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Implementation towards IOT based Smart Energy Meter

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ABSTRACT: Communication technology development is increased day by day. Due to the development of communication technology, every product is manufactured with smart activities. From the past decade, most electric devices are executed automatically using the remote control. Internet of Things (IOT) is used to connect various devices easily with the help of sensors. All the connected devices are working automatically without any human interventions. The roles of human beings are only to manage and control the connected devices from a remote location. Electric meters also using the concept of IOT. This paper describes smart meter devices. This system's main purpose is to automatically read the number of current consumption units with LED light, calculate the amount, and display the messages to the user's website and user's smartphone. This system also issues the user's alert message when the current consumption unit crosses the limited level.

KEYWORDS: Internet of Things; current consumption; total transmission energy; smartphone.

I. INTRODUCTION

The Internet of Things (IOT) is inter communication of embedded devices using networking technologies. The IOT will be one of the important trends in future, can affect the networking, business and communication. In this paper, proposing a IOT based prepaid energy meter. Most of the energy meters are designed to bill as per the units of energy consumed. These meters need to be manually read by people in order to provide monthly/quarterly bills. We here propose a IOT based smart electricity meter. The system is designed to allow amount of energy to be used as long as the account has balance pending. It also allows the operator to recharge the user account using IOT. The system first accepts account recharge and allows to use only limited units of energy as per recharge and then cuts off the supply. The prepaid electricity billing meter could be widely used to provide a new more customized electricity billing system, where users may recharge when they intend to use that facility. It also consists of a ESP8266 module that allows the operator to recharge the meter remotely using email message service. This puts forward an innovative electricity billing and "use as needed" electricity usage scheme. It also eliminates the need for manual electricity meter reading tasks. This meter are digital meter with short circuit protection, Over voltage protection, Anti-Theft detection.

II. RELATED WORK

For this work existing meter reading techniques in India are analyzed and conducted an extensive study on different energy measuring instruments available now AMR system and several related works are available. Many emetering systems have now been proposed, based on GPRS, Bluetooth, GSM as explained in [1], [3], [4], [5], [6], [7] and [8].Design of an Electric Energy Meter for long-distance data information transfers which based upon GPRS is proposed in [1]. These systems can't be implemented so easily because the regular use of GPRS is still a dream to the common people .A GSM Energy meter with instant billing facility is introduced in [2] and [3],but still the problem of missing SMS will degrade the accuracy and performance. A more reliable and userfriendly system with web portal for multiple access using the advanced Visual studio .net frame work is created in this project which will manage the data efficiently even if there is loss of SMS. It makes the design different from the previous proposals

III. PROPOSED ALGORITHM

Step1: Calculate the basic parameters for energy usage:

    i.   V and ZI terms using CT/PT

    ii.   Apparent power

    iii. Energy

Step 2: Display energy reading on LCD;

Step 3: Enable GSM modem application to:

    i.   Obtain data from microcontroller.

    ii.   Generate billing information based on amount of energy consumed

    iii. Send billing information to consumer

Step 4: consumer gets the billing notifications through messages

Step 5: when balance is low gsm will send the notification to the consumer.

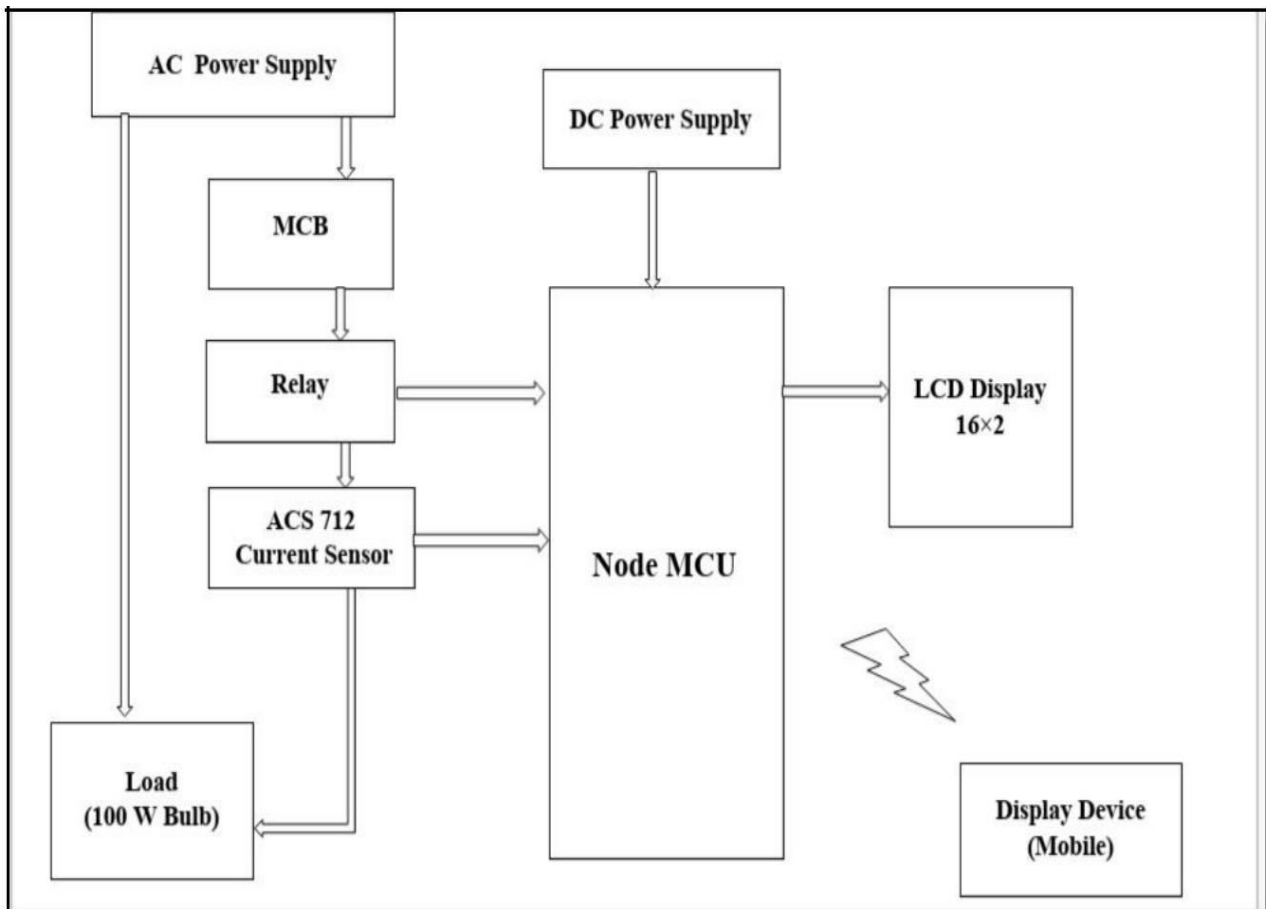Step6: if there is low balance in the sim then power supply will turn off.

