

# INTELLIGENT CLOUD BASED REMOTE ELECTRICITY METERING AND BILLING SYSTEM OVER IOT

Yogesh kamble , Ankit Mhatre , Akshay Yewale , Rohit Sabne , Rushikesh Agalave

<sup>1</sup> Student, Electrical Engineering, Trinity College Of Engineering & Research Pune, Maharashtra,India

<sup>2</sup> Student, Electrical Engineering, Trinity College Of Engineering & Research Pune, Maharashtra,India

<sup>3</sup> Student, Electrical Engineering, Trinity College Of Engineering & Research Pune, Maharashtra,India

<sup>4</sup> Student, Electrical Engineering, Trinity College Of Engineering & Research Pune, Maharashtra,India

## ABSTRACT

*This paper gives an overview of current wireless charging technologies on electric vehicles (EVs) charging. In general, the near-field technologies are preferred over ones. Inductive power transfer and strongly coupled magnetic resonance technologies are chosen for detailed review. Furthermore, special issues related to EV applications are also discussed, namely efficient power supply, misalignment tolerance, multiple pick-up control, simultaneous power and data transmission and shielding methods*

*Arduino and GSM based smart energy meters for advanced metering and billing system is able to read and send data via wireless protocol using GSM technology through GSM modem, capable of managing the meters as well as the line connections. For GSM module uses the network coverage of the SIM.*

*Smart Energy Meter uses SMS or/and Wi-Fi to send the power/unit data to cloud, so that user can access the data room module Apps and websites. Using cutting edge technology smart energy meters will save money, labour, efforts and time and at the same time it will effectively monitor the electricity consumption, usage and fraud. It is safe and easy to use and user friendly.*

*The metering system uses cheap components which will decrease the overall cost of the equipment increasing its affordability and penetration in non-metered areas.*

**Keywords:** Smart Meter, GSM, IOT, Tariff Based Metering, Wii-Fi Data Logging

## 1. Introduction:

Electricity is the heart of today's world. And now the world is going to be digital so electricity is very much important aspect.

A system is said to be intelligent when it can decide what to do without any instruction and can work automatically. An Electric or Energy meter measures the total electrical energy in units used by the appliances which consume electrical energy from the main power supply.

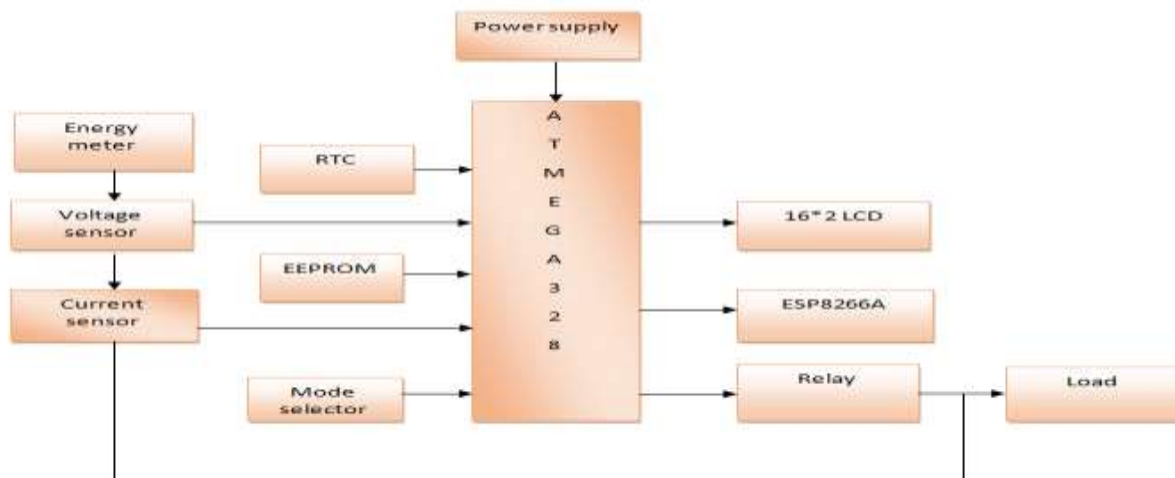
The system has to be made in such a way that the power consumption is analysed properly. Currently the system we use required human involvement which leads to the time consumption the system uses Atmega328p microcontroller because it is energy efficient hence it consumes less power. Electricity is one of the vital requirement for sustainment of comforts of life. IT should be used very judiciously for its proper utilization. But in our country we have lot of localities where we have surplus supply for the electricity while many areas do not even have access to it.

Our policies of its distribution are also partially responsible for this because we are still not able to correctly estimate our exact requirements and still power theft is prevailing. On the other hand consumers are also not satisfied with the services of power companies. Most of the time they have complaints regarding statistical errors in their monthly bills. Thus we are trying to present an idea towards the minimization of technical errors and to reduce human dependency at the same time. With the help of this project we are aiming to receive the monthly energy consumption from a remote location directly to a centralized office. In this way we can reduce human efforts needed to record the meter readings which are till now recorded by visiting every home individually.

