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IOT BASED SMART GRID SYSTEM USING ARDUINO

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ABSTRACT

Electricity as an important invention without which life on Earth is impossible. So obviously there is a need for measuring the consumed electricity. Accomplished by the wattmeter, but a person from has to visit each customer's house for measuring the power consumption and for calculating the bill amount of customers. So, it requires much manual work and consumes time. We have intended to construct an IoT based energy meter to each customer of TNEB. So, the proposed energy meter measures the amount of power consumed and uploads it to Things peak cloud the concerned person can view the reading. The power reading is sent to the cloud using ESP 8266, a Wi-Fi module. The power reading from digital wattmeter is read using the opt coupler and transmitted digitally to the Arduino. So, it automates the process of measuring the power consumption at homes using IoT and thereby enabling remote access and digitalization for each customer

Keywords: Internet Of Things (Iot), Arduino UNO.

I. INTRODUCTION

Classical infrastructure of power grid, from power generation to end users, includes several power devices in order to transfer the power generated at a power station to end users safely and efficiently. These power devices are power generators, transformers, power switches, power breakers, transmission and distribution lines, utility meters, relays and fuses. So that each of all these components has its own potential problems due to old technologies used. On the other hand, modern power system technologies offer integration of renewable energy to the grid, smart metering, bidirectional energy flow, preventing power outages, sustainability of clean and safe energy, as well as energy efficiency. Moreover, controllability, measurability and cyber security of the energy at each point of the grid are unavoidable in a modern power grid system. If any classical power system is integrated in with an information and communication technology, then the power grid is converted in to a smart grid and bidirectional power flow is provided. A smart gird system is a kind of sophisticated technology that allows not only bidirectional power flow but it also has several different aspects such as availability, effectiveness, accuracy, controllability, economically, flexibility, interoperability, maintainability, measurability, optimality, reliability, sustainability, stability, security, and scalability [1-6]. As figured out in Fig. 1, all these features of the smart grid make the power grid robust enough against any power failure, voltage sag, power losses, voltage and frequency fluctuation, over voltage, and over current. Moreover, a smart grid system brings producers, network operators and prosumers, as well as energy policy makers. While a classical power grid consists of only producers and network operators at national grid level, a smart grid combined the prosumers and policy makers in to the game. Because, a consumer can also be a producer and sell the energy produced to the grid. The energy produced by a prosumer can be obtained directly from a renewable energy source or a battery system. The Internet of things (IOT) concept enables us to connect the normal day to day devices with each other over the internet.

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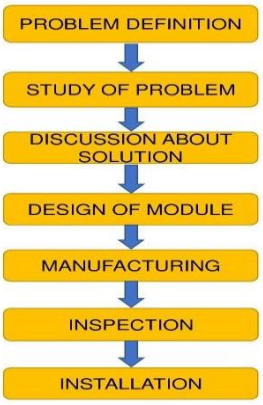
II. METHODOLOGY



