message. The stream pipe is connected to a unidirectional endpoint for the interrupt, isochronous and bulk data transfer modes. The message pipe is connected to bidirectional endpoint for control data transfer.

2.2.2 LCD

LCD (Liquid Crystal Display), this device acts as peripheral to microcontroller. This device is used to provide User interface. This device helps user to select the content which are available on the storage device.

2.2.3 Keypad

Keypad is used to listen to the commands given by user. Keypad consists of various keys such as cut, copy, paste etc.

2.2.4 Microcontroller

Microcontroller used in this device is ATMEGA 328. It consists of following features4K/8Kbytes of In-System Program-mable Flash with Read-While-Write capabilities, 256/512/512/1Kbytes EEPROM, 512/1K/1K/2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a byte-oriented 2-wire Serial Interface, an SPI serial port, a 6-channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a programmable Watchdog Timer with internal Oscillator,and five software selectable power saving modes[2].

2.2.5 Host controller

The Host controller used over here is VNC1L.The VNC1L is the first of FTDI‟s Vinculum family of Embedded USB host controller integrated circuit devices. Vinculum can also encapsulate certain USB device classes handling the USB Host Interface and data transfer functions using the in-built MCU and embedded Flash memory. When interfacing to mass storage devices, such as USB Flash drives, Vinculum transparently handles the FAT File Structure using a simple to implement command set. Vinculum provides a cost effective solution for introducing USB host capability into products that previously did not have the hardware resources to do so. The VNC1L has a Combined Interface which interfaces a controlling application with the Command Monitor. The combined interfaces are UART, Parallel FIFO and SPI [4].

3. Test and results

It is expected that the data transfer will happen at 5kb/sec.

4. Advantages

- **Portable**: the device will be portable. It will be easy to carry. The user can carry out data transfer at any place and time.
- **Less Power consumption**: it consumes less power compare to the computer and laptop.

5. Conclusions

This device will be very useful for the student and other persons also, as it gives easiness in the data transfer process.

References

[1] JanAxelson “USB Complete”-third edition.

[2] www.alldatasheet.com

[3] www.ftdichip.com

[4] www.vinculum.com

[5] www.lvr.com

Reconfigurabilty of Spiral Antennas

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Abstract

Thereconfigurable antennas are being worked out since four decades. Different types of spiral antennas that are suitable for achieving reconfigurability have been compared. There are various methods of achieving reconfigurablity but it involves challenges to decide the suitable type of reconfigurability, method of achieving it and the costs involved.. A simple microstrip spiral antenna is simulated and its bandwidth and gains are observed with different substrates. The spiral antenna has been simulated with Rogers RT/duroid, FR4, duroid, Rogers R04350 and Rogers TMM3. The bandwidth obtained for Rogers RT/duroid, duroid andRogers R04350 are 8.2 GHz, 8.57 GHz and 8.6GHz respectively. The bandwidth obtained for FR4 and Rogers TMM3 are 10.23 GHz and 12.93 GHz respectively. The gains for all designs with these substrates vary from 5 to 6 dB.

Keywords:**Reconfigurability, Spiral antenna, Pattern Reconfigurability, Frequency Reconfigurabilty.**

1. Introduction

Reconfigurability, when used in the context of antennas, is the capacity to change an individual radiator's fundamental operating characteristics through electrical, mechanical, or other means [1]. Ideally, reconfigurable antennas should be able to alter their operating frequencies, impedance, bandwidths, polarizations, and radiation patterns independently to accommodate changing operating requirements. Antenna reconfigurability can provide numerous advantages. For instance, the ability to tune the antenna's operating frequency could be utilized to change operating bands, filter out interfering signals, or tune the antenna to account for a new environment. If the antenna's radiation pattern could be changed, it could be redirected toward the access point and use less power for transmission, resulting in a significant savings in battery power. However, the development of these antennas poses significant challenges to both antenna and system designers. These challenges lie not only in obtaining the desired levels of antenna functionality but also in integrating this functionality into complete systems to arrive at efficient and cost-effective solutions.

Different types of antennas have been used to incorporate reconfigurability. These varieties include dipoles, microstrip antennas, log periodic antennas, helical antennas and frequency-independent antennas. Frequency independent antennas provide uniform electrical characteristics over a wide frequency band but with low gain. Frequency independent antennas include log periodic antennas, spiral antennas and fractal antennas [2]. Among the frequency independent antennas spiral antennas have advantage of smaller size because of their spiral arms. Spiral antenna is a type of RF antenna. It is shaped as a two-arm spiral, or more arms may be used. The main characteristics of the spiral antenna are its broad bandwidth of operation, wide half power beam width (HPBW), and circular polarization (CP) for the radiated field [3].

2. The Spiral Antenna

Spiral antennas belong to the class of frequency independent antennas which operate over a wide range of frequencies. Polarization, radiation pattern and impedance of such antennas remain unchanged over large bandwidth. Such antennas are inherently circularly polarized with low gain. Array of spiral antennas can be used to increase the gain. Spiral antennas are reduced size antennas with its windings making it an extremely small structure. The antenna geometry has been

subject of investigations for several years. These characteristics are attractive for wireless systems such as wireless-LAN, GSM, CDMA, etc.[3]. One characteristic of the spiral antenna that is utilized is the fact that the maximum beam direction can be changed by physically changing its arm length thus providing tilted beam radiation with respect to its centre axis.

2.1 Different Types of Spiral Antennas

The Unidirectional Equiangular Spiral Antenna is constructed by wrapping balanced equiangular spiral arms on a conical surface. The nonplanar antenna so constructed, with small cone angle, has a unidirectional rotationally symmetric radiation pattern. The maximum radiation occurs on the antenna axis off the apex of the cone [4]. The beam width for this antenna is around 70° which say that antenna gain isn't very impressive. The pattern Bandwidth is around 3.7 GHz. And the impedance over the bandwidth remains almost constant.

The Archimedean spiral antenna is a popular of frequency independent antenna. The Archimedean spiral is usually backed by a lossy cavity to achieve frequency bandwidths of 9:1 or greater. The Archimedean spiral has property that any ray from the origin intersects the successive turning of spiral in points with constant separation distance. The gain of the antenna is about 6 dB over 1.5 GHz to 4 GHz giving bandwidth of 2.5 GHz. Also the Impedance is constant over the bandwidth.

Round spiral antennas are generally designed by using Archimedean spiral geometries which have linear growth rates. To obtain smaller antennas with nearly the same performance, square spiral Archimedean geometries are also widely used instead. A single arm rectangular spiral antenna printed on finite size dielectric substrate backed by finite size conducting plane gives gain of approximately 6.7 dB [5]. This geometry is used to form dual band spiral antenna for satellite and terrestrial communication [6].

Among the various kinds of spiral antennas, single arm planar spiral antennas have merits of easy design, layout and implementation with decent bandwidths and gains.

3. Reconfigurability

Reconfigurable antennas have potential to add substantial degrees of freedom and functionality to mobile communication applications. Most reconfigurable systems concentrate on changing operating frequency while maintaining radiation characteristics [7]. However, broadband antennas like spiral antennas have been used by several authors to incorporate recofigurabilty. Some methods have been discussed to achieve reconfigurabilty of various antenna parameters.

3.1Methods of Achieving Pattern Reconfigurability

In general, electrical changes to a radiating structure usually result in changes in radiation characteristics. an annular slot antenna is used as both a frequency and pattern reconfigurable device. Frequency reconfigurability for this antenna is supported through PIN diode switches that control input matching circuitry, whereas the pattern reconfigurability is enabled with diode switches placed at locations around the slot to control the direction of a pattern null that is inherent to basic antenna operation [8].

Another way of achieving reconfigurability is parasitic tuning which is done by pacing reflectors and parasitic element at certain distance from antenna. Parasitic tuning can also be achieved by shorting spiral antenna to ground or by providing an open along the width of antenna. This is done in the reconfigurable square microstrip spiral developed by Huff et al.[1] that provides a broadside or 45° tilted beam over a common impedance bandwidth.

3.2Methods of Achieving Frequency Reconfigurability

The effective length of the antenna, and hence its operating frequency, can be changed by adding or removing part of the antenna length through electronic, optical, mechanical, or

other means. Many have demonstrated different kinds of switching technology, such as optical switches, PIN diodes, FETs, and radio frequency microelectromechanical system (RF-MEMS) switches[3][8].
Although changes to the conductors predominate in reconfigurable antenna designs, changes in the material characteristics of designs also promise the ability to tune antennas in frequency. In particular, an applied static electric field can be used to change the relative permittivity of a ferroelectric material, and an applied static magnetic field can be used to change the relative permeability of a ferrite. These changes in relative permittivity or permeability can then be used to change the effective electrical length of antennas, again resulting in shifts in operating frequency.
Also the use of varactor diodes is used to change the effective antenna length [1].

3.3Some of the Reconfigurable Spiral Antenna Configurations

A fully integrated solution providing scan-beam capability with a single antenna is presented by Chang won Jung et al.[3]. The proposed system includes a reconfigurable rectangular spiral antenna with a set of MEMS switches, which are monolithically integrated and packaged onto the same substrate. The system is based on a single-arm rectangular spiral antenna, capable of changing its radiation pattern using RF-MEMS switches.
Another configuration was first proposed by Greg H. Huff, and Jennifer T. Bernhard [9]. They proposed similar kind of profile as configuration but they used RF MEMS SPST switches and produced a radiation pattern that was reconfigurable in broadside or endfire direction.

3.4 Challenges Involved in Implementing Reconfigurable antenna

There are multiple dimensions in this trade-off space, including reconfiguration speed, power consumption, actuation requirements (voltage or current), fabrication complexity, durability, device lifetime, complexity of control and bias networks, weight, size, cost, dynamic range, sensitivity, and, of course, performance.
In general, mechanical reconfiguration mechanisms are slower than their electronic counterparts, but they can often achieve much more dramatic changes in performance through physical changes in the antenna structure. As electrically driven mechanical relays, RF-MEMS switches may promise better isolation and lower power consumption than solid-state switches such as PIN diodes and FETs, but they cannot yet compete in the dimensions of switching speed or power handling capability.
Another challenge faced by the designers of reconfigurable antennas is the matching networks of such antennas. Reconfigurable antennas usually cover a wide range of frequencies this can lead to changes in matching networks. Many designers limit the range of reconfigurable antennas so that a single network could support the antenna.

4. Simulations

According to the Ring theory of Spiral antenna, it radiates from a region called active region, where circumference of spiral equals one wavelength hence, the length of the spiral is taken to be one wavelength at 3.7 GHz. The total arm length 81 mm, width of spiral patch is 1 mm, spacing between successive turns is also 1 mm, dimensions of substrate are 34X36 mm, and radius of coaxial feed is 0.325 mm, substrate thickness 3.175 mm. The design dimensions are shown in Fig.1. The design was tried for different substrates having different relative permittivity. The substrates used were Rogers RT/duroid, FR4, duroid, Rogers R04350 and Rogers TMM3. Their frequency response and radiation pattern was observed in HFSS v.10. The reflection coefficient obtained for Rogers RT/ duroid, duroid and Rogers TMM3 are shown in Fig.2, Fig.4 and Fig.6 respectively and those of Rogers R04350 and FR4 are shown in Fig 8 and Fig 10 respectively. The radiation patterns

obtained for Rogers RT/ duroid, duroid, Rogers TMM3, Rogers R04350 and FR4 are shown in Fig.3, Fig.5, Fig.7, Fig.9, Fig.11 respectively.

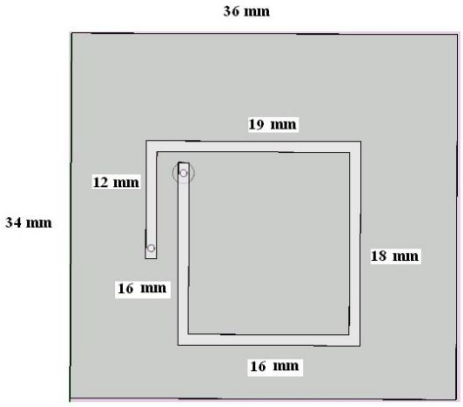

Fig. 1 Design geometry and dimensions.

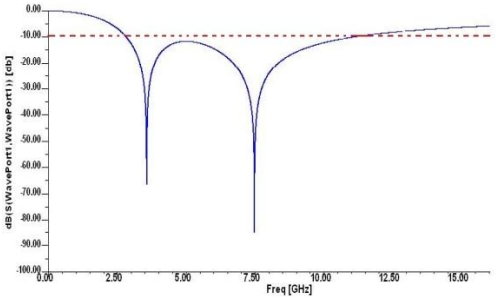

Fig. 2 Reflection coefficient for Rogers RT/ duroid with εr=2.2.

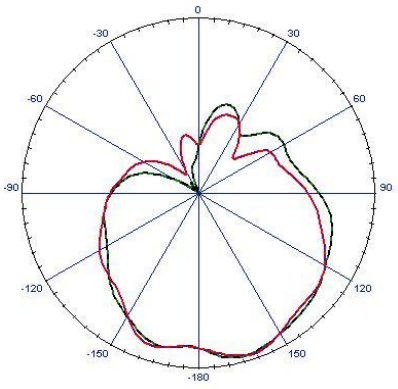

Fig. 3 Radiation pattern for Rogers RT/duroid with εr=2.2.

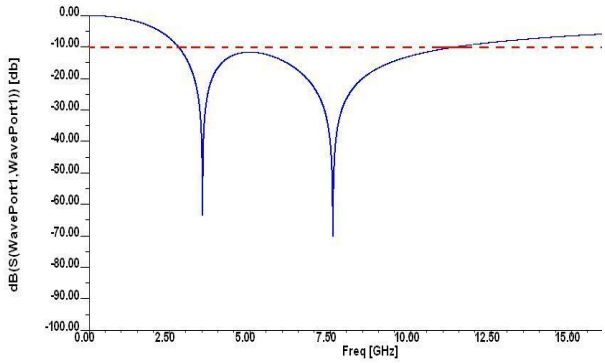

Fig. 4 Reflection coefficient for duroid with εr=2.2.

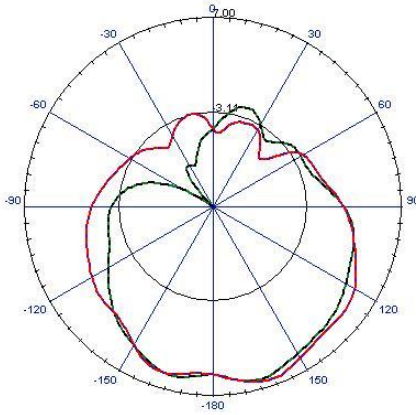

Fig. 5 Radiation pattern for duroid with εr=2.2.

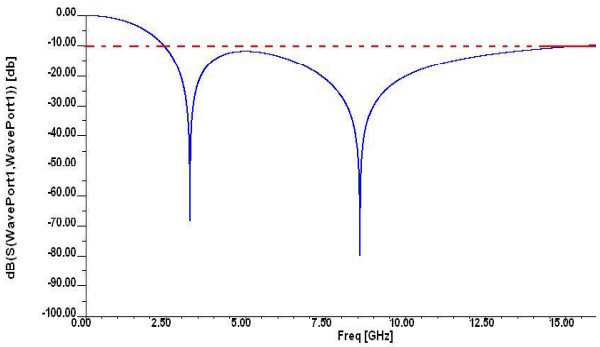

Fig.6 Reflection coefficient for Rogers TMM3 with εr=3.27.

5. Results and Discussion

The bandwidth and gain obtained for all simulations are shown in the Table1, it is seen that the bandwidth obtained for Rogers TMM3 substrate is maximum i.e. 12.93 GHz and the gain also seem to be maximum i.e. 6.62 dB. The bandwidth is measured below -10 dB in reflection coefficient vs. frequency graph. The bandwidth obtained for Rogers RT/duroid 5880 is 8.2 GHz and gain obtained is 6.3 dB. The bandwidth obtained for duroid is 8.57 GHz and gain obtained is 6.18 dB. The bandwidth obtained for Rogers R04350 is 8.6 GHz and gain obtained is 4.08 dB. The bandwidth obtained for FR4 is 10.23 GHz and gain obtained is 4.68 dB.

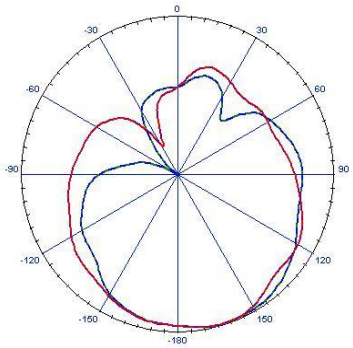

Fig. 7 Radiation pattern for Rogers TMM3 with εr=3.27.

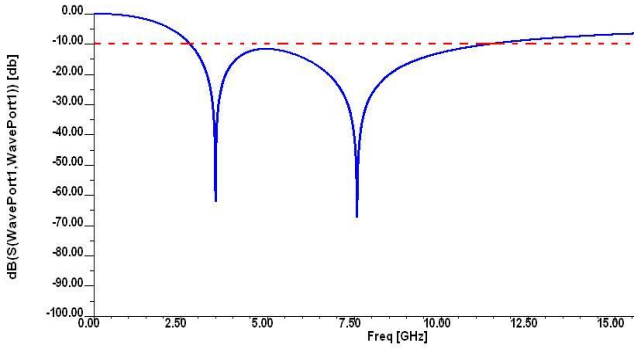

Fig.8 Reflection coefficient for RogersR04350 with εr=3.48.

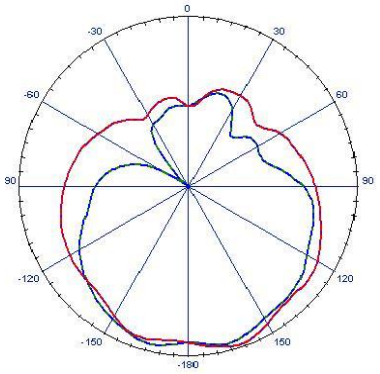

Fig. 9 Radiation pattern for Rogers R04350 with εr=3.48.

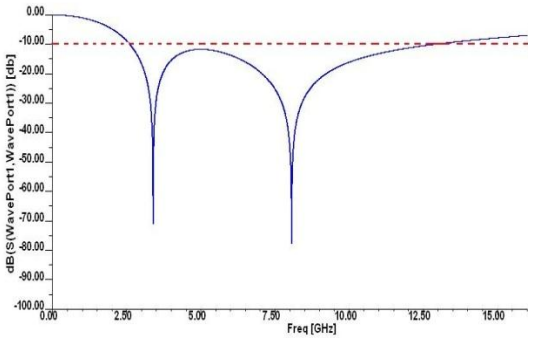

Fig. 10 Radiation pattern for duroid with εr=2.2.

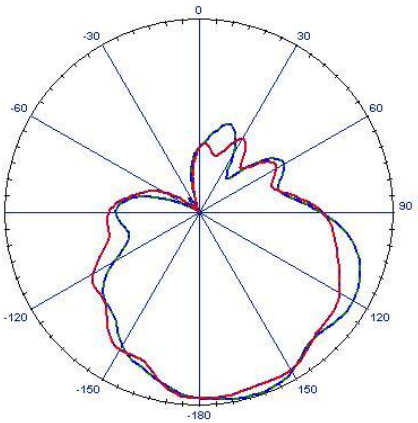

Fig. 11 Radiation pattern for FR4 with εr=4.4.

Table 1: Results of spiral antenna with different Substrates

Sr no	***Substrate***	***εr***	***Frequency Range (GHz)***	***Bandwidth (GHz)***	***Gain (dB)*** @ Φ=90°
1	Rogers RT/dur	2.2	2.84 to11.04	8.2	6.3@166°
2	Duroid	2.2	2.79 to 11.26	8.57	6.18@162°
3	Rogers TMM3	3.27	2.47 to15.4	12.93	6.62@160°
4	Rogers RT043	3.48	2.78 to11.38	8.6	6.39@162°
5	FR4	4.4	2.62 to12.85	10.23	5.47@176°

5. Conclusions

The reconfigurable antennas improve the functionality of a single antenna. The reconfigurability in frequency, radiation pattern and polarization can be achieved by different techniques. From the literature survey done so far, it is also seen that not all types of reconfigurabilities can be accommodated in a single antenna simultaneously. Spiral antenna is suitable and beneficial for incorporating reconfigurabilty because they provide large bandwidths and have smaller dimension due to their spiralled geometry but they have low gains. Even when researches regarding reconfigurable antennas have been developed since 40 years very few such antennas are in use.

This is because the benefits and costs ofimplementation and operation of reconfigurable antennas are notclear from a system perspective.Although reconfigurable antennas deliver expanded functionalityover fixed antennas, they typically require extra parts, extra control lines, and extra infrastructure atone level or another. The same model of simple microstrip spiral when tried with four different substrates, Rogers TMM3 was seen to be providing better frequency and bandwidth. The changes in the substrate material are showing changes in the bandwidths as well as gains. This shows that choice of substrate plays an important role in antenna performance.

References

[1] Jennifer T. Bernhard, Reconfigurable Antennas, New York: Morgan & Claypool, 2007.

[2] Constantine A. Balanis, Antenna Theory: Analysis & design, John Wiley & sons, 2009.

[3] Chang won Jung, Ming-jer Lee, G. P. Li, and Franco De Flaviis, "Reconfigurable Scan- Beam Single-Arm Spiral Antenna Integrated With RF-MEMS Switches", IEEE Transactions On Antennas And Propagation, vol. 54, no.2, February 2006,pp. 455-462.

[4] J. D .Dyson, "The Unidirectional Equiangular Spiral Antenna," University of Illinois Antenna Lab. Tech. Rep. No. 33, Wright Air Dev. Cen., Wright-Patterson Air Force Base, Ohio, July 10, 1959, pp. 329 – 334.

[5] Hisamatsu Nakano, Yosuke Okabe and Junji Yamauchi, "Tilted and Axial Beam Formation by A Single Arm Rectangular Spiral Antenna with Compact Dielectric Substrate and Conducting Plane", IEEE Transactions on Antennas and Propagation, vol. 50,no.1, January 2002, pp. 17–23.

[6] Cheng-Nan Chiu, Wen-Hao Chuang, "A Novel Dual-Band Spiral Antenna for a Satellite and Terrestrial Communication System", IEEE Antennas And Wireless Propagation Letters, vol. 8, 2009, pp. 624 – 626.

[7]G.H. Huff, J. Feng and J.T. Bernhard, "A Novel Radiation Pattern and Frequency Reconfigurable Single Turn Square Spiral Microstrip Antenna", IEEE Microwave and wireless components letters, vol.13, no. 2, February 2003, pp. 57-59.

[8]Nikolaou, S., Bairavasubramanian, R., Lugo, Jr., C., Carrasquillo, I., Thompson D.C., Ponchak, G.E., Papapolymerou, J., and Tentzeris, M.M., "Pattern and frequency reconfigurable annular slot antenna using PIN diodes," IEEE Transactions on Antennas and Propagation, vol. 54, February 2006, pp. 439–448.

[9]Greg H. Huff, Jennifer T. Bernhard, "Integration of Packaged RF MEMS Switches With Radiation Pattern Reconfigurable Square Spiral Microstrip Antennas", IEEE Transactions on Antennas And Propagation, Vol. 54, No. 2, pp. 464 – 469, February 2006.

RF BASED TRAIN SAFETY SYSTEM

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Abstract

Historically, rail safety has been built upon the reactive analysis of past accidents and the Introduction of corrective actions to prevent the recurrence of those events. With today's

Extremely high accident rate, it is increasingly difficult to make further improvements to the level of safety by using this approach since it becomes very complex. Therefore, a proactive approach to managing safety has been developed that concentrates on the control of processes rather than solely relying on inspection and remedial actions on end products. This innovation in train system safety is called a Train Safety Management System (TSM), an expression indicating that safety efforts are most effective when made a fully integrated part of the business operation.

It is now generally accepted that most train accidents result from human error. It would be Easy to conclude that these errors indicate carelessness or incompetence on the job, but that would not be accurate. Investigations are finding that the human is only the last link in a chain that leads to an accident. These accidents will not be prevented by merely changing people; increased safety can only occur when the underlying causal factors are addressed.

Enhancing overall safety in the most efficient manner requires the adoption of systems Approach to safety management. Every segment and level of an organization must become part of a safety culture that promotes and practices risk reduction. Safety management is based on the premise that there will always be safety hazards and human errors.

TSM establishes processes to improve communication about these risks and take action to minimize them. This approach will subsequently improve an organization's overall level of safety.

