

# IOT Based Smart Electricity Meter Control and Surveillance for Prediction Future Meter Consumption Using Machine Learning.

Prof. Rupali Parte<sup>1</sup>, Asmita Jadhav<sup>2</sup>, Disha Nayak<sup>3</sup>, Saniya Shaikh<sup>4</sup>, Sneha Andhare<sup>5</sup>

<sup>1</sup>Prof. Rupali Parte, Professor, Dept. of Computer Science, JSCOE, Pune, Maharashtra, India.

<sup>2</sup>Asmita Jadhav, UG Student, Dept. of Computer Science, JSCOE, Pune, Maharashtra, India.

<sup>3</sup>Disha Nayak, UG Student, Dept. of Computer Science, JSCOE, Pune, Maharashtra, India.

<sup>4</sup>Saniya Shaikh, UG Student, Dept. of Computer Science, JSCOE, Pune, Maharashtra, India.

<sup>5</sup>Sneha Andhare, UG Student, Dept. of Computer Science, JSCOE, Pune, Maharashtra, India.

## ABSTRACT

Electricity is the heart of today's world. And now world is going to be digital so electricity is very much important aspect. Generation and supply of electricity is the primary task of electricity board but it is also important to measure the power used by the consumer that is taking readings and generate the bills. In present electricity metering-system there are many manual errors, corruption is also there also loafers are there. To overcome issues faced by consumers also to make people get idea of the upcoming bill (predicted bill) values for next month based on historical usages as per the month, the date or weeks we have come up with this model. As recently in lockdown many people have faced the issue of hefty bills also to avoid crowding in line for bill payment at electricity board office to revise units or rectify the wrong units consumed and errors in the photos taken by the employees while recording readings to avoid all such human manual intervention and all the excess unnecessary travelling we are implementing this model. As the present current electricity bill those are not capable to connect through the internet so, we have created a hardware which will be able to connect the internet.

**Keyword:** Wi-Fi module, Relay, Bluetooth device, Arduino uno, Android device, MySQL.

## 1. INTRODUCTION WITH PROBLEM IDENTIFICATION:

### 1.1. PROBLEM STATEMENT:

In a current scenario taking reading and generating bills are manual work. It is very time consuming.

### 1.2. INTRODUCTION

World is changing towards automatic wireless technologies, which prefer not only reducing human efforts but is helping in making systems automatic and efficient. 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 consumes electrical energy from the main power supply. Electromechanical and Electronic meter are two types of meter available in market to measure the unit consumption. Electromechanical meters are commonly used in village areas, where the uses of modern technology is not as high as it is in cities. Electro-mechanical meters have become out of date now –a-days. Electronic meters replace electromechanical meters. This meter consists of LCD/LED to display the reading. Calibration Led is used on the meter which shows the units consumed. Manpower is required to read the meter and note down the reading. The reading on the meter is increasing which is used to generate the electricity bill. An IOT Based Smart Electricity Meter and billing System does the same task without human efforts. IOT Based SEM system is controlled using Arduino Mega, which is a microcontroller board. The purpose behind choosing this board is it is efficiency and memory. It is more efficient in terms of memory and GPIO.

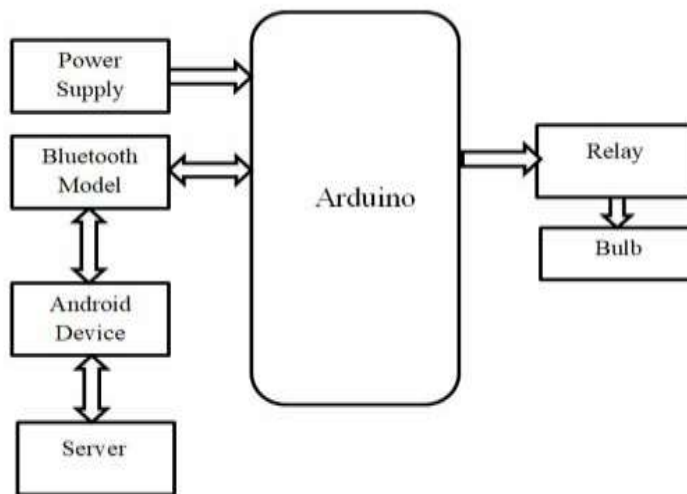
The data obtained is then sent to the database through internet. Data obtained can be easily send wirelessly over long distance without any noise disturbance using internet. As the data is directly sent to the cloud there is no occurrence of range and distance problem and is highly accurate and efficient because of no human interference. Other wireless technologies such as Zigbee, Bluetooth etc. have limited range thus cannot be used over very long distances effectively. This project envisages the use internet and the concept of IOT by which the base station as well as users remains updated with the current consumed units, changing the present problems faced by the electricity board and the user.

