VIVA-Tech International Journal for Research and Innovation *Volume 1, Issue 4 (2021)*
ISSN(Online): 2581-7280 *Article No. X*
PP XX-XX

VIVA Institute of Technology
9thNational Conference on Role of Engineers in Nation Building – 2021 (NCRENB-2021)

VIVA-TECH IJRI
ANNUAL RESEARCH JOURNAL

VIVA-TECH INTERNATIONAL JOURNAL FOR RESEARCH AND INNOVATION
ANNUAL RESEARCH JOURNAL
ISSN(ONLINE): 2581-7280

IOT BASED POWER GRID MONITORING & CONTROL SYSTEM

Sarvesh Avere[1], Pranit Vichare[2], Pavan Machhi[3], Prof. Anojkumar Yadav[4]
[1]*(Electrical Department, VIVA Institute of Technology, India)*
[2]*(Electrical Department, VIVA Institute of Technology, India)*
[3]*(Electrical Department, VIVA Institute of Technology, India)*
[4]*(Electrical Department, VIVA Institute of Technology, India)*

Abstract : *Energy generation corporations provide electricity to any or all the households via intermediate controlled power transmission hubs referred to as Electricity Grid. Generally issues arise thanks to failure of the electricity grid resulting in black out of a complete space that was obtaining provide from that individual grid. This project aims to resolve this downside victimization IOT because the means that of communication and conjointly coping with numerous alternative problems that a wise system will traumatize to avoid needless losses to the Energy producers.*

Keywords –*IOT, Microcontroller, Power Grid, Sensors, Wi-Fi Technology.*

I. INTRODUCTION

IOT sensible Energy Grid is predicated on ATmega family controller that controls the assorted activities of the system. The system communicates over net by victimization Wi-Fi technology. A bulb is employed during this project to demonstrate as a sound client associated a bulb to demonstrate an invalid client. The foremost factor that this project facilitates is re-connection of cable to active grid. If associate Energy Grid becomes faulty associated there's an another Energy Grid, the system switches the Transmission Lines towards this Grid so facilitating uninterrupted electricity provide thereto explicit region whose Energy Grid went OFF. And this data of that Grid is active is updated over IOT webpage wherever the authorities will login and might read the updates.

Except for observation the Grid this project has advances capabilities of observation energy consumption and even find thieving of electricity. The quantity of electricity consumed and also the calculable value of the usage gets updated on the IOT webpage in conjunction with the Energy Grid data. Line fault conditions ar simulated within the system victimization 2 switches. Switch one when can simulate a thieving condition and conjointly can advise the authorities over the IOT interface. During this manner the sensible Energy Grid project makes positive that the electricity provide is continuous and helps in maintaining a updated record of consumption and thieving data that is kind of a valuable data for the energy manufacturing corporations.

II. Problem Statement

In most countries, business power is formed offered via nationwide grid, interconnecting various generating stations to load. the standard strategies that area unit in use these days like SMS area unit pricey. Since IOT is price effective due to net compared to SMS, observance and dominant

of energy usage at lower price is formed attainable. Daily consumption reports area unit generated which may be monitored by user through internet page and/or web portal.

The system is additional reliable and correct reading values area unit collected from energy victimisation devices. Live readings of devices is viewed victimisation Webpage in robot Mobile or Laptop/Pc. Also, the readings is viewed on-line. The human interference is avoided and every one the values area unit unbroken maintained within the central server. The communication medium is secure and meddling of energy meters or thievery of electrical line is known simply. If miscalculation happens within the system, the worth within the central server won't be updated. Since the values area unit hold on within the central info, the reports area unit created accessible from anyplace within the world. Also, the server is on-line 24x seven.

III. LITERATURE SURVEY

[1]Fahad Khan & Muhammad Abu Bakar Siddiqui Ateeq Ur Rehman, Jawad Khan Muhammad Tariq Sadiq, Adeel Asad IOT Based Power Monitoring System for Smart Grid Applications

Year of Publication: February 2020.

This paper proposes however net of Things (IOT) is wide employed in sensible energy observation, industrial automation, and a range of applications and conjointly describes the IOT primarily based power observation system.