Our aim through this project is to take certain precautions and try to prevent the accidents as much as possible by designing the devices. There are situations where motorman of train knows that there is something wrong in the train which can cause the problem. The Transceivers are design that will try to help and stop these accidents These Transceivers will send signal in form of RF waves to nearby control room or to main control room. This project also includes GSM technology. When Control room is not in the vicinity or not possible to inform them about the fault then through GSM technology, SMS can be sent which will help us to reach control room.

Keywords: Author Guide, Article, Camera-Ready Format, Paper Specifications, Paper Submission.

1. Introduction

The text must be in English. Authors whose English language is not their own are certainly requested to have their manuscripts checked (or co-authored) by an English native speaker, for linguistic correctness before submission and in its final version, if changes had been made to the initial version. The submitted typeset scripts of each contribution must be in their final form and of good appearance because they will be printed directly. The document you are reading is written in the format that should be used in your paper.

This document is set in 10-point Times New Roman. If absolutely necessary, we suggest the use of condensed line spacing rather than smaller point sizes. Some technical formatting software print mathematical formulas in italic type, with subscripts and superscripts in a slightly smaller font size. This is acceptable.

Illustrations or pictures:

Fig1.kasara train accident.

Many people were killed and injured when the Vidarbha Express rammed into four derailed coaches of a Mumbai suburban train.

The accident occurred around 9.30pm, when four coaches of the Kasara-CST suburban local train derailed and fell across the parallel railway line.

A few minutes later, the speeding 12105 Mumbai-Gondia Vidarbha Express rammed into the derailed bogies scattered on its route towards Kasara. As a result, the engine of the Express train also derailed and blocked the services on both sides.The time lag between the derailed local train coming to a halt and the collision was only 1.17 seconds, and the loco pilot did the best possible thing by applying the brakes, Mr. Jain said, adding that this resulted in one of the bogeys of Vidarbha Express piling up on top of another.Asked if anti-collision device could have averted the incident, He said, "It is very unlikely for an automatic system to be effective even in the slim time lag. Manual intervention was the best possible action in such situation."

Fig.2 andheri train accident

Railway safety is a crucial aspect of rail operation the world over. Malfunctions resulting in accidents usually get wide media coverage even when the railway is not at fault and give to rail transport, among the uninformed public, an undeserved image of inefficiency often fueling calls for immediate reforms.

As there are accidents of trains often taking place all over India, RF based safety system is being designed. Recently few months back, an accidents took place in Andheri .The reasons behind these accident was found out by western railway later on. After all the study they design an anti-collision device. The main drawback of the anti-collision device is that it works only on line of sight and otherwise it fails.

An attempt through our project is made to design a device that works in omni direction viz. all direction and may prevent all these accidents.

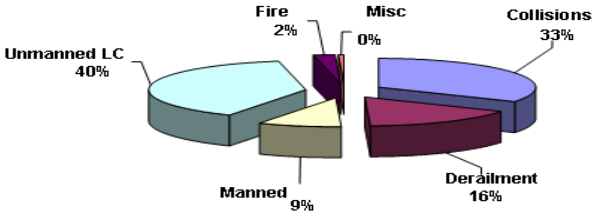

Fig.3. Causalities in Train Accidents during 1995-96 to 2006-07 Charts

2.1 Footnotes

Sr.no.	Author	Title	Year	Work Done.
01.	Indranil Majumdar	Railway - collision avoidance system	2001	Invented in 2001 and patent granted in 2007(India patent no 201106).It didnt receive much attention as he had no railway background.
02.	Prof. Sagar Jadave	Line of sight Anti-collision device.	2012	Unanimous development of Train collision avoidance as an open architecture system without attracting any royalty unlike the Anti - collision device. Anti collision device details are not yet released.

3. Tables, Figures

Table 1: Margin specifications

Margin	***A4 Paper***	**US Letter Paper**
Left	18.5 mm	14.5 mm (0.58 in)
Right	18mm	13 mm (0.51 in)

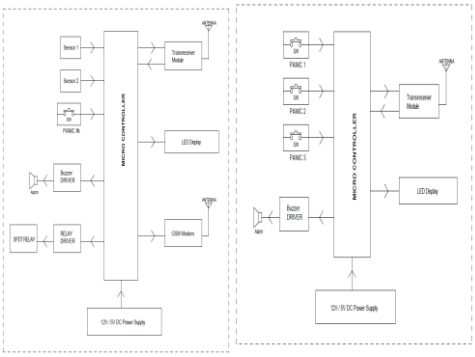

Fig. 4 transciever module

4. Conclusions

Thus train safety management system is the Advanced Train Management System which willprovide significantly upgraded capabilities to the Indian rail industry.

Train Safety System is designed to support Indian rail safety management objectives of improving rail network capacity, operational flexibility, train service availability, transit times, rail safety and system reliability.

This project can be used as a Trainer-kit for anyone who is interested in understanding this very Interesting system of Management.

During the course of this Project Hand-on experience about the working of different systems for managing train in Indian railways was gained. It makes one realize the complexities involved in running the “Life-Line” of India.

Acknowledgments

Words are only representations of our regards and gratitude that we have towards our actions and their inherent associations. As a matter of fact, without co-operation, no thought could be coined into real action. Consistent motivation and invaluable support throughout any project is an issue that cannot quantitatively measured. These acknowledgements are only a fraction of regards towards their gestures.

Our first note of thanks goes to our most cherished Head OF ELECTRONICS AND TELECOMMUNICATION Department **Prof.Archana Ingle.** For her undiminished trust in his support throughout our tenure and for giving us an opportunity to work on a project which made us capable of handling assignment on our own and become relevant.

We are also grateful to project guide **Prof. Madhura Tilak** for giving us advice from the beginning of our idea to its completion, which has resulted in the form of our final product.

I take this opportunity to express my deep sense of gratitude towards those, who have helped us in various ways, for preparing my project.

Last but not the least, our parents who provided us support and encouragement at all stages while the project went on.

References

[1] Gurdial Singh Khosla, Railway Management InIndia, the University of MichiganThacker 1972.

[2] V.Rajaraman,Computer programming in C,PHI Learning private LTD.

[3] Yashwant Kanetkar,C Programming, BPB Publicaions,2010

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Pile Failure in Earthquake: Current Understanding, Codes of Practice &Inconsistency in Observed Pile Failure

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Abstract

The current understanding of pile failure is based on a bending mechanism. It is thought that the pile fails in earthquake due to bending because of lateral loads due to inertia & slope movements (lateral spreading). The current understanding simply treats piles as beam elements.

However, when we study the failure of piles from the case histories, we realize that there are inconsistencies in observations of pile failure. This paper highlights the limitations of the current understanding of pile failure/codes of practice. It discusses case histories of some of the pile failures.

Keywords*: bending mechanism, current codes, lateral spreading, liquefaction, etc.*

1. Introduction

Bending mechanism is thought to be the reason for pile failure as per the current understanding/codes of practice. Fig. 1 shows the current understanding of pile failure (Finn & Thavaraj, 2001).

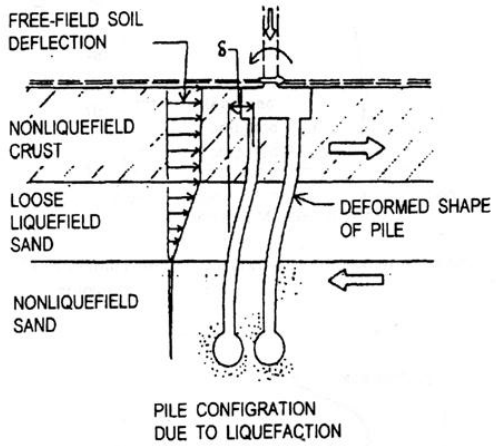

Fig. 1: Current understanding of pile failure, Finn & Thavaraj (2001)

Permanent lateral deformation or lateral spreading is reported to be the main distress in piles, Abdoun & Dobry (2002), Finn & Fujita (2002), Hamada (2000). In view of soil-pile interaction, the current mechanism of failure assumes that the pile is pushed by soil. If the ground surface adjacent to piled foundation is observed, it is deformed. The deformation is suggestive of this mechanism. Fig. 2 shows surface observations of lateral spreading observed after the Bhuj earthquake near the Navalakhi port (Gujarat).

Fig. 2: Lateral Ground Spreading near Navalakhi Port during the 2001 Earthquake, Madubhushi et al (2001)

2. Codes of Practice

2.1 Japanese Code of Practice (JRA 1996)

This unanimity led the Japanese Code of Practice (JRA 1996) for example, to include checks on bending moments in piles due to lateral spreading of the ground (fig. 3).

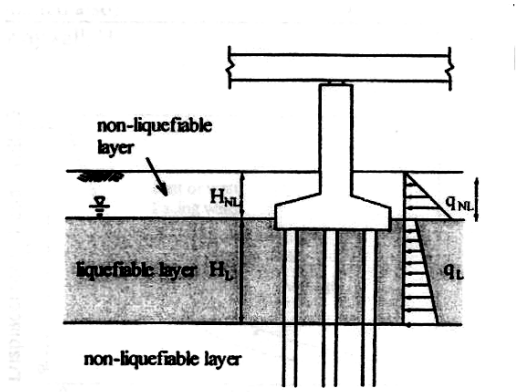

Fig. 3: JRA (1996) code of practice

2.2 Eurocode 8 (1998)

The Eurocode says that the piles should be designed against bending due to inertia & kinematic forces arising from the deformation of the soil surrounding the pile. It goes on saying: "Piles shall be designed to remain elastic. When this is not feasible, the sections of the potential plastic hinging must be designed according to the rules of Part 1-3 of Eurocode 8".

Eurocode 8 (Part 5) says: Potential plastic hinging shall be assumed for:

- A region of 2d from the pile cap
- A region of (+-)2d from any interface between 2 layers with markedly different shear stiffness (ratio of shear moduli >6)

Here, d = pile diameter. Such region shall be ductile, using proper confining reinforcements.

NEHRP code also focuses on bending strength of the pile.

2.3 Indian Road Congress Code (IRC 78, 2000) for Design of Bridges/Flyovers

IRC 78 code (2000) prescribes the following:

1. Clause no. 709.4.2 prescribes that the piles may be designed taking into account all the load effects & their structural capacity examined as a column. The self load of pile or lateral load due to earthquake, water current force, etc. on the portion of free pile up to scour level & up to potential liquefaction level, if applicable, should be considered.
2. Clause 709.1.7 stipulates that the minimum pile diameter shall be as below:

Types of Piles	Bridges on Land	River Bridges
Driven cast-in-situ piles	0.5 m	1.2 m
Precast piles	0.35 m	1.0 m
Bored piles	1.0 m	1.2 m

3. Clause 705.4.1 describes that, in soil the minimum depth of foundations below the point of fixity should be the minimum length required for developing full fixity as calculated by any rational formula.
4. Clause 709.1.4 requires that for the piles in streams, rivers, creeks, permanent steel liner should be provided at least up to maximum scour level. In case of marine clay or soft soil or soil with aggressive material, permanent steel liner of sufficient strength shall be used for the full depth of such strata. The minimum thickness of liner should be 5 mm.
5. The reinforcements in pile should be provided for the full length of pile, as per the design requirements. However, the minimum area of longitudinal reinforcement shall be 0.4% of the C/S area in all concrete piles. Lateral

reinforcement shall be provided in the form of links or spirals with minimum 8 mm diameter steel, spacing not less than 150 mm. Cover to main reinforcements shall not be less than 75 mm.

2.4 Indian Standard IS: 1893 (1984 edition & 2002 edition)

IS 1893 (1984) code prescribes that:

"The piles should be designed for lateral loads neglecting lateral resistance of soil layers liable to liquefy".

Desirable field values of N to avoid liquefaction problems are as below:

Zone	Depth below GL (m)	N Value	Remarks
III, IV, V	Up to 5	5	For depth b/w 5 to 10 m, linear interpolation is recommended
	10	25	
I & II, imp. Struct.	Up to 5	10	
	10	20	

The above clauses are retained in the 2002 edition.

In summary, the current understanding of pile failure simply treats piles as beam elements & assumes that the lateral loads due to inertia & slope movement cause bending failure of the pile.

3. Inconsistency in Observed Pile Failure with the Current Understanding

Pile foundations are observed to fail even in level grounds.Tokimastu & Asaka (1998) carried out detailed investigation of the pile failure during 1995 Kobe earthquake & reported that:

" In the liquefied level ground, most PC piles (Prestressed Concrete Plies used before 1980's) & many PHC piles (Prestressed High Strength Concrete Plies used after 1980's) bearing on firm strata below liquefied layer suffered severe damage accompanied by settlement &/or tilting of their superstructure".

Figure 4 shows one such failure from the 1995 Kobe earthquake. The building is located in the centre of Fukaehama, Higashinanada-Ku. The building settled about 1.1 m. & tilted considerably.

Fig. 4: Kobe earthquake: failure of a piled foundation in level ground, Tokimatsu,2003

Fig. 5: Collapse of piled Kandla tower in laterally spreading ground after the 2001 Bhuj earthquake, Madabhushi et al.

If lateral spreading is the cause of failure, it is unlikely that a piled foundation will collapse in a level ground i.e. in absence of lateral spreading. PHC piles are high strength concrete piles & can sustain lot of bending strength.

3.1 Failure of Bridges

It is a common observation in seismic bridge failure that piers collapse while abutments remain stable (Figures 6 & 7). Fig. 6 shows the collapse of one of the piers of the Million Dollar Bridge leading to bridge failure. Fig. 7 shows similar failures of the Showa Bridge during the 1964 Niigata earthquake.

Fig. 6 & 7

Fig. 6: Bridge failure during earthquake liquefaction, Failure of Million Dollar Bridge during the 1964 Alaska earthquake

Fig. 7: Failure of the Showa bridge

Bhattacharya & Bolton (2004a) note that in a bridge design, the number of piles required to support an abutment is governed by lateral load due to the fact that the abutment, as well as carrying the dead load of the deck, has to retain earth & fills of the approach roads to the bridge (Fig. 8). The bridge piers (intermediate supports) predominantly support the axial load of the deck.

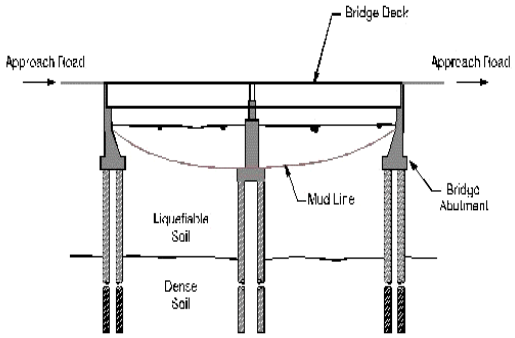

Fig. 8: Schematic diagram of a bridge

The lateral load acting on the pier during an earthquake is primarily the inertial force. The lateral capacity of a pile is typically 10 to 20% of the axial load capacity. Thus, for a multiple-span bridge having similar span lengths, the number of piles supporting an abutment will be more than that of a pier. In the examples cited above, only bridge piers collapsed while the abutments remained stable. This shows that the bridge pier foundation failure may be influenced by axial load. In contrast, the current design methods only concentrate on lateral loads.

3.2 Location of Hinge Formation

After the excavation of the NHK building, the NFCH building, Hamada (1992) & the 3-storied building, Tokimatsu et al (19997), it was observed that hinge formation occurred within the top third of the pile. Had the cause of pile failure been lateral spreading, the plastic hinge location would have been expected at the interface of liquefiable & non-liquefiable layer as this section would experience the highest bending moment.

3.3 Showa Bridge failure

Fig. 7 illustrates the effects of lateral spreading loads on piled foundations of Showa bridge. Fig. 9 shows the schematic representation of the bridge failure.

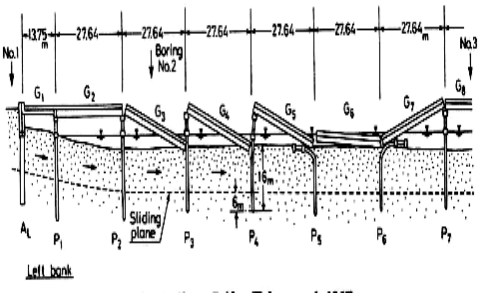

Fig. 9: Schematic diagram of the failure of Showa bridge after Takata et al (1965). Diagram shows half of the bridge.

Piles under pier no. P_5 deformed towards the left & the piles of pier P_6 deformed towards the right, Takata et al (1965), Fukuoka (1966). Had the cause of pile failure been lateral spreading, the piers should have deformed identically in the direction of the slope. The piers close to the riverbanks did not fail, whereas lateral spreading is seen to be most severe at these places.

Furthermore, Bhattacharya et al (2003a, 2003b), Bhattacharya (2003) showed that the piles of the Showa bridge are safe against the current codal provisions of the JRA (1996) code with a factor of safety of 1.84.

3.4 Failure Pattern of Piled Structure in the Absence of Liquefied Soil

Fig. 10 shows the failure pattern of structures resting on slender columns representing a piled building or a bridge in absence of soil. Fig. 10(a) may represent a piled raft or a pile group in the absence of soil. Fig. 10(b) may represent a row of piles in the absence of soil as in the failure of Showa bridge. Thus in the absence of soil, we would expect a pile-supported structure to fail in a similar pattern but it remains to be seen if liquefied soil behaves like "absence of soil". The failures in Figures 10 (a & b) are due to axial load alone.


a


b

Fig. 10 a: A group of slender columns representing a pile group or a piled raft.

Fig. 10 b: A row of slender columns representing a row of piles as in the Showa bridge.

The static axial load at which a frame supported on slender columns becomes laterally unstable is a critical load or buckling load (P_{cr}). Fig. 11 shows Euler's effective length concept to normalize the different boundary conditions of pile tip & pile head.

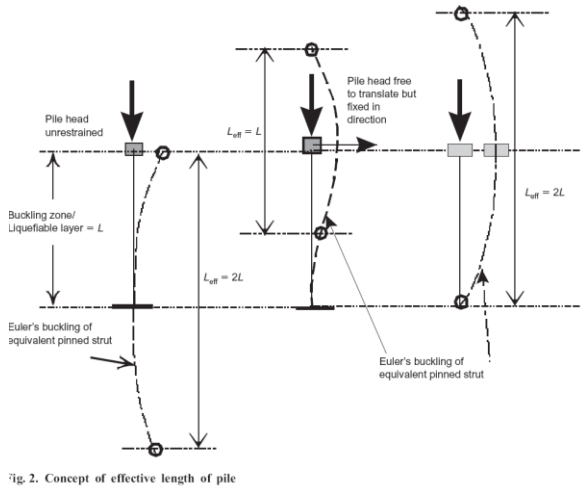

Fig. 2. Concept of effective length of pile

Fig. 11: Concept of Effective Length of Pile from Bhattacharya (2003). In piles, the pile top is free to translate in most of the practical cases.

$P_{cr} = (\pi^2 EI/L^2_{eff})$

3.5 Boundary Conditions of A Pin-Ended Column & that of a Piled Structure

The buckling instability of frames supported on slender columns (fig. 10) is different from the ones usually text book type or the one observed in an INSTRON machine. In the machine, its difficult to create a boundary condition which is free to translate at the top. In most piled foundations, the top part is free to translate unless raked piles are used.

In frame buckling, the medium surrounding is air. On the contrary, for piles it is liquefied soil. The behavior of liquefied soil can thus be thought to influence the behavior of pile under the action of axial load.

3.6 Conclusion

The shortcomings of current understanding of pile failure/codes of practice are:

- The effect of axial load as soil liquefies is ignored.
- Some observations of pile failure case histories cannot be explained by the current hypothesis.
- Bhattacharya (2003) showed that the pile foundation of Showa bridge, considered safe by the 1996 JRA code, actually failed in 1964.
- The JRA was revised few times after the 1964 Niigata earthquake (in 1972, 1980 & 1996)

References

1. Bhattacharya S., Madabhushi S P G & Bolton M D (2004) "An Alternative Mechanism of Pile Failure in Liquefiable Deposits during Earthquakes", Geotechnique 54, Issue 3 (April), pp 203-213.
2. Xiao SEI, Quingquiao WANG, Junjie WANG, Damage Patterns & Failure Mechanisms of Bridge Pile Foundation under Earthquake, The 14th World Conference on Earthquake Engineering, October 12-17, 2008, Beijing, China.
3. Subhamoy Bhattacharya, Failure of Pile-supported Structures during Earthquakes- Concepts, Theory & Practice, NPEEE Short Term Course (AEGA 2004), IIT Madras.
4. Bhattacharya S & Bolton M D (2004d): "Buckling of Piles During Seismic Liquefaction", paper no. 95; 13th World Conference on Earthquake Engineering, Vancouver, Canada.

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Publication: An Investigation on Characteristic Properties of High Performance Self Compacting Concrete using Fly Ash as Mineral Admixture, Indian Concrete Journal (ICJ), Sept. 2009

Soil Stabilization-an economically viableaid torainwater harvesting, with special emphasis on Bhayander Soil

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Abstract

Providing water to India's ever-increasing population is a growing problem. The quantity of water available is reducing by the year. The challenge before us is to preserve the available free rain water to the maximum for future use. This is especially true because water is needed not only for the basic needs of human beings, but alsofor agricultureand industry. In fact it is an unavoidable commodity for all of creation.

This study proposes to suggest economically viable solutions to this problem through thestorage of water in earthen structures including reservoirs, canals and ground tanks. Maintaining surface storage of harvested rainwater with minimum or no loss is a major concern, although there are various methods to preserve harvested water. Most modern solutions are costly and unaffordable to the general public. Therefore, this study evaluates methods to maximize water storage on ground surface reservoirs. This calls for minimum, if not zero permeability, and good shear strength. Clayhas a detrimental effect on structures, especially when there is variation in moisture movement. Permeability and shear strength play an important role in determining the behavior of clayeysoil under wet conditions; hence these are two major factors considered in this study. A sincere effort has gone into determining the optimum percentage of admixtureto reduce the permeability of soil usingthe commonest admixtures such as cement, lime and their combinations. This paper presents the findings of an experimental study.

1. Introduction

Water harvesting is the need of the hour. Drinking water is a basic necessity for the growing population. Studies conducted by various agencies prove this fact beyond doubt. Consider New Delhi, India's capital, for example: In 1961, New Delhi had a population of 26.6 lakhs, while its sources of raw water were from wells sunk along the Yamuna. There were 5 water treatment plants having a total capacity of 35 MGDand one sewage treatment plant having a capacity of 18 MGD. In 1981,the population was 62.22 lakhs, while the sources of raw water werewells sunk along the Yamuna, Bhakra, storage / Yamuna, upper Ganga canal and eight water treatment plants having a total capacity of 303 MGD and seven sewage treatment plants with a capacity of 122 MGD. In 2001, the population of Delhi was 138.5 lakhs, the sources of raw water were wells sunk along the Yamuna, Tehri, upper Ganga Canal, Bhakra, storage / Yamuna, upper Ganga Canal Ground water and 11 water treatment plants having a total capacity of 715 MGD and 11 sewage treatment plants having a capacity of 346 MGD (figures courtesy studies published by Centre for Science and Environment) The demand for water is growing in many cities. India's urban population has grown by almost five times in five decades. Till a few years ago, our cities were self-sufficient in meeting their water needs, thanks to the available water bodies. But the condition today is different: most water bodies have completely disappeared.

The municipalities are under increasing strain to provide water to the multiplying urban population.

Currently, the people depend on the governments for management and distribution of water. Therefore, the governments are under pressure to launch new projects to meet the need. Rather than helping to provide solutions, the public continues to be a demanding group. Public participation in collecting and preserving water is now the need of the hour. We also need to revive traditional systems for collecting and distributing water.

An old technology is now gaining popularity—it involves collecting and using rainfall from a catchment's surface. Rainwater harvesting in a large scale has existed for more than 4000 years in Palestine and Greece. In ancient Rome residences were built with individual cisterns and paved courtyards to capture rain water. Rain water harvesting is essential because surface water is inadequate to meet our demands. Rapid urbanization has resulted in decrease in infiltration of rain water into the sub-soil and recharge of ground water has diminished.

Rain water harvesting is done either through storage of water on the surface for future use or through recharge to ground water. The storage of rain water is a traditional technique and the structures used were underground tanks, ponds, check dams, weirs etc.Recharge of ground water is a new concept in rainwater harvesting and is done through pits, trenches, dug wells, hand pumps, recharge shafts, lateral shafts with bore wells, and spreading technique. There are various methods of water harvesting available but we need to choosecost-effective ones, depending on the catchment area available. One of the most effective methods is to store water in large open reservoirs,and preserve it with minimum or no loss. Stabilizing the interior of the pond with admixture is found to be a good and cheep solution.

