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Road-Safe a GIS-Based roads monitoring system

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Abstract: *Roads are a vital mode of transport in India. Roads should be frequently maintained. While doing road maintenance functions, the government faces pressures arising from inadequate budgets and increasing road network. The key drawback of road management system is that an efficient way to collect road data isn't out there. Road maintenance prioritization relies on ad-hoc demands of appointed representatives. Who fail in forming correct choices because of road information being not available at one location and public demands threshold and wish for explicit roads to be repaired urgently doesn't reach the authority. This brings about negligence of heavily damaged roads particularly in the fringe areas for extended periods of your time, this might typically cause road accidents and vehicle damages, that raises the priority for public safety. The road network management system ought to be improved drastically. existing ways to collect information on the road are shown to be ineffective.*

Keywords *- GIS, Road Asset Management System, Cloud, Crowdsourcing, data collection, automation*

I. INTRODUCTION

Recently, there has been a fast development of the road transportation network throughout Maharashtra thanks to escalating human population and economic activities[1]. The rise of personal vehicles on the road has demanded the commitment to improve the present road transportation systems. Current road transit helps the authority in managing road infrastructure effectively[2]. It is also supported in terms of watching the road infrastructures narrowly. However, to keep the road infrastructure in safe condition, a comprehensive watching and managing system ought to be developed. By providing a comprehensive road management system, the incidence of road accidents can also be minimized[3]. Many countries have developed road management systems for the past decades for their countries[4]. However, the prevailing system still needs to be improved for current work and wider scope. In previous studies, a road management system has been established to be able to manage the road network system properly. enforced internet-based system for route pavement management system by desegregation spatial and attribute info within the system[5]. We propose the development of road management system supported by net GIS[6]. Geographic data system (GIS) is a powerful tool and has capability to handle and method for spatial knowledge of a giant volume. GIS is outlined as a system that is able to input, store, retrieve, update, display, and comprehensively analyze spatial knowledge supported pc hardware and software systems. It's conjointly referred to as desktop GIS. GIS becomes a widespread technique a pair of which will produce maps, incorporate information, envision and settle issues, and foster significant arrangements. Applying

GIS for road management systems has been used before in developed countries[7]. it's a good system to observe all the activities that occur on the roads and store the records for future development. What is more, this method will be used as a decision network (DSS) for road development and construction within the future. to make this method easy to access, it'll be developed on a net platform. Net GIS is Internet-based platform that has client-side applications provided through WWW protocol running on the worldwide net which might engraft geographic info knowledge as well as non-geographic knowledge. It's a replacement kind of Desktop GIS that is among the fastest development of the net. The objective of this method is to propose a good road management system to boost the present system. Open Source web-based GIS software system is employed in developing the system so as to reduce the upkeep price. By implementing this method, it provides a comprehensive system which will monitor and manage road conditions that is also able to be accessed by users through the net.

