

Web based Prepaid Energy Meter with theft control

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Abstract

The idea behind this project is to construct the web based Prepaid Energy Meter with theft control, which eliminate manual meter reading so that the bills can be paid in advance by which the consumers can plan their electricity bill well in advance. In this system anyone can recharge their electricity need, like our mobile phones. This proposed system helps the users with the real time information about the peak loads (max energy consumption), energy theft, effective usage of power consumption, billing status etc. This automated system is built by using Arduino controller, different sensors & IoT. It continuously reads the energy meter readings and the real time information is available to the user with IoT. Whenever the energy consumption reaches its limit, the power supply connection will be disconnected and alert information is given to the consumer during minimum balance and null balance. Power theft information is given to both user and electricity board; hence it is helpful to identify the exact power theft location. To avoid unnecessary usage of power consumption, load based automatic switch system is used which can built up home automation system. This energy saving system replaces the conventional meter reading and offers the consumers with user friendly access to energy meter from remote location.

Key words: Energy meter, IOT, Power Theft.

1. Introduction:

An Energy meter or KWH meter is a device that measures the amount of electrical energy supplied or produced by a residence, business or machine. Web Based Prepaid Energy Meter is a good concept in which anyone can recharge its balance, like we do in our mobile phones. This paper explains about a automated system by using Arduino and IoT were built. Anyone could recharge the electricity unit through this system, just by sending a SMS. It can also disconnect the home power supply connection, if there is any low or zero balance in the system and also this system will reads the energy meter readings and automatically send some updates to user's mobile phone like low balance alert, cut off alert, resume alert and recharge alerts. With the use of IoT, the information are sent to the user then and there and the consumer can plan electricity usage and can do the recharge accordingly.

Web based energy meter having the ability to provide the output in an attractive manner.

2. Literature review:

Continuous monitoring of energy meter with the IoT based communication was proposed.[1].In addition to monitoring the meter, power theft also built and uses GSM to transfer the informations to the user[2].Home automation with prepaid concept is proposed and electrical appliances are connected through Bluetooth[3].The smart card is used for recharging energy units and theft detection is implemented.[4].Using IoT , the monitoring was carried out and uses IoT and GSM for effective data transmission to mobile and other devices.[5].

In existing system the smart energy meter[8,10] was implemented using either bluetooth, or GSM . Hence smart energy meter with theft control using IoT technology and home automation[9] is proposed here.

3. Proposed system

This proposed system is implemented with Arduino micro controller, current sensors and IoT. current sensors are used to monitor the consumption level, based on these sensor data, the controller calculates the consumption level and also the possibility of theft scenario.

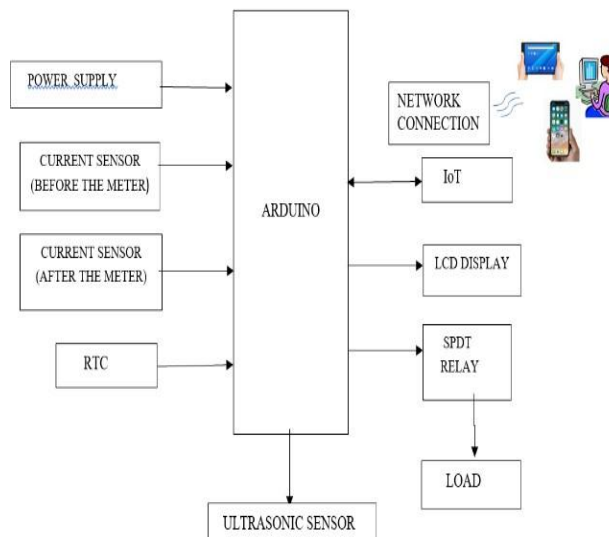


Fig 1. Block diagram of web based prepaid energy meter with theft control.

Two current sensors are used to monitor the energy level before and after meter. Based on the two sensor data, the controller identifies the possibility of theft detection. The ultrasonic sensor is used to identify availability of human being and based on this sensor information the unnecessary usage of power is

controlled by the system. The power consumption is continuously monitored by the controller and whenever the consumption exceeds minimum balance level, alert messages are given to the system. The real time information of different sensors is available to the consumer and electricity board department with the use of IoT. The user can monitor and control the energy meter from any

remote location using any one internet accessible devices. The information are also displayed on LCD display.

4. Results:

Arduino IDE is used to write the coding for Microcontroller. ISIS simulator tool is used for simulation. The Fig 2. shows a sample simulation output for Theft control module. There is some power consumption before energy meter itself; hence the display shows the 'Theft detected' information.

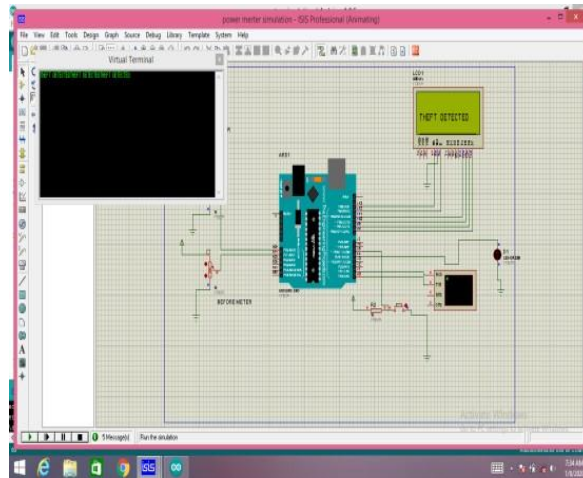


Fig 2. Simulation output of the proposed system.



Fig 3. Output of the Ultrasonic sensor.

The above fig.3 shows the output of the system based on ultrasonic sensor input. The ultrasonic sensor sense the availability of human being and hence the controller connects the load to supply line.

METER MONITOR	VALUE	STATUS
LOAD	55	LOAD ON
SECONDS	5384	
AMOUNT OF USAGE	1.00	
THEFT IDENTIFICATION	55	THEFT DETECTED

Fig 4. Webpage display.

The above fig.4 shows the sample web page display output of the system. It gives the real time data of power usage and theft detection status.

5. Conclusion:

The design of web-based energy meter using IOT can make the users to pay for the electricity before its consumption, it is clear that the proposed system had overcome the drawbacks of the existing system. This method will reduce the energy wastage and create the awareness of unnecessary wastage of power. Theft detection can be easily monitored and controlled. It has drastically reduced the human work by visiting each house before the date of payment and avoided the man-made errors. This automated system also monitors and controls the unnecessary wastage of power.

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