

MICROCONTROLLER BASED ENERGY METER READING BY USIG IOT TECHNOLOGY

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Abstract:

This paper focuses on the design and implementation of the EB power monthly calculations. The main part of the our work is the fabrication of a cost effective IOT based smart energy meter which displays readings on EB meter, the instant power consumption at user side, which is collects the how much amount of power will consumed per two months. So the power consumption reading will update at every 6 seconds. So we can easily note the reading via internet. the readings are updated to internet via IOT module.

Keywords : EB Power, IOT, EB Meter,IOT Module.

1. INTRODUCTION

The internet of thing allows object to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer based systems, and resulting in improved efficiency, accuracy and economic benefit. The increasing generation needs empowered gadgets by wireless technology which includes Bluetooth, Radio Frequency Identification, Embedded sensors and many more. In that IOT technology has grown from its beginning and now presently widely using it.

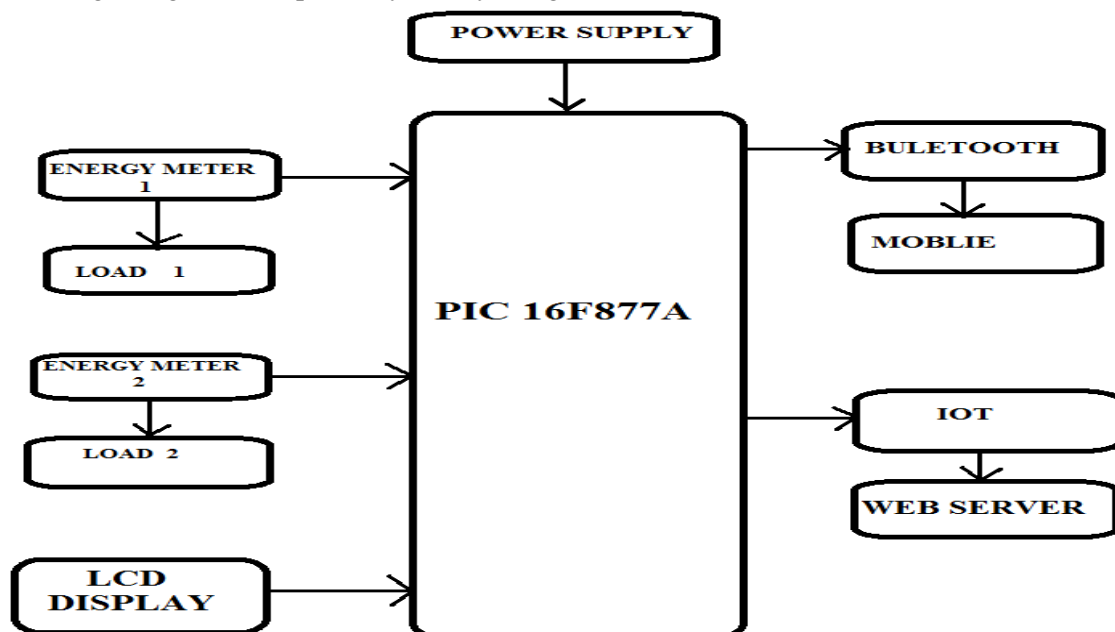


Fig.1. Block diagram of proposed IOT based energy meter reading

The electricity plays an important role in our life. Now-a-days as the consumers are increasing rapidly it became very hard to handle the electricity requirements. Without electricity it's impossible to survive and also it is important to save the electricity loss. As the generation is increases the consumer's requirements also increasing so in accordance with it the technology improvement is needed. So we developed the system with faster and improved technology i.e. IOT. The electricity also contains some issues like power theft. Power theft is a measure crime and it also directly affects the economy of our country. Transmission, generation and distribution of electricity include the loss of electricity. To avoid the losses we need to monitor the power consumption and losses, so that we can efficiently utilize the generated power. Meter tampering is part of power theft and also illegal crime which we can minimize. Billing is a process in general the human operator goes to every consumer's home then providing bill it will take lot of time. To resolve these issues we developed system on the base of IOT energy meter reading.

2. RELEATED WORK

From thorough review of related work and published literature, we have observed that many researchers have done rigorous work on power line communication (PLC)andIoT. It is observed from the careful study of reported work that in the real world, PLC and IoT based meter can improve the efficiency of power system and can help to analyse the unnecessary loss of power in different areas. The paper by Landi C, Merola P, Ianniello G on ARM-based energy management system using smart meter and Web server gave us the basic idea for IoT based energy meter and also the paper by PoonamBorle, AnkithaSaswadhar, DeepaliHiwarkar, Rupali S Kali on Automatic Meter Reading for Electricity gave us idea for PLC communication. The present system only provides feedback to the customer at the end of the month that how much power is consumed in the form of bill. The consumer has no way to track their energy usage on a more immediate basis. The consumers are growing exponentially fast and load on power providing divisions is rapidly rising. In the existing system meter tampering can be done easily and it's one of the major drawback for an energy crisis. In this project we are using three 8-bit Microcontrollers. PIC18F46K22 and PIC18F2520 on the consumer end for theft detection, PLC communication and IoT operation. PIC18F46K22 on the service provider end for PLC modem communication. The project mainly focuses on theft detection, power optimization and providing the relevant energy consumption information to user. Where the user can monitor the energy consumption units from a web page by providing device IP address. Theft detection unit connected to energy meter will notify company side when meter tampering and theft detection occurs in energy meter through PLC modem and theft detected will be displayed on the terminal window.