### 1.3 Methodology:

In this system with high efficiency and robustness the user need to registered first, then the data of the user will be stored at cloud(database) access to internet is via android, which have unique mac id. So exchange of meter cant be possible. The billing will be automatic through server based unit. In the current meter we are able to see the digits digitally but these values are not sent to server. For this we are using an Ardino board in which we will be using the processor of android device. Android device is used as all Wi-Fi-module, Bluetooth module, the in-sim card module already integrated in the android device. The user is registered on server via authorized server admin. Once the user registered user will get unique meter id and username. As the user log in and meter is started. As meter is started timer and meter unit reading increases and as timer increases unit value immediatly sent to server along with the cost which will be consume units of the server. When the user start meter, the due date will be automatically set to 1 month after the registration date and the meter bulb can be turned off only when due date has been crossed and show unpaid bill status.

## 2. BLOCK DIAGRAM

As shown in the diagram relay and Bluetooth model is connected to Arduino. Server processes the data received from android device via Bluetooth.



2.1 Simple Block diagram

## 3. HARDWARE COMPONENTS:

### 3.1 Arduino Uno

We are going to connect Arduino uno to Bluetooth model and relay so that we can control the power supply through Bluetooth input that we get from android app. The RX and TX pins of the Arduino are connected to the TX and RX pins of the HC-06 Bluetooth module, respectively. We have to upload the required code into Arduino to control

power supply The Bluetooth module receives data from the paired Android app and triggers the relay based on the received data.

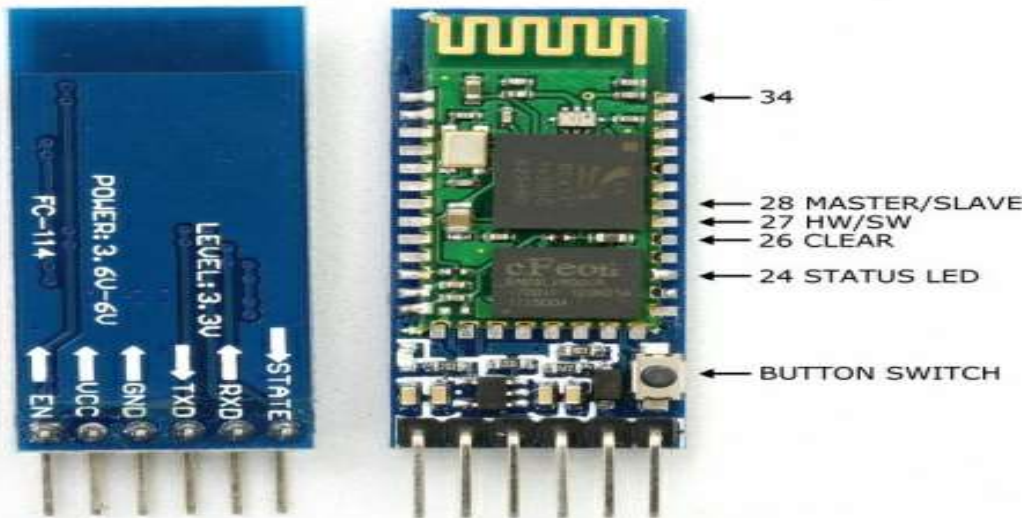


**Fig -3.1 Arduino Uno**

**3.2 Bluetooth Module:**

Once you have connected the HC-05 module with the Arduino that is the RX and TX pins, you can power the Arduino. If the red and blue LEDs on HC-05 are blinking, you have successfully paired the Bluetooth module with Arduino.

You can also check the Bluetooth connectivity status using the State pin on Arduino.



