International Journal for Modern Trends in Science and Technology, 6(12): 125-128, 2020

ISSN: 2455-3778 online
DOI: https://doi.org/10.46501/IJMTST061224
Available online at: http://www.ijmtst.com/vol6issue12.html

Smart Energy Meter

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To Cite this Article
Dr. Belsam Jeba Ananth. M, Dr. Ananth.J P and Premnath.S P, "Smart Energy Meter", *International Journal for Modern Trends in Science and Technology*, 6(12): 125-128, 2020.

Article Info
Received on 06-November-2020, Revised on 25-November-2020, Accepted on 29-November-2020, Published on 03-December-2020.

ABSTRACT

In present time Electricity is the necessary thing in the world for human life. Today every home, offices, companies, industries have electricity connection. So here this project is building only for interfacing electricity energy meter with microcontrollers. The main aim of the project is identifying the current meter reading and intimating the user when they are crossing the certain limit. It also identifies the power theft and auto tripping will be done.Here, Arduino is used for interfacing and the main aim of this project is to know, how much unit is obtained and the total amount of rupees has to be paid. That will be sent to the EB office for billing. Excess power usage can also be monitored. Hence, power theft can be avoided. If bill is not paid in time, then it will automatically turn off the power.

KEYWORDS: *Energy reading, Power management, wireless sensor network*

I. INTRODUCTION

The development of automatic metering system is presented in this paper. The power management system is consists of Zigbee Digital Power meters installed in every consumer unit and an Electricity e-Billing system at the energy provider side. The Zigbee Digital Power meter (ZPM) is a single-phase digital kWh power meter with embedded Zigbee modem which utilize the Wireless sensor network to send its power usage reading using information back to the energy provider wirelessly. At the power provider side, they have the control to change priority of the devices when power distributed in low range.

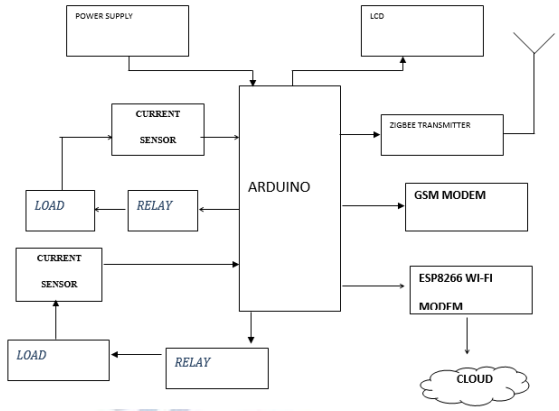
Human operator billing or prone to reading error as sometime the houses electric power meter is place in a location where it is not easily accessible. The concept of dynamic assignment of priorities to interrupts is discussed which reduces the time delay for a lower priority task which under some circumstances becomes a higher priority task. Slicing of interrupt timings is also discussed which can be used to improve the performance. The highest priority task is serviced a greater number of times and with lesser time period. Hence it need not wait for the slack time of other previously higher priority interrupts. If power will be less in grid, automatically power will be managed. Our proposed system when low power generation automatically goes to power management. All the devices controlled depends upon the priority based and timing-based control the devices when low power generation.

II. PORTFOLIO

In our country Electricity Board billing system and reading of load consumption is made by man power. Sometimes the man from the Electricity Board may have made mistake on reading and sometimes the disconnected household may consume power in illegal way. To overcome these problems, we made revolution on energy metre system. The project proposed is IoT based Smart Energy Metre Tracking using Zigbee our smart energy metre will track the power consumption and send a notification to the consumer as a message they can pay the amount received on the message. If the consumer failed to pay the bill the power supplied to the consumer is disconnected by the electricity board from the remote area by tapping on the web server.