Soilstabilization is the process of improving the engineering properties of the soil, and thus to make it more stable. It is required when the soil available for construction is not suitable for its intended purpose. In its broad sense, stabilization includes compaction, pre-consolidation, and many other processes. However the term stabilization is generally restricted to the process which alters the soil material itself for modification of its properties.

Soil stabilization is generally used to:

- Increase or reduce strength or reduce sensitivity to the environmental changes, especially moisture changes
- Increase or reduce permeability
- Reduce compressibility
- Reduce frost susceptibility

The need for maximizing water storage in earth structures like reservoirs, canals, and ground tanks calls for a minimum, or zero permeability and good shear strength.

2. Objectives of Study

The objective of this study is to evaluate the quality and sustainability of soil lining of ground water storage at Bhayander. Marine clay soil abounds in this place as in other partsof Mumbai. These soils are characterized by low strength, high compressibility and sensitivity to disturbances.These properties make such places unsuitable and problematic for civil engineering construction. Marine clay deposits exhibit very low shearing strength and great affinity towards water. So it is very

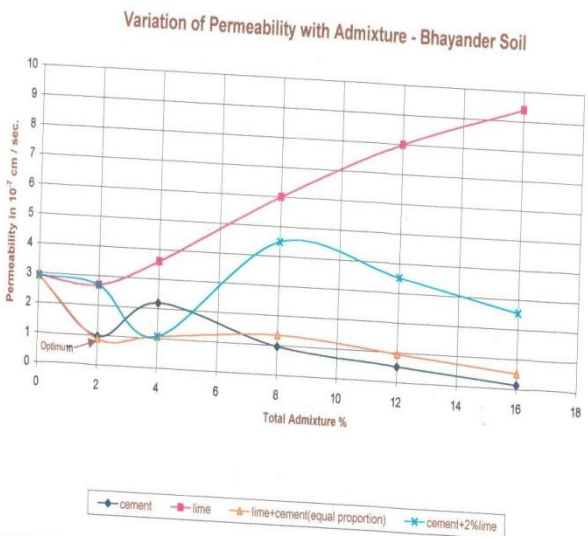
difficult to use such soil for any type of structure without suitable treatment. This study investigated the mechanical properties of Bhayander soil. The permeability characteristics of the soil is analyzed, as the variation of permeability, SL, UCS & CBR on stabilization of Alibag soil which is of Black cotton Soil from Alibag.This is done to know the stabilisation of a different type of soil and its effects.Strength and shrinkage characteristics along with permeability isstudied. Though there are various methods available, stabilization by additives are preferred. The additives usually employed are cement, lime, fly-ash, asphalt, and other chemicals. Thecommonest stabilizers, cement and limehave been proved to be veryeffective andare preferred for soils selected.

3. Discussion of Result

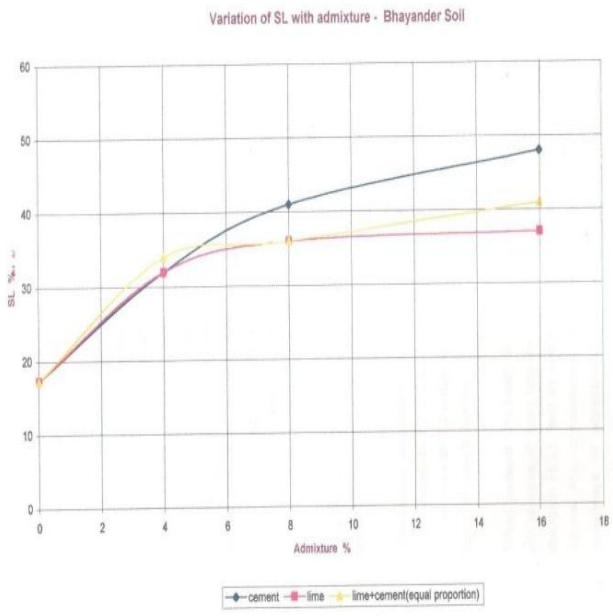
Results of the tests have been presented and discussed below for Bhyander soil. The results are super imposed for the comparison of the effect of differenttypes of stabilization on different properties like permeability, UCS and CBR

4. Bhayander soil

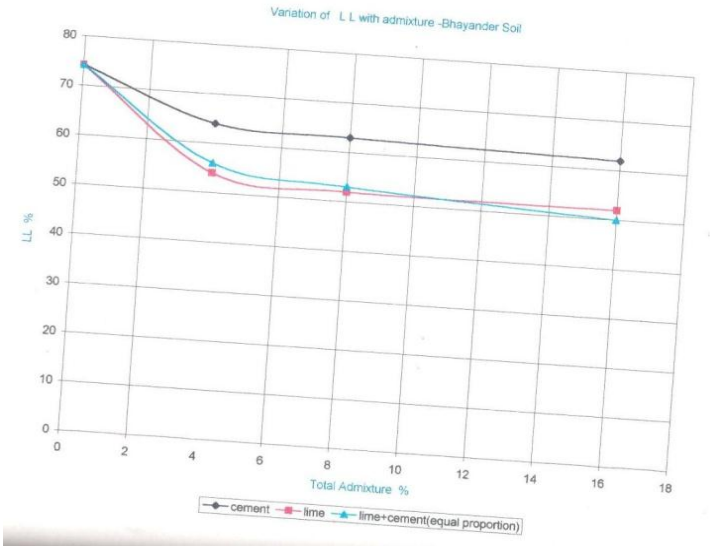
Graph - 1



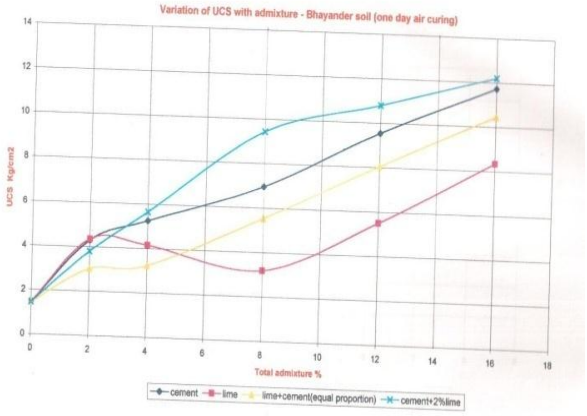
Graph - 5



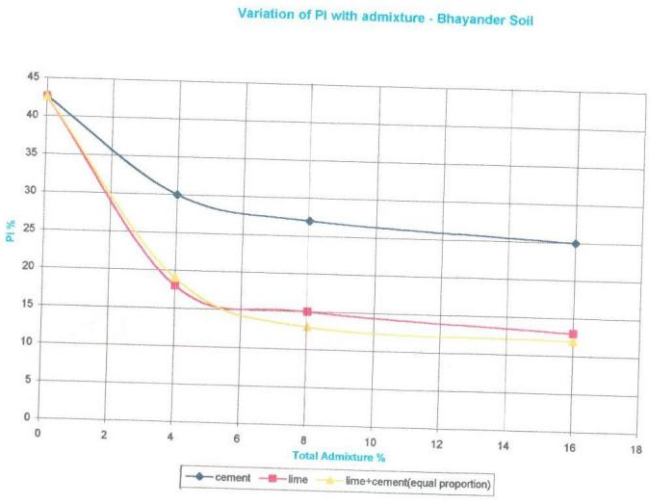
Graph 2



Graph- 6



Graph -4



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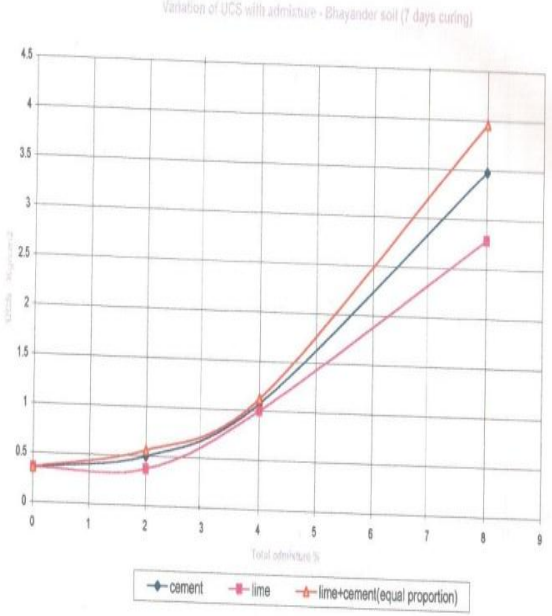
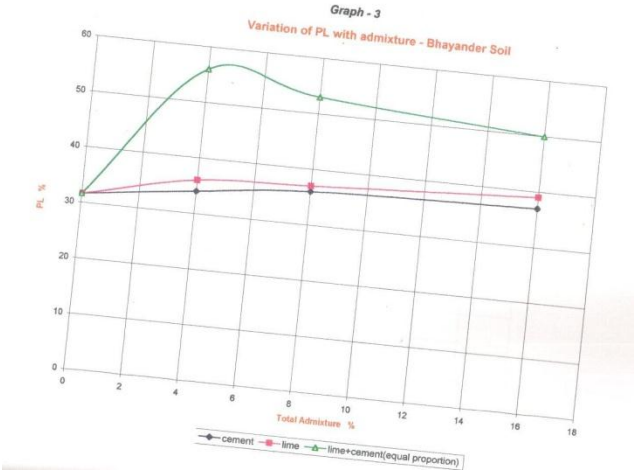
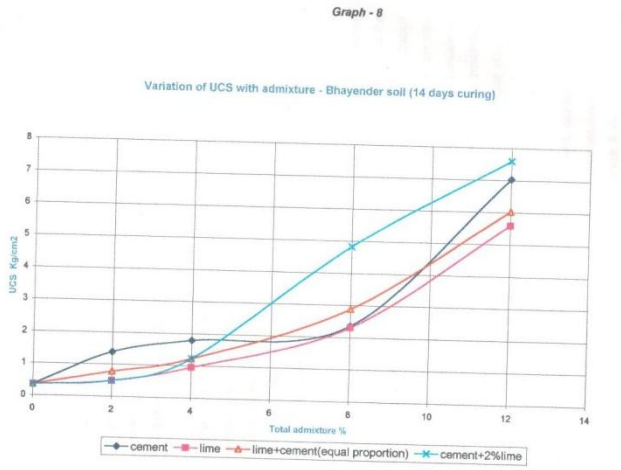


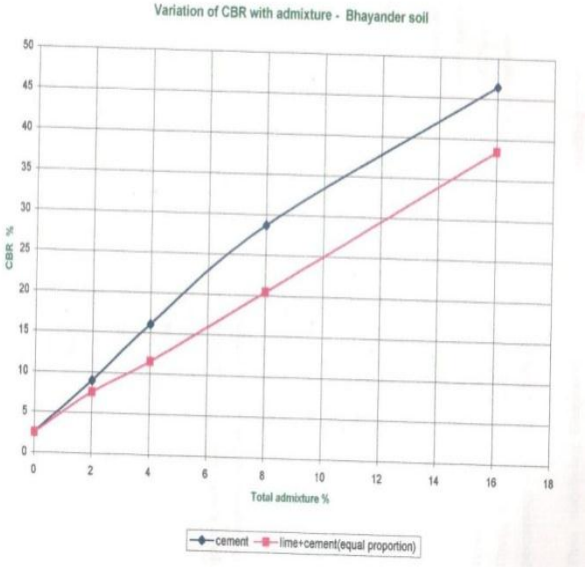
Graph - 3



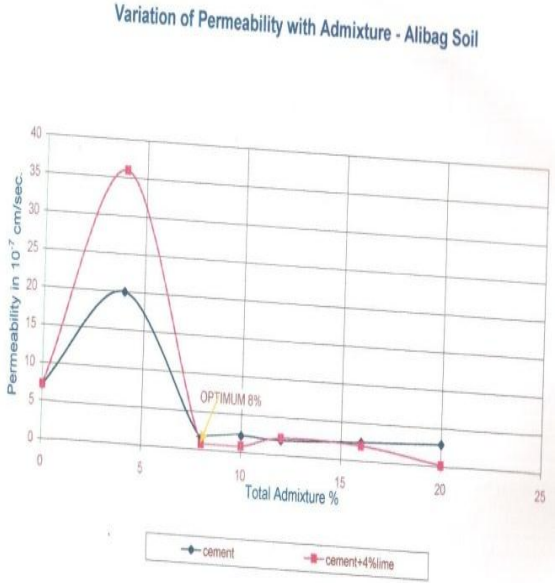
Graph - 8



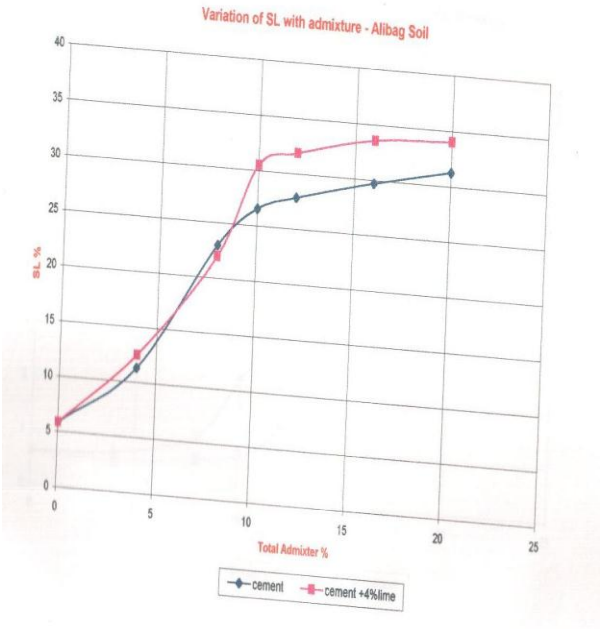
Graph - 9



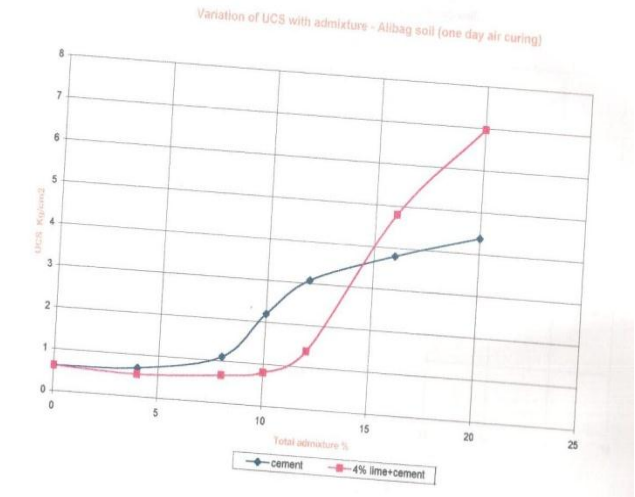
Graph -10



Graph - 11



Graph - 12



The variation of permeability on stabilization of Bhayandersoil is shown in **Graph 1. Graph 2,3,4,5**give variation of LL, PL, PI and SL respectively of the stabilized soil. The variation on UCS on stabilization of Bhayander Soil is shown in **Graph 6, 7, 8**. The Variation on CBR on stabilization of Bhayander soil is shown in **Graph 9.**

This particular soil is predominantly clay of about 96% as per particle size analysis. Differential free swell index of 17.9 % indicates that the soil is a non-swelling soil. Shrinkage limit is also quite high as 17.3% confirming the non-swelling character. Therefore detrimentaleffects due to swelling arenegligible

Keeping permeability as the first and foremost important property to be considered for lining of ponds, reservoirs, canals etc., the variation in permeability is discussed first. Permeability for this soil is found out as 2.93 X 10^{-7} cm/sec, which is generally a low value of permeability. Stabilization further reduced the permeability to a great extent.

Graph1indicates that, when lime is used as an admixture, till 2% lime, permeability decreased slightly due to the introduction of fines into the soil and afterwards it increased continuously as the percentage lime is increased. This is due to decrease in the LL and PI due to addition of lime. By adding lime the CaO reacts with aluminia, silicate and calciumions and reduced the plasticity of cohesive soils. Increase in effective grain size distribution is observed by adding lime to clay soil. This increased the permeability. Similar trend is reported for sandy clay. Hence it is not advisable to use lime for reducing the permeability of the soilsand can be used where better drainage is required.

In the case of cement, effects of decrease in LL, PI, gelling or pozzolanic reactions are seen. The permeability depends on which reaction is predominant. When cement is used as an admixture, till 2%, permeability decreased as in case of lime due to introduction of fines. It is understood that the quantity of cement used is small (2% to 4%)

though it reacts with clay particles together into a coherent mass. Effect of decrease in LL and PI is predominant compared to pozzolanic action of cement. That is why at a particular range i.e between 2 to 4 % in this case there is a slight increase in permeability. A further increase in cement decreased the permeability continuously to a lower value since pozzolanicreaction is predominant. This decrease in permeability of the cement-stabilized soil is due to interlocking network throughout the soil mass and due to the hydration of cement and the gelling action.

When equal amounts of cement and lime were added initially there is a decrease in permeability till 2% (cement + lime) as in the above two cases, then increased slowly up to 8%. Further addition did not yield an appreciable change giving a compensating behavior.

When (cement + 2 % lime) were added permeability decreased up to 4% due to the introduction of fines into soil. The increase in permeability up to 8% is due to decrease in LL and PI and inadequate cement content for pozzolanic reaction.Above8% permeability continuously reduced, though marginally, as the percentage of admixture is increased, due to pozzolanic reaction being predominant

Out of the four typesof combinations tried;equal amount of (cement + lime) is found to give the least permeability at the earliest trial; that is at 2%(cement +lime)as shown in the Graph. Hence a combination of 2% (cement + lime) takenequally is considered as the optimum combination for the soil-lining. The least permeability 0.89X 10^{-7}cm/ sec is considered as the optimum permeability. A percentage reduction in permeability with reference to original permeability 2.93 X 10^{-7}cm/sec is about 70% or reduction is approximately one third of the original permeability.

Graphs 2,3&4 indicates that on stabilization, in all types of combination of admixture, the liquid limit decreased and the plastic limit increase thereby reducing plasticity index as the percentage of admixture is increased indicating a reduction inswellingpotential as the percentage admixture is increased. **Graph 5** shows that the shrinkage limit of the soil increased indicating a reduction in swelling potential as the percentage admixture is increased.Stabilizationchanged the failure mode of the soil from plastic to brittle and developed a high tensile stress of the soil causing high shrinkage. Itis found that cracks started appearing in the shrinkage limit soil pat of 4% admixture in all type of combination and the cracks widened as the percentage is increased. These cracks are due to thehydration reaction and not due to swelling properties. Sincethese shrinkage cracks are very much undesirable and cause further loss of water, these higher proportion of admixture shouldbeavoided in stabilization work. Though higher percentage (above 4%) of admixture gave low permeability, due to adverse effect of shrinkage these cannot be recommended for soil lining.

Unconfined compressive strength test is carried out with one-day air curing because the tests on cement and lime revealed that minimum three hourstime is required for cement and lime for its final setting. **Graph 6** shows that in three types of combinations like cement, equal (cement + lime) and (cement + 2 % lime), the strength increased as the % of admixture is increased. However the test results are obtained with (cement + 2% lime)

where strength increased to 1.21kg/cm2 from 1.46 kg / cm2. In case of lime also there is an increase in strengthupto 2 %,reduced up to 8% and then continuously increased. This change in the increasing trend of strength in case of lime could be due toabad specimen.

The optimum combination defined earlier with reference to the permeability criteria and shrinkage criteria is 2 % (lime + cement). At this proportion the corresponding UCS is 3.01 Kg/cm^2 and is sufficient for the lining of canals, ponds etc. The percentage of improvement in UCS with reference to the natural soil of 1.46 Kg/cm^2 is 106 % or the increase is approximately two times the original value.

UCS tests were also conducted with 7 days curing, covering the specimens with wet sackcloth; the specimens with lower percentage of cement gave very low strength after curing. Table 13 shows that the cured strength of natural soil is less than that of the uncured, due to softening of the soil after curing. 7 days as well as 14 dayscured strength of natural soil is reduced to0.35 Kg $/cm^2$compared tothe uncured strength of 1.46 Kg/cm^2. Curing reduced the strength in stabilized soil also. **Graph 7&8** shows the increasing trend of cured UCS in stabilized soil. The value of cured UCS at optimum proportion is 0.56 $kg/cm^2$and 0.78 $kg/cm^2$for 7 days and 14 days respectively.

CBR tests were conducted and the effect of stabilization is very good on CBR. Two types of combinations, cement and equal (cement + lime), were carried out.**Graph9** shows rapid increase in CBR. At optimum proportion of 2% (cement + lime), the CBR increased to 7.5% with reference to 2.48% of natural soil. The percentage increase is 204%.

Thus stabilizing Bhayander soil, which is non-swelling type with proper combination of cement and lime showed the required reduction in permeability while strength characteristics of the soil were improved.

5. Alibag Soil

The variation of permeability, SL, UCS & CBR on stabilization of Alibag soil are shown in **Graph 10, 11, 12, and 13** respectively.

This particular soil is Black Cotton Soil from Alibag, predominantly clay about 70% and silt about 27 % as per particle size analysis. Differential free swell index of 125% indicates that this soil is highly swelling type. The shrinkage limit is also quite low as 5.87 % confirming the swelling Character. Therefore detrimental effectsdue to swelling are unavoidable unless treated.

This soil is also tested along the same line as Bhayander soil for the same purpose. Permeability for this soil is found out as 7.2 X 10^{-7} cm/sec. Stabilization is carried out with two types of combinations, cement and (cement + 4 % lime)

Graph 10 indicates that when cement was used as an admixture in this soil, permeability increased till4 % due to insufficient quantity of cement for pozzolanic reaction. The effect of decrease in LL and PI is predominant. Further additives beyond 4 % decreased permeability up to a particular percentage (say 8%) due to cement reaction. Additives beyond 8% did not show any reaction and per

In case of (cement +4% lime) initially till 4 %, permeability increased due to the presence of onlylime. Also, by adding lime up to 4 % the LL and PI decreased thereby increasing the effective grain size and the permeability of the

soil increased. On further addition of admixture, cement is introduced and the effect of chemical reaction with cement is predominant resulting in reduced permeability especially where the silt content is slightly higher as in this case. Beyond a particular percentage (8 % in this case) no further reaction takes place as seen in the Alibag soil and the variation in permeability is negligible. At 8 % of the value of the permeabilityis 0.76 x 10^{-7}cm/sec, which is the minimum permeability. Here the UCS value of this soil is 0. 61 kg/cm^2

Graph 12 indicates that in both the typesof combinations, the strength continuously increased as the admixture is increased. The corresponding value of UCS at the optimum combination based on permeability suggested earlier is 0.66 kg/cm^{2}and the percentage increase is 8 % which is fairly sufficient. Hence the optimum proportion is finalized as (4% Cement + 4% Lime) based on permeability as well as strength criteria. The percentage reduction in permeability with reference to the original permeability is about 847 % or the reduction is almost one by ninth.

CBR test in this soil gave a very poor CBR of 0.15 %. On stabilization in both types of combinations gave a rapid increase in CBR as the admixture is increased as shown in **Graph 13**

Hence stabilizing Alibag soil which is a swelling soil, with a proper combination of cement and lime showed the required reduction in permeability while strength characteristics were improved. These are the two criteria for the soil lining of the ground surface reservoir.

6. Conclusion

Studies on the stabilization effect of inorganic chemicals like cement and lime in Mumbai Marine clay and Alibag black cotton soil revealed that these soils are very responsive to stabilization in reducing their permeability and increasing their strength characteristics. The shrinkage characteristics played a very important role in deciding the extent of stabilization for a particular soil. The optimum proportion based on permeability and strength criteria for Marine clay from Bhayander is 1% cement + 1% lime. But for Black cotton soil from Alibag, the optimum proportion based on the same criteria is 4% cement + 4% lime. Hence soil stabilization by admixtures would be a viable and economic solution for storage of harvested water on surface reservoirs in any kind of soil whether swelling or non-swelling type.

