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Robotic Monitoring of Power Systems

Rameez Rashid[1], **Naseer Ganiee**[2]
[1]M.Tech Scholar, Department of Electrical Engineering, RIMT University, Punjab, India
[2]Director/Founder MindGates, Srinagar, Jammu & Kashmir, India

ABSTRACT

Information technology plays a very important role in the progress and development of country. The technology domain is present in every sector like banking, e-commerce, tourism etc. The applications are developed using number of platforms and people are using applications more and more for number of tasks. This paper focus on IOT technology and how it is implemented in power systems like power grids to make proper automation and minimize problems that we face in manual system.

Keywords: *Sensor, IOT, Smart Grid, Wi-FI.*

I. INTRODUCTION

Economically effective maintenance and monitoring of power systems to ensure high quality and reliability of electric power supplied to customers is becoming one of the most significant tasks of today's power industry. As with any preventive maintenance technology, the efforts spent on the status monitoring are justified by the reduction of the fault occurrence and elimination of consequent losses due to disruption of electric power, damage to equipment, and emergency equipment replacement costs. In the past few years, there have been several significant developments on monitoring technologies for distribution power cables. This review describes technical results relevant to mobile sensing of distributed systems, especially for maintenance tasks.

IOT technology is considered an essential imperative for Smart Grids (SGs). However, IOT devices have inherently limited responsiveness that may not be sufficient for a time critical SG with strict demands on communication delay. In practice, it remains an outstanding problem to combine IOT technology with existing grids. To facilitate deployment of IOT-based grids in domestic environments, we propose IOT-grid, a programmable, small-scale, grid that can be easily implemented with low-power hardware with limited processing capacity. The proposed grid accommodates existing small-scale DC power systems (e.g. solar panels) and we then explore the communication aspects of IOT-grid, namely, control and monitoring functions. We observe that processing delays of IOT devices have large impact on IOT-grid, which cause a chain of control commands to take considerable longer time as the number of commands increases. To mitigate this problem, we propose a mechanism based on sending burst commands with scheduled responses. Our experimental results show that, in the presence of processing delays, this method can significantly reduce the overall response time.

To Make power systems more efficient and Information Technology enabled it is very important to incorporate smart concept in Grid Stations. A Smart Grid is simply a combination of electrical and infrastructure using IT service within existing electrical network.

II. Problem Formulation

Energy generation companies supply electricity to all the households via intermediate controlled power transmission hubs known as Electricity Grid. Sometimes problems arise due to failure of the electricity grid leading to black out of an entire area which was getting supply from that particular grid. This research aims to solve this problem using IOT as the means of communication and also tackling various other issues which a smart system can deal with to avoid unnecessary losses to the Energy producers. Apart from monitoring the Grid it is very important to monitor energy consumption and even theft of electricity to make proper use of electricity. The amount of electricity consumed and the estimated cost of the usage needs to be updated on the webpage along with the Energy Grid information.

III. Research Objectives

The main objectives of my research are described below:

- Imparting sensors in electrical domain.
- The complete configuration of different sensors used.
- Measurement of current, voltage and power.
- Establish the capability of controlling various high capacity load appliances using the proposed and developed approach.
- To In-corporate smart concept in Electrical Engineering.
- To avoid unnecessary losses to the energy producers using IOT.
- To monitor energy consumption and theft of electricity.
- To display electricity consumed with the estimated cost of usage on a webpage.
- To display full energy grid information on the webpage.

