

# IoT BASED SMART METER

Kewal Kokate<sup>1</sup>, Bhagyashri Pagar<sup>2</sup>, Sujata Thombre<sup>3</sup>, Mrs. J.A. Lele<sup>4</sup>

<sup>1,2,3,4</sup> Department of Electronics and Telecommunication, MIT College of Engineering, Kothrud, Pune, India

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**Abstract:** In this project smart energy meter using IoT and Arduino have been introduced. In this method we are using Arduino because it is energy efficient i.e. it consumes less power, it is fastest and has two UARTS. In this project, energy meters which is already installed at our houses are replaced with a small modification and converting it into smart meter. The use of Wi-Fi module provides a feature of notification through internet. One can easily access the meter working through web page that we designed. Current reading with cost can be seen on web page.

**Key Words:** Internet of Things, Smart Energy Meter, Electric board, Controller, LCD 16x2, Wi-Fi Model, Current Sensor, Voltage Sensor, ATmega 328.

## 1. INTRODUCTION

The Internet of Things concept enables us to connect the normal day to day devices with each other over the internet. The devices connected through IoT concept can be controlled and analyzed remotely. The IoT concept provides the basic infrastructure and opportunities to form a connection between the physical world and computer based systems. The concept has been gaining importance with more and more wireless devices that are increasing rapidly in the market. It connects the hardware devices with each other over the internet. The ESP 8266 Wi-Fi module used in the system provides the connectivity with the internet in the system.

Now-a-days the demand for electricity is increasing at a constant rate throughout the population and is being utilized for various purposes wiz, agriculture, industries, household purposes, hospitals etc. So, it is becoming more and more complicated to handle the electricity maintenance and requirements. Therefore there is an immediate requisite to save as much electricity as possible. As the demand from the newer generations of population for electricity is increasing so in accordance with it the technology improvement is needed. The proposed system provides a technical twist to the normal energy meters using the IoT technology. Also there are other issues that we have to address such as power theft and meter tampering which in turn generate economic loss to the nation. Monitoring, Optimized power usage and reduction of power wastage are the major objectives that lie ahead for a better system.

The present system vastly depends on human involvement for billing. Billing requires a human individual to visit each and every customer's energy meter and generate the bill by taking the unit readings from the energy meter. This is a time consuming process. To address all the

mentioned constraints we developed a system on the basis of IoT technology.

## 2. LITERATURE SURVEY

[1] This paper proposed that power utilities in different countries especially in the developing ones are incurring huge losses due to electricity theft. This paper proposes prepaid energy metering system to control electricity theft

[2] This paper proposed a cheap smart meter which is designed not only to measure the customer's power consumption and generation but also to enable and support the new operation and control functions in the distribution networks. It is based on open source hardware (Arduino and Arduino Ethernet Board) and offers a plurality of communication possibilities, like USB, Ethernet, ZigBee or Bluetooth

[3] This paper proposed a high potential energy savings solution by impacting the behaviour habits of individual in their households. To solve this scenario it requires that consumers do have a sophisticated feedback system, which provides better understanding and comparison of, how their action relates to their energy consumption, and by doing so they can optimize the use of electricity.

## 3. PROPOSED SYSTEM

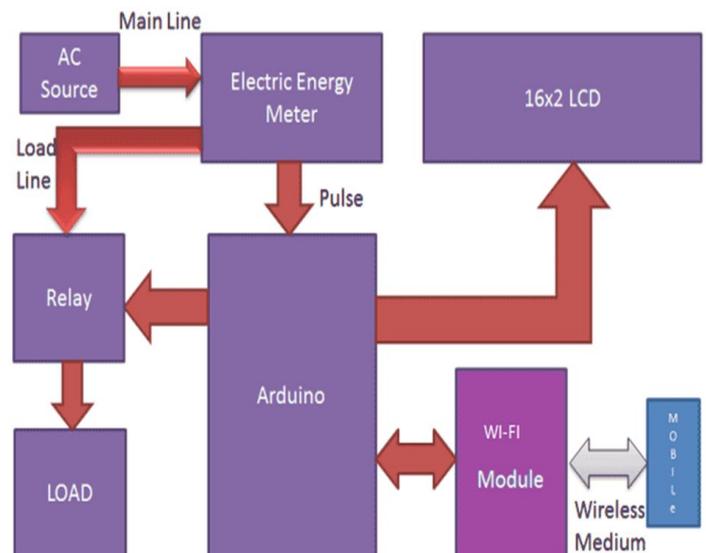


Figure1- Block Diagram of IoT based smart meter.

### 3.1 ATMEGA 328

The main purpose of using ATmega 328 is its high functionality with simplicity and familiarity. ATmega 328 bridges the gap between sensors and IoT (Internet of Thing). ATmega 328 is powered with 5 volts dc supply for its operation.