Acknowledgement

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References

1. **Butter worth (1987)** "Ground Engineers 'Reference Book "Butter worth and Co. Publishers Ltd.,
2. **Manfred. R. Housman (1990):** "Engineering Principles of Ground modification" McGraw-Hill Publishing Company

3. **Joseph E Bowels (1978):** "Engineering Properties soils and their measurement" McGraw-Hill International Book Company
4. **R.E. Means & J.V. Parcher (1974):** "Physical properties of soil" Prentice-Hall of India Pvt. Ltd.
5. **Wintercorn& Fang (1975):** "Foundation Engineering handbook" Published in India by NeerajGalgotia for Galgotia Book source, New Delhi.
6. **Dr.B.J. Kasmilkar (1991):** Geotechnical Engineering" VidhyarthiGrihaPrakasan, Pune

Journals & papers

1. Paul K Mathew and S NarendraRao "Effect of Lime on cation exchange capacity of marine clay" ASCE Geo technical and Geo Environmental Engineering
2. S. Nara Singh Rao& G. Rajshekaran " Reaction product formed in lime stabilized marine clays" Journal of Geo Techniques
3. R. K. Katti "Search for solution to problems in B C Soils" First IGD annual lectures IIT Delhi
4. Central Board of irrigation and power research stream applied to river valley projects :Review on Soil stabilization with admixtures" Literature Review No. 7
5. Dr. R. K Katty& K.R. Kulkarni "A study effect of trace in organic chemicals on Lime stabilization of an expansive soil sample from poona" Journal of the Indian Road Congress

List of Referred Websites

1. (http://www.rainwaterharvesting.org/delhi_waterv4.htm)
2. http://phylares.vub.ac.be/Thesissen/2007%20Muayad%20Esaifan.pdf
3. http://books.google.co.in/books?id=V-CHgr_suC4C&pg=PA11&lpg=PA11&dq=water+harvesting+and+soil+stabilisation&source=bl&ots=qI894bzVhC&sig=l2-CFsP9I44ab9FFJF70AZ2b4Z0&hl=en&sa=X&ei=7rAqUc_qJITmrAeH-oCQBg&ved=0CFUQ6AEwAw#v=onepage&q=water%20harvesting%20and%20soil%20stabilisation&f=false
4. http://naldc.nal.usda.gov/catalog/6578

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ISO 14000 with Green procurement and Entrepreneurship –A future scenario

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Abstract

Environmental issues are increasingly becoming important in managing any business today. There are also growing demands by the overseas buyers for more and more environmental friendly products. Industries are shifting to eco friendly products as their business strategy for future sustainability and competitiveness. For this green purchasing and green supply chain are two popular approaches adopted around the world. The Paper showcases how green procurement is used by the industries as a means towards improving their products and operations from environment perspective to reduce risk, total cost of ownership and improve supply chain performance. It addresses the importance of integration between ISO 14000 and green purchasing to form an integrating system that can encourage all firms in supply chains to redesign products and renovates processes for continuous improvements towards green productivity.

Keywords: eco friendly products, business strategy, sustainability, green purchasing, green supply chain, ISO 14000

1. Introduction

Green procurement is purchasing eco friendly products. Eco friendly products include products made from recycled, reused materials, products that conserve energy and water, energy used from renewable resources like wind, solar and bio based fuels, products using alternatives to hazardous or toxic chemicals, radioactive materials and bio hazardous agents .It also includes minimizing negative impacts on environment over the life cycle of manufacturing, transportation, use and recycling or disposal.ISO 14000 provides eco labeling system (ISO 14021) for customers to choose green parts. Suppliers who supply green products are the motivators for green market and green supply chain.

2. Green Procurement

Green procurement activities in both public and private sectors have four main approaches

1. Procuring eco labeled products or services.
2. In house product/service evaluations.
3. Third party product/service evaluations.
4. Supply chain initiatives.

2.1 Green Procurement Program

The typical Green procurement program elements are

1. Recycled content products
2. Energy efficient products and energy efficient standby power devices.
3. Alternative fuel vehicles, alternative fuels and fuel efficient vehicles
4. Bio based products
5. Non ozone depleting substances
6. Environmental protection chemicals

2.2 Tangible benefits of green procurement

1. Cost avoidance –lower waste management fee, low hazardous materials ,management fee, less time and cost for reporting
2. Savings from conserving energy, water, fuel and other resources
3. Easier compliance with environment regulations
4. Demonstration of diligence
5. Reduced risk of accidents ,reduced liability and lower health and safety costs

6. Support of environmental /sustainability strategy and vision
7. Improved image and brand, goodwill
8. Increased shareholder value
9. Improved employee and community health through cleaner air and water, less demand for landfill and less demand for resources.

2.3 Challenges of green procurement

1. Estimating hidden costs and potential savings (e.g. reporting, material handling, disposal)
2. Misinformation and lack of communication
3. Lack of clear definitions
4. Integration into management systems
5. Educating marketing and sales professionals
6. Green procurement initiatives typically don't come easily
7. Potential barriers to trade
8. Changing the mindset for green purchasing
9. The extra cost is high
10. Lack of external motivation
11. Lack of environmental concern
12. Insufficient and incomplete ,incomparable environmental information
13. Some environmentally preferable products aren't as readily available and may not meet performance specifications or may not be cost competitive.

2.4 Green Purchasing Strategies

Product standards –

1. Purchase products that have environmentally friendly attributes(recycled materials, non toxic ingredients)
2. Purchase products with eco labeling

Behavior standards

1. Require suppliers to have EMS that meets recognized standards(such as EMAS,ISO 14001)
2. Audit suppliers to evaluate their environmental performance.
3. Require suppliers to disclose information about their environment practices, pollution discharges etc.
4. Require suppliers to maintain and implement EMS
5. Require suppliers to obtain formal certification of EMS

Collaboration

Work with suppliers to help them reduce environmental impacts through changes in product design and material use.

2.5 Global efforts encouraging firms to implement green purchasing

Many countries have started to regulate related laws to encourage firms to implement green purchasing. Taiwan announced the government procurement law in 1998 to compel public enterprises or administrative offices to procure greener products or services through compulsory competitive tendering.

In 1995 US government issues seven guiding principles for implementation of green procurement to encourage public sector .Japan set up a time schedule in guiding firms to engage in green purchasing and set up national eco labeling. In Japan GPN (Green purchasing network) brings together 2610 member organizations in promoting green purchasing practices among consumers. Canada's going green program aims at

promoting use of innovative technologies and processes for existing and new federal facilities.

3 Globalization and greening the supply chain

International organizations which promote sustainability have a number of options to promote greening supply chain

1. Develop expertise in strategic supply chain management
2. Document win- win examples of green purchasing
3. Promote green buying and supplier evaluation and purchasing policy
4. The use of environmental management systems standards as ISO 14001, EMAS, BS7750 etc is a criteria for greening purchasing. ISO 14001 does not require compulsory improvements in environmental performance where as EMAS standard does. So improvement in supplier's environmental performance depends on standard being applied.
5. Promote cleaner production as a specific requirement of environmental management system.
6. Study and disseminate 'best practices 'to help suppliers to improve their environmental performance.
7. Develop an environmental training program for corporate purchasing departments.
8. Target trade and business associations.

4. ISO 14001-Stepwise approach

The process of implementing ISO 14001 EMS can be achieved in a step wise approach and can be divided into steps summarized below

ISO 14000 family

140001 & 04 Environmental management system

14010,11,12,15 Environmental auditing

14020, 21,22,24,25 Environmental labeling

14031, 32 Environmental performance evaluation

14040, 41, 42,43,48,49 Life cycle assessment

14052 Vocabulary

14061, 64 Guides

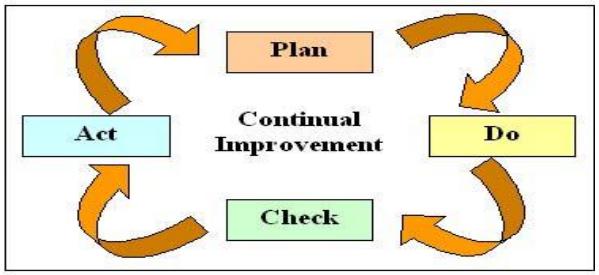

Fig.1 ISO 14001 Operation Cycle

Table 1: Steps to implementation of ISO 14001 environmental standards

Step	***Objective***
1	Obtain senior management commitment to environmental concerns
2	Set up an environmental steering committee
3	Determine the extent of the company's environmental outlays and requirements
4	Train the environmental team and employees
5	Establish an effective environmental management system(EMS)
6	Establish environmental policies and procedures including goals and missions
7	Create sound environmental management programs
8	Maintain correct documentation of environmental management system
9	Establish a functional process of recording for the EMS
10	Review of the EMS by management
11	Initiate and conduct environmental auditing
12	Select the appropriate standard from the ISO 14000 family

13	Decide on a registration strategy to whole organization or to particular part
14	Register to ISO 14001. Certification is carried out by accredited third party bodies and not by ISO
15	Integrate ISO 14000 with ISO 9000 to lower cost of production

5 Green products' marketing

Challenges in Green marketing

1. Need for standardization
2. New concept
3. Patience and perseverance
4. Avoiding green myopia

Golden rules of green marketing

1. Know your customer
2. Educate your customers
3. Being genuine and transparent
4. Pressure the buyer
5. Consider your pricing
6. Giving your customers an opportunity to participate
7. Thus leading brands should recognize that customer consumer expectations have changed.

Green marketing –adopts by worldwide firms

Green marketing has been widely adopted by firms worldwide and following are the possible reasons cited for this wide adoption

1. Opportunities
2. Government Pressure
3. Competitive pressure
4. Social responsibility
5. Cost of profit issues

Example No 1 Best green IT project statebank of India Green IT @ SBI .By using eco and power friendly equipment in its 10,000 new ATMs, the banking giant has not only saved power costs and earned carbon credits. The state bank of India became first Indian Bank to harness wind energy through a 15 megawatt wind farm developed by suzlon energy.

Example No 2Tata motors in setting eco friendly showroom using natural building material for itsflooring and energy efficient lights. The Indian Hotel's company whichruns Taj chain is in process of creating eco rooms which will have energy efficient mini bars, organic bed linen and napkins made from recycled paper.

6. Green products and entrepreneurship

Green entrepreneurship provides entrepreneurs with an opportunity to pursue potentially viable and successful business ventures while protecting the environment.

Green entrepreneurship can

1. Create jobs and offer entrepreneurship opportunities.
2. Increase energy efficiency, thus conserving natural resources and saving money.
3. Decrease harm to workers' health
4. Enable business to tap into sources of local, state and federal funding

7. Conclusion

Green purchasing is responsible purchasing going beyond price and volume. Environmental standards apply for all operations everywhere and throughout the supply chain. There are a small but growing number of companies that have demonstrated that buyer supplier collaboration on environmental issues results in better economic as well as environmental performance for both

parties. Multinational and large companies and government have a number of opportunities to promote green purchasing.

References

[1] J. Ball Building and environment 37(2002) pg no 423

[2] Mishra etal/Journal of Engineering, science and management education/vol3,"Green marketing in India: Emerging opportunities and challenges "2010/9-14

[3]Chung-Chiang Chen" ISO 14000 with green purchasing a future scenario" Resources, energy and development 1:43-54

[4] The evaluation gap on ISO 9000 and ISO 14000 between large manufacturers and service providers

[5] Khiewnavawongsa, S & Schmidt E.K 2008 green power to the supply chain, Purdue University, Indiana

[6]www.greenprocurement.gr

[7] www.cleanproduction.org

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HYBRID ROCKET

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Abstract

A hybrid rocket is rocket with rocket motor that shares components from both solid-propellant rocket and liquid-propellant rocket design. It uses propellants in two different states of matter – one solid and the other either liquid or gas. It has a tank supplying liquid or gaseous propellant into a combustion chamber that contains a solid propellant. Hybrid rockets exhibit advantages over both liquid rockets and solid rockets especially in terms of simplicity, safety, and cost. Like liquid rockets and unlike solid rockets they can be shut down easily and are simply throttle-able. The conventional 'forward' hybrid stores liquid oxidizer in the tank, and solid fuel within the chamber. With a 'reverse' hybrid, the fuel is the liquid in the tank, and solid oxidizer is in the chamber.

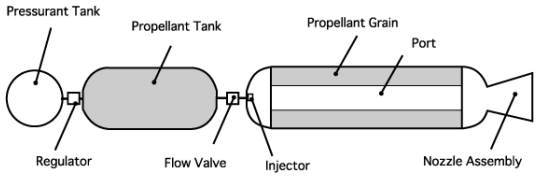

Fig. 1 Schematic Diagram of a Hybrid Rocket Engine

1. Introduction

Hybrid rocket engines (HREs) are chemical rockets which present interesting advantages over liquid rocket engines (LREs) and solid rocket motors (SRMs) and can provide a safe and affordable option for many applications.

In its simplest form a hybrid rocket consists of a pressure vessel (tank) containing the liquid propellant, the combustion chamber containing the solid propellant, and a valve isolating the two. When thrust is desired, a suitable ignition source is introduced in the combustion chamber and the valve is opened. The liquid propellant (or gas) flows into the combustion chamber where it is vaporized and then reacted with the solid propellant. Combustion occurs in a boundary layer diffusion flame adjacent to the surface of the solid propellant.

Generally the liquid propellant is the oxidizer and the solid propellant is the fuel because solid oxidizers are problematic and lower performing than liquid oxidizers. Furthermore, using a solid fuel such as HTPB (Hydroxyl-terminated polybutadiene) or paraffin wax allows for the incorporation of high-energy fuel additives such as aluminum, lithium, or metal hydrides.

Common oxidizers include gaseous or liquid oxygen or nitrous oxide. Common fuels include polymers such as polyethylene, cross-linked rubber such as HTPB or liquefying fuels such as paraffin wax.

Every rocket engine can be viewed as consisting of two parts; a combustion chamber and a nozzle. The combustion chamber is responsible for producing hot gases at high pressure. The nozzle essentially converts the thermal energy into kinetic energy and expels gases at high velocity (of the order of 2-3 kin/s). The increased momentum of the exhaust gases produces thrust.

2. Hybrid Rocket Fuels

Fig. 2 Fuel Port

The fuel for a small hybrid rocket motor is generally a tube of combustible material. The tube is known as the fuelgrain. The hole down the centre of the tube is called the fuel port. For a larger hybrid rocket motor, multi-port grain geometries are common, where there will be several separate ports in the fuel grain, with oxidiser injected down each port. Common hybrid rocket fuels include:

- Polyethylene: Density 960kg/m3
- Poly – Methyl Methacrylate: Density 1683kg/m3
- Poly – Vinyl Chloride: Density 1380 kg/m3
- Hydroxyl Terminated Poly-Butadiene: Density 930kg/m3

3. Hybrid Rocket Oxidizers

Fig. 3 Oxidizer Tank

In High Power Rocketry and Amateur Rocketry, by far the most common oxidiser used with hybrid rocket motors is Nitrous Oxide (*sometimes known somewhat incorrectly as NOx*). Nitrous oxide (N_2O) is an oxidizing liquefied gas and is clear and colorless. It has a slightly sweet odour. At room temperature, Nitrous Oxide is stable and inert. It is classified as a non-flammable gas. Nitrous Oxide supports combustion and can detonate at temperatures in excess of 650° C (1202° F).Nitrous Oxide is probably the easiest oxidiser to handle due to its benign nature compared to other oxidizers, as well as being relatively easy to acquire, due to there being no special restrictions on its sale or use, and due to it being self-pressurizing. Common hybrid rocket oxidizers include:

- Nitrous Oxide (N_2O)
- Gaseous Oxygen
- Hydrogen Peroxide(H_2O_2)
- Liquid Oxygen (O_2)
- Nitrogen Tetroxide (N_2O_4)
- Nitric Acid (HNO_3)

4. Hybrid Rocket Motor Combustion Chamber

Fig. 4 Combustion Chamber

The combustion chamber in a hybrid rocket motor not only provides the location for propellant combustion, but also contains the whole fuel grain. The length of the combustion chamber is determined by the fuel grain configuration (*e.g. a single port or multi-port fuel grain configuration*). Also, the longer the combustion chamber, the more stable the combustion, since the propellant has more opportunity for even mixing.

5. Hybrid Rocket Motor Injection System

Fig. 5 Injection Chamber

There are two methods of injection that can be used for injecting oxidiser into the combustion chamber of a hybrid rocket motor:

- Direct injection into the fuel grain port.
- Injection into a pre-combustion chamber.

For hybrid rocket motors on the high power and amateur rocketry level, where a single circular port geometry is most frequently used, direct injection of the oxidiser is the best approach, since there is no need to inject multiple oxidiser streams down multiple ports, and hence less requirement for a homogenized oxidiser stream from multiple injector nozzles.

6. Properties

6.1 Advantages of Hybrids:

Table 1: Advantages of Hybrids

Compared To-	**Solids**	**Liquids**
Simplicity	-Chemically simpler -Tolerant to processing errors	-Mechanically simpler -Tolerant to fabrication errors
Safety	-Reduced chemical explosion hazards -Thrust termination and abort possibility	-Reduced fire hazards
Performance Related	-Better Isp performance -Throttling/Restart capability	-High fuel density -Easy inclusion of solid performance additives
Other	-Reduced environmental impact	-Reduced mass of liquid
Cost	-Reduced Development costs are expected -Reduced recurring costs are expected	

6.2 Hybrid Combines The Worst of Two Worlds??

It is often claimed that hybrids combine the low performance of a solid rocket and the complexity of a liquid engine. While this statement could certainly be true for a poorly designed hybrid (like any other system), it is NOT universally valid. A well designed hybrid could

– Deliver Isp performance much better than a solid (up to 35 seconds of improvement)

– Be much simpler than a liquid

- Fault tolerance
- No active cooling
- Reduced plumbing/simpler injector

These advantages with the additional benefits such as inherent safety, easy throttling and environmental cleanliness make well designed hybrids highly desirable alternatives to the existing chemical systems.

6.3 Disadvantages of Hybrids:

Hybrid rockets also exhibit some disadvantages when compared with liquid and solid rockets. These include:

- Oxidizer-to-fuel ratio shift ("O/F shift") - with a constant oxidizer flow-rate, the ratio of fuel production rate to oxidizer flow rate will change as a grain regresses. This leads to off-peak operation from a chemical performance point of view.

- Low regression-rate (rate at which the solid phase recedes) fuels often drive multi-port fuel grains. Multi-port fuel grains have poor volumetric efficiency and, often, structural deficiencies. High regression-rate liquefying fuels developed in the late 1990s offer a potential solution to this problem. Propellant combinations which require high mixture ratios reduce the contribution grain fuels make. In this case the choice of the oxidizer plays a significant role.

- Uneven regression rate along the length of the grain.

7. Hybrid Propulsion – Non-Technical Challenges:

7.1 Challenges

- Lack of technical maturity.
- Hard to compete against established solid and liquid technologies.
- Established propulsion industry is fine with the *status quo*.
- Smaller group of rocket professionals relative to solid and liquid rockets.

7.2 Approach

• Keep educating young engineers on the virtues of hybrid propulsion
– Growing number of young professionals interested in hybrid propulsion
• Understand that hybrids will **NOT** eliminate the solid and liquid technologies
– Hybrids are complementary to other chemical rockets
– Initially concentrate on the niche and easy applications that clearly benefit from the Hybrid approach
• Suborbital Applications: Sub-orbital space tourism (Spaceship Two)
– Performance is secondary to safety and cost
• Small launch vehicle propulsion

7.3 How to Make Hybrids Competitive:

For hybrids to be competitive with the existing liquid and solid rocket systems, they need to have equal or better performance while retaining their simplicity, low cost and safety advantages. The diagram shown summarizes the key components needed to make hybrids viable alternatives to the existing chemical systems. Note that some of these virtues are competitive in nature such as the performance and simplicity while the others are complimentary such as simplicity and low cost.

8. Hybrid Propulsion – Technical Challenges:

8.1 Challenges

• Low regression rates for classical hybrid fuels
– Results in complicated fuel grain design
• Low frequency instabilities
– Instabilities are common to all chemical rockets
– They need to be eliminated
– Expensive and long process
• Lack of benign, high performance, cost effective oxidizers (common to all chemical rockets)

8.2 Approach

• Solutions to these technical issues should be such that they do **NOT** compromise the simplicity, safety and cost advantages of hybrids.

9. Hybrid Safety:

Generally, well designed and carefully constructed hybrids are very safe. The primary hazards associated with hybrids are:

- Pressure vessel failures - Chamber insulation failure may allow hot combustion gases near the chamber walls leading to a "burn-through" in which the vessel ruptures.

- Blow back - For oxidizers that decompose exothermically such as nitrous oxide or hydrogen peroxide, flame or hot gasses from the combustion chamber can propagate back through the injector, igniting the oxidizer and leading to a tank

explosion. Blow-back requires gases to flow back through the injector due to insufficient pressure drop which can occur during periods of unstable combustion. Blow back is inherent to specific oxidizers and is not possible with oxidizers such as oxygen or nitrogen tetroxide unless fuel is present in the oxidizer tank.

- Hard starts - An excess of oxidizer in the combustion chamber prior to ignition, particularly for monopropellants such as nitrous oxide, can result in a temporary over-pressure or "spike" at ignition.

10. Conclusions:

The following general conclusions can be drawn from this study:

- Hybrid rockets are a tipping point technology. A small investment could make a big difference in the field of chemical rocket propulsion. In the case of matured solid and liquid technologies, improvements are expected to be gradual.
- A well designed hybrid can deliver good performance while retaining its inherent simplicity, safety and cost advantages.
- It would be beneficial to develop a high performance system to demonstrate the capability of advanced hybrids. An upper stage motor is an ideal application.
- The advanced hybrid rockets designed as replacements for the Orion 38 solid rocket motor are appreciably lighter than the solid motor.
- A simple launch vehicle calculation revealed that the use of hybrid upper stages instead of the Orion 38 motor could results in substantial increases in the payload capability. Improvements of 40% or higher are possible for demanding missions.

References:

- http://www.ukrocketman.com/rocketry/hybridscience.shtml
- http://myweb.tiscali.co.uk/aspirespace/Hybrid%20Engines.htm
- http://myweb.tiscali.co.uk/aspirespace/TechPapers_files/Introduction%20to%20hybrid%20design.pdf
- http://en.wikipedia.org/wiki/Hybrid_rocket
- http://www.slideshare.net/psandee/hybrid-rocket-combustion
- Arif Karabeyoglu, Hybrid Rocket Propulsion For Future Space Launch, Department of Aeronautics and Astronautics, Stanford University, 2008, p. 4, 11-12.
- Arif Karabeyoglu, Jose Stevens, Dmitriy Geyzel, Brian Cantwell, Dave Micheletti, High Performance Hybrid Upper Stage Motor, American Institute of Aeronautics and Astronautics, p. 8.
- Dario PastroneApproaches to Low Fuel Regression Rate in Hybrid Rocket Engines, International Journal of Aerospace Engineering, Vol. 2012, p.1, 9.
- H. S. Mukunda, V. K. Jain, P. J. Paul, A review of hybrid rockets: present status and future potential, Proe. Indian Acad. Sci., Vol. C 2, part 1, May 1979, p. 215-216.

USE OF COMPOSITES IN MODERN AVIATION INDUSRTY: A REVIEW

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Abstract

In the early days of aviation, the pioneers of flight struggled with one major problem - weight. Early engines had difficulty producing enough thrust to overcome the relatively heavy airframes. However, improved materials technology has lead in the last few decades to the creation of a completely new breed of material - the composite. The actual idea of composites is nothing new and has been in use from primitive ages for making bows, arrows etc. However, in modern times, the science of composites has very much taken off. This is because composites offer several advantages over standard metals in certain applications, so their use has expanded from a being a scientific curiosity, useful really only in very high end situations, to a reasonably common part of most high-technology situations, including in the aviation sector. In this article, I have tried to discuss the general use of composites with reference to the two latest aircrafts in the aviation industry i.e. the BOEING 787 DREAMLINER and the AIRBUS A 380.

Keywords: *Role of composites, Special materials used in aircrafts, Future composite materials, Use of composites in Boeing 787 and Airbus 380.*

1. INTRODUCTION

Fiber reinforced plastics (FRPs), such as carbon fiber reinforced plastics (CFRPs) and glassfiber reinforced plastics (GFRPs), have been used widely in aerospace, defense and transportation structures as well as sports and leisure goods owing to their high specific stiffness, high specific strength, high damping, high corrosion resistance and low coefficient of thermal expansion. With drastic increase in oil price, problems of saving energy in, such as transportation, is deeply concerned lately. Boeing has announced that as much as 50 % of the primary structure, including the fuselage and wing, on the Dreamliner-787 will be made of composite materials. Dreamliner-787 will bring the economic advantage of large jet transports to save 20 % more fuel than any other airplanes of their size [1]. In addition, composite materials possess the advantage over rival aluminum alloys as they provided greater durability, reduced maintenance, and increased potential for future development. It is also possible that sensors will be embedded into the composite structures to acquire and to monitor the health and help schedule maintenance.

