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IOT BASED SMART ENERGY METER

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Abstract: Efficient energy utilization plays a very vital role for the development of smart grid in power system. The proper monitoring and controlling of an energy that is consumed is a chief priority of the smart grid. The existing energy meter system has many problems associated to it and one of the key problems is there is no full duplex of communication. To solve this problem the smart energy meter is proposed based on Internet of Things (IoT). The proposed smart energy meter controls and calculates the energy consumption using ESP32 module, a Wi-Fi module and uploads it to the Thingspeak from where the consumer or producer can view the reading. Therefore, the energy analyzation is done by the consumer becomes much easier to access and controllable. This system also helps in detecting and control over power theft. Thus, this smart energy meter helps us in home automation using IoT and enabling wireless communication which is a great step towards Digital India. The setup of an IoT based smart energy meter helps us to view how much of power consumption in LCD display and Mobile/Laptop associates globally from anywhere at any time.

***Keywords*: ESP32 MODULE, Wi-Fi, ThingSpeak.**

I. INTRODUCTION

Efficient energy utilization plays a very vital role for the development of smart grid in power system. The proper monitoring and controlling of an energy that is consumed is a chief priority of the smart grid. The existing energy meter system has many problems associated to it and one of the key problems is there is no full duplex of communication. To solve this problem the smart energy meter is proposed based on Internet of Things (IoT). The proposed smart energy meter controls and calculates the energy consumption using ESP32 module, a Wi-Fi module and uploads it to the Thingspeak from where the consumer or producer can view the reading. Therefore, the energy analyzation is done by the consumer becomes much easier to access and controllable. This system also helps in detecting and control over power theft. Thus, this smart energy meter helps us in home automation using IoT and enabling wireless communication which is a great step towards Digital India. The setup of an IoT based smart energy meter helps us to view how much of power consumption in LCD display and Mobile/Laptop associates globally from anywhere at any time.

II. LITERATURE SURVEY

Shanzhi Chen; Hui et all (IEEE Transactions 2018) has discussed about various applications, challenges and opportunities of IOT applications with respective to Indian scenario. In this paper, author discussed low-cost real-time IOT based energy management system as proposed. It is conceived as part of a distributed system that measures the main power system quantities

and gives the possibility to manage the whole power plant. An integrated Web Server allows the gathering of the statistics of power consumptions, power quality and is in position to interface devices for load displacement. The device is characterized by quick access to the data and the combination of a smart meter and digital communication capability allows local and remote access. In this way, it is possible to manage the power consumption by the electrical appliances and also check the amount of power consumed by our appliances in terms of money. The power system resulted in an overall reduction in energy consumption and costs.

Leo Louis (IJEART, 2019) has discussed about the real time pricing of the current consumption of each individual apartment of the complex which gives better results and effectively created positive impact on the consumers for the controlled economic use of current. In this application the author used the analog meter to display the power consumed.

Jeo biron and Jonathan Follet (IEEE Conference proceedings 2020) put very notable effort to make the smart energy meter has handheld portable device. The used wired digital meter to display the power consumed of the individual compartment of the home. These meters are usefully implemented in Singapore.

Jhon Lennon (2018) Iot based energy meter for efficient energy utilization in smart grid provide wireless meter reading system that can monitor and analyze the data at every interval providing accurate results with less error. Energy conservation, lots of power saving from power department.

Bibek Kanti Barman (2018) in this paper it explain about the energy utilization which plays a vital role for the development of the smart grid in power system. Therefore proper monitoring and controlling is given first priority. In the existing energy meter system has many problems associated to it. To solve this problem, a smart energy meter is proposed based on Internet of Things (IoT). This system also helps in detecting power theft. Thus, this smart meter helps in home automation using IoT and enabling wireless communication which is a great step towards Digital India.

2.1 Outcome of Literature Survey

From the literature survey it has been understood that, many researchers have developed product to measure voltage consumed by home appliances. But the product is operating manually. Very few companies like Cisco, Samsung, Intel etc. are now trying to release these products to measure the voltage consumption of home appliances which are capable of controlling through IOT clouds. Therefore, we have opted this concept of measuring energy consumption through IOT in this project.