**Fig.3.2 Bluetooth Module**

**3.3 Android Device:**

We need two android devices for this project, one for connecting to Bluetooth model and other for the user to see user details both performed by android apps. We used android studio for creating the apps and MYSQL database to store user details.

**3.4 Relay**

For connecting relay to Arduino we have to remove the electric supply first. This will work as a switch, so remove the physical switch and connect to relay pin NC and COM and tighten the screw.



SmartEshop.Pk

Fig 3.4 Relay

### 3.5 Hardware setup

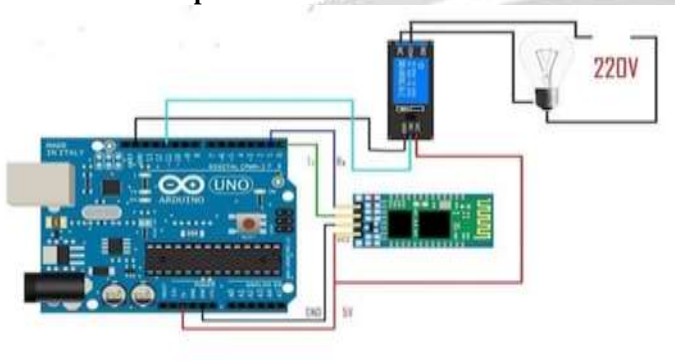


Fig:3.5 hardware setup

## 4. SOFTWARE COMPONENTS:

### 4.1 MYSQL

As we are using WAMP server for creating server side page we use MYSQL for storing database. We have created tables in MYSQL for storing user, admin credentials as well as for storing details about the bill generated, units consumed, due date, meter status etc.

### 4.2 Android Studio:

For creating meter app and user app we made use of android studio which uses java as programming language. For certain conditions to retrieve data from database and modify it through app we use php integration through WAMP.

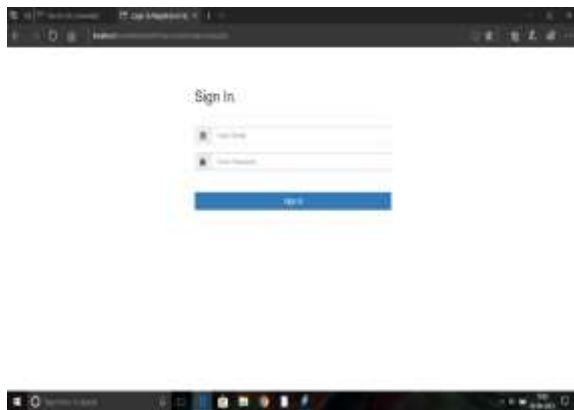
### 4.3 Wi-Fi Module:

The different versions of Wi-Fi area unit accessible by varied IEEE 802.11 protocol standards, with the various radio technologies decide the ranges, radio bands, and speeds that will be achieved. Wi-Fi most typically uses the two.4 rate (12 cm) radio frequency and five rate (6 cm) radio frequency philosophical system radio bands; these bands area unit divided into multiple channels.

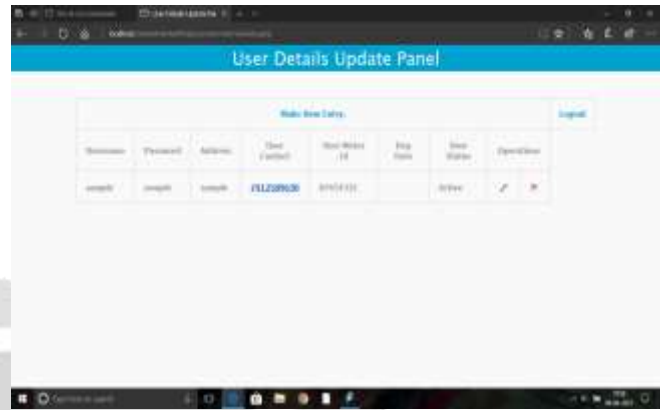
## 5. IMPLEMENTATION

### 5.1 Server page:

As shown in the figures below admin has to sign into server with credentials from database. After signing in, the admin is able to see the user details as well as is able to add new users and make changes to it with edit option. The admin can also delete a user as per need