Aircraft manufacturing technology has come a long way from the days when engineers used wood and steel to construct aircraft. In the early 1920s aluminium replaced wood and steel, which greatly helped in improving aircraft design? With advancement in technology in the aviation industry, composite materials are replacing aluminium slowly. Composite materials areboth light and strong which make them a boon for aircraftmanufacturers, as it helps in enhancing performance [7].

2. THE ROLE OF COMPOSITES IN THE AVIATION INDUSTRY

Composites have unique characteristics that make them perfect material choices for several applications in aviation such as: high strength, high stiffness, long fatigue life, low density and great adaptability to a specific function. Weight reduction is the greatest advantage of composite material usage and is one of the key factors in decisions regarding its selection. Other advantages include its high corrosion resistance and its resistance to damage from

fatigue. These factors play a role in reducing operating costs of the aircraft in the long run, further improving its efficiency. Composites have the advantage that they can be formed into almost any shape using the moulding process.

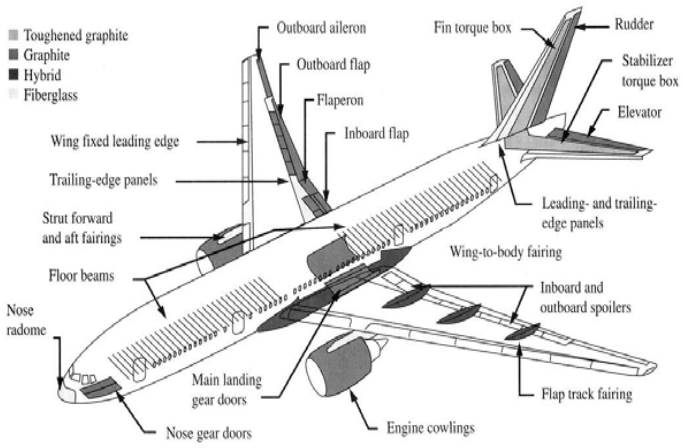

Fig- 1: Boeing 777 commercial airliner

3. SPECIAL MATERIALS FOR THE AVIATION INDUSTRY

3.1 Aluminium-Lithium Alloys:

Among the new aircraft materials, aluminium lithium alloys are particularly attractive because of their weight-saving potential. When aluminium is alloyed with lithium, for every 1% addition of lithium, there is approximately a 3% reduction in alloy density and an increase in stiffness of about 6%.

3.2Hybrid Composites:

Hybrid composites are FRP-metal sandwich laminates consisting of alternating layers of high-strength aluminium alloys and fibre reinforced epoxy adhesive. Two categories of hybrid composites are available commercially today, the ARALL and GLARE laminates, which differ in the type of fibre used for reinforcement. ARALL laminates (for aramid reinforced aluminium laminate) use 50% fibre volume of adhesive of high-modulus aramid fibres. GLARE laminates (for glass reinforcement) are unidirectional or bi-axial reinforced with 60% fibre volume of high strength glass fibres. GLARE laminates are a more recent development, complementing the original ARALL product through provision of higher compression strength.

4. TRENDS IN MAJOR CIVIL AIRCRAFT MANUFACTURERS

After the terrorist attacks of September 11, 2001, negative financial fallout occurred with many air carriers. As of 2005, a slow recover took place and the two main commercial aircraft carriers and rivals, The Boeing Co. (Seattle, Washington) and Airbus Industrie (Toulouse, France) developed significantly different views regarding the future of commercial air travel. Airbus reasoned that the number of non-stop flights between large numbers of paired cities would decrease, although populations continue to concentrate in and around major metropolitan areas. Based on these predictions, Airbus developed the super-jumbo A380, capable of carrying 555 to as many as 890 passengers to fly at lower per-passenger costs. Boeing, on the other hand, expected the population distribution to contribute to an increase in new non-stop flights and growth in the number of trips between paired cities. According to Boeing's calculations, large aircraft like the B747 and the A380, will be only 4% (790) of the total commercial jet fleet, while almost 4300 are expected to be regional jets over the next 20 years. Consequently, Boeing came up with the 7E7 ("E" means efficiency) and then renamed 787 DREAMLINER. Being this a mid-sized jet, belonging to the same category as the B767, and taking into account that this category makes up the greatest number of in-service commercial jets, airlines began to look more at fuel efficiency, especially with rising fuel prices.

In the quest for more efficient aircraft, both aircraft manufacturers turned their attention once again to composite materials.

5. USE OF COMPOSITES IN BOEING 787 DREAMLINER

The B787 Dreamliner is the first full size commercial aircraft with composite wings and fuselage. Composites on the B787 account for 50% of the aircraft's structural weight. Aluminium comprises only 12% of the mentioned weight. Titanium makes up a greater percentage than aluminium namely 15%. Steel comprises 10% and other metals 5%.

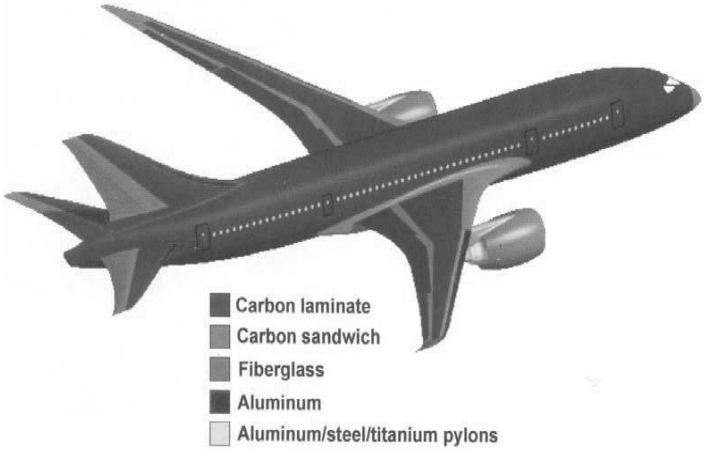

Fig- 2: Use of composites in Boeing 787 Dreamliner

Before the BOEING 787 DREAMLINER became a reality, the composite materials used in the aircraft had to pass strict aerospace acceptance tests. They had to meet strict structural demands and also had to pass the following tests:-

5.1 Fire, Smoke, and Toxicity (FST) Tests.

The composite materials must withstand a certain temperature and if lit on fire, the flame must spread slowly. Additionally, when the composite material burns, it cannot produce smoke and toxic fumes.[8]

5.2 Chemical Resistance

Composite materials on the 787 Dreamliner must be impervious to a wide range of chemicals that could be found on an airplane such as fuel and hydraulic fluid.[8]

5.3 Heat Cycling

The composite materials must work in below freezing to extremely hot temperatures, and the structural performance must be the same.[8]

5.4 Water Absorption

The composite materials used in aerospace must not absorb moisture.[8]

5.5 Manufacturing Quality Control

When manufacturing components for the Dreamliner, each part must follow strict quality assurance procedures and inspections [8]. The use of composites helped to save fuel on the Dreamliner, but there are benefits to the passengers as well. In particular, the 787 is much more comfortable to fly in. Due to the properties of composites, airlines are able to increase cabin pressure and increase the cabin humidity. This may sound like a small difference, but an increase in humidity dramatically increases the comfort and prevents jet leg.

Fig. 3: Fuselage of Boeing 787

Additionally, the 787 Dreamliner is the most amazing advancements of technology and

increases the acceptance of composite materials. People all across the world can now see and feel the benefits first hand like never before.[8]

6. USE OF COMPOSITES IN AIRBUS A380

The largest and one of the best aircrafts available in the aviation industry today, the AIRBUS A380 also leads from the front when it comes to use of composites. Usually, thermoplastic composites have taken a back seat in the aviation industry in comparison to thermosets. But the A380 makes extensive use of thermoplastic composites. Thermoplastic composites make up two thirds of the fixed leading wing edge. These composites are in the form of cored panels and start from each wing's inboard engine upto the wingtip. This helps to reduce weight and also serves as a better safety and maintenance option in case of bird-strikes. [6]

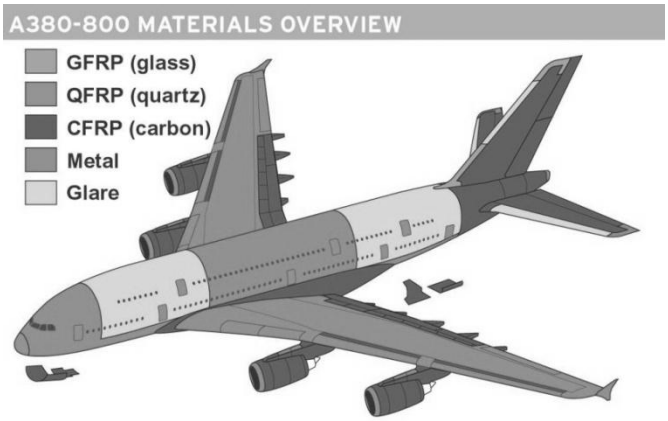

Fig - 4: Airbus A380

7. FUTURE COMPOSITE MATERIALS

1.1.1.1 7.1Ceramic Matrix Composites:

Major efforts are underway to develop light-weight, high-temperature composite materials at National Aeronautics and Space Administration (NASA) for use in aircraft parts. Temperatures as high as 1650°C are anticipated for the turbine inlets of a conceptual engine based on preliminary calculations.[1] In order for materials to withstand such temperatures, the use of Ceramic Matrix Composites (CMCs) is required. The use of CMCs in advanced engines will also allow an increase in the temperature at which the engine can be operated, leading to increased yield.[2] Although CMCs are promising structural materials, their applications are limited due to lack of suitable reinforcement materials, processing difficulties, lifetime and cost.

1.1.1.2 7.2 Spider Silk Fibres:

Spider silk is another promising material for composite material usage. Spider silk exhibits high ductility, allowing stretching of a fibre up to 140% of its normal length.[3] Spider silk also holds its strength at temperatures as low as -40°C.[3] These properties make spider silk ideal for use as a fibre material in the production of ductile composite materials that will retain their strength even at abnormal temperatures. Ductile composite materials will be beneficial to an aircraft in parts that will be subject to variable stresses, such as the joining of a wing with the main fuselage. The increased strength, toughness and ductility of such a composite will allowgreater stresses to be applied to the part or joining before catastrophic failure occurs. Synthetic spider silk based composites willalso have theadvantage that their fibres will be biodegradable. Many unsuccessful attempts have been made at reproducing spider silk in a laboratory, but perfect re-synthesis has not yet been achieved. [4]

1.1.1.3 7.3 Hybrid composite steel sheets:

Another promising material can be stainless steel constructed with inspiration from composites and nanontech-fibres and plywood. The sheet of steel is made of same material and is able to handle and tool exactly the same way as conventional steel. But is some percent lighter for the same strengths.

8. CONCLUSION

There is no doubt to the fact that composites are the way forward in the modern aviation industry. Now, the challenge facing aircraft engineers is to refine old techniques and make the best use of composites possible. All of us know that we are facing a grave shortage of fuels in the present age. With the introduction of the BOEING 787 DREAMLINER, aviation engineers have made a point that maybe, with good use of composites; we may be able to deal with the fuels available. This is a speck of hope and efforts are on all over the world to progress in that area in these desperate times the two aviation giants Boeing and Airbus have come up with good solutions which have shown a good path forward.

9. REFERENCES

1. INI International - Key to Metals – Retrieved at http://www.keytometals.com/Article103.htm
2. R. Naslain - Universite Bordeaux - Ceramic Matrix Composites - Retrieved at http://www.mpg.de/pdf/europeanWhiteBook/wb_materials_213_216.pdf
3. Department of Chemistry - University of Bristol - Retrieved at http://www.chm.bris.ac.uk/motm/spider/page2.htm
4. Wired Science - Spiders Make Golden Silk - Retrieved at http://www.wired.com/wiredscience/2009/09/spider-silk/
5. Composite aircraft may hide dangerous flaws- Paul Marks- Aviation Topic Guide
6. Thermoplastic Composites Gain Leading Edge On The A380-High-Performance Composites. The use of composite materials in aviation- Jordan Cropper
7. *The use of composite materials in aviation-Srikanth Radhakrishna*
8. What is the 787 Dreamliner-How composite materials make the most advanced airplane ever.-Todd Johnson

AUTOMOTIVE AERODYNAMICS: BASIC CONCEPTS AND CFD

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Abstract

Today in automotive industries, aerodynamics play vital role in vehicle design. In developing a new road vehicle it is essential for the designer to understand thoroughly the structure of the airflow around the vehicle. This will have influence on principal features such as the shape of the vehicle, aerodynamic drag, fuel consumption, noise production and road handling. The main concern of automotive aerodynamics are reducing drag, wind noise, preventing undesired lift forces at high speed and other causes of aerodynamic instability at high speed. This paper describes the aerodynamics concept for ground vehicles. It also explains the computational fluid dynamic method used for aerodynamic analysis.

Keywords:*Aero, Fluid, Dynamics, Pitch, Yaw, Roll.*

1. Introduction:

Aerodynamic forces and moments, as well as the tire-road forces, affect "g-g" maneuvering performance (and stability and control). Unlike the tire forces which are primarily independent of speed, the aerodynamic forces increase rapidly with speed. For example, aerodynamic drag determines the vehicle's performance characteristics at highspeed including maximum speed, forward acceleration at the higher speeds, and braking deceleration.In addition to the direct effects of aerodynamic forces, the interaction of the aerodynamic and tire forces can have a large effect on lateral acceleration performance. For example, aerodynamic downforce (negative lift) increases the tire loads and this in turn increases the lateral force capability of the tires.These factors impact fuel economy, handling and NVH of the vehicle [1].The motion of air around a moving vehicle affects all of its components in one form or another [2]. Engine intake and cooling flow, internal ventilation, tire cooling and overall external flow all fall under the umbrella of vehicle aerodynamics [3].

2. Objectives of Aerodynamics:

The objectives to be achieved using aerodynamics are illustrated in the figure 1. It may be noted that aerodynamics does not only play an important role in the performance and stability of the vehicle but also in other critical factors such as; cooling, comfort and visibility.

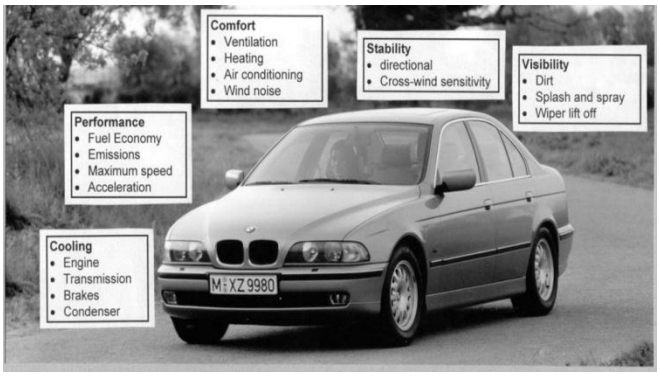


Fig.1. Spectrum of Tasks for Aerodynamics

3. Basic Concepts:

3.1. Bernoulli's Equation:

The gross flow over a body of a car is governed by the relationship between velocity and pressure expressed in Bernoulli's Equation (Bernoulli's Equation assumes incompressible flow, which is reasonable for automotive aerodynamics, whereas the equivalent relationship for compressible flow is Euler's Equation). The equation is:

$$P_{static} + P_{dynamic} = P_{total}$$

$$P_S + \frac{1}{2}\rho v^2 = P_t$$

Where,

$$\rho = Density\ of\ air$$
$$v = Velocity\ of\ air$$

This relationship is derived by applying Newton's Second Law to an incremental body of fluid in a well-behaved fashion. For purposes of explanation, "well-behaved" simply means that the flow is moving smoothly and is experiencing negligible friction-condition that apply reasonably to the air stream approaching a motor vehicle. In deriving the equation, the sum of the forces brings in the pressure effect acting on the incremental area of the body of fluid. Equating this rate of change of momentum brings in the velocity term. Bernoulli's equation states that the static plus the dynamic pressure of the flow will be constant (P_t) as it approaches the vehicle. Visualizing the vehicle as stationary and the air moving (as in a wind tunnel), the air stream along lines, appropriately called "streamlines". A bundle of streamlines forms a stream tube. The smoke stream used in a wind tunnel allows streamtubes to be visualized.

At a distance from the vehicle the static pressure is simply the ambient, or barometric, pressure (P_{atm}). The dynamic pressure is produced by the relative velocity, which is constant for all streamlines approaching the vehicle. Thus the total pressure, P_t is the same for all streamlines and is equal to

$$P_S + \frac{1}{2}\rho v^2$$

As the flow approaches the vehicle, the streamtubes split, some going above the vehicle, and others below. By inference, one streamline must go straight to the body and stagnate (the one shown impinging on the bumper of the car). At that point the relative velocity has gone to zero. With the velocity term zero, the static pressure observed at that point on the vehicle will be P_t. That is, if a pressure tap is placed on the vehicle at this point, it will record the total pressure.

Consider what must happen to the streamlines flowing above the hood. As they first turn in the upward direction, the curvature is concave upward. At a distance well above the vehicle where the streamlines are still straight, the static pressure must be the same as the ambient. In order for the air stream to be curved upward, the static pressure in that region must be higher than ambient to provide the force necessary to turn the air flow. If the static pressure is higher, then the velocity must decrease in this region in order to obey Bernoulli's Equation.Conversely, as the flow turns to follow the hood (downward curvature at the lip of the hood) the pressure must go below ambient in order to bend the flow, and the velocity must increase.

In the absence of friction the air would simply flow up over the roof and down the back side of the vehicle, exchanging pressure for velocity as it did at the front. In that case, the pressure forces on the back side of the vehicle would exactly balance those on the front, and there would be no drag produced.The drag is due in part to friction of the air on the surface of the vehicle, and in part to the way the friction alters the main flow down the back side of the vehicle.On the front face of a vehicle body, the boundary layer begins at the point where the stagnation streamline hits the surface. In the boundary layer the velocity is reduced because of friction. The pressure at the stagnation point is the total pressure (static plus dynamic) and decreases back along the surface.

The pressure gradient along the surface thus acts to push the air along the boundary layer, and the growth of the layer is impeded. Pressure decreasing in the direction of flow is thus known as a "favorable pressure gradient," because it inhibits the boundary layer growth.As the flow turns again to follow the body, the pressure again increases. The increasing pressure acts to decelerate the flow in the boundary layer, which causes it to grow

in thickness. Thus it produces what is known as an "adverse pressure gradient." At some point the flow near the surface may actually be reversed by the action of the pressure as illustrated in Figure 2. The point where the flow stops is known as the "separation point." Note that at this point, the main stream is no longer "attached" to the body but is able to break free and continue in a more or less straight line. Because it tries to entrain air from the region behind the body, the pressure in this region drops below the ambient. Vortices form and the flow are very irregular in this region. Under the right conditions, a *Von-Karman* Vortex Street may be formed, which is a periodic shedding of vortices. Their periodic nature can be perceived as aerodynamic buffeting.

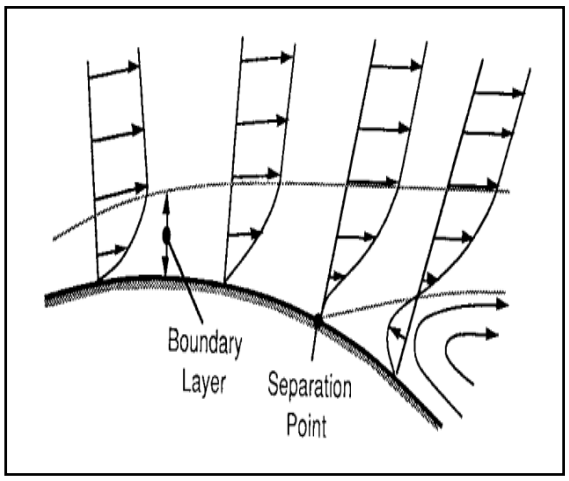


Fig.2. Flow separation in an adverse pressure gradient.

The phenomenon of separation prevents the flow from simply proceeding down the back side of a car. The pressure in the separation region is below that imposed on the front of the vehicle, and the difference in these overall pressure forces is responsible for "form drag." The drag forces arising from the action of viscous friction in the boundary layer on the surface of the car is the "friction drag."

3.2. SAE Aerodynamic Axis System

Historically, wind tunnel facilities worldwide have used different nomenclature and reference axes. In order to "provide a common nomenclature for use in publishing road vehicle aerodynamic data and reports" the SAE Road Vehicle Aerodynamics Committee has published J1594, "Vehicle Aerodynamics Terminology". This committee includes international representation.(1)
The axis system origin is located on the ground at mid-wheelbase and mid-track as shown in Figure 3.

X is positive forward
Y is positive right
Z is positive downward

3.3. Aerodynamic Force/Moment Coefficients
Aerodynamic forces and moments are primarily due to pressure changes over the body surface. These pressure changes vary directly with the dynamic pressure of the free stream, q_∞. The actual forces are also proportional to some reference area which is related to the area upon which the pressure changes act (a reference area is used for convenience since it may be difficult to calculate the actual area). Finally, a coefficient must be introduced to take into account the effect of the body shape on the velocity distribution over the body and the orientation

of the body in the fluid. The drag coefficient, C_D, is defined as

$$C_D = \frac{Drag}{Aq} = \frac{D}{Aq} = \frac{D/A}{q}$$

Where D = drag in Newton.
A = reference area in m^2, usually the frontal or the plan area of the vehicle
$q = q_\infty$ in N /m^2
$C_D$is non-dimensional.

Thus C_D is the drag per unit area per unit q_∞ (the kinetic energy in the airstream available for conversion to pressure and force).

Moments and torques result from aerodynamic

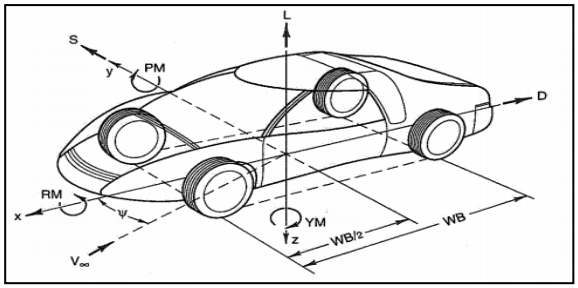


Fig.3. SAE Aerodynamic Axis System

forces and depend on a reference length, WB (= wheelbase, *l*).

The six forces and moments are then given by

Lift, L	= $C_L q_\infty A$	(positive upward, L = − F_Z)
Drag, D	= $C_D q_\infty A$	(positive rearward, D = − F_x)
Side Force, S	= $C_s q_\infty A$	(positive to right, S = + F_y)

Pitching Moment, PM	= $C_{PM} q_\infty$ A x WB	(positive nose up PM = M_Y)
Yawing Moment , YM	= $C_{YM} q_\infty$ A x WB	(positive nose right YM = M_Z)
Rolling Moment, RM	= $C_{RM} q_\infty$ A x WB	(positive right side down RM = M_X)

Drag Component

Drag is the largest and most important aerodynamic force encountered by passenger cars at normal highway speeds. The overall drag on a vehicle derives from contributions of many sources. Various aids may be used to reduce the effects of specific factors.

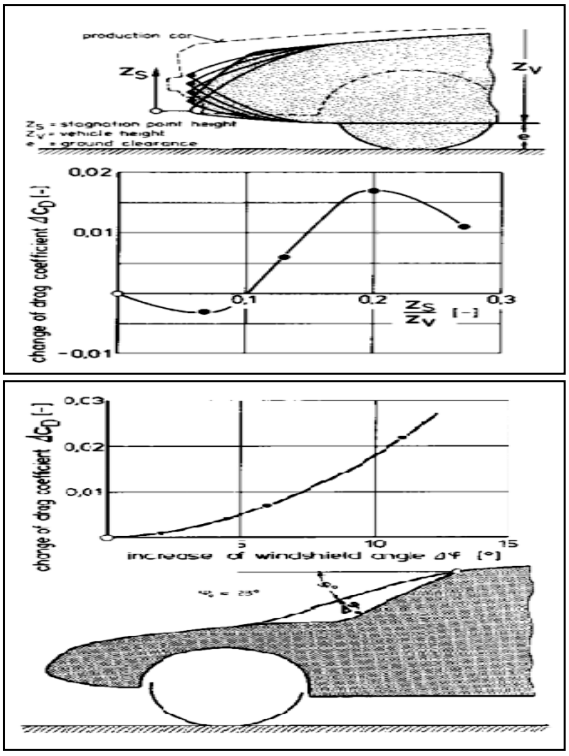


Fig.4. Influence of Front End Design and Windshield angle on Drag.

