

# Review Paper on Smart Energy Meter Using IoT

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**Abstract -- We can see a person standing in front of our house, whose duty is to read the energy meter. The person checks the meter board, takes the readings and the bill is received at the customer's place within two or three days. This procedure from taking the meter readings to generating the electric bills and delivering the electric bills to each customer's house involves a lot of time as well as money. Sometimes there may be issues like extra bill amount or notifications to the customers even if the bill is paid. To overcome this drawback we have come up with an idea of developing an IOT based smart energy meter which will reduce the errors in bill generation and also save the time of the workers of the electricity board. In this system, the electric meter board will be connected to Arduino board which will take the readings from the meter board with the help of sensor and will give the notifications or to update the readings on the web based system which will be connected through the Wi-Fi module. The readings or the consumption are updated every single day depending upon how much the energy is been consumed in a particular house. This system also involves sending the notifications or messages to the customer about the consumption of energy. Through this system, the customer can get the notification about the energy consumption globally.**

**Indexed Terms:** Energy Meter, Arduino, GSM Modem, Wi-Fi, Digital Screen, Web Page, and Load.

## I. INTRODUCTION

The existing electricity billing system consists of manual process for Bill generation which requires lot of man power. It causes lot of calculation errors and faults. The present system also lacks the facility to convey the user about his energy consumption on daily basis which causes the user to be surprised when he receives large amount of electricity bill generated at the end of the month. The paper discusses about the project based on "Smart Energy Meter" which mainly focuses on providing the information about his daily energy consumption and cost through a website and also predict his bill which will be generated at the month end. The complete information will be shown on his dashboard after he has successfully logged in to

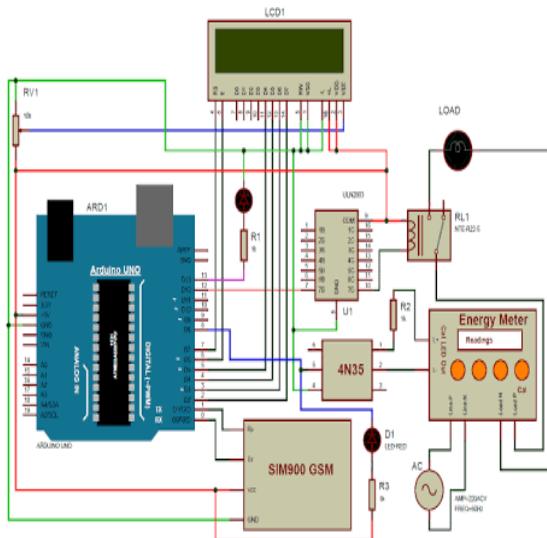
the website by providing correct details. The system will also notify the user via SMS by warning him about his consumption when a threshold value is reached even if he does not check it on his website account.

## II. LITERATURE SURVEY

Paper	Review/Findings
"Smart Energy Meter Using Android Application And GSM Network" Diya Elizabeth Paul , Prof . Alpha Vijayan.	This is implemented to getting a fully automated electricity billing system. The aim is to measure and monitor the electricity consumed by consumers in a locality and transmitting the consumed power to the station as well as issuing the bill of consumed power automatically.
"Smart Energy Meter "Jithin Jose K#1, Leneesh Mohan#2, Nijeesh U K#3 ,Tony C Benny#4	Even the latest energy meter is not tamper proof. Hence considering all these factors it is possible to design an energy meter that is tamper proof, supports automatic metering and billing system, and at the same time helps in finding the fault location of transmission lines.
"IOT BASED ENERGY METER READING" Pooja D Talwar1, Prof. S B Kulkarni2	This paper is described to measure energy consumption in the house and generate its bill automatically using telemetric communication. This can help in reducing energy consumption in house as the owner is continuously being notified about the number of units that are consumed.