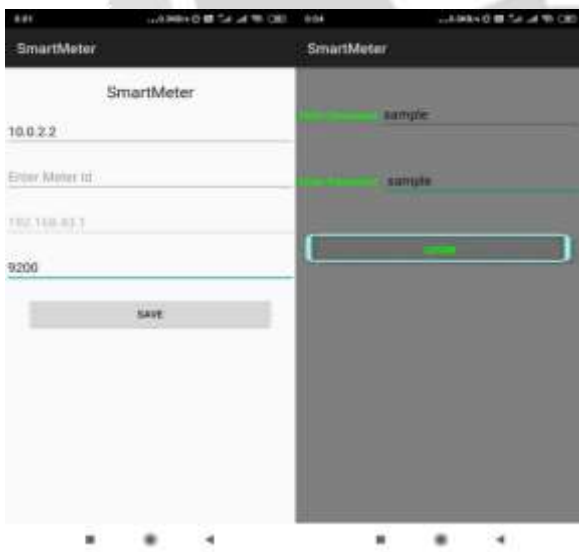
5.1 Admin sign-in page



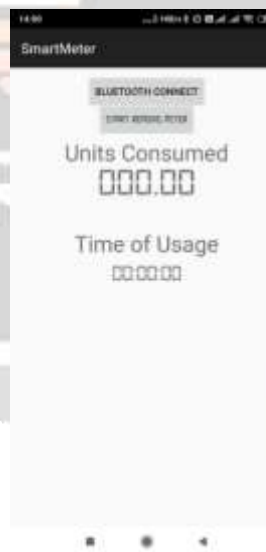
5.2 User records

### 5.2 Meter Android App:

We have to log into android device which is used to connect to Bluetooth, for this server IP address is needed along with user credentials as stored in database. After logging in, using connect button Bluetooth module is connected to device and after pressing start reading meter button the time and consumed units gets increasing and connected bulb gets turned on. After reaching due date the bulb automatically is turned off.



5.2.1 MeterId is entered starts



5.2.2 User login



5.2.3 Initial stage



5.2.4 After reading

### 5.3 User App:

User App fetches the data from database to display the records of the user. Whenever user requires to check the generated bill, units consumed of particular meter which the user is using for that the user can login with particular

meter number to see the details and pay bill before due date to avoid cut of electricity supply based on units consumed bill is generated. Initially at the start the consumed units are zero at the start of month. We can predict the value with the prediction feature available. Based on the units consumed the values get changed initially it is zero units.

Name	Units Consumed
sample sample	0
Enter your Contact	Total Bill
7412589630	0
Units Consumed	DueDate
0	25-7-21
Total Bill	Prediction for 2021-07-28
0	26441.4796584022
DueDate	

**Fig 5.1 User App with predicted values.**

## 6. CONCLUSION

The existing system have some of the problems like manual work, Human errors, inaccurate meter reading, corruption, Power theft. In proposed system the electricity connection to each user will given only to the registered user and power consumption in unit is send to server which will be used to calculate the bill. Also the bill will be send via IoT (Internet of Things).

## 7. FUTURE SCOPE

The system designed reduces the efforts of manual data assortment of energy meter. Also, data that's received at service provider side is simple to manage for bill generation and completely different such tasks. With this methodology we have a tendency to area unit ready to collect the reading likewise as management the supply to the user eliminating manual meter reading.

## 9. REFERENCES

- [1]. V. Preethi; G. Harish, "Design and implementation of sensible energy meter", 2016 International Conference on ingenious Computation Technologies (ICICT).
- [2]. Gobhinath.S, Gunasundari.N, Gowthami.P, "Internet of Things (IOT) based mostly Energy Meter", International analysis Journal of Engineering and Technology(IRJET), Volume: 03, Issue: 04, Apr-2016.
- [3]. Himshekhar Das; L. C. Saikia, " GSM enabled sensible energy meter and automation of home appliances", 2015 International Conference on Energy, Power and Environment: Towards property Growth (ICEPE).
- [4]. C. Subramani, Baibhav Amrit, Priti Singh, Siddharth Manna," sensible energy metering and power larceny management victimisation arduino & GSM ", 2017 2d International Conference for Convergence in Technology (I2CT).