Forebody drag is influenced by design of the front end and windshield angle. Generally the "roundness" of the front end establishes the area over which the dynamic pressure can act to induce drag. Figure 6 shows the influence of the height of the front edge of the vehicle. The location of this point determines the location of the streamline flowing to the stagnation point. This streamline is important as it establishes the separation of flow above and below the body. Minimum drag is obtained when the stagnation point is kept low on the frontal profile of the vehicle. A well-rounded shape, in contrast to the crisp lines traditionally given to the frontal/grill treatment of passenger cars, is equally important to aerodynamics. A rounded low hood line can yield reductions of 5 to 15% in the overall drag coefficient.

The windshield establishes the flow direction as it approaches the horizontal roof. Thus its angle has a direct influence on drag, particularly on trucks. Shallow angles reduce drag, but complicate vehicle design by allowing increased solar heating loads and placing more critical demands on the

manufacturer of the windshield to minimize distortion at shallow angles. Figure 4 shows the change in drag as the windshield angle is increased from the nominal angle of 28 degrees.

The underbody is a critical area generating body drag. Suspensions exhaust systems and other protruding components on the underbody are responsible for the drag. The air flow in this area is a shear plane controlled by zero air speed on the road surface, and induced flow by drag of the underbody components. The recognized fix for minimizing underbody drag is the use of a smooth underbody panel. Protuberances from the body represent a second area where careful design can reduce drag. The wheels and wheel wells are a major contributor in this class. Significant drag develops at the wheels because of the turbulent, recirculating flow in the cavities.

Side Force:

The lateral wind components will also impose a side force on the vehicle attempting to change its direction of travel. The exact effect depends both on the vehicle and the nature of the wind. In strong crosswinds, the side force is typically greater than the drag force, such that the angle of the overall wind force is much greater than the relative wind angle. When the vehicle first encounters a crosswind condition on the road (a transient crosswind), the lateral force is first imposed on the front of the vehicle and may divert it in the downwind direction. The aerodynamic shape of the vehicle and even the steering system characteristics affect performance in this sense.

Lift Force:

The pressure differential from the top to the bottom of the vehicle causes a lift force. These forces are significant concerns in aerodynamic optimization of a vehicle because of their influence on driving stability. The lift force is measured at the centerline of the vehicle at the center of the wheelbase. As shown in Figure 7, the lift force is dependent on the overall shape of the vehicle. At zero wind angles, lift coefficients normally fall in the range of 0.3 to 0.5 for modern passenger cars, but under crosswind conditions the coefficient may increase dramatically reaching values of 1 or more. Lift can have a negative impact on handling through the reduced control forces available at the tires. Front lift, which reduces steering controllability, is reduced by front bumper spoilers and by rearward inclination of front surfaces. Lift at the rear of the vehicle, which also reduces stability, is the most variable with vehicle design. In general, designs that cause the flow to depart with a downward angle at the rear of the vehicle create rear lift. Lift can be decreased by use of underbody pans, spoilers, and a change in the angle of attack of the body (a 3-degree cant on the body can decrease lift force by 40 percent).

Pitching Moment

While the lift force acts to decrease (or increase) the weight on the axles, the pitching moment acts to transfer weight between the front and rear axles. Pitching moment arises from the fact that the drag does not act at the ground plane (thus it accounts for the elevation of the drag force) and the lifting force may not act exactly at the center of the wheelbase. Because it is a moment equation, a characteristic length is needed to achieve dimensional consistency in the equation. The vehicle wheelbase is used for this purpose. A moment can be translated about without changing its effect, so there is no need for a "point of action." Most modem cars have a pitching moment in the range of 0.05 to 0.2, and it is quite sensitive to the angle of attack on the vehicle.

Yawing Moment

The lateral force caused by a side wind does not normally act at the mid-wheelbase position. Thus a yawing moment, YM, is produced. The yawing moment coefficient varies with wind direction, starting at zero with zero relative wind angle and growing almost linearly up to 20-degree angle. The

slope of the coefficient at small angles ranges from 0.007/deg to 0.017/deg.

Rolling Moment

The lateral force caused by a side wind acts at an elevated point on the vehicle. Thus a rolling moment, RM, is produced. The moment has only a minor influence on vehicle stability, depending largely on the roll steer properties of the suspensions. The rolling moment coefficient is sensitive to wind direction much like the yawing moment coefficient, being quite linear over the first 20 degrees of relative wind angle. The slope of the rolling moment coefficient ranges from 0.018/deg to 0.04/deg.

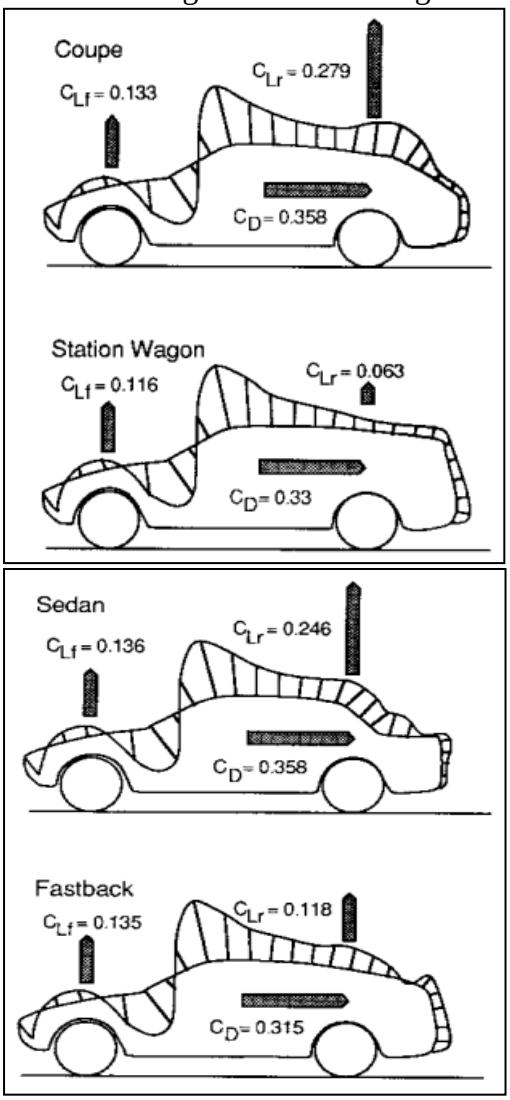


Fig.5. Aerodynamic lifts and drag forces with different vehicle styles.

4. Methods Used for Evaluating Vehicle Aerodynamics

Aerodynamic evaluation and refinement is a continuous process and an integral part of automotive engineering, which is not limited to the vehicle initial design phase only. Typical analysis and evaluation tools used in this process may include wind tunnel testing, computational prediction, or coast down test. Each of these methods may be more suitable for a particular need and, for example, a wind tunnel or a numeric model can be used during the initial design stage prior to the vehicle being built. Once a vehicle exists, it can be instrumented and tested on the track.

4.1. Computational Fluid Dynamics Technique

Today CFD is becoming very popular technique for numerical prediction of fluid flow distribution in many industries such as Aerospace, Automobile, Chemical, Marine, Medical and Bio-Technology. In automotive industries CFD is being used in various areas such as aerodynamic design, engine combustion, thermal control system, and lubrication and exhaust system analysis.

The flow of air around road vehicles (cars, buses & trucks) under normal operating conditions is principally turbulent. The geometry of the vehicle is complex, the flow around it is fully three-dimensional, the boundary layers are turbulent, flow separation is common and there are large turbulent wakes in which longitudinal trailing vortices are common. It is typically characterized by large-scale separation and recirculation regions, a complex wake flow, long trailing vortices and the interaction of boundary layer flows on the vehicle and ground. This will have influence on principal features such as: the shape of the vehicle, aerodynamic drag, fuel consumption, noise production and road handling.

A major objective of vehicle aerodynamic design is the reduction or control of flow separation. In developing a new road vehicle it

is essential for the designer to understand thoroughly the structure of the flow around the vehicle. Computational Fluid Dynamics (CFD) has matured sufficiently as a technology to enable it to calculate such quantities such as drag and lift for a road vehicle without resort to wind tunnel testing.

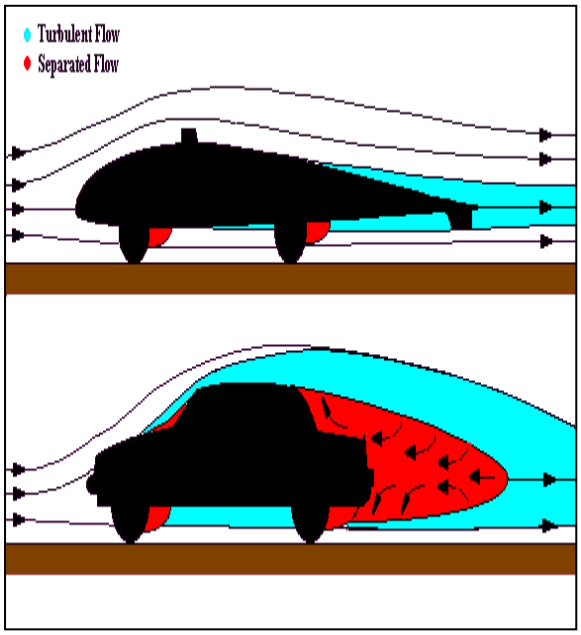
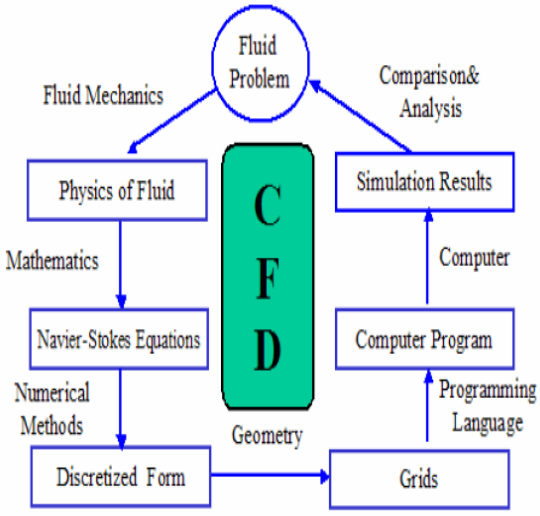


Fig.6. Air flow over vehicle

Basics Concepts of CFD:

Computational Fluid Dynamics (CFD) is the simulation of fluids engineering systems using



modeling (mathematical physical problem formulation) and numerical methods (discretization methods, solvers, numerical parameters, and grid generations, etc [5].

Firstly, we have a fluid problem. To solve this problem, we should know the physical properties of fluid. Then we can use mathematical equations to describe these physical properties. This is done Navier-Stokes Equations. Navier-Stokes Equationsare analytical and to solve these equations by computer, we have to translate them to the discretized form. The translators are numerical discretization methods, such as Finite Difference, Finite Element, Finite Volume methods. Consequently, we also need to divide our whole problem domain into many small parts because our discretization is based on them. Then, we can write programs to solve them. The typical languages are Fortran and C. Normally the programs are run on workstations or supercomputers. Lot of commercial CFD codes like ANSYS FLUENT, Star CCM+, OpenFOAM etc. are available now for ready use. The end result of the CFD is simulation is the plots of variation in different fluid properties and the values of parameters such as drag, lift, pressure drop and many more.

Methodology:

A complete CFD analysis consists of:

1. Pre-processing
2. Processing or Solving
3. Post-processing

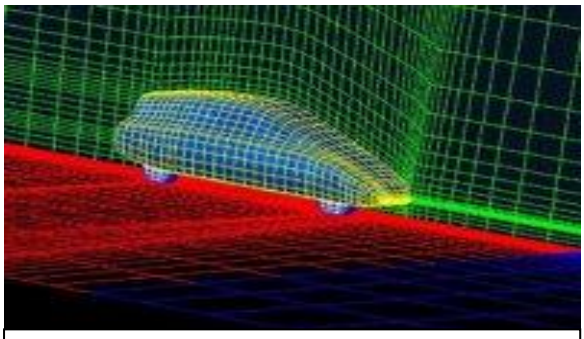
Pre-processing: This stage consist of:

- Generating a computational mesh or grid;
- Determining the equation to be solved;
- Specifying the boundary conditions.

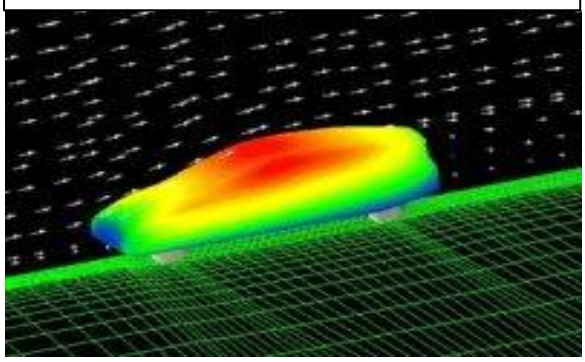
1. *Processing:* The Simulationis started and the equations are solved iteratively as steady-state or transient.

2. *Post-processing:* Finally it is used for the analysis and visualization of the resulting solution.

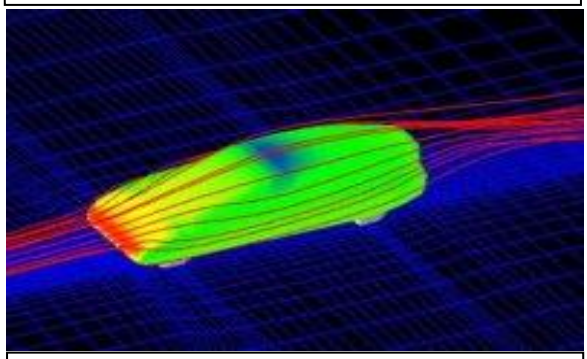
Aerodynamic Analysis Using CFD Technique:



Mesh on car's surface, symmetry plane and ground



Airflow particles around the car



Airflow around the car, colored by kinetic energy

What the software does, basically, is divide the geometric structure of the object (car, engine, etc.) into a finite number of elements or cells. The newly-created mesh can lead to less or more accurate results of the CFD, depending on the number of cells. The higher the number, the more accurate the results, as the software will be given more data to work with [6].

The next step is to create a second mesh, this time representing the volume occupied by the fluid. Its flow is, just as in the case of the object it comes in contact with, divided into as many cells as possible, in order to determine the exact behavior of the particles. What's important here is that the supercomputer will analyze each cell/element as an independent part. That's why the structure of both the defined surface and fluid flow must be divided into as many cells as possible, as each may influence the overall results in a decisive manner.

After that, the computer will set up a clear image on how exactly the fluid will come in contact with the initial surface or object, while also emphasizing the exact problems encountered by it in the process. Finally, the simulation is being given the go ahead, at which point the CFD software starts working on solutions to the aforementioned problems. Whatever issue might arise in the fluid flow process, it will be solved both as a self-sustainable element and as a transitory state.

The final phase of the CFD refers to the analyzing of the results and, of course, the solution.

One example that stands above all is the **Albert 2 supercomputer** used by BMW Sauber at their Hinwil base in Switzerland. The aforementioned piece of machinery uses 1,024 Intel processor cores, has a total memory of 2,048 GB and a maximum power of **12,288 Gigaflops** (approximately 12,288,000,000,000 calculations per second), with the necessary software being provided by German subsidiary of US-based Fluent.

5. Conclusion:

From the above literature, we conclude that it is necessary to have understanding of aerodynamic concepts in order to improve efficiency and performance of new and upcoming vehicle designs as well as rectifying flaws in old vehicle designs. The advantages of CFD over conventional testing methods are ability to virtually simulate real conditions, cost and time efficiency and foresight of design. Lot of vehicle designs can be simulated and it helps in optimizing the final shape of the vehicle. Hence CFD in automotive aerodynamics is an important area of interest in future refining of aerodynamic concepts.

References:

[1] **Milliken, William F and Milliken, Douglas L.***Race Car Vehicle Dynamics.* Warrendale,PA15096-0001 USA : SAE International, 1995. ISBN 1-56091-526-9.

[2] **Gillespie, Thomas D.***Fundamentals of Vehicle Dynamics.* Warrendale, PA : SAE International, 1992.

[3] **Katz, Joseph***Aerodynamics of Race Cars.***.** doi: 10.1146/annurev.fluid. 38.050304.092016, California, USA : The Annual Review of Fluid Mechanics, 2006. 0066-4189/06/0115-002 7S2 0.00.

[4] **Ashish Singh, Santhosh Kumar, Kishor Nikam.***High Performance CFD Computations for Ground Vehicle Aerodynamics.doi:*10.4271/2011-26-0107. Paper no: 2011-26-0107.

[5] **Hucho, Wolf-Heinrich.***Aerodynamics of Road Vehicles -State of the Art and Tasks for the Future.* 25, s.l. : Steyr, 2003.

[6] **Zuo, Wangda.***Introduction to Computation of Fluid Dynamics.* St. Petersberg : FAU Erlangen-Nürnberg. JASS 05.

[7] "http://www.autoevolution.com/news/how-does-cfd-computational-fluid-dynamics-work-6400.html"\l"image4" http://www.autoevolution.com/news/how-does-cfd-computational-fluid-dynamics-work-6400.html#image4

HYDROGEN AS AN ALTERNATE FUEL IN AN INTERNAL COMBUSTION ENGINE: A REVIEW

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ABSTRACT

Hydrogen has always been seen as a viable fuel alternate for IC Engines. This paper focuses on Hydrogen as a fuel for IC Engine. The technical feasibilities to use hydrogen and combustive properties of hydrogen fuel have been discussed. The efficiency of hydrogen internal combustion engines are also been discussed.

Keywords*: alternative fuel, hydrogen, Model development, application discussion.*

1. INTRODUCTION

In general, getting an internal combustion engine to run on hydrogen is not difficult. Getting an internal combustion engine to run well, however, is more of a challenge.

Internal combustion engines are classified as spark ignition (SI) and compression ignition (CI) engines, depending on the combustion process initiated in the cylinder. A spark plug initiates the combustion of the fuel-air mixture in SI engines. In CI engines, fuel-air mixture is self-ignited by compression. It must be mentioned that hydrogen's auto-ignition temperature is high (about 5760C), and it is impossible to bring hydrogen to its auto-ignition temperature by compression only. So, supportive ignition triggering devices should be used in the combustion chamber.

Many researchers have been directed their studies towards the effect of using hydrogen in internal combustion engines. Das evaluated the potential of using hydrogen for small horsepower SI engines and compared hydrogen fuelling with compressed natural gas (CNG)[2,3]. Another study dealt on certain drawbacks of hydrogen fuelled SI engines, such as high NO_x emission and small power output determined the performance, emission and combustion characteristics of hydrogen fuelled SI and CI engines. Karim reviewed the design features and the current operational limitations associated with the hydrogen fuelled SI engine[4]. Li and Karim investigated the onset of knock in hydrogen fuelled SI engine applications [5].

2. COMBUSTIVE PROPERTIES OF HYDROGEN

2.1 Wide Range of Flammability

Hydrogen has a wide flammability range (between 4 and 75 percentage hydrogen in the mixture) compared to petrol (between 1 and 7.6 percentage). As a result, hydrogen can be combusted in an internal combustion engine over a wide range of air fuel mixtures. A significant advantage of this is that hydrogen can run on a lean mixture. This is why it is fairly easy to get an engine to start on hydrogen. There is a limit to how lean the engine can be run, as lean operation can significantly reduce the power output due to a reduction in the volumetric heating value of the air/fuel mixture. Additionally, the final combustion temperature is generally lower, reducing the amount of pollutants, such as nitrogen oxides, emitted in the exhaust.

2.2 Low Ignition Energy

Hydrogen has very low ignition energy. The amount of energy needed to ignite hydrogen is about one order of magnitude less than that required for gasoline.

2.3 Small Quenching Distance

Hydrogen has a small quenching distance, smaller than gasoline. Consequently, hydrogen flames travel closer to the cylinder wall than

other fuels before they extinguish. Thus, it is more difficult to quench a hydrogen flame than a gasoline flame.

2.4 High Auto ignition Temperature

Hydrogen has a relatively high auto ignition temperature. This has important implications when a hydrogen-air mixture is compressed. The auto ignition determines what compression ratio an enginecan use, since the temperature rise during compression is related to the compression ratio.

The temperature rise is shown by the equation:

$$T_2 = T_1\left(\frac{V_1}{V_2}\right)^{\gamma-1} \qquad (1)$$

where:

V_1/V_2 = the compression ratio
T_1 = absolute initial temperature
T_2 = absolute final temperature
γ = ratio of specific heats

The high auto-ignition temperature of hydrogen allows larger compression ratios. This higher compression ratio is important because it is related to the thermal efficiency.

2.5 High Flame Speed

Hydrogen has high flame speed at stoichiometric ratios. Under these conditions, the hydrogen flame speed is nearly an order of magnitude higher (faster) than that of petrol. Hydrogen engines can more closely approach the thermodynamically ideal engine cycle. At leaner mixtures, however, the flame velocity decreases significantly.

2.6 High Diffusivity

Hydrogen has very high diffusivity. This ability to disperse in air is considerably greater than gasoline and is advantageous for two main reasons. It facilitates the formation of a uniform mixture of fuel and air. Secondly, if a hydrogen leak develops, the hydrogen disperses rapidly.

2.7 Low Density

Hydrogen has very low density. Hence a very large volume is necessary to store enough hydrogen to give a vehicle an adequate driving range.

3. PRINCIPALS AND CONCEPTS

To be able to run a hydrogen engine, the mixture formation of air and hydrogen does not need precise control. Consequently; simple systems such as an external mixture system with a gas carburetor can be used for the fuel supply [2]. However, a complete control of the combustion process is only possible with an injection system and an electronic control unit (electronic management system), as used for all new petrol and diesel engines. Therefore, the carburetor is discarded to be replaced by a low-pressure gas injection system in the inlet manifold, allowing multi-point sequential injection of the gaseous hydrogen fuel in each inlet channel just before the inlet valve. Such an injection system, as applied to liquid fuels (petrol, liquid LPG) has several advantages including the possibility to tune the air-fuel ratio of each cylinder to a well-defined value, increased power output and decreased cyclic variation of the combustion process in the cylinders. Timed injection also has an additional benefit for a hydrogen fuelled engine, as it implies a better resistance to backfire [6].

4. DESIGN MODIFICATIONS

4.1 Spark plugs

Use cold rated spark plugs to avoid spark plug electrode temperatures exceeding the auto-ignition limit and causing backfire. Cold rated spark plugs can be used since there are hardly any spark plug deposits to burn off. Do not use spark plugs with platinum electrodes as this can be a catalyst to hydrogen oxidation.

4.2 Ignition system

Avoid uncontrolled ignition due to residual ignition energy by properly grounding the ignition system or changing the ignition cable's electrical resistance. Alternatively, the spark plug gap can be decreased to lower the ignition voltage; this is no problem for hydrogen engines as there will be almost no

deposit formation.Spark plug gaps as small as 0.25 mm has been used.

4.3 Injection system
Provide a timed injection, either using port injection and programming the injection timing such that an initial air cooling period is created in the initial phase of the intake stroke and the end of injection is such that all hydrogen is inducted, leaving no hydrogen in the manifold when the intake valve closes; or using direct injection during the compression stroke.

4.4 Hot spots
Avoid hot spots in the combustion chamber that could initiate pre-ignition or backfire.

4.5 Compression ratio
The choice of the optimal compression ratio is similar to that for any fuel, it should be chosen as high as possible to increase engine efficiency, with the limit given by increased heat losses or appearance of abnormal combustion (in the case of hydrogen primarily pre-ignition).

5. EXPERIMENTAL SET UP AND PROCEDURE

Fig. 1 shows the basic set up of the test bench. The engine was Fiat licensed one produced by the Tofas Company. Besides the engine itself, flywheel, starting motor, alternator, fuel pump, fuel tank, dashboard and exhaust assemblies were mounted to the proper places.
Load applied to the engine was varied by using the knobs that change the current in the stator of eddy current dynamometer [1].