[2] Prathik.M,Anitha.K,Anitha.V"Smart Energy Meter Surveillance Using IOT"

Year of Publication: February 2018.

In this paper we have a tendency to ascertained that The Arduino module is programmed to perform the objectives with the assistance of esp8266 Wi-Fi module. It's projected to beat all the disadvantages within the already existing energy meter. All the small print ar sent to the consumer's mobile through the IOT and it's conjointly displayed within the LCD. It's a time saving method and it helps to eliminate the human interference.

[3] S S Nagendra Kumar, S Koteswara Rao, M Suresh Raju, S Trimurthulu, K Sivaji, T Ram Manohar Reddy IOT Based Control and Monitoring of Smart Grid and Power. Theft Detection by Locating Area

Year of Publication: July 2017

This paper proposes the technology of IOT primarily based sensible Grid, It shows Advancement in high speed communication and low value sensing element plus the accumulated preparation of the advanced offer utilities with higher data to manage the grid.

IV. METHODOLOGY

Figure 1. Block Diagram of IOT based Power Grid Monitoring and Controlling System

4.1 WORKING OF THE SYSTEM:

4.2 Block Diagram Blocks:

1. Current sensor
2. Voltage detector
3. A2D converter
4. Microcontroller
5. 12V & 5V DC supply
6. Buzzer
7. Relay Switch
8. LCD Display
9. Wi-Fi module
10. Cloud
11. Interface block

4.3 Operation of Blocks:

1. Current Sensor & Voltage Sensor:

   This Block may be a shunt may be a device that permits current to pass around another purpose within the circuit. the present to be Measured should be 1st reborn into voltage in order that it may me measurable too with the ADC channels. The Voltage device block represents a perfect voltage device, that is, a tool that converts voltage measured between 2 points of associate degree electrical device into a physical signal proportional to the voltage. Connections + and – square measure electrical preserving ports through that the device is connected to the circuit.

2. A2D (Analog to Digital) Convertor:

   The project is predicated on a pre-programmed ATmega small controller. the whole system divided in four sections. Analog device interfacing, analog to digital convertor (ADC), wireless transmission, and power provide section.

3. Microcontroller:

   The project is based on a pre-programmed ATmega micro controller. The complete system divided in four sections. Analog sensor interfacing, analog to digital converter (ADC), wireless transmission, and power supply section.

4. Wi-Fi Module:

   The ESP8266 Wi-Fi Module may be a self contained SOC with integrated TCP/IP protocol stack that may provide any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting associate degree application or offloading all Wi-Fi networking functions from another application processor.

5. Relay Circuit:

   A single pole dabble throw (SPDT) relay is connected to port RB0 of the small controller through a driver semiconductor (Q1). The relay needs twelve volts at a current of around 100mA, that cannot offer by the small controller. that the driver semiconductor is additional. The relay is employed to work external electronic lock, or the other device ETC.

6. Power Supply:

   The power provide circuit. It's supported three terminal voltage regulators, which offer the specified regulated +5V and unregulated +12V. Power is deliver at the start from commonplace 12V AC/DC adapter or 12V_800ma electrical device.

4.4 Working:

The power supply is turned ON, the microcontroller ATmega 328p and relays driver is required 5V & 12V DC supply. So by use of a step-down transformer, the Rectifier circuit to give required supply to all interface components get the required supply. The three-phase supply is fed to load by using contactor to controlling the load.

In between three-phase line and load the voltage, current, zero crossing detector sensors are connected for sensing different parameters. In microcontroller write program for calculating all parameters like voltage,

current, active power, reactive power, apparent power, Power factor, etc. All this parameter receives by three-phase main lines and load side sensors.

The microcontroller reads the data from various sensors in digital digit by using A2D converter and analyses according to the given instructions, Microcontroller reads the commands from the internet and provides control signals to the relay via a three-phase contactor, which will control the Load.

After the microcontroller process on that data, the load control is based on automatic and manual mode the control is based on the sensed parameters is received an alert from the sensors and display indication on LCD or alert via a buzzer. The sensor information is displayed visually in the server in the cloud web page.