II. PREVIOUS WORK

Olena Vereynch et.al [8] has used digital technologies and mathematical and informational approaches to analyze, determining causes and taking measures for preventing accidents. He carried out a pilot project for determining accident black spots (places where road traffic accidents have historically been concentrated). Spatial data analysis using for black spots 4 definition has been proposed and had practical testing during the pilot realization. Open data about road accidents, open-source geo information systems, and Python programming language were used for the method implementation. Haseeb Tariq et.al [9] has proposed an Intelligent Transportation Systems (ITS). In which he proposes that it is more practical to use real-time data collected opportunistically from multiple vehicles and use to classify road surface quality. We believe that the authors approach of continues anomaly detection poses a challenging problem without practical implications for both city municipalities and regular drivers, as smart cars are only available for select minority. Liang wang et.al [10] has proposed a mobile crowdsourcing based system to detect urban road crack and estimate its damage degree. Specifically, for the heterogeneous crack data, he has put forward a crowdsourcing data quality evaluation and selection mechanism. In the authors proposed solution the data classification algorithm has proved to be not practical as the accuracy is not good and the data collection can only be done in clear weather conditions as non clear images classification cannot be done. Mark Dougherty et.al [11]. Has proposed a automated data collection solution of road conditions. Road monitoring can be automated using data from conventional sensors, vehicles on board devices, and audio 6 and video streams from cost-effective devices. The author presents an insight into a threshold-based decision making algorithms. By these methods, data is acquired preprocessed and then analyzed to improve decision making for gravel road maintenance. Threshold-based methods Automated systems use threshold-based methods to detect road anomalies. We find the proposed method difficult to implement as particular less costly sensor author is using are attached to the bottom of the vehicle, the problem with this is the drivers most likely avoid going over a bad road, which affect in missing the collection of the data. William J. O'Brien et.al [12] has proposed the use of visualization of geospatial data that is distributed across data sets and requires integration over time and space to aid decision makers. SHA of USA has relied on experience and historically collected data to make decisions on prioritizing maintenance projects. We find the propose solution problematic because Although historical data of maintenance and construction can be relied upon, it alone should not be always used decisions on prioritizing maintenance projects. Hamidah Bt.Hasan et.al [13] have proposed a informative database, gathered through GIS to ensure maintenance is done effectively. This framework is fit for putting away, making due, examining, figuring and showing all types of geological information for street support works. In this study, the author has adopted GIS application software – ArcView, and has assessed and investigated its viability in overseeing street data set. These data are then used to help the administration to guarantee viable and deliberate street upkeep. Zhenhua Liu et.al [14] proposed an information system, which covers planning, bidding, progress management, funds management, project acknowledgment, street upkeep and other business to understand the existence cycle the board of provincial road. He has applied modern information technology such as GIS, remote sensing image processing, mobile internet in the system. It has been applied in certain regions and accomplished great outcomes which show that it can give a powerful specialized means to provincial municipal road department. M. Szanto L. Vajta et.al [15] has proposed a driver assistance systems which open new possibilities for constructing road database, which describe the environment of roads in deep details. The locally available vision arrangement of a cutting edge vehicle conveys considerably more data than we really want for its fundamental undertakings. By use of additional evaluation of the visual information, and with the installation of extension elements and communication tools the authors achieve a cheap data source for a couple of new applications. Such system cannot be used in India as the number of smart cars in India are very few. All proposed data collection system for road managements system are costly. Carrying out a street support framework basically comprises of considering the entire of an organization using a street information base, looking for an upkeep strategy corresponding to an

economic condition, Numerous street management frameworks are not actually supportive in light of the fact that they create improper results; this is generally due to insufficient analysis and reporting. For example, in several countries where a RMS has been implemented, after several years it is still impossible to get a picture of Road damage severity, date of road damage, demand from public for road repair on a particular location, in depth financial data of money invested in any particular segment of road

III. METHODOLOGY

There is a rapid development of the road transportation network. Such a huge road network is managed by the Ministry of Road Transport and Highways which faces a challenging task of maintaining this huge road network throughout the year with limited budget. The key problem with road network management is that an effective way to collect road data is not available. Road maintenance prioritization is based on ad-hoc demands of elected representatives, who are many times not able to make correct decisions because the detailed information of road assets is not available at a single location and public demands threshold and want for particular roads to be repaired urgently does not reach the authority. Which many times result in negligence of bad or poor roads especially in the fringe areas for extended periods of time, this may sometimes lead to road accidents and vehicle damages, the result is wasteful expenditure and deterioration of road maintenance service of the overall road network.We propose building a friendly web interface that will aid all the concerned public and agencies and the government to make data informed decisions as road maintenance management is concerned. There will be Two Web interfaces in the RMS. The General public interface and the Road Authorities interface. The General Public interface consists of the Landing page, explaining the function of website. There will be Login and signup button on the landing page. After signing up or login in the user will be redirected to the RMS(road management system) Main page. Where he will have two functionality. Submitting complaint : The user will be able to select the geo-location of the damaged road by dragging the marker on the top of the damaged road. After the geolocation is selected the user will be prompted to enter additional information regarding the road damage. The details include, type of damage, if possible the images of the damage, which section of the road is damaged (left center or right). After filling out the details the user can submit the data.See how safe the selected route is: After the user fills in the “from” and “to” location data the user will provide a route with the help of a routing algorithm. And if the rout have any issues, it will be marked on the map .After the RMS server receives the data on road damage form the user. It waits till the particular road segment complains to exceed the threshold set. Once the threshold is passed the Map data is updated and the Road Authorities interface will receive a notification and message. The Employee will check the submitted data and assign the priority. And update the main map data.