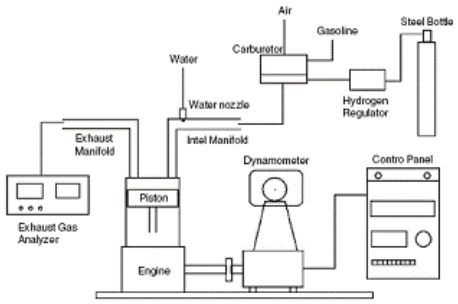

Fig 1: Experimental set up

6. COMPARISION OF PERFORMANCE CHARECTERISTICS

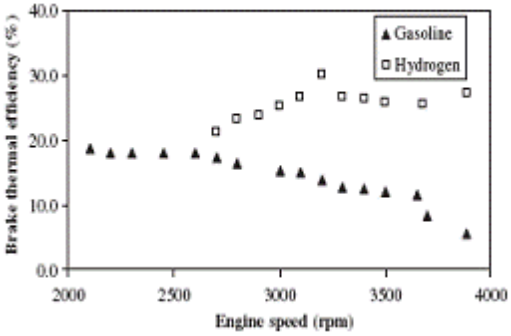

Fig 2: Brake thermal efficiency

Hydrogen fuel has higher brake thermal efficiency and even can operate at lower engine loads withbetter efficiency. It can benoticed that brake thermal efficiency is improved to about 31 percentage with hydrogen fuelled engine compared to gasoline fuelled engine.

Comparison of brake thermal efficiency of the fuels is shown in Fig. 2[1]. Here brake thermal efficiency of hydrogen is much better than the brake thermal efficiency of gasoline engine even at a low speed.

7. COMPARISION OF EMISSION CHARECTERISTICS

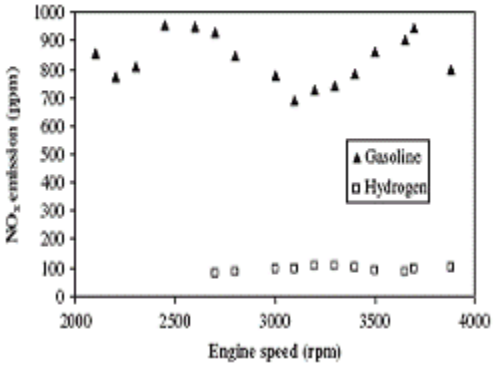

Fig 3: Emissions of NO_x

Fig. 3 illustrates NO_x levels of both engines. Significant decrease in NO_x emission is observed with hydrogen operation. Almost 10 times decrease in NO_x can be noted, easily. The cooling effect of the water sprayed plays important role in this reduction. Also

operating the engine with a lean mixture is kept NO_x levels low.

Fig. 4 shows CO emission versus engine speed for both engines. Although excess air for complete combustion is present in the cylinder, the engine is not capable of burning the total fuel. It was expected that hydrogen fuelled engine must have zero CO emission.

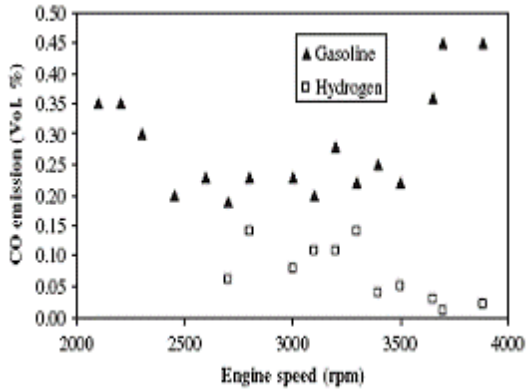

Fig 4: Emissions of CO

As it is seen in Fig. 4, some amount of CO is still present. This is due to the burning of lubricating oil film inside the engine cylinder. As engine speed increases, CO emission tends to decreases.

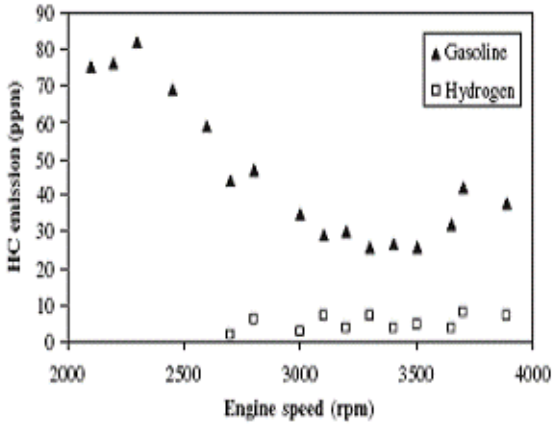

Fig 5: Emissions of HC

The temperature caused by combustion is very high inside the cylinder. As the piston expends the heat evaporates some amount of oil. In addition to this evaporated oil, incompletely burned oil also contributes to HC emission shown in Fig.5.

8. CONCLUSION

Hydrogen is a very good candidate as an engine fuel. Appropriate changes in the combustion chamber would increase the possibility of using hydrogen across a wider operating range. Hydrogen has the potential to achieve problem-free operation in IC engines.

Power and torque loss occurs at low speed hydrogen operation. At high speed hydrogen gives better performance as compare to gasoline operation. Similarly Thermal efficiency and Brake mean effective pressure of hydrogen is more at higher speed. NO_x emission of hydrogen fuelled engine is about 9-10 times lower than gasoline fuelled engine. Emission of CO, HC and CO_2 of hydrogen is very less so hydrogen is environment friendly. Short time of combustion produces lower exhaust gas temperature for hydrogen.

The future advances depend on whether hydrogen can be obtained abundantly and economically.

REFERENCES

[1]Erol Kahramana, S. Cihangir Ozcanlib, Baris Ozerdemb, An experimental study on performance and emission characteristics of a hydrogen fuelled spark ignition engine International Journal of Hydrogen Energy. 32 (2007) 2066 - 2072

[2] Das LM, Gulati R, Gupta PK,A comparative evaluation of the performance characteristics of a spark ignition engine using hydrogen and compressed natural gas as alternative fuels, International Journal of Hydrogen Energy. 2000;25(8):783-93

[3] Das LM,Hydrogen engine: research and development programmes in Indian Institute of Technology, Delhi, International Journal of Hydrogen Energy. 2002;27(9):953-65

[4] Karim GA, A comparative evaluation of the performance characteristics of a spark

ignition engine using hydrogen and compressed natural gas as alternative fuels, International Journal of Hydrogen Energy. 2000;25(8):783-93

[5] Li H, Karim GA. Knock in spark ignition hydrogen engine, International Journal of Hydrogen Energy 2004; 29(8):859-65

[6] Sorusbay C, Veziroglu TN. 1988 "Mixture formation techniques for hydrogen-fueled internal combustion engines" Proceedings of the Seventh World Hydrogen Energy Conference, Moscow, vol.3, p. 1909–21.

A review on the modern steam engines

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Abstract
The "Schoell Cycle" engine is a 21st century, high efficiency, compact and powerful steam engine. The modern Schoell's engine is advanced version of Rankine steam cycle. It is an external combustion engine. The engine is capable of running virtually on any fuel. It uses water as both a working fluid and a lubricant. The engine has the potential to power cars, trucks, buses, trains and other forms of modern transportation in ways that are cleaner and less reliant on fossil fuels than current practical alternatives.[1]

1.Schoell's Engine-Introduction

The Cyclone Engine is a Rankine Cycle heat regenerative external combustion engine, otherwise known as a "Schoell Cycle" engine. The engine is named after its inventor Harry Schoell. The modern Schoell's engine is advanced version of Rankine steam cycle. It is an external combustion engine.The engine harnesses the heat from fuel combustion in a heat exchanger system. The fuel burns for a much longer period of time, allowing for a more complete burn, and very little of the emitted heat is lost to the environment, but is converted to rotational torque. The Cyclone engine shows a net cycle efficiency of 31.06% [3]. It exceeds the efficiency of a conventional IC engine.

The new and advanced Rankine cycle steam engine, invented and developed by Cyclone Power Technology Inc.* has amply demonstrated a much improved modern steam engine power source that can successfully be sized to power anything from a few horsepower to over a thousand horsepower. The basic principles and designs upon which the engine operates are identical no matter what size is contemplated, from a simple lawn mower engine to a massive locomotive, industrial or marine engine.

Fig 1: The Cyclone Mark V engine-flow diagram[1]

2.Materials and Methods

This research is based on independent research and literature reviews. The various sources of research include recent journal articles and online sites. The articles and sites are based on modern steam engines which have the potential to replace conventional IC engines. The principles, working and advantages of 'Schoell's cycle' engine were found out during this research.

3.The Working of Cyclone Engine

The Cyclone Engine is a Rankine Cycle heat regenerative external combustion engine. It creates mechanical energy by heating and cooling water in a closed-loop, piston-based engine system [1]. The process looks like as shown in Fig 1:

3.1 HEAT PROCESS

1. Fuel is atomized and injected into the patented centrifugal combustion chamber (part 1) where a spark ignites the fuel-air mixture into a flame that spins around the heat coils. Thermocouples control the duration of combustion to keep the heat in the combustion chamber at a constant temperature.

2. Water contained in the coils becomes super-heated steam (up to 1200°F) in as little as 5 seconds from startup which is **(a)** piped to the cylinders, **(b)** where it enters through a valve system and the valve timing mechanisms regulate how much steam enters the cylinders – the longer the cut-off the greater the torque and acceleration.

3.2 MECHANICAL PROCESS

3. Steam enters the six radial-configured cylinders under pressures up to 3200 psi to push the pistons down in sequence. Note, no motor oil is used – water is both the working fluid and engine lubricant. Also, because of the valve design, the engine starts without the need of a starter motor.

4. The motion of piston rotates the crank shaft .The high starting is produced by the first rotation itself.

3.3 COOLING PROCESS

5. Steam escapes the cylinders through exhaust ports and enters the condensing unit where it turns back into water, and collects in a sealed pan at the bottom of the condenser.

6. Blowers spin fresh air around the condenser to speed the cooling process.

3.4 REGENERATIVE PROCESS

7. Air which has been pre-heated from the condensing unit, continues up to a second heat exchanger located in the exhaust port of the combustion chamber, further pre-heating the air used for combustion while also cooling the exhaust fumes (to about 320°F).

8. A high pressure pump pipes water from the collecting pan to the heat coils via heat exchangers surrounding each of the cylinders and then to the center of the coils to start the heat cycle again.

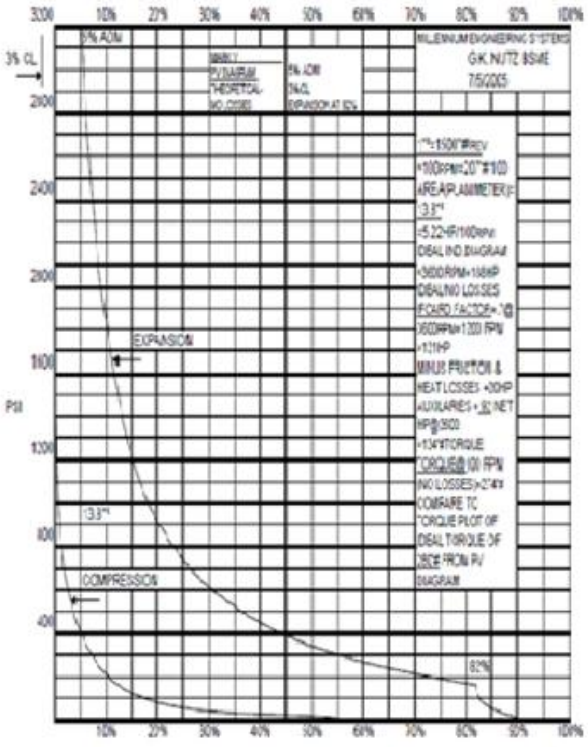


Fig 2: PV diagram of Mark V Engine

4.Comparison with IC Engine

1. The Cyclone engine is an external combustion engine due to which it is much cleaner and less polluting as compared to an IC engine. With properly designed engines even NOx production can be eliminated [1].
2. The Cyclone engine's burner system can use any light liquid fuel. No separate pollution hardware or control

systems are needed. The engine has been tested with a number of fuels possible like gasoline, propane, kerosene, alcohol, Diesel oil, to orange peel oil and even the oil collected from the Gulf oil spill.

3. The Cyclone engine shows a net cycle efficiency of 31.06% [3]. It exceeds the efficiency of a conventional IC engine.

4. The moving parts count in a vehicle system is drastically reduced from that of the IC engine particularly with an automatic transmission. The massive starting torque of the Cyclone steam engine means that for some uses, no transmission whatever is required. This ability is shared only by the electric motor; but that vehicle power source is seriously supply limited to a very short duty cycle. No gasoline or Diesel engine offers this huge advantage and cost savings to the vehicle manufacturer.
5. The Cyclone steam engine is inherently much quieter than the equivalent horsepower IC engine. As it has a drastically reduced moving parts count and can operate at a slower speed to develop its full power, the Cyclone engine will demonstrate a very long service life.
6. Compared to the IC engine and automatic transmission package seen today, the Rankin cycle engine can be more economical to produce either in mass or limited production.
7. The Cyclone Engine needs no catalytic converter or muffler, no oil pump or motor oil and no transmission or transmission fluid.
8. The operating temperature is lower than IC engine. The engine does not require high speed to produce the torque and horsepower demanded due to which the engine has a very long service life.

	CYCLONE	GASOLINE	DIESEL	HYBRID	HYDROGEN	FUEL CELL	ELECTRIC	STEAM RANKIN	STIRLING	TURBINE
BASE FUEL EFFICIENCY	7	6	8	9	9	10	7	5	6	1
WELL TO WHEEL EFFICIENCY	10	8	9	9	1	2	6	5	7	2
MULTI-FUEL CAPABLE	10	1	2	2	1	5	1	10	9	6
RANGE ON FUEL	10	8	9	9	5	10	1	5	7	4
INFRASTRUCTURE SUPPLY FUEL	10	10	10	10	1	1	8	10	10	10
FUEL STORAGE - (RANGE)	10	8	9	9	5	10	1	5	7	4
EMISSIONS OUTPUT	9	5	1	6	10	10	10*	8	8	6
RADIATED HEAT	9	4	3	7	6	9	10	7	7	1
WEIGHT	9	9	8	8	7	1	2	5	4	10
SIZE	9	9	8	6	7	1	5	6	4	10
COST OF MAINTENANCE	9	6	7	5	6	7	10	5	4	10
COST TO MANUFACTURE	10	10	8	1	7	9	9	6	4	1
TOTALS	112	84	81	81	65	75	67	78	77	65
RANK	1	2	4	3	9	7	8	5	6	10

This table is a comparison of engines listed in the first row ranked according to relative values assigned to their attributes listed in the first column. These attributes are graded from one to ten, where ten represents the highest valuation. For simplicity, the categories are not weighted. The score column for each engine is added up and the final row converts the score totals to a ranking where the highest scoring engine is ranked with the scores of the other engines following in descending order.

5.Mark V Engine specifications

- 6 cyl radial pistons with spider bearing
- 2.00” Bore – 2.00” Stroke – Piston Area 3.14” – 37.7 cu in
- Operating RPM - 3,600
- Operating Pressure = 3200 PSI
- Max HP 100 @ 3,600 RPM

- Dimensions 27” X 27” X 24” H
- Approx weight 336 lbs
- Tube size ¼” and 3/16” SS x 600’ 12 rows
- Condenser 55 sqft dynamic cyclone aluminum
- Water lubrication / deionized water closed loop system
- Heat exchanger with centrifugal combustion chamber
- Exhaust air heat exchanger
- Piston exhaust heat exchanger 6 ft² (3/16” SS tube)
- Operating Temperature = 1,200˚
- Automatic hydraulic piston valve for variable clearance volume
- Infinite valve timing 34˚ - 3˚
- Approx fuel rate 6 gal/hr gasoline (83,5000 BTU/HR)
- Self starting with high torque – 850 ft/lb

6.Mark V Engine efficiency calculations

The energy balance between system and cycle is given by

Qc=Qs-Qf

where:Qs=energy absorbed by system

Qc= energy absorbed by cycle

Qf=energy rejected by generator

Therefore

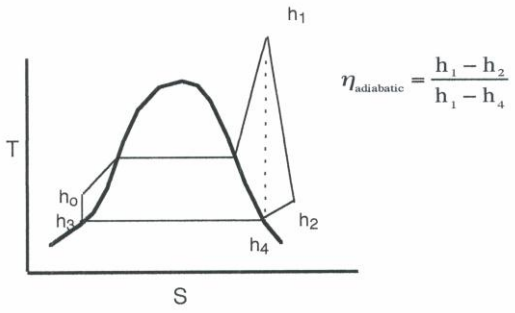
n(sys)=work/Qs

n(eng)=work/Qc

n(gen)=Qc/Qs

The relation between efficiencies of system engine and generator is given by

n(sys)=n(eng)*n(gen).....(1)



Qc=m*(h1-h2)-m*dp/pw

.....(dp=change in pressure, pw=density of water)

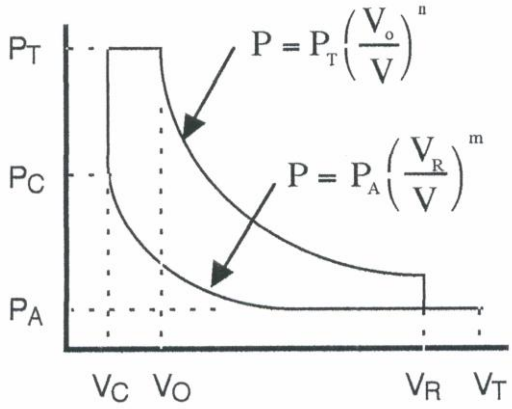
And, W=m*(h1-h2)-m*dp/n(pump)*pw

n(eng)=1/[(h1-h3)-dp/pw]*Sr

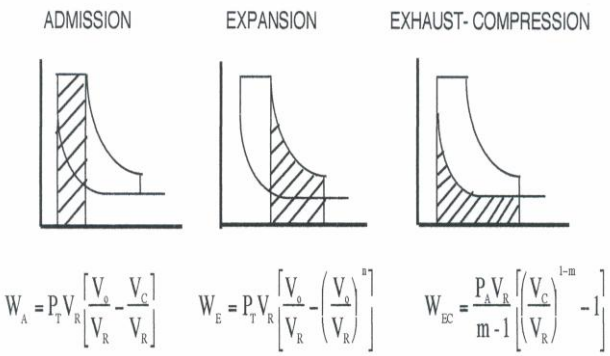
.....(Sr=steam rate)..... (2)

Now a non dimensional multiplier'@' is multiplied in equation 1 to adjust the impact of pre combustion and feed water regeneration.

n(sys)=@*n(gen)*n(eng).....(3)



This is generalized pressure-volume diagram of a high compression uniflow engine



The above diagram shows the work areas associated with high compression

The net work is the sum of all these works

Wnet=Wa+We-Wec

Wn-f=Pt*Vr[x*n-x^n/n-1-Vc/Vr-1/(m-1)*Pa/Pt{(Vc/Vr)^(1-n)-1}-f(t)-f(p)]

f(t)=normalized engine frictional work=2*3.4125*t/Pt

f(p)=normalized pump work=ps/pw*np[x-(Zf*Pa/Za*Pt)*(Vc/Vr)^(1-m)]

Where, x=cutoff=Vo/Vr

ps=density of steam

t=engine frictional torque per cubic inch displacement

Zf=compressibility of steam at cut off

Za=compressibility of exhaust steam

CHARACTERISTIC PERFORMANCE OF CYCLONE POWER SERIES

$$S_R = \frac{\left[x - \frac{Z_E}{Z_A}\frac{P_A}{P_T}\left(\frac{V_C}{V_R}\right)^{1-m}\right]}{Z_F R T_S\left[\frac{xn - x^n}{n-1} - \frac{V_C}{V_R} - \frac{1}{m-1}\frac{P_A}{P_T}\left\{\left(\frac{V_C}{V_R}\right)^{1-m} - 1\right\} - f(t) - f(p)\right]}$$

Steam rate will evaluated at 5% cut off which is the highest power that can be sustained indefinitely

Pt-supply pressure; 3200 psia

Pa-condenser suction temperature; 14.7

Ts-supply temperature; 1200F

Vc/Vr-engine clearance; .030

Zf-compressibility @ final mixing temp; 0.909

ZA-compressibility @condenser suction pressure; 1.0

R-steam constant; n=1.3; m=1.2;

ps= 3.56lb/ft^3; pw=61.16 lb/ft^3

np= 0.75

t=0.05 ft-lb/in^3

Therefore;

f(t)=0.00117

f(p)=0.00323

On the basis of above information the Cyclone power series will exhibit a steam rate of 6.662lb/bhp-hr

Calculation for engine efficiency and system efficiency are based on the following information

h1-enthalpy of supply steam :1569.9Btu/lb

h3-enthalpy at feed pump inlet :180.07Btu/lb

Kg-portion of waste heat recovered from generator flue: 15%

Ke- portion of waste heat recovered from engine exhaust: 25%

Therefore;

h1-h2=0.5461*(hp-hr)/lb

dp/pw=0.0038*(hp-hr)/lb

Therefore by equation for efficiency of engine we get

n(eng)=1/[(h1-h3)-dp/pw]*Sr=**27.68%**

The system efficiency multiplier resulting from pre combustion and feed water regeneration may now be computed

@=1/[1-Ke*(1-n(eng))]*[1-Kg*(1-n(gen))]

@=1.2469

Therefore the system efficiency=@*n(gen)*n(eng) =31.06%

7.Conclusions

The Rankine cycle reciprocating steam engine exactly matches the torque and load requirements of the motor vehicle. Be it a passenger car, pickup truck, bus, motor home or railroad locomotive. It can burn any light liquid fuels or bio fuel oils with complete and totally clean combustion, something no other fuel burning engine can claim. When using such fuels, the Rankine cycle engine does not require any additional pollution control hardware, burner alterations or additional system modifications.

Cyclone's Schoell cycle engine has many proponents. It was named by Popular Science magazine as an Invention of the Year in 2008, and has won two Tech Awards from the Society of Automotive Engineers [1]. The vehicle adaptation of Cyclone's Schoell cycle engine is becoming an increasingly important matter and some dramatic demonstration is needed in the immediate future, particularly when one considers the constant outpouring of often conflicting, naive and unwise pollution and fuel economy mandates by our governments. It takes time and effort to make the automobile companies take notice.

To date, 2011, only the Schoell Rankine cycle engine has demonstrated the long desired high packing density and high net cycle efficiency demanded to power the modern vehicle. No other system developer has come forward to demonstrate any rival system.

References

1. James D. Crank,THE MODERN STEAM ENGINE available at www.cyclonepower.com/PDF/Cyclone%20Engine%20White%20Paper.pdf

2. Dr. Phillip F. Myers, The Cyclone Engine Empowers the Biofuels Revolution: Part 1 http://www.cyclonepower.com/PDF/The%20Cyclone%20Engine%20Empowers%20the%20Biofuels%20Revolution.pdf

3. Jerry Peoples, Performance Of The Cyclone Power Series available at http://www.cyclonepower.com/PDF/JerryPeopleEqu.pdf

4. Harry Schoell, Background of Invention available at http://www.cyclonepower.com/PDF/background.pdf

5. Harry Schoell ,Cyclone Engine Mark V specifications. Proprietary Information of Cyclone Power Technologies Inc. available at http://www.cyclonepower.com/PDF/MarkV_Spec_Sheet.pdf

Applications Of Thermoacoustics Technology: A review

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Abstract

This paper presents a detailed review on thermoacoustic technologies and its various applications, which have achieved an important breakthrough in recent times. Thermoacoustic technology has proved to be a feasible technology which has been applied in a number of energy related applications such as refrigeration, liquefaction of natural gas, generation of electricity,etc..This process has wide reaching potential because of its relative simplicity. There have been many advances and more advance study is being done to fully implement this concept in day to day processes.