3. PROPOSED METHOD

Today the world is facing such an environment that offers challenges. Energy crisis is the main problem faced by our society. A relevant system to control and monitor the power usage is one of the solutions for this problem. One approach through which today's energy crisis can be addressed is through the reduction of power usage in households. The consumers are increasing rapidly and also burden on electricity offering divisions is sharply increasing. The consumers must be facilitated by giving them an ideal solution: - i.e. the concept of IoT (Internet of Things) meters and on the other hand service provider end can also be informed about electricity thefts using theft detection unit and PLC modem. Today's Demand actually requires accessing the device characteristics remotely in a reliable way. One of the possible way to accomplish the task is to connect a device (energy meter) to internet by providing IP address to it. In this project we are using three Microcontrollers, two on the

consumer side for theft detection and IoT, one on the company side for PLC modem communication. The project mainly focuses on theft detection, power optimisation and providing the relevant energy consumption information to user. Here the user can monitor the energy consumption units from a web page by providing device IP address. Theft detection unit connected to

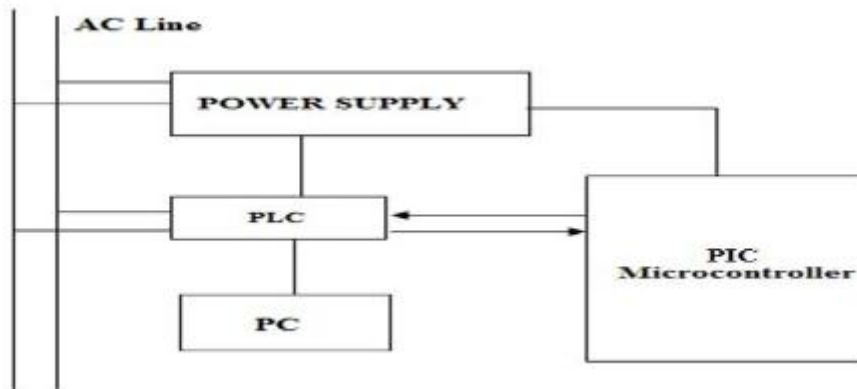


Fig.2. Proposed PLC Communication

energy meter will notify company side when meter tampering and theft detection occurs in energy meter through PLC modem and theft detected will be displayed on the terminal window. The block diagram of the Proposed IoT based electricity energy meter (consumer end) consist of power line communication modem, theft detection and Wi-Fi unit. Power supply section deliveries power to all the components which requires Power. The μ unit takes the information from the electricity meter and additionally carries out the appropriate control procedures and sends the required information like number of units through Wi-Fi module. LCD module is used to get visual information like no. of units, temperature and Wi-Fi configuration. On the service provider end, PLC acts as modem and sends necessary commands during theft detection and also if consumer fails to pay the billed amount in time, the disconnection and reconnection can be done by sending their respective commands to the controller.

4. RESULT ANALYSIS

Triac switch circuit comprises of zero crossing detector MOC3031 IC (zero cross based optotriac isolator) which is used to turn on and off load and BTA12 triac which is connected in parallel to snubber



Fig.3. Implementation of Board

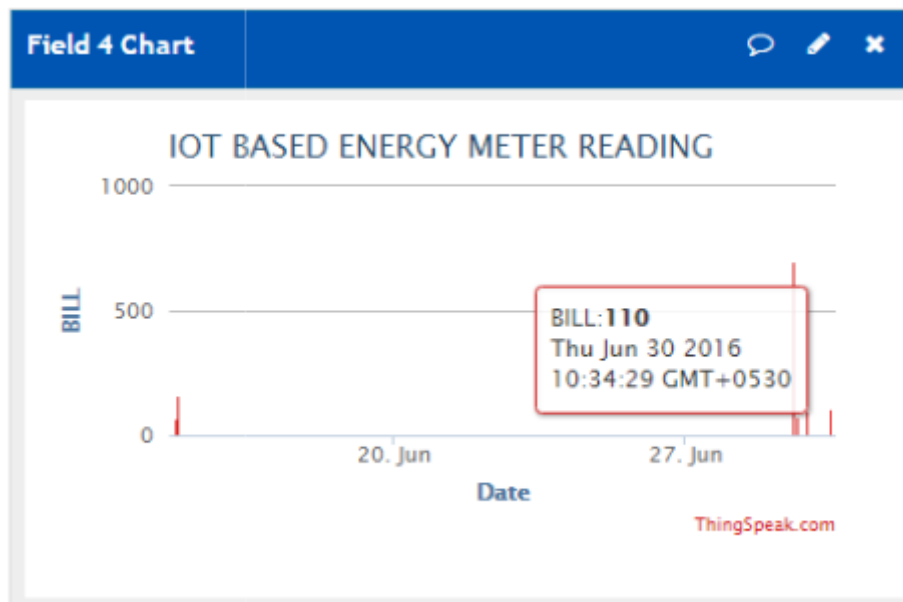


Fig.4.IOT Energy Meter Reading

circuit comprises of RC which will avoid the inrush current and it is a good practice to use an RC snubber network across the triac to limit the rate of rise (dv/dt) to a value below the maximum acceptable rating. the representation of consumers end implementation IOT board consists of ARM 7 controller, Arduino Uno, theft detection and WIFI ESP8266.

CONCLUSION

The project is mainly concentrated on IOT network. When we discussed certain points to be notify. First point is we converting conventional energy meter which is electromagnetic into a digital meter. We are doing automatic reading and also connection and disconnection of meters using WIFI module. Then meter reading has come faster. It is publically available for the customers as well as for the KPTCL. Both the peoples will be using the information as per their requirements and they will be having freedom to check the bill, tampering, when the meter has been connected and disconnected before the due date. All the information will be displayed by using smart app. Finally concluding our project that we are successfully monitored the tampering i.e. seal tampering and we have read the meter bills which also be uploaded on the website using IOT concept. Overall the new things we are worked with in our project are ARM controller coupled with Arduino controller and the IOT model.

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