

IOT BASED PREPAID ENERGY METER

Shivam Roy¹, Shreyans Patel², Mahir Udepurwala³

^{1,2,3}Student, Dept. of Electronics and Communication Engineering, GCET, Gujarat, India

Abstract - The current electric meter does not have provision to monitor our Electricity consumption. Automatic Meter Reading System uses SMS as the Medium transfer data to the server. But, the IOT Based energy meter upload the Reading periodically to a central public server to GPRS. GPRS is more cost effective than SMS and is very use full in frequent update. There is no need for a person to visit every home at the end of every month for checking the reading. In recent years, the numbers of smart phone users have increased drastically. The users can view their current energy meter reading through mobile they can also monitor their energy meter online. By using this system, the users will be aware of the electricity uses in his/her home. With slight modifications to the system, it can be used by corporate companies to monitor their power consumption and help them reduced the power wastage to a greater scale. The GSM technology is used so that the consumer would receive messages about the consumption of power (in watts) and if it reaches the minimum amount, it would automatically alert the consumer to recharge. This technology holds good for all electricity distribution companies, private communities, IT parks and self containing housing projects.

Keywords: GSM technology, Prepaid Energy Meter, Internet of Things, GPRS, Energy Meter

1. INTRODUCTION

In this project we have shown the concept of prepaid energy meter which will automatically sense the energy consumed in the home and when it reaches to that value which is initially fed in the hardware it will disconnect the power line. A user interface is given in the hardware for user interface which will interact with the user with hardware, through user interface user can set a value or we can say a credit limit after which the user wants to be informed about that. GSM Decoder Section is that interface in this project, which will make the user to interact with the hardware so that user is able to initialize the hardware or can initially set the value. Power consumption measuring

circuit will side by side measures the power which is being used in the house. The measured values are then sent to the microcontroller for further process and finally the SMS is send to the user via GSM Modem

With the use of GSM modem one can recharge energy meter with the help of mobile. Also the amount left for usage will be continuously displayed on the LCD. This project will help in remote monitoring and control of the domestic energy meter. This system enables the electricity. Also the electricity department needs not to go individually check the meters in order to take the readings can be achieved by the use of microcontroller unit that continuously monitors and records the energy meter reading in its permanent (nonvolatile) memory location. This system also makes use of a GSM modem for remote monitoring and control of energy meter. The microcontroller based system continuously records the reading and the live meter reading can be sent to the electricity department on request. This system also can be used to disconnect the power supply to the house in case of non-payment of electricity bills. A dedicated GSM modem with SIM card is required for each energy meter.

1.1 Advantages of proposed methodology over existing methodology

The present power usage reading is made manually by moving to the consumer locations. This requires large number of labor operators and long working hours to accomplish the task. Manual billing is sometimes restricted and delayed by bad weather conditions. The printed billing also has the tendency of getting lost. Over the last few years, Smart (Prepaid) Energy Meter has been proposed as an innovative solution aimed at facilitating affordability and reducing the cost of utilities. This mechanism, essentially, requires the users to pay for the electricity before its consumption. In this way, consumers hold credit and then use the electricity until the credit is exhausted. If the available credit is exhausted then the electricity supply is cutoff by a relay. Readings made by human operators are prone to errors. This project addresses the above mentioned problems. The development of GSM

infrastructure in past two decades made meter reading system wireless. The GSM infrastructure, which has national wide coverage, can be used to request and retrieve power consumption notification over individual houses and flats. Apart from making readings using GSM communication, billing system is needed to be made prepaid to avoid unnecessary usage of power. The use of Prepaid Energy meter is still controversial. On the one hand, those that support the diffusion of prepaid meters claim that they benefit both consumers and utilities because they help users to consume more efficiently and to improve the management of their budget, while allowing firms to reduce financial costs. On the other hand, those that are against prepaid meters argue that their adoption is expensive for firms and risky for low income consumers, as the insecurity and volatility of their income may force them to make little use of the service, or ultimately, bring about involuntary self disconnection.