### 1.1 Literature Survey

In order to overcome the problems of the existing traditional meter reading system, efforts are underway around the world to automate the meter reading systems and to provide comprehensive information to the consumer for efficient use of utilities. Researchers have proposed different implementation techniques for AMR. One is the SMS-based Reconfigurable Automatic Meter Reading System which uses the GSM network for sending the ARM data. The other technique is secure and scalable automated reading system which uses the existing local ISPs instead of requiring its own proprietary set communication infrastructure. The gateway node basically consists of an embedded microprocessor system, based on embedded linux, and a modem. The remote real time automatic reading system employs distributed structure based on wireless sensor networks which consists of measure units, sensor nodes, data collectors, server and wireless communication network.

## 2. Block Diagram



### 3. Block Diagram Discription:

#### 3.1\_ATMEGA 328 Arduino\_:

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.



### 3.2 Polarised capacitors (large values, 1 $\mu$ F +):



LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons: The declining prices of LCDs. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data. Ease of programming for characters and graphics.

### 3.3 IOT module :



The ESP8266 is a system on a chip (SOC) Wi-Fi microchip for Internet of Things (IOT) applications produced by press if Systems.

Given its low cost, small size and adaptability with embedded devices, the ESP8266 is now used extensively across IoT devices. Although it's now been succeeded by the newer generation ESP32 microcontroller chip, the ESP8266 is still a popular choice for IoT developers and manufacturers.

The ESP8266 module enables microcontrollers to connect to 2.4 GHz Wi-Fi, using IEEE 802.11 bgn. It can be used with ESP-AT firmware to provide Wi-Fi connectivity to external host MCUs, or it can be used as a self-sufficient MCU by running an RTOS-based SDK. The module has a full TCP/IP stack and provides the ability for data processing, reads and controls of GPIOs.

### 3.4 ENERGY METER :

Energy Meter or Watt-Hour Meter is an electrical instrument that measures the amount of electrical energy used by the consumers. Utilities are 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, refrigerator, and other home appliances.



### 3.5 VOLTAGE SENSOR

Voltage Sensor is a precise low-cost sensor for measuring voltage. It is based on the principle of resistive voltage divider design. It can make the red terminal connector input voltage to 5 times smaller.



### 3.6 CURRENT SENSOR :

The ACS712 Module uses the famous ACS712 IC to measure current using the Hall Effect principle. The module gets its name from the IC (ACS712) used in the module, so for you final products use the IC directly instead of the module.



### 3.7 PROTEUS

Basically PROTEUS is also a simulating software but it helps you attach many components with the Arduino. Like resistors, capacitors, LEDs, LCDs, keypads, ICs etc. and these are just few that I have named in general. It has a complete library and you will find everything that you will ever need. You can design your complete circuit and then simulate it to view the final output. This means that after perfecting your project on the programming side in KEIL, you'll need to simulate it on PROTEUS to determine the output of the hardware components and change it if need be. This will completely ensure your project's success.

#### Project Image:



### 4. CONCLUSIONS :

This system makes trouble-free for electricity department to access the energy consumed by the consumer. It works both automatically and manually. This meter sends billing directly to mobile before due date without causing human intervention. The system reads the data from the energy meter without tampering it, the proposed model is used to



calculate the energy consumption of the household. Hence the wastage of energy is less and it also bring awareness among all.

## 5. ACKNOWLEDGEMENT

It gives us immense pleasure to present our project report on “INTELLIGENT CLOUD BASED REMOTE ELECTRICITY METERING AND BILLING SYSTEM OVER IOT” under the guidance enables this task to path of completion. We would like to extend our thanks to Miss. Prof. J.V. Satre (HOD) and all our professors, staff members and all our friends who extended their co- operation to complete. Finally yet importantly, we express our gratitude to our TCOER Office, Department Of Electrical and library staff and those who have helped us directly or indirectly during preparation of this project report.

## 6. REFERENCES :

1. Andrzejzadowicz, jakubgrela, "Control application for an internet of things energy meter-a key part of an integrated building energy management system",2015 IEEE.
2. P. Loganthurai, M. Veeralakshmi, A. Vanmathi, Professor, Department of EEE, K.L.N College of Engineering, "Smart Energy Meter Billing using GSM with Warning System",IEEE 2017.
3. OsmiJaiswal, Dilip Chaubisa, B.E, Student Department of ECEL.D College of Engineering, "Arduino Mega and IOT based Intelligent Energy Meter (IEM) to Increase Efficiency and Accuracy in Current Billing Methodology" ICE-CDS-2017
4. Md. Masudur Rahman,OhidulIslam, Md. Serazus Salak in," Arduino and GSM Based Smart Energy Meter for Advanced Metering and Billing System," Pabna University of Science and Technology, Pabna, Bangladesh 2015 IEEE.
5. Himshekar Das, L. C. Samika, GSM Enabled Smart Meter and Automation of Home Appliances, National Institute of Technology, Silchar, India 2015 IEEE.