AUTOMATIC ELECTRIC BILL GENERATING SYSTEM USING WIFI MODULE

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ABSTRACT: It is difficult to observe the readings from the meter manually. Now a days power consumption increases, and also there is wastage of power by unnecessary usages. The goal of this project is to overcome this problem. this paper introduces a smart meter for automatic metering and billing. The integration of the Arduino and WIFI module provide the meter reading with some automatic functions that are predefined. The energy meter can be combined with the controller and the WIFI module to send information such as energy consumption and generated bill over telnet app in mobile such as data can be then fed and integration into existing energy management systems located at power companies or organizations to provide to serve customers without man-power.

KEY WORDS: Arduino Uno, WIFI Module, telnet application

I. INTRODUCTION:

Now a days every house consists of electricity. There is no house without electricity and also, we can't imagine the world without electricity. The energy meters are placed in every house hold to measure or record the units of the electricity consumed. By the record of the units, we need to calculate the electric bill manually. Sometimes it makes difficult to record the units from the energy meter then the errors will occur in the records. It causes errors in the bill calculations. It causes losses for the customers will paying the bill and also for the planning the usage of the electricity by the record of the units observed.

Now a days electricity meter reading for electricity units and billing is done by human workers from home to home and building to building. This requires huge amount of time and sometimes it may cause errors while reading the units. And also, without knowing we are consuming much electricity, so that huge amount of electricity was going waste without unknowingly. To overcome the problems facing on this system we are proposing the system which was able to send the units and amount to the user mobile. By this the user can observe the readings any time when it is required. So that the user can understand that how much electricity he was consuming. For this we are using the WIFI module to transmit the data to the mobile.
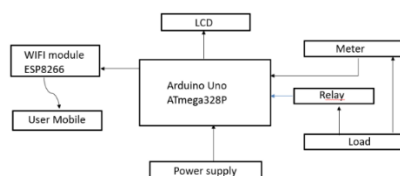
II BLOCK DIAGRAM:

Fig 1: Block diagram of the system

III HARDWARE COMPONENTS:

A. ARDUINO UNO:

It is an ATmega328P based microcontroller board. There are 14 digital pins and 6 analog pins. It has everything need to support a microcontroller; it makes easy to do the projects. It is designed with low current consumption.

Fig 2: Arduino uno microcontroller

B. ENERGY METER:

An electric meter is a device that measures the amount of electrical energy consumed by an electrical load over a certain period of time. An energy meter is a device that regulated in billing units, the most common one being the kilowatt hour.

C. LCD:

A liquid crystal display (LCD) made up of several blocks it consists of different sizes n*m, where m is number of rows and n is number of characters displayed in row. It is designed to project on screen information of a microcomputer.

In all kinds of projects LCD is used to display output. These are designed around LCD NT-C1611 module, are inexpensive, easy to use, and it is even possible to produce a readout using the 5*7 dots plus cursor of the display. They have a standard ASCII character set and numeric characters.
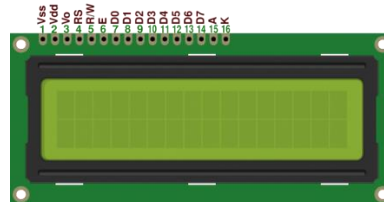

Fig 3: 8-bit LCD display

D. WIFI MODULE:

An ESP8266 WIFI module mainly used to develop the different IOT applications. It will transmit data (units and cost) to the user mobile. By using this the data can transfer to the users through internet. By this we can save or store the data in website, and the user can check the data through the website link. It makes easy to transmit data because it is wireless communication.

Fig 4: ESP8266 WIFI Module

E. RELAY:

It is an electrically operated switch. Relay is used to control the circuits by using electrical signal, it will connect and disconnects the circuit. It will minimize damage or protect the system from the load. In

applications it is used to control a circuit by a low-power signal. By using relay we can control the appliances as a switch.

Fig 5: Relay

F. POWER SUPPLY:

Electrical energy is a source of electricity. A device that supplies electricity or other types of electricity to a product or group of goods is called a power unit. The term is generally used for electrical appliances, less often for electrical appliances, and rarely for other electrical appliances.
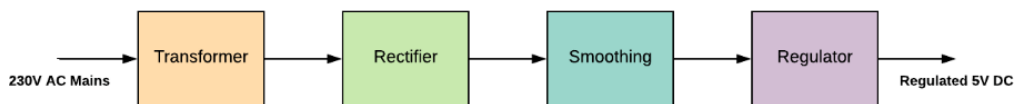

Fig 6: regulated power supply block diagram

G. LDR SENSOR:

LDR OR Light Dependent Resistor is a variable resistor. It is also known as photoresistor. LDR sensor varies based on the intensity of light falling upon it. This sensor works based on the surrounding light. Based on the intensity of light the resistance of the LDR will increase or decrease.

Fig 7: LDR sensor

IV CONSTRUCTION:

We use Arduino Uno for this project implementation and also we use the WIFI module to transmit data to the mobile phone. And also in this we use relay module to operate the system, LDR sensor for light intensity and LCD to display.

The pins 0 &1 are connected to the EIFI module. These WIFI module will send the data to the mobile phone which we required. To observe the data in mobile phone we need to instal telent application. In this by entering the IP address of the WIFI module we can observe the data.

The pins from 2 to 7 are connected to the LCD display. By this we can observe the working process of the project. And also we can observe the output.

The pin 8 is connected to the LDR sensor. It is used to increase the light intensity.