2. BLOCK DIAGRAM

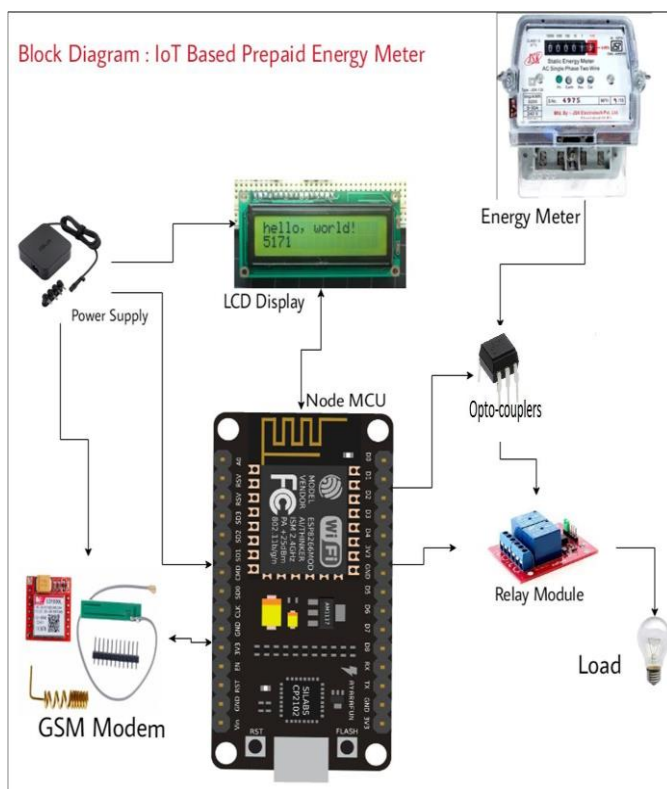


Fig -1: Block Diagram

2.1 BLOCK DIAGRAM DISCIPTION

Power Supply can be use for providing +5V supply through regulator IC. Wifi Module can be use for communication with Internet. GSM is use for Recharge & Energy Meter reading through SMS. Micro-Controller can be use for operation of data transforming from Energy Meter to Mobile. Relay can be use for switching operation. Opto-Coupler ckt can be use for connection of Energy meter to Microcontroller.

Node MCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. WI-FI compatible devices can connect to the internet via a WLAN and a wireless access point. Such an access point has a range of about 20 meters indoors and greater range outdoors.

3. CIRCUIT MODULE

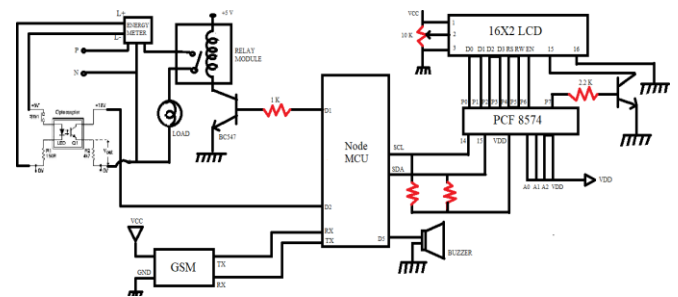


Fig -2: Circuit Module

3.1 CIRCUIT DISCIPTION

When +5 volt supply can be provided to the arduino, LCD and GSM modem, then arduino which can be in on condition. After that arduino will be provide signal to the display "SYSTEM READY" on LCD. According to programming of arduino which display different characters. After that GSM modem send the message to the electricity board .Then electricity board can be recharge the energy meter through GSM modem. The load should be connected to the energy meter by using relay module.

After some power consumed by load then energy balance should be reduced there minimum value. Then alert message send to the user. Due to low balance condition the arduino will be send the signal to the relay module to disconnect the supply.

4. SIMULATION WORK

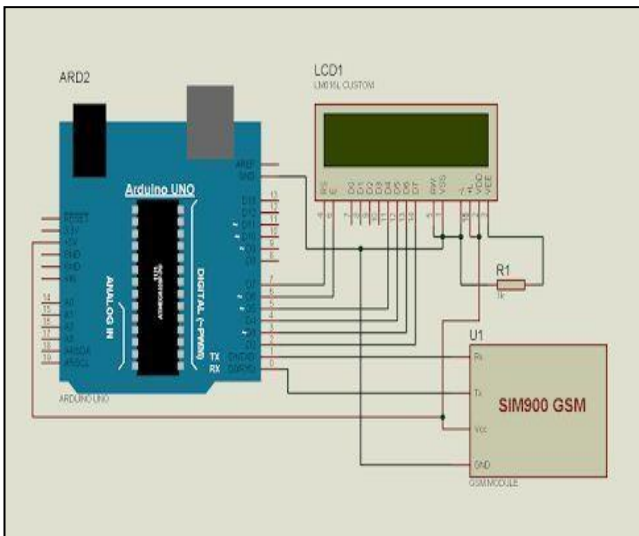


Fig -3: Arduino+LCD+GSM

5. RESULT

After performing project the result get on display.



Fig -4: LCD Screen

6. ADVANTAGES

- The users can be aware of their electricity consumption. The human work of collecting readings by visiting every home.
- No need to wait for the month end bill.
- They no exactly how much power is being utilized.
- Less labor cost.
- Remote access of meter reading.

7. APPLICATIONS

- Industrial control
- Medical systems
- Access control and Communication gateway

- Embedded soft modem
- General purpose applications

8. CONCLUSION

The IOT based Energy meter for calculating consumed power and displayed in LCD has been achieved using. The consumed power is send through serial communication to the Virtual terminal constructed in PROTEUS. This project can therefore enlighten management about wasted time, and unnecessary trips, book keeping and billing because it gives an accurate accounting of units driven because the prevention of malpractice.

9. FUTURE SCOPE

In future our work can be focus on design and implement product to provide better performance and reliable service. That should be done by implement in product feature by using Internet of Things. They should be provided wireless communication. We are implement our product design to afford by consumer. Hardware work can be done with suitable proper connection and efficient work can be achieved.

We are thinking about to add new future in our product to provide world wild connection of all energy meter with secure system to manage all the energy consumption device without use of complex system based on wiring. Also we can done measurement device with digital technology according respect of our PM shree. Narendra modi thing to make in India project.

10. REFERENCES

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