III. PROPOSED WORK

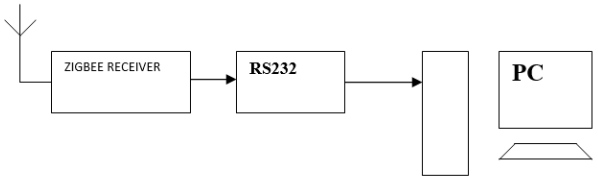
This block mainly consists of Sensors. Arduino Uno is interfaced with the energy meter the meter reading is measured by using Current sensors, which is connected to the load through the relay unit. The measured consumption of load is read by Arduino and also displayed on the LCD display. The consumed unit and amount for the consumption are sent to the consumer on the regular period of days by using the GSM module. The reading and data are also stored in Electricity Board server cloud by ZigBee transmitter can also be sampled by an internal ADC and the resulting codes available directly or through peripheral or internal processor RSSI can be used internally in a wireless networking card to determine when the amount of radio energy in the channel is below a certain threshold at which point the network card is clear to send (CTS). Once the card is clear to send, a packet of information can be sent RSSI can be used internally in a wireless networking card to determine when the amount of radio energy in the channel is below a certain threshold at which point the network card is clear to send (CTS). Once the card is clear to send, a packet of information can be sent.



(Metering - side)

Fig 1.1 Block diagram of Proposed System

This block diagram shown in Fig 1.1 mainly consist of Sensors. Arduino Uno is interfaced with the energy meter the meter reading is measured by using Current sensors, which is connected to the load through the relay unit. The measured consumption of load is read by Arduino and also displayed on the LCD display. The consumed unit and amount for the consumption are sent to the consumer on the regular period of days by using the GSM module. The reading and data are also stored in Electricity Board server cloud by ZigBee transmitter.



(Controlling-side)

Fig 1.1.1 Block diagram of Proposed System

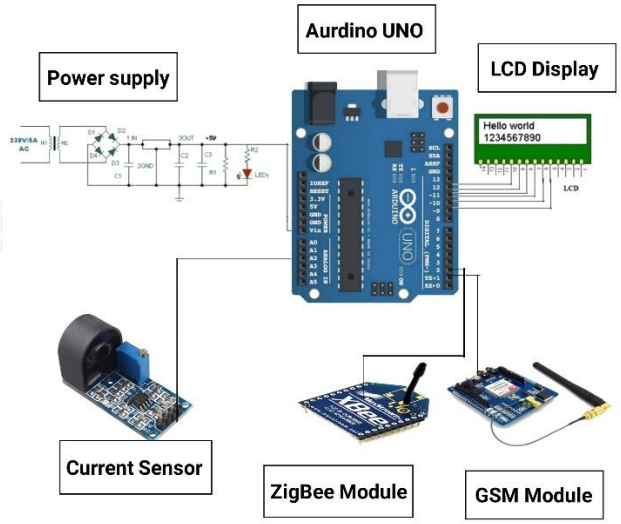


Fig 1.2 Circuit Diagram of Proposed System

Figure 1.2 represents the circuit diagram for the proposed system, in which GSM, GPS, and various sensors are inter-connected to Arduino ZigBee is used to establish a wireless connection between the sensor nodes and control centres. The connection done in the hardware kit is done as per the connection in the circuit diagram, to sense the parameter of the power is calculated using the sensors connected to the connected to the Arduino.RS232 is capable of serial communication between the ZigBee receiver and the control centre. The GPS module is used to find the exact location of the fire with latitude and longitude information. The GSM module is used to digitalize the parameters sensed and transfer the informationinformation.

IV. EXPERIMENTAL RESULTS

Arduino is used as a microcontroller, which is used to gather the measured parameters from the sensor Arduino has been chosen to be employed in our work because it is cost-efficient and has a flash memory of 32kb. Arduino is also a great tool for developing interactive objects and controlling the input and output of the sensors Compared to the traditional techniques the proposed techniques using ZigBee for forest fire detection are found to be a successful Implementation. The number of false alarms is reduced and effective distinguishing of fire can be done without any damage to property and human lives. Gas sensor MQ-2 is connected to the analog pin A3 of the Arduino UNO. The output of the gas sensor is an analog value. Flamesensor LDR is connected to the analog pin A5 of Arduino UNO. The sensors are connected to the analog pins to convert the analog values into digital values. This is carried out by an ADC Converter present in the Arduino .