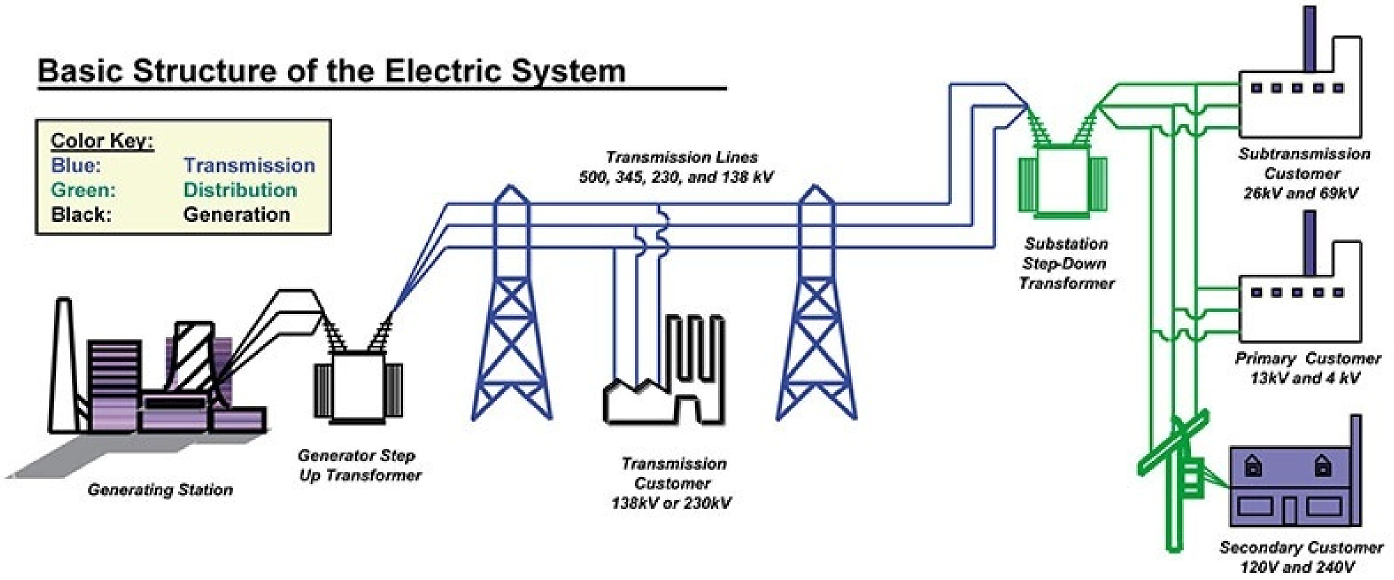
IV. Methodology

1. Existing Methodology

The grid starts with a fundamental equation that governs it. Simply put this equation is:

Generation=Load Generation =Load

The power grid is a network that carries takes energy, converts it to electricity and delivers it you, the consumer. Currently, for the most part, energy is produced in central generation stations. These are power plants that produce electricity by turning a generator. There are many ways to turn a generator, from using wind, to burning natural gas or coal to spin a turbine. From the power plant, electricity then enters what is known as the power grid. The basic electric system is shown below.