Electricity board gives the service before collecting the payment from the customers and it is difficult for Electricity board to collect the payable amount from the customers and at the same Electricity board cannot stop to providing the service. So there is need of a system service after payment.

III. PROBLEM STATEMENT

The existing energy meter system has many problems associated to it and one of the key problems is there is no full duplex of communication..

IV. OBJECTIVES

- To develop the embedded system capable of sensing the power consumed by each load connected to system .
- To link the data retrieved by the load to the UBIDOTS IOT web server.
- To screen the android app suitable for displaying the consumed power by the individual loads.
- To consolidate the individual power as segregated value to display in the mobile.

V. METHODOLOGY

This chapter gives the overall in-depth information about the project. This chapter also involves aspect of the project, such as design, implementation and modelling, software implementation and simulation software used in our project.

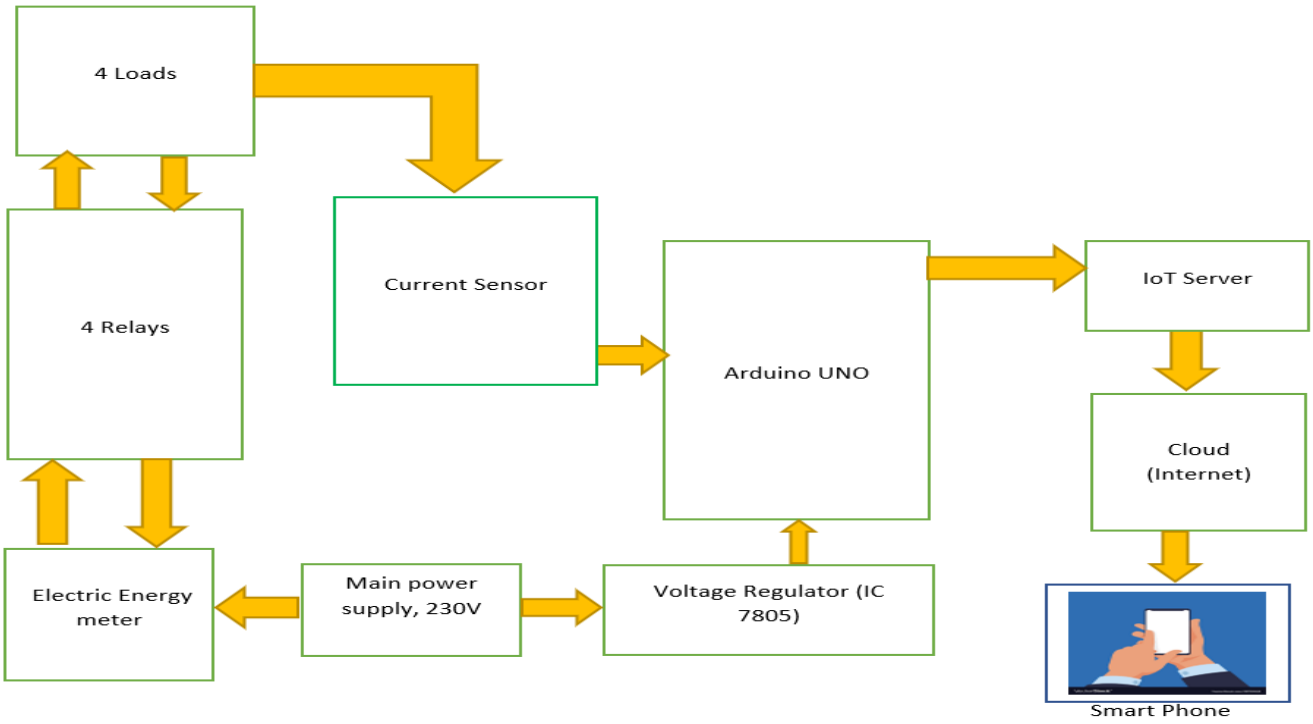

Figure.1: Block Diagram

DVANTAGES/DISADVANTAGES/APPLICATIONS

Advantages

- Control over energy consumption
- Smart energy display that allows you to see how much energy generated by your appliances.
- It helps you track the actual cost of your bill before even it is generated. You can also identify when you use the least or most energy.