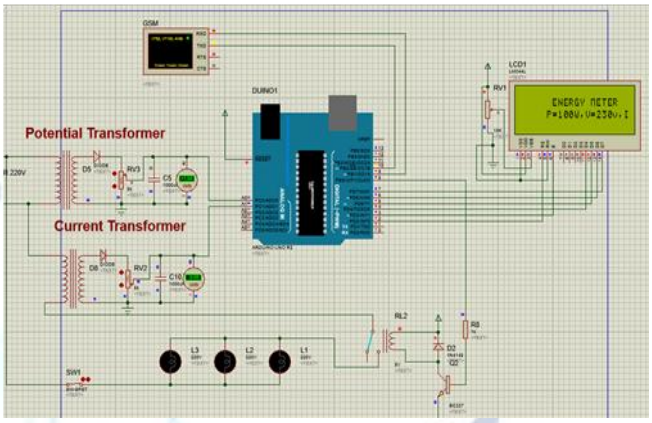


Fig 1.3 Simulation Circuit Diagram

Several pins RX and TX of the Arduino are used to connect the GSM module. The TX pin of GSM is connected to RX of Arduino and the RX pin of GSM is connected to the TX pin of Arduino. Also, the grounds of both GSM and Arduino are interconnected. The enable pin of the LCD Module is connected to the digital pin 11 of the Arduino. The LCD module is connected in 4-bit mode. The 4 data pins of the LCD are connected to the 4 digital pins of the Arduino. The register selects (RS) pin of LCD is connected to the digital pin

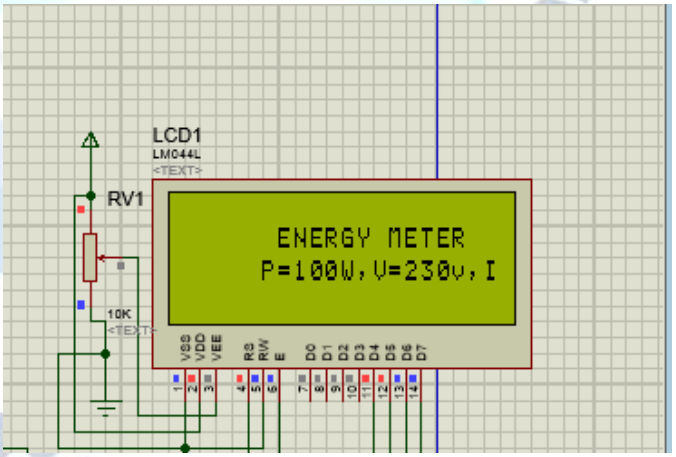


Fig 1.3.1Simulation output

The existing reading system in metering in our country is a time consuming and it needs a number of labors to. The proposed project will eliminate the need for labor and it is a cost efficient. The proposed system gives the

information about the energy consumption on real time on IoT dashboard on mobile application and PC. The consumed load Charge billing through IoT and the notification sent as a message through GSM. This smart energy meter also provides the distributor to make disconnection or reconnect the supply from the remote area when the consumer failed to pay their bill. Fig 1.4 shows the final Hard ware kit of the proposed system

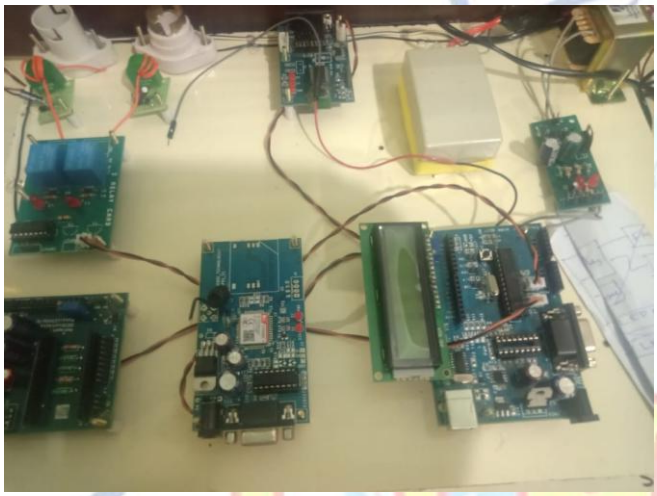


Fig 1.4 Hardware kit of the proposed system

V. SUMMARY

In this project, IoT based smart energy meter tracking system is very useful to read the consumption of energy in a efficient and highly accurate. It helps to Electricity Board to avoid the drift for disconnecting supply of unpaid consumers, rather it may disconnect from the remote area. The major advantage our project is the system consist of Zigbee, It is the one of the developing high level communication protocol. The system is designed with IoT which helps the system more reliable.

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