The pins 9 & 10 are connected to the relays. In this project we used two relays. Pin 9 is connected to the relay 1 and pin 10 is connected to the relay 2. These relays are used to control the bulbs or any other devices which we connected.

This is the construction and which devices are connected to which pins of the Arduino.

V WORKING:

The energy meter connected to the load and it displays the energy consumed by the load when the power is supplied. We can observe the units in the energy meter, sometimes we will face the difficulty to read the units. To solve this problem, we will send the message to the user how much units was consumed. For this Energy Meter is connected to the Arduino, now the bill is generated in it. in Arduino consists of predefined data which helps to generate the bill. The data was written in the form embedded C program which was inserted in the Arduino. The bill generated and the units can be observed in LCD. And the units and bill generated was send to the mobile phone by using ESP8266 WIFI module.

To observe the units and bill in the mobile phone, user need to instal the telnet app from the play store. And next connect to the WIFI in the user mobile. Next open the telnet app and enter the IP address and port number of the WIFI module.

Finally, after entering the IP address, we can observe the units and generated bill in mobile phone. If the IP address was entered incorrectly the we are unable to observe the data in telnet application. So while entering the IP address we need to enter it correctly. The user can observe this any time by entering the IP address in telnet app. In this we can also reset the data, by this the process we start from the first. The readings will count from the start.

By knowing the units consumed by the user, the user can understand where he was consuming more and where he was wasting electricity. To reduce this the user, control the appliances from this app to reduce this problem. By giving commend we can on or off of the appliances by using relay. By using the relay, we can turn on or off the appliances like bulbs. when the user command in the app like

"*1#"

based on the information stored for that command in Arduino the relay will work. So that the user will save electricity.

The construction of this system was shown in fig 10. By this we can observe data and control the appliances. To demonstrate this project, we take help of LDR sensor for unit count. It increases the units based on the light intensity.

VI FLOWCHART

Fig 9(a) shows the basic process of calculating the electric bill and data transmit to the mobile. Fig 9(b) shows that how the transmitted data can access or observed the data in mobile phone. By this we can understand the basic idea of this system and how it is working. By this we can get clear idea while working on it and make it easier.
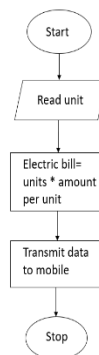

Fig 9(a): flowchart for data transmit.

Step 1: Start
Step 2: reading units from the energy meter and the Arduino will extract the data from the energy meter
Step 3: Calculating the electric bill. Where electric bill is equal to the product of number of units and amount per unit. The electric bill will be generated in the Arduino. The cost per the unit was predefined in it.
Step 4: data transmit to mobile phone by using WIFI module.
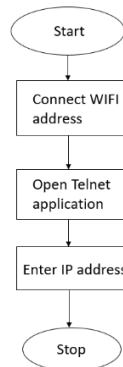Step 5: Stop

Fig 9(b): flowchart for data observes.

Step 1: Start
Step 2: Connect the WIFI address to the mobile.
Step 3: Instal the telnet application and open the application.
Step 4: Enter the IP address and port number of the WIFI module and connect it. Then we can observe the units and bill generated in it.
Step 5: Stop

VII RESULT:

The implementation of this project can be observed in figure 10. From this the message of the units and electric bill will be sent to the mobile phone through the WIFI module. From this we can observe the units and bill in the mobile phone by using telnet application, how the data will be appeared in the mobile phone was shown in fig 11. This makes easier to the user to know the units and bill, who are facing the difficulty while reading the units from the meter directly. This will reduce the errors which causes during the recording of the units.
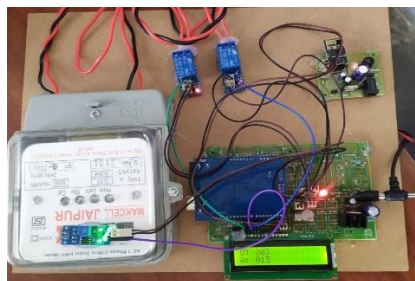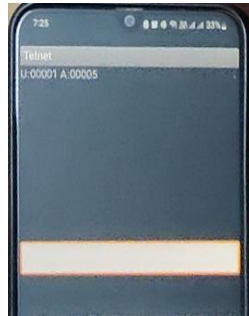

Fig 10: Implementation of the system

Fig 11: result of the system

VII CONCLUSION:

By this the meter readings become easy for the users. By this system the user can observe the units and bill in the mobile phone by using the telnet application. By knowing the units easily without errors, the user will take care while consuming the electricity, so that the power wastage will decrease. It will reduce the errors caused by human while collecting readings or generating bill.

REFERENCES:

[1] Andrea Z and Lorenzo V., "Internet of Things for Smart Cities," IEEE Internet of Things Journal, vol/issue: 1(1), Feb 2014.

[2] Isna K. and S. D. Sawant, "Integration of Cloud Computing and Internet of Things," International Journal of Advanced Research in Computer and Communication Engineering, vol/issue: 5(4), Apr 2016.

[3] T. Chandler, "The Technology development of automatic metering and monitoring system," in IEEE International power Eng. Conf., Dec. 2005.

[4] M. Faisal and A. Mohamed, "A new technique for power quantity-based condition monitoring," in 17th conf. Electrical Power Supply Industry, Oct. 2008.

[5]   N Dinesh Kumar, M Priyanka "Library and Auditorium Electrical Appliances Automation", Vol 7, Issue 1, (Jan 2016), Journal of Electronic Design Technology, Pg No 1-8. ISSN: 2321-4228.