III. MODELING AND ANALYSIS

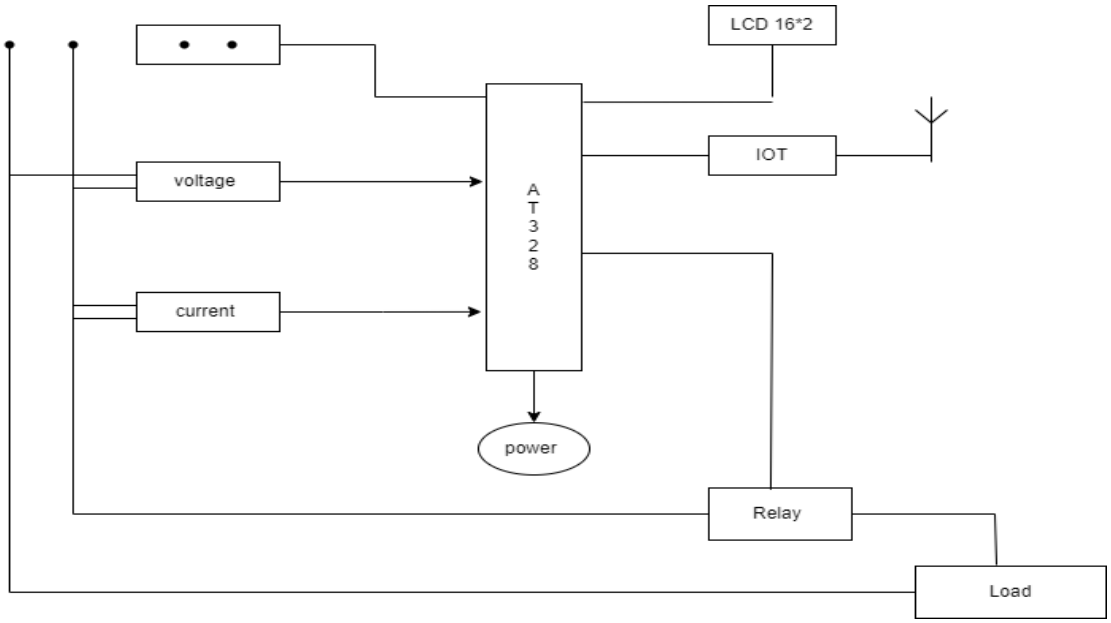


Figure 1: Block Diagram

A complete IoT based sensing system is proposed for Substation automation application in Smart Grid environment. Various parts of the system are discussed in detail along with their possibility of application alongside the present substation automation systems. An overall implementation of the system including network topologies, wireless communication networks and secure communication with other parts of the power grid is also discussed. The MQTT protocol suggested in the proposed system is relevant to the substation environmentand provides a reliable and secure way to communicate sensor data to a large audience. The system design is cost effective and easy to implement and configure. It provides a new approach to monitor, store, visualize and communicate.

IV. RESULTS AND DISCUSSION

Firstly, we have to switch on the mains. Current sensor senses the power utilized by the load. Which gives output in analog form. The output of the sensor is supplied as input to the analog input part in the Arduino Nano Board. Arduino board has inbuilt analog to digital. convertor which converts analog input of power to digital output. This digital output isdisplayed on LCD display in form of Watts as shown in Image -1 below. There is a set pointvalue; when the power utilized by the load exceeds the set point value LCD displays “Theftdetected” as shown in the Image -2 below. The Node MCU is used to connect internet with the monitoring hardware system. The power utilized by the load is displayed in the cloud viz, Things Speak cloud in graphical format as shown in the Chart -1 and Chart -2 below. It shows time to time power utilization of the load/loads connected to the system.

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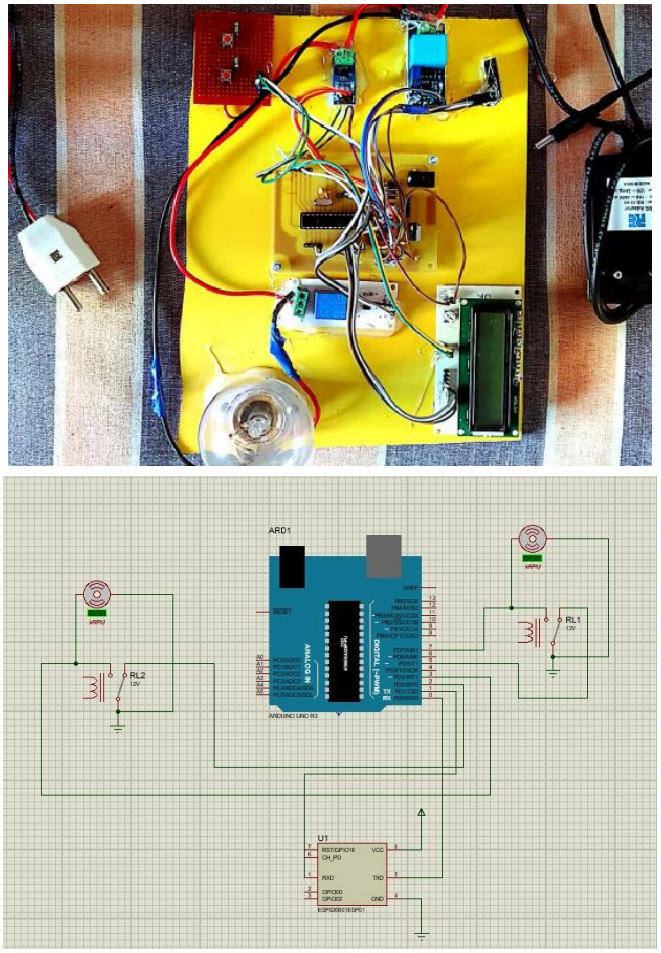

Figure 2: Project hardware

V. CONCLUSION

Energy Monitoring using IOT is an innovative application of internet of things developed to control home appliances remotely over the cloud from anywhere in the world. In the proposed project current sensor is used to sense the current and display it on internet using IoT. The system updates the information in every 1 to 2 seconds on the internet using public cloud THINGSPEAK. In the present system, energy load consumption is accessed using Wi-Fi and it will help consumers to avoid unwanted use of electricity. IoT system where a user can monitor energy consumption and pay the bill Online can be made. Also, a system where a user can receive SMS, when he/she crosses threshold of electricity usage slab can be equipped. We can make a system which can send SMS to the concerned meter reading man of that area when theft is detected at consumer end. Also using cloud analytics, we canpredict future energy consumptions.

VI. REFERENCES

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