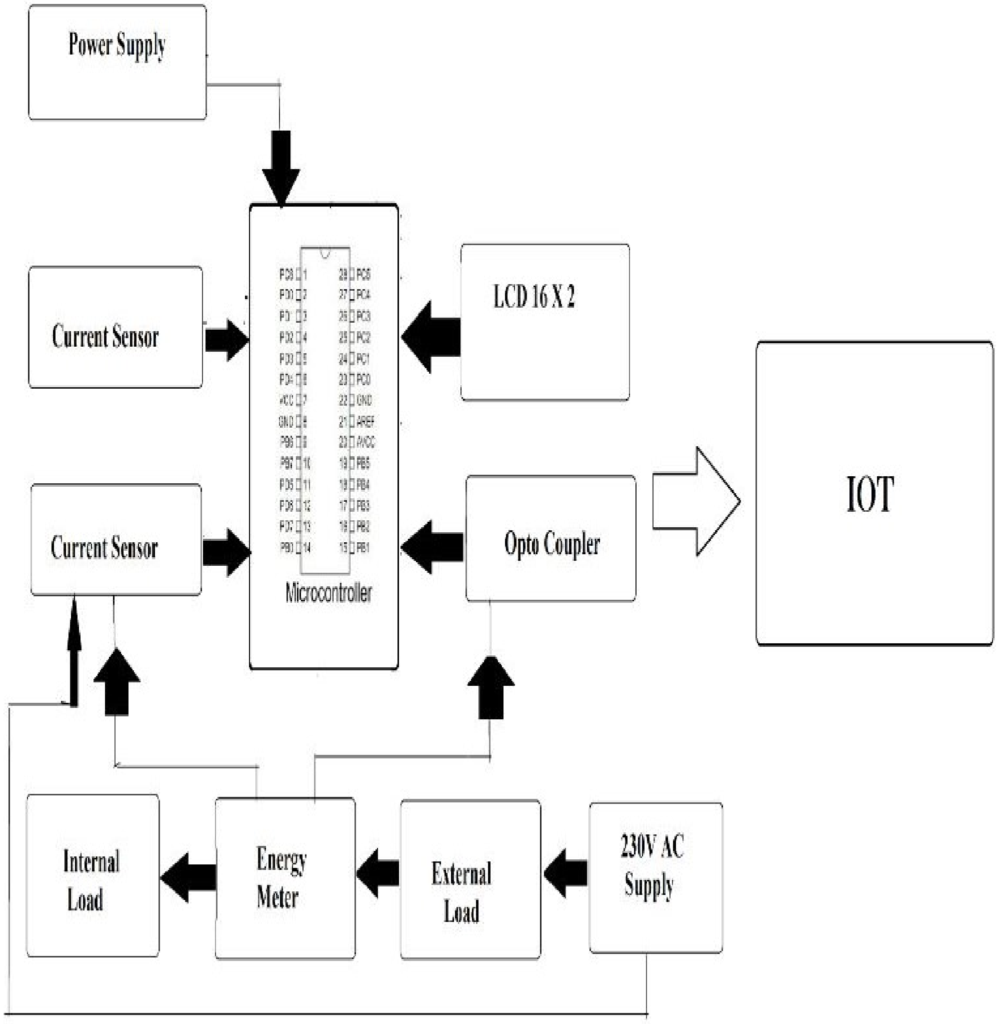


2. Proposed Methodology

Work is based on the concept that whenever one grid station which transfers the power to households is interrupted due to some fault ,with the help of IOT based technologies we can connect all the loads connected to grid station with some other station so that power supplied does not get interrupted. The existing methodology does the same work but manually .The current strategy provide us the way to connect the IOT technology to the power station so that this can be done with the help of a particular software with the help of the single click.

Energy generation companies supply electricity to all the households via intermediate controlled power transmission hubs known as Electricity Grid. Sometimes problems arise due to failure of the electricity grid leading to black out of an entire area which was getting supply from that particular grid. This project aims to solve this problem using IOT as the means of communication and also tackling various other issues which a smart system can deal with to avoid unnecessary losses to the Energy producers.IOT Smart Energy Grid is based on ATmega family controller which controls the various activities of the system. The system communicates over internet by using Wi-Fi technology. A bulb is used in this work to demonstrate as a valid consumer and a bulb to demonstrate an invalid consumer. The foremost thing that this project facilitates is re-connection of transmission line to active grid. If an Energy Grid becomes faulty and there is an another Energy Grid, the system switches the Transmission Lines towards this Grid thus facilitating uninterrupted electricity supply to that particular region whose Energy Grid went OFF. And this information of which Grid is active is updated over IOTGecko webpage where the authorities can login and can view the updates. Apart from monitoring the Grid this work has advances capabilities of monitoring energy consumption and even detects theft of electricity. The amount of electricity consumed and the estimated cost of the usage gets updated on the IOTGecko webpage along with the Energy Grid information. Theft conditions are simulated in the system using two switches. Switching one each time will simulate a theft condition and also will notify the authorities over the IOT interface. In this way the Smart Energy Grid project makes sure that the electricity supply is continuous and helps in maintaining a updated record of consumption and theft information which is quite a valuable information for the energy producing companies.

3. Proposed Block Diagram



V. Conclusion

A revolution in energy domain is underway, namely the Smart Grid. Smart Grid is a user friendly technology and user can check daily consumption from any location using internet. Owner can control customer meter from control unit. Smart grid represents one of the most promising and prominent internet of things applications. More efficient transmission of electricity, quicker restoration of electricity after power disturbances. Reduced operations and management costs for utilities, and ultimately lower power costs for consumers.

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