1. Introduction

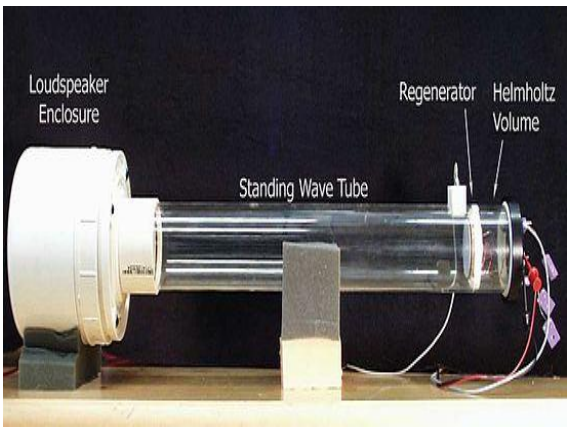
Thermoacoustics is the study of the thermoacoustic effect & the attempt to harnessthe effect as a useful heat engine. Simply put, thermoacoustic effect is the conversion of heat energy to sound energy or vice versa. One ordinarily thinks of a sound wave as consisting only of coupled pressure and position oscillations. In fact, temperature oscillations accompany the pressure oscillations and when there are spatial gradients in the temperature oscillations, oscillating heat flow occurs. The combination of these oscillations produces a rich variety of "thermoacoustic" effects. In everyday life, the thermal effects of sound are too small to be easily noticed, for example, the amplitude of the temperature oscillation in conversational levels of sound is only about 0.0001°C. However, in an extremely intense sound wave in a pressurized gas, these thermoacoustic effects can be harnessed to create powerful heat engines and refrigerators. Whereas typical engines and refrigerators rely on crankshaft-coupled pistons or rotating turbines, thermoacoustic engines and refrigerators have no moving parts (or at most only flexing parts without the need for sliding seals).This simplicity, coupled with reliability and relatively low cost, has highlighted the potential of thermoacoustic devices for practical use. As a result, thermoacoustics is maturing quickly from a topic of basic scientific research through the stages of applied research and on to important practical applications. Recently, thermoacoustic phenomena have been employed in the medical field for imaging of tissues. The history ofthermoacoustic engines is long but sparsely populated. The Sondhaus tube is the earliest thermoacoustic engine that is a direct antecedent of the thermoacoustic prime movers.

2. Thermoacoustic machines

There are two basic kinds of thermoacoustic machines:

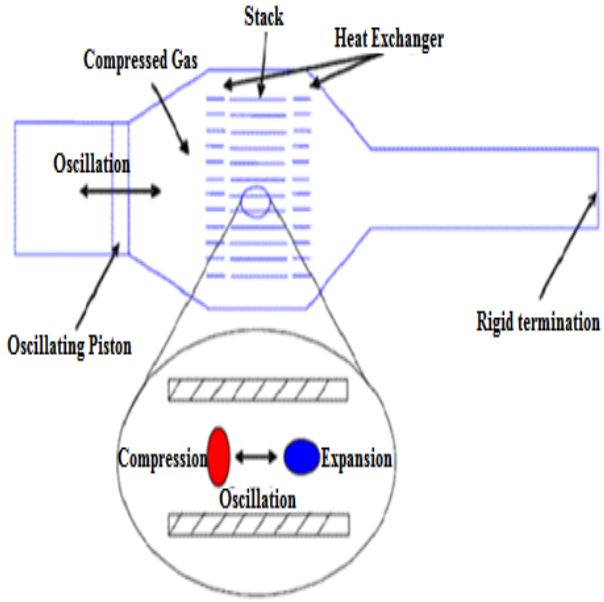
1. Thermoacoustic prime movers

2. Thermoacoustic refrigerator



2.1 Principle of operation

When a sound wave is sent down a half-wavelength tube with a vibrating diaphragm or a loudspeaker, the pressure pulsations make the gas inside slosh back and forth. This forms regions where compression and heating take place, plus other areas characterized by gas expansion and cooling.

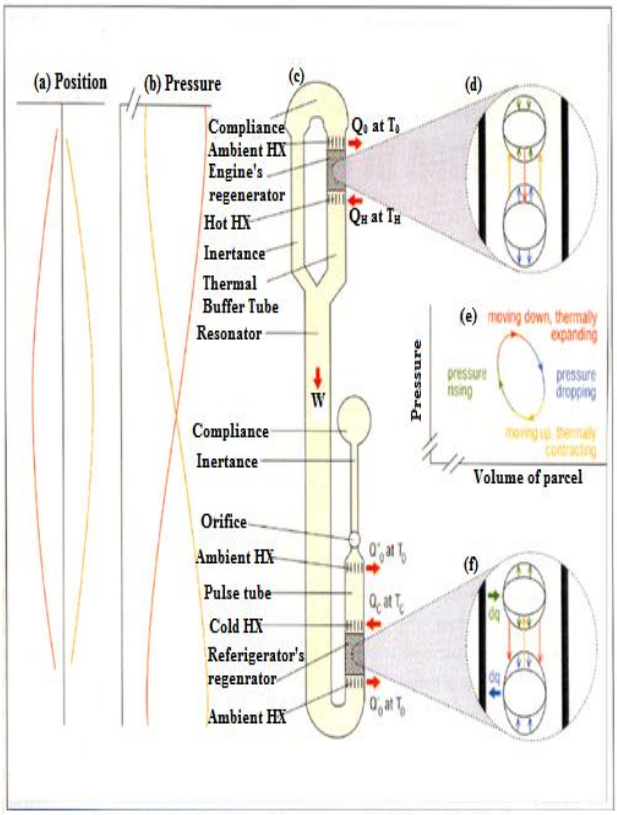


3. MATERIALS AND METHODS

This research is based on independent research and literature reviews. The various sources of research include recent journal articles and online sites. The article and sites are based on thermoacoustics which has the potential to enhance the existing technologies.

4.THERMOACOUSTIC REFRIGERATION

The applications of thermoacoustic engines fall into two categories which depend upon whether the refrigerator is powered by electricity or by heat[1]. Although the heat driven thermoacoustic refrigerators and cryocoolers areattractive for applications where there is abundant heat or waste heat, at the present time, only two thermoacoustically driven refrigerators have been demonstrated. Several other heat-driven thermoacoustic refrigerators are currently in the design stages for the aboveapplications including a refrigerator for storage of medical supplies and vaccines in Bangladesh, asolar driven refrigerated cargo container for transportation of tropical fruits, and a natural gas liquefaction plant [2].



Schematic of a Heat driven Thermoacoustic Refrigeration System

The nascent technology of thermoacoustics seems attractive because the small number ~often zero! of moving parts and sliding seals suggests low cost and reliability [3]. Especially when both engine and refrigerator are present in one system,

thermoacoustic devices are very simple: little more than heat exchangers of conventional design in large vessels that confine the thermoacoustic working gas and define the geometry in which the gas resonates.

Due to the simplicity of its operation and the use of only one moving part, thermoacoustic refrigeration is also be suitable for cooling the latest generation of computer chips which can run at twice their room temperature design speeds when their temperature is reduced to -50°C[4].

Linear motor Thermoacoustic cooler

4.1 BENEFITS

Inert working fluid. Helium, being an inert gas, cannot participate in chemical re actions and hence no toxicity, flammability, or negative environmental effects (ODP=GWP=O).

No sliding seals or lubrication. Due to the high frequency operation, high powers can be achieved with small displacements sono sliding seals or gas bearings are required. This also means that no "tight tolerance" machined parts are required thereby reducing manufacturing costs.

Very few simple components. Electrically driven systems require only one moving part and thermally driven systems have no moving parts. The "stack" can be fabricated from cheap plastics.

Large range of working temperatures. Depending upon the position and length of the stack in the acoustic standing wave field, one can trade off the temperature span and the heat pumping power. Different working fluids are therefore not required for different temperature ranges.

Intrinsically suited to proportional control. Just as one is able to control the volume of a stereo system, a electrically driven thermoacoustic refrigerator's cooling power is continuously variable. This allows improved overall efficiency by doing rapid cool-down at a lower COP and then maintaining heat leak losses at higher COP. This "load matching" can also reduce heat exchanger inefficiencies by minimizing temperature differences within the fluids andexchangers.

Immaturity. Thermoacoustics is the youngest of the heat engine cycles. It is more likely that important breakthroughs which substantially improve performance and manufacturability will still occur here rather than the older technologies which have already "skimmed the cream".[1]

4.2 TECHNICAL ISSUES

1.Immaturity: Because thermoacoustics is the youngest of existing heat engine cycles, it lacks the infrastructure (suppliers, sales and service base, educational programs, etc.) which can enhance marketability.

2. ***Efficiency:*** The previous thermoacoustic cryocooler designs have been optimized for temperature span rather than COP.Their best measured performance has given a COPR I20%, again exclusive of electroacoustic efficiency.

3. ***Electroacoustic conversion.*** Although electrical to acoustical conversion efficiencies on the order of 90% are, in principle, realizable at reasonable cost, present thermoacoustic drivers have had electroacoustic efficiencies under 50%. This should not be a problem since efficiencies for

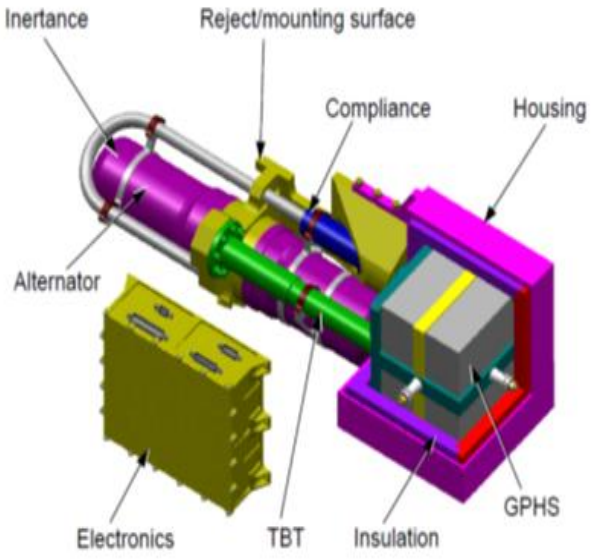
similar linear motor technology in Stirling applications as high as 93% have been measured.

4.***The "talent bottleneck."*** Because thermoacoustics is a new science and requires expertise in a diverse number of non-traditional disciplines within the refrigeration and HVAC communities (acoustics, transduction, gas mixture thermophysics, PID, PLL and AGC control, etc.), there are very few experimentalists who are interested or capable of research in this field. This severely limits the number of potentially promising applications which can be pursued simultaneously.[1]

5. THERMOACOUSTIC POWER GENERATOR

A traveling-wave thermoacoustic power converter that generates electricity from heat was developed and tested. Models were developed, and trade studies were performed to design a power conversion system aimed at the ~100-W radioisotope-powered deep-space and Mars Lander Missions.

The power converter design incorporates a thermoacoustic driver that converts heat to acoustic power without any moving parts [5]. The acoustic power is used to drive a pair of flexure-bearing supported pistons connected to voice coils in a vibrationally balanced pair of moving coil alternators, which produces ac electrical power.
The power converter performance was characterized as a function of heat input (and thus alternator stroke) at fixed hot-end temperature and fixed reject temperature.
The thermoacoustic power converter successfully produced over 50 Watts of electrical output power at up to 18% system efficiency [6]. This is the first known successful implementation of traveling-wave, thermoacoustic-to-electrical power conversion technology and is just a first step toward a space-qualified, high-efficiency power source based on thermoacoustic technology.



Thermoacoustic Radioisotope Power System

6. LIQUEFACTION OF NATURAL GAS

The first natural-gas-fired thermoacoustic liquefier was completed in Denver in 1997 (Figure 4). It achieved a liquefaction capacity of 140 gpd of LNG, producing 2 kW of refrigeration power at –140°C [7].

Current Prototype 500 GPD Acoustic Liquefier

The second phase of hardware development, which began in mid 1999, has been the development of an efficient 500 gpd system. The thermoacoustic portion of the system is prominently visible in Figure 5, with the engine on top and refrigerators on the bottom, linked by a half-wave resonator. The natural gas burner is at the very top, under the blue banner. The engine is in the large bulge below the burner. The refrigerators are hidden inside the large, cylindrical vacuum insulation can near the bottom, but two of their slender inertances and compliances are visible above the vacuum can [8].The thermoacoustic working helium is at an average pressure of 450 psi, with oscillations up to ±45 psi in amplitude at a frequency of 40 Hz. In this system, three refrigerators are used, driven in parallel by the thermoacoustic wave but connected in series with respect to the natural-gas stream so that the first acts as a natural gas precooler, the second removes the rest of the sensible heat and some of the latent heat, and the third removes the rest of the latent heat. The design calls for the engine and resonator to deliver 30 kW of acoustic power to the refrigerators, whose combined cooling power is 7 kW. The burner delivers heat to the engine, and is made more efficient by a traditional recuperator topreheat the incoming fresh air by capturing heat from the flue. Waste heat is removed from the engine and the refrigerators by circulating water at ambient temperature. Overall system efficiency should yield liquefaction of 65 percent of a natural-gas stream while burning 35 percent. In 2001, the 500-gpd system was operated at 60 percent of its design pressure amplitude, with the engine producing 12 percent of its design power and each of the three refrigerators running separately at 25 percent of their design powers. All thermoacoustic phenomena were working as expected, but a crack in an inaccessible weld prevented testing at higher powers. During 2002, this system is being rebuilt, including dramatic improvements to the burner and burner-engine heat exchanger.

7. FUTURE SCOPE

During the past two decades there has been an increasing interest in the development of thermoacoustic cooling and heating for a variety of commercial, military and industrial applications.Thermoacoustic cooling and heating has accelerated rapidly with the production ban of chlorofluorocarbons(CFCS and HCFCS) at the end of year 2015.Thermoacustic refrigerators can be constructed such that they use only inert gases which are non toxic and does not contribute to ozone depletion or global warming.The numerical complexities of thermoacoustic engines are outweighed by theadvantages of using the phenomenon.Thermoacoustic devices in operation are "low tech"devices, which have no moving parts & hence should require low maintenance. This makes the potential for their application desirable in many fields, applicationswould include, aerospace, industrial & in the third world. Thermoacoustic devises arecurrently used by high budget industries but are still able to be constructed from smaller budgets. They are silent in operation

& will operate from any source of heat, includingchemical fuels, solar radiations, waste heat from industrial processes etc.

8. CONCLUSION

Thermoacoustics has shown how promising a technology it can be. This technology is the first new breakthrough in thermal energy conversion in decades. These engines convert thermal energy into electric current at high efficiency. They cost less than one fourth that of photovoltaic cells per peak watt & have applications from pollution free lawn & garden equipments to automobiles to stationery power generation. The future mayhold some very large uses for thermoacoustics, depending on how industry chooses to respond to the idea of integrating thermoacoustic devices into their products. The research is, however, going to continue regardless of the way industry acts and further advances will be made in the field of applicable thermoacoustics. The future may see thermoacoustic refrigerators dominating the market and thermoacoustic engines powering transportation vehicles. Although they are nothing more than air pressures, sound waves hold the technological power to provide a safe, efficient & clean method of heating, cooling, and running engines. It could be said, with much honesty, that these technological advances are truly the "wave" of the future.

9. REFERENCES

[1]Steven L.Garrett, Thomas J.Hofler, and David K.Perkins,"Thermoacoustic refrigeration",June 25, 1993.

[2] J. C. Wheatley, G. W. Swift, A. Migliori, and T. Hofler, "Heat-driven Acoustic Cooling
Engine having no Moving Parts," U. S. Patent No. 4,858,441 (Aug. 22, 1989).

[3] R.S Reid, G.W Swift, "Experiments with a flow-through thermoacoustic refrigerator", *Acoustical Society of America*. [S0001-4966(00)04712-3] , 2000.

[4] S. Garrett, "ThermoAcoustic Life Sciences Refrigerator," NASA Tech. Report No. LS-
101 14, Johnson Space Center, Space and Life Sciences Directorate, Houston, TX (October
30, 1991)

[5]Michael Petach, Emanuel Tward, and Scott Backhaus, "Design Of A High Efficiency Power Source(HEPS) Based On Thermoacoustic Technology", NASA , 2004

[6] Backhaus S.,. Tward E, and Petach M., "Thermoacoustic Power Systems For Space Applications."
Proceedings of the Space Technology and Applications International Forum 2002

[7] G.W Swift and John Wollan Praxair,"Thermoacoustics for Liquefaction of Natural Gas", LNG Technology, 2002.

[8] Van Wijingaarden, W. C., 1999. "Therrnoacoustic refrigeration - A stirring concept for offshore associated
gas liquefaction, "Monetizing Stranded Gas Reserves Conference, Houston, December 1999.

HVDC LIGHT TECHNOLOGY

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Abstract

During the latest 20 years, HVDC has become the dominating technology for long distance transmission of bulk power. The use of 800 kV HVAC that was introduced in several countries during the 1960´s and 1970´s has come to a halt. The rapid development and the increased confidence in the HVDC technology have caused the transition from ac to dc. This paper will cover the HVDC light technology.

A new transmission and distribution technology, HVDC Light, makes it economically feasible to connect small-scale, renewable power generation plants to the main AC grid. Vice versa, using the very same technology, remote locations as islands, mining districts and drilling platforms can be supplied with power from the main grid, thereby eliminating the need for inefficient, polluting local generation such as diesel units. The voltage, frequency, active and reactive power can be controlled precisely and independently of each other. This technology also relies on a new type of underground cable which can replace overhead lines at no cost penalty.

Introduction:

As the size of a concentrated load in cities increases due to the on-going urbanization, metropolitan power networks have to be continuously upgraded to meet the demand. Environmental issues are also becoming more and more of a concern all over the world. Strong forces are pushing for replacing old local generation with power transmission from cleaner sources. Land space being scarce and expensive,substantial difficulties arise whenever new right-of-way is to be secured for the feeding of additional power with traditional transmission lines. With increasing power levels, the risk of exceeding the short-circuit Capability of existing switchgear equipment and other network components becomes another real threat to further expansion.

Increasing demands on the power quality in urban areas is also a factor to consider for the power system engineer. The HVDC Light system is a solution to these problems. This technology is designed to transmit large quantities of power using underground cables and at the same time adds stability and power quality to the connected networks. The cables are easily installed underground using existing right of ways, existing cable ducts, roads, subways, railways or channels. The HVDC Light converter stations are compact and by virtue of their control, they do not contribute to the short-circuit levels. As its name implies, HVDC Light is a high voltage, direct current transmission technology and is well suited to meet the demands of competitive power market for transmission up to 1100 MW.

What is HVDC Light

HVDC Light is the successful and environmentally-friendly way to design a power transmission system for a submarine cable, an underground cable, using overhead lines or as a back-to-back transmission. HVDC Light is HVDC technology based on voltage source converters (VSCs). Combined with extruded DC cables, overhead lines or back-to back, power ratings from a few tenths of megawatts up to over 1,000 MW are available. HVDC Light converters are based on insulated gate bipolar transistors (IGBTs) and operate with high frequency pulse width modulation in order to achieve high speed and, as a consequence, small filters and independent control of both active and reactive power. HVDC Light® cables have extruded polymer insulation. Their strength and flexibility make them well suited for severe installation conditions, both underground as a land cable and as a submarine cable. The

converter station designs are based on voltage source converters employing state-of-the-art turn on/turn off IGBT power semiconductors. HVDC Light has the capability to rapidly control both active and reactive power independently of each other, to keep the voltage and frequency stable. This gives total flexibility regarding the location of the converters in the AC system, since the requirements for the short-circuit capacity of the connected AC network are low (SCR down to zero). The HVDC Light design is based on a modular concept. For DC voltages up to ± 150 kV, most of the equipment is installed in enclosures at the factory. For the highest DC voltages, the equipment is installed in buildings. The required sizes of the site areas for the converter stations are also small. All equipment except the power transformers is indoors. Well-proven and equipment tested at the factory make installation and Commissioning quick and efficient.

HVDC Light characteristics

An HVDC Light converter is easy to control (Fig 1). The performance during steady state and transient operation makes it very attractive for the system planner as well as for the project developer. The benefits are technical, economic, environmental as well as operational. The most advantageous

- Independent control of active and reactive power
- Feeding of power into passive networks network without any generation)
- Power quality control
- Modular compact design, factory pre-tested
- Short delivery times
- Re locatable/Leasable
- Unmanned operation
- Robust against grid alteration

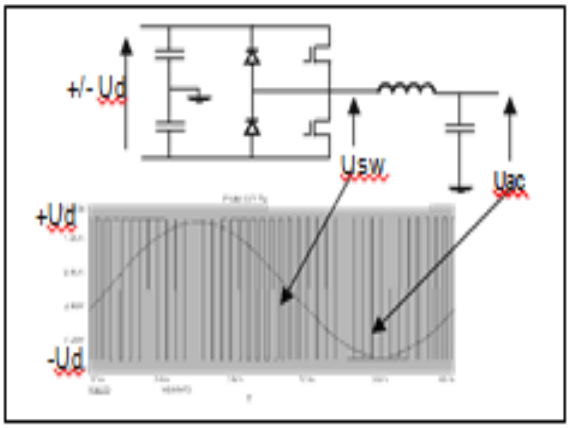

Fig.1: Principle of pulse width modulation

Control of active and reactive power

The control makes it possible to create any phase angle or amplitude, which can be done almost instantly. This offers the possibility to control both active and reactive power independently. As a consequence, no reactive power compensation equipment is needed at the station, only an AC-filter is installed. While the transmitted active power is kept constant the reactive power controller can automatically control the voltage in the AC-network

Reactive power generation and consumption of an HVDC Light converter can be used for compensating the needs of the connected network within the rating of a converter (Fig 2). As the rating of the converters is based on maximum currents and voltages the reactive power capabilities of a converter can be traded against the active power capability. The combined active /reactive power capabilities can most easily be seen in a P-Q diagram (positive Q is fed to the AC network).

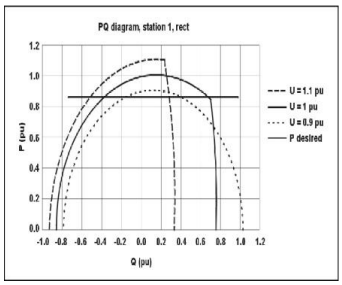

Fig.2: PQ Chart

Power Quality Control

The Light converter has s a switching frequency of 2kHz that is 40 times faster compared to a phase commutated converter operated at 50 Hz. This offers new levels of performance regarding power quality control such as flicker and mitigation of voltage dips and sags, harmonics etc caused by disturbances in the power system (Fig 3). Power Quality problems are issues of priority for owners of industrial plants, grid operators as well as for the general public. In the presence of a fault which would normally lead to an AC voltage decrease the converter can be rapidly deblocked and assist with voltage support to avoid severe disturbances in local industries that are sensitive to voltage dips. The response time for a change in voltage is 50 ms i.e. for a step order change in the bus voltage the new setting is reached within 50 ms. With this speed of response HVDC Light will be able to control transients and flicker up to around 3 Hz, thereby helping to keep the AC bus voltage constant.

Applications

The VSCs performance and characteristics invite to many new applications and concepts which previous has not been considered due to technical and economical limitations. The major driving force is the deregulation of the electricity market, where short delivery times, flexible systems and power ranges up to 200 MW are frequency asked for. The ability of the HVDC Light concept to meet these new requirements will certainly contribute to that many new projects will be built. Some examples of applications are:

1. Connecting Wind power farms to the grid

2. Distributed generation

3. Multiterminal DC-grid

4. Interconnecting networks

5. Utilization existing right of way

Wind power

HVDC Light is flexible and can easily be expanded by adding new units. Wind farms are often enlarged after just a few years, or joined by new farms in adjacent locations. Many suitable wind farm areas are located remotely where the network is weak. In these cases, the size of the wind farm is often restricted by the short circuit ratio. A wind farm connection directly to the AC network requires a minimum short circuit ratio around 10 for acceptable performance. With an HVDC Light connection the short circuit ratio is not a restriction. Wind generators absorb reactive power from the AC network for magnetization. HVDC Light can supply the reactive power to the wind generators independently of the active power it receives.

Multiterminal DC grid

One feature of the HVDC Light converter is that the polarity does not change when the power flow changes. Instead the current direction changes. This makes it easy to use a converter as a building block in a multi-terminal system. Any number of HVDC Light converters can be connected to a DC bus with fixed polarity, and by that, a meshed DC system, with the same topology as an AC system, can be built.

Interconnecting networks

It is well known that HVDC is well suited for connection of asynchronous as well as synchronous networks. With HVDC light these interconnections can be made smaller and still have a good economy. Due to the robustness of the VSC, the station can be placed where it is best needed irrespective to network conditions. Should there be a difference in energy prices in the networks trading is possible since we have full control of power flow between the stations.

Conclusions

It is widely recognized that the role of network services has changed as a result of the introduction of competitive power markets. HVDC Light is a DC transmission technology that has important advantages for application in competitive markets. These advantages include its modularity, standardized design leading to short delivery times, and compact stations and cables reducing environment impacts and controllability giving possibilities to match the power need and/or to control the voltage in the network. These features mean that HVDC Light facilities can be installed quickly in response to competitive market signals.