IV. FIGURES AND TABLES

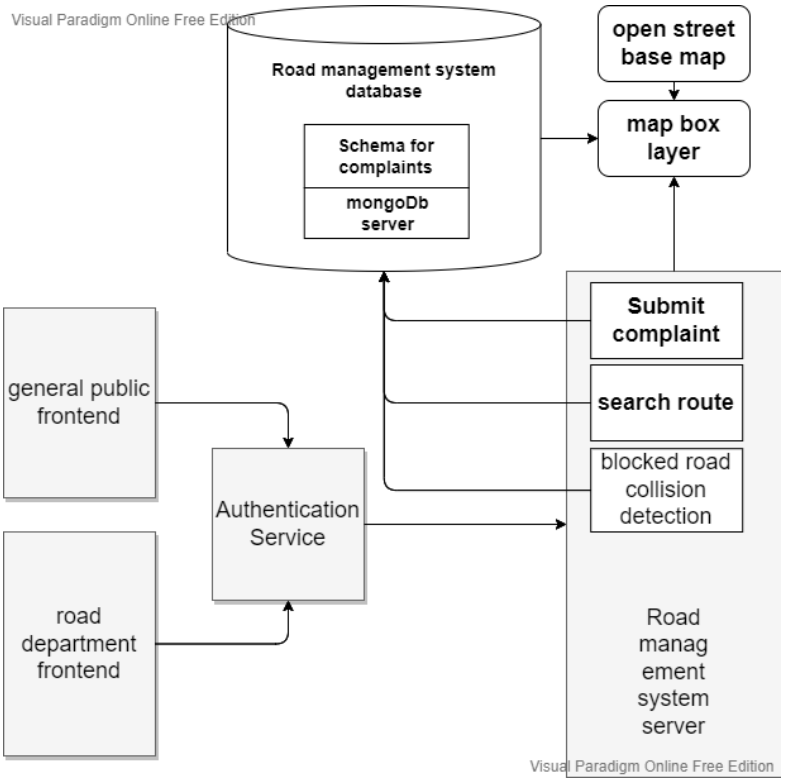

Fig 1: Block diagram

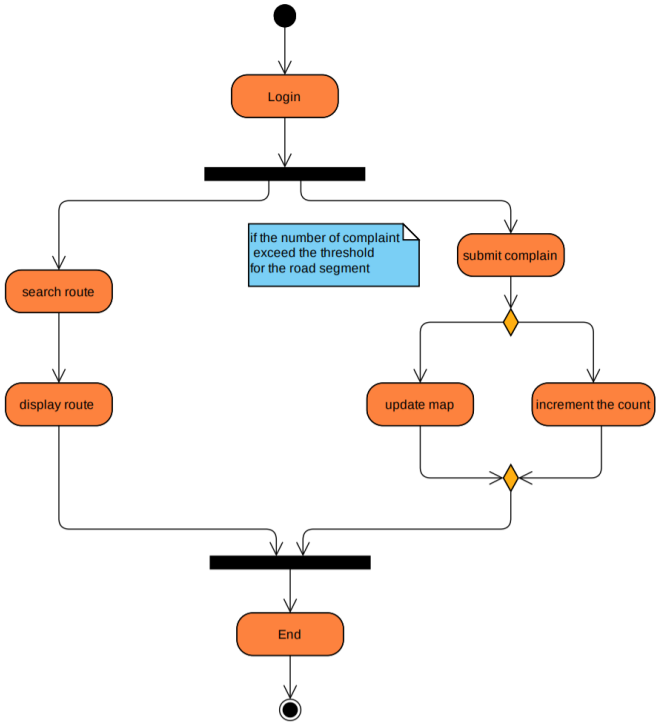

Fig 2: Flow diagram

V. CONCLUSION

The Proposed system will collect the data of potholes and road damages as most, it reduces the number of damages and accidents on road and is one of the effective means of Road maintenance system by using GIS technology. This project can be used by municipal co-corporation for maintenance of road. Use of this innovative technology not only strengthened the road maintenance but also increased the road life. This will prevent from road accidents and heavy traffics which occurs due to bad roads.

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