4.5 Component Required:

Table.1: Components with their Ratings

SR NO	COMPONENT	RATING
1	THREE PHASE AUTOTRASFORMER	0V-470V
2	THREE PHASE LOAD BANK	
3	RELAY AND DRIVER IC	12V DC
4	MICROCONTROLLER IC	ATMEGA328P
5	CONTACTOR	240V,50Hz
6	CURRENT SENSOR& VOLTAGE SENSOR	-
7	WI-FI MODULE	3.6V DC
8	LCD DISPLAY	16*2, 5V DC
9	BUZZER	5V DC
10	MISCELLANEOUS (SWITCHES, WIRES, PCB BOARD, ETC)	-

V. CONCLUSION

In this project the idea of IOT for fault detection, monitoring, controlling of 3 phase load. The system has the flexibility to mix numerous perceived parameters in real time and improve correct detection of different faults occur in load aspect. The observance of the lamp load system presents the activity of different parameters specifically power issue, offer voltage and cur-rent, frequency, real powers, reactive power, apparent power. Thus, compared to alternative typical ways this technique has additional variety of fields that allows alarm, alert messages and fast dominant.

The conception of IOT is given here for remote observance and dominant the hundreds. the info is additionally displayed serially. the appliance of the system is required these days for each electrical system. The system has the precise advantage less maintenance, simple and fast dominant and accessing of knowledge remotely. Experimental results make sure the practicability of the implementation of the system.

VI. Acknowledgements

We shall be failing in our duty, if we will not express our sincere gratitude to all those distinguished personalities with the help of whom we have successfully completed our project. My deep gratitude to **Dr. Arun Kumar**, PRINCIPAL, VIVA INSTITUTE OF TECHNOLOGY, who always been playing a great role in all round development of the student. My deep gratitude to **Prof. Bhushan Save**, THE HEAD OF ELECTRICAL DEPARTMENT and our project coordinator **Prof. Pratik Mahale** and our project guide **Prof. Anojkumar Yadav** for his valuable guidence, advice and constant aspiration to our work, teaching and non-teaching staff for their kind support, help and assistance, which they extended as and when required.

Last but not the least I wish to thank my friends for providing technical and moral support. I hope that this project report would meet the high standards of all concerned pwople and for their continuous co-operation during the whole period of period of project that helped us in enhancement of this project.

REFERENCES

[1] "Cloud Based Data Acquisition via IOT for Electrical Power Quality Monitoring", *Velibor Pjevalica - May 2019 (IEEE Paper)*
[2] "IOT Based State Estimate For Microgrid", MdMasudRana, Wei Xiang and Eric Wang- *Jan 2018 (IEEE Paper)*
[3] "IOT Energy management Platform For Microgrid", Tai-Yeon Ku, Wan-Ki Park – *2017 (IEEE Paper).*
[4] "Real time active power control in smart grid", Abdulfetah Shobole, Mohammed Wadi- *Nov 2017 (IEEE Paper).*
[5] IOT-Based Smart Grid System Design for smart home, AdiCandra Swastika, Resa Pramudita, RifqHakimi, *July 2017 (IEEE Paper).*
[6] A Review on "Power Quality Monitoring and Its Controlling Techniques", Dr.D.Sivakumar, J.P.Srividhya, and T.Shanmathi- *May 2016*
[7] "Active/Reactive power decomposition approaches to the AC optimal power flow problem", ByungKwon Park- *Sep 2014 (IEEE Paper).*
[8] "Application of Internet Of Things In Smart Grid Power Transmission", Qinghai Ou, Yan Zhen, Xiangzhen Li- *Jun 2012 (IEEE Paper)*
[9] "Internet of things for Energy efficiency of buildings," *International Scientific Journal Architecture and Engineering, Marco Casini – 2013*
[10] "Design and Implementation of Wireless Power Monitoring System for Public Buildings" Shu-ping Le, Hong Zeng, JianQiu, Song Zhang - *2013 (IEEE Paper)*