### III. PROPOSED WORK

Monitoring and keep the tracking of the electricity consumption is a tedious task today. Various issues arise like people are unaware about the energy which is been consumed at their places and get worried about receiving the high electricity bills. It is important to know that the customers are charged accordingly so the need is quite certain. To avoid this we automate the system by allowing the users to monitor the energy meter readings over the internet. Our proposed system uses the Arduino UNO board, Wi-Fi module and a LCD display. The Wi-Fi module is the main component in the IOT operation. The Arduino UNO board is connected to a sensor which will sense the meter readings and the readings are then processed and are updated over the Wi-Fi through the Wi-Fi module. The readings are updated over the webpage which can be easily accessed by the users. In this system the user will also be notified about the consumption through the SMS when the energy consumption reaches the threshold value. This allows the user to easily check the energy usage by using a simple web application. Thus this system allows the users to effectively monitor the electric meter readings and check the billing online with ease.



*Fig. Schematic representation*

### IV. COMPONENTS

- Arduino UNO.
- GSM Module.
- Energy Meter.
- Load.

- Wi-Fi Module.
- Dashboard

#### 4.1. ARDUINO UNO-



*Fig. Arduino UNO*

The Atmel AVR® core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), 5= two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

#### 4.2. GSM Module-



*Fig. GSM Module*

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz's The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using

this modem, you can make audio calls, SMS, Read SMS; attend the incoming calls and internet etc. through simple AT commands.

#### 4.3. ENERGY METER-



*Fig. Energy Meter*

Power meters are sometimes referred to as energy meters and vice versa. Per definition, (active) power is a measure of what is required (or consumed) in order to perform useful work. For example, a light bulb with a 100W rating consumes 100 watts of active power in order to create light (and heat). Energy, per definition, is the measure of how much work has been required over a known period of time. In the light bulb example, leaving the bulb on for an hour it will consume  $100W \times 3600s = 360000Ws$  (watt-seconds) = 100Wh (watt-hours) = 0.1kWh (kilowatt-hours) of energy.

#### 4.4. Load-

In this project, for the consumption of electrical energy we need to apply certain load so that the consumption of electrical energy will be noted by the Arduino.

#### 4.5 Wi-Fi Module -



It is used to create a network between hardware and software.

#### 4.6 Dashboard –

After the user has logged in to the website the dashboard looks like the above given figure. The unit consumption and the cost will be shown in the form of graphs and charts.

### V. FUTURE SCOPE

The project mainly aims at providing overall infrastructure of the energy meter presently used for the smart city concept. The main improvement for the future is going to make energy meter readings, tampering identification techniques, and connection and disconnection and also the pre-information providing to the users all is going to happen on Wi-Fi internet. Where we are going to develop some Wi-Fi hotspots in each area through which all the energy meters are get connected and set 4 to 5 parameters which is also going to be monitored. And the overall improvement information will be providing to the energy meter i.e. KPTCL will be easy for them to handle the things. Also in future we can go with some standard apps or standard tools, where in which it makes work easy for KPTCL people by reading the meter readings faster than the fastest method. And connect and disconnect of every meters on the on – payment and non – payment that will be fast as compared to the present method.

### VI. ADVANTAGES

- To reduce wastage of energy.
- Prevent electricity shortage during dry seasons.
- Make every customer a self-interested guardian of the power (energy) supply.
- Real time bill monitoring
- Time reduced receiving bill.

## VII. APPLICATIONS

- Makes it easy for MSEB to generate bills with less manpower.
- Enables users to track their energy consumption daily which helps them save energy.
- It has wide application in residential and commercial building in a public energy supply system monitoring
- It has application in public power sources

## VIII. CONCLUSION

In present electricity billing system, workers from MSEB visit each consumer's home to take the readings for consumption and also visit again to deliver the bill. The project will eliminate this requirement of manpower and will be able to generate the bills more conveniently. The consumers also consume lot of energy unknowingly, therefore the system will enable users to track their consumption on daily basis which will help them reduce their consumption and also they will be notified via mobile SMS after a threshold value of energy consumed is reached.

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