Disadvantages

- There are many reports of disadvantages of smart meters, but this isn't the case.
- We've debunked some of the common smart meter myths below.
- Some people have concerns around their data security, but the communication network that sends data from your smart meter uses similar secure technology to the banking industry.

Applications

- IoT can be utilized for various applications of the smart grid with distributed energy plant meter, energy generation and energy consumption meter smart meter, energy demand side management and various area of energy production.

VI. RESULTS AND DISCUSSIONS

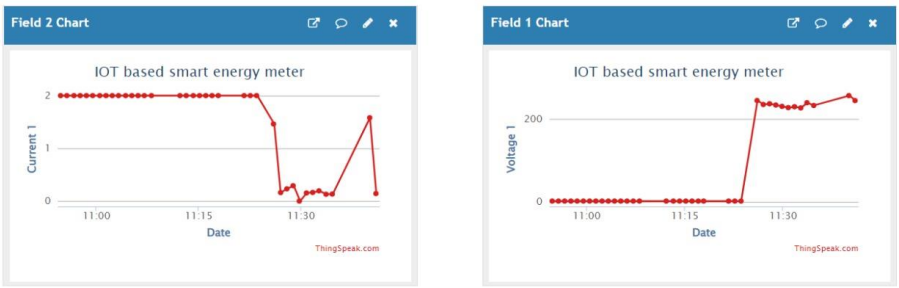

Figure 1: current and voltage output of load 1

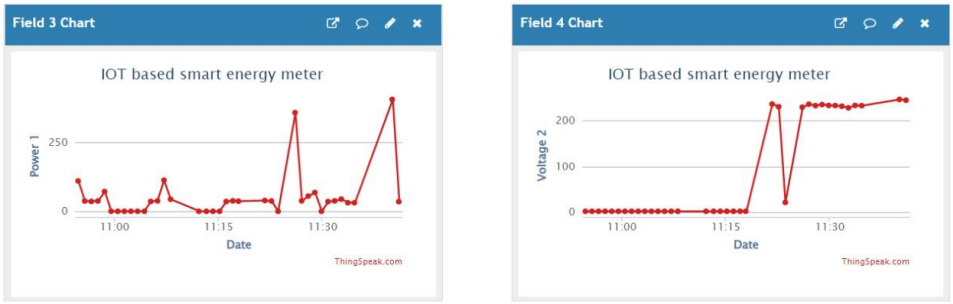

Figure 2: power output of the load 1 and voltage output of load 2

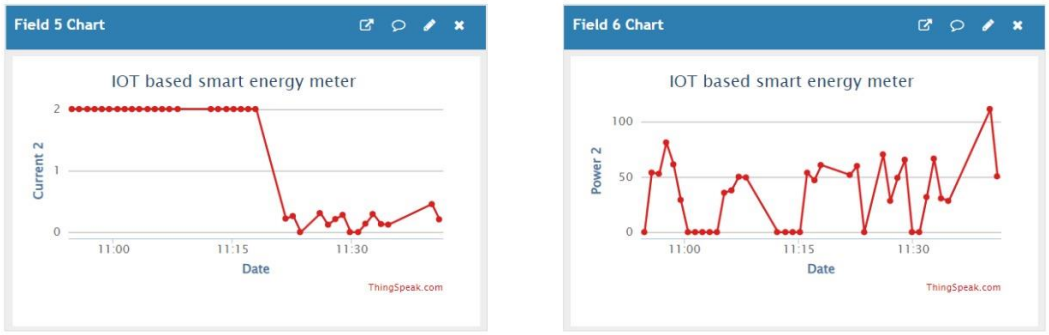

Figure 3: current and power output of load 2

VII. CONCLUSION

- By using this project, we can reduce the manual effort to take the reading from the energy meter which is cost effective.
- Encourage clients to opt for prepaid meters on a voluntary basis and offering tariff or non-tariff incentives to those users who prepaid their power changes would help the utilities to execute this system.
- Divergence in service is going to be the key competitive factor to the improve market share in the present power markets prepaid meters with their advantages over conventional ones are likely to help power providers to differentiate and offer value –added services to users.
- It is user friendly and we can enhance this project, in which an electricity department can send message to the consumer about the billing information. Reduces man power.
- Reduces man power.

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