### 3.2 ENERGY METER

Energy meter or watt-hour meter is an electrical instrument that measures the amount of electrical energy used by the consumers. Utilities is one of the electrical departments, which install these instruments at every place like homes, industries, organizations, commercial buildings to charge for the electricity consumption by loads such as lights, fans, refrigerators and other home appliances. Energy meter measures the rapid voltage and currents, calculate their product and give instantaneous power. This power is integrated over a time interval, which gives the energy utilized over that time period. In this project we are using the SCT013 (current sensor) and ZMPT101B (voltage sensor) as a Energy Meter.

### 3.3 LIQUID CRYSTAL DISPLAY (LCD)

LCD is used for displaying the Product name, Current Power & total cost. When product is installed then, it will show the name of the Product and then it display unit and cost. With the increment in load the cost will unit and cost will change and that is also display on LCD.

### 3.4 Wi-Fi MODULE (ESP8266)

All the calculated data by ATmega 328 is further processed by Wi-Fi Module in order to store on IoT (Internet of Things) Server or Cloud. In order to analyse this data on daily, weekly and monthly basis we are using popular IoT platform Adfruit.

### 3.5 SYSTEM IMPLEMENTATION

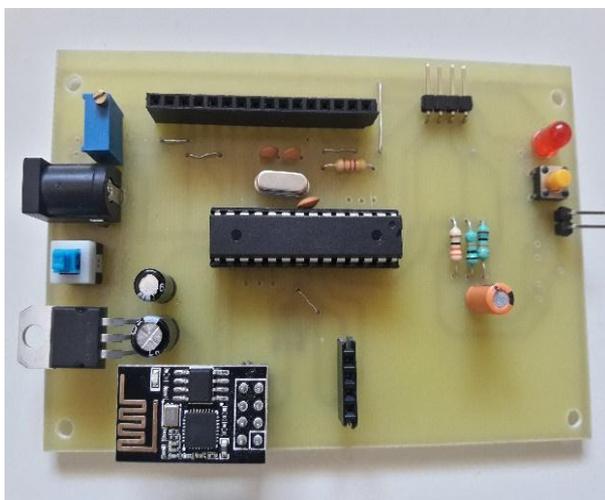


Fig.1: PCB of IoT BASED SMART METER



Fig.2: Display Readings at time of Measurement

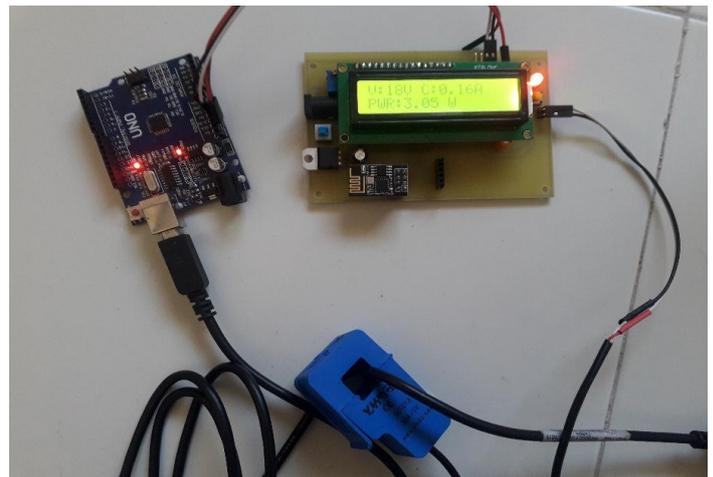


Fig.3: SETUP at the Time of Measuring USB Port Current

### 3.6 HOW DOES IT WORK?

AC energy meter is system in which your able monitor remotely your energy usage using android application. We Designed system suing AVR microcontroller and current and voltage sensor .to measure current we used SCT sensor which accessed using controller ADC and calculated exact current and we used ZMPT101B for Voltage measurement. After getting those two value we calculated power and display all those parameter on LCD screen and also updated on the cloud with help of WIFI module esp8266 this process getting perform repetitively. With help of android App we are able monitor current energy usage.

### 4. CONCLUSION

The project is based on the internet of things concept. This is aimed at replacing the old energy meters with an advanced implementation. It can be used for automatic power reading by which one can optimize their power usage thereby reducing the power wastage. The readings from the meter are uploaded to Adfruit.com where a channel with the energy usage for a particular energy meter can be viewed by both the service end and the customer. A smart app can be help to User to Cut the Supply when no one at Home

### 5. FUTURE SCOPE

The project can be further extended to detect the energy meter tampering. A smart app can be designed to provide various alerts based on the readings from the device.

A unified can be provided to the customers for both viewing the energy usage and a platform to pay the bill online following the digital India initiative. In one case the service provider can evaluate the bills which are not paid and can disconnect the energy connection remotely.

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