Fig1: Flowchart

IV. APPLICATION

- ✓ Portable energy and power meters
- ✓ Grid monitoring
- ✓ Smart energy meter
- ✓ Smart plug
- ✓ Its applications include shopping malls
- ✓ Residential townships
- ✓ commercial buildings
- ✓ employ quarters etc.

V. SIMULATION RESULTS

When power supply is given to the controller and controller take the readings from meter and send SMS to the user after every month. The accuracy of Smart Energy Meter is checked by comparing the readings that are displayed on the LCD and that are received by SMS. Smart Energy Meter is also checked by connecting and disconnecting the customer's connection. We connected different loads 100W, 200W, and 1000W and checked its performance
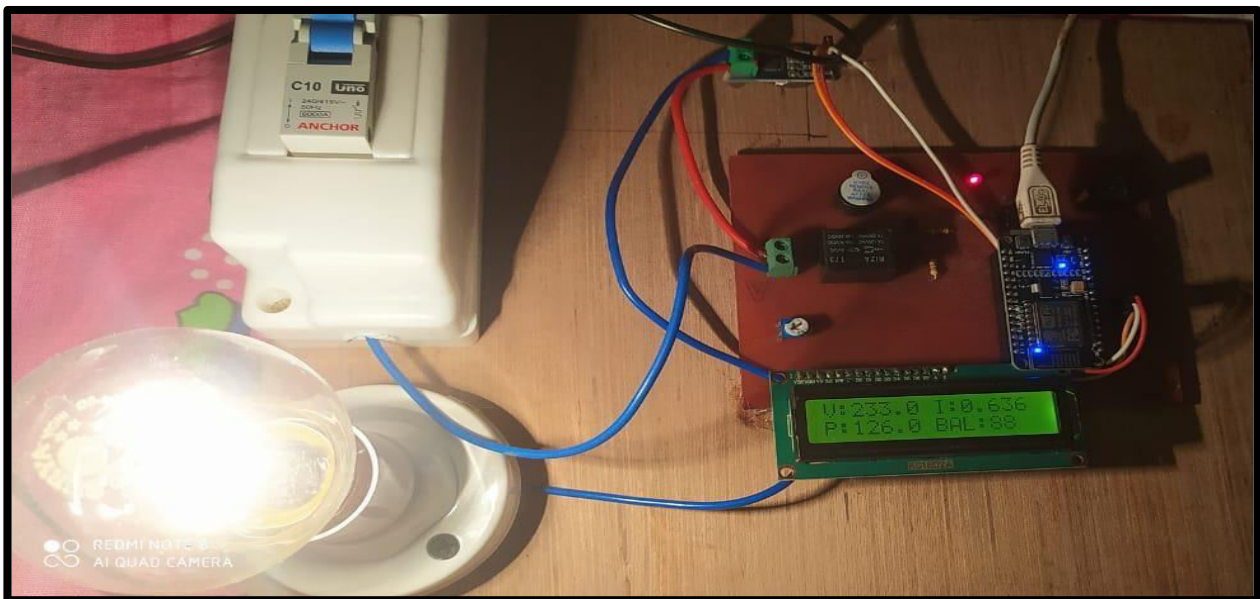

Fig2: Experimental Result

VI. CONCLUSION AND FUTURE WORK

Smart energy meter with reading indication has been developed by using GSM. Which is more useful to consumer for billing and maintaining less bill payment and it decreases the human needs for paying and other issues related to billing. We can extend it for industrial purposes also by interfacing three phase meters but the circuit have to modify for getting proper voltage to the controller. I thought there are few possibilities which can also be done on this project in future as I have provided flexibility in the project especially in controller section. The future research should include the proper methodology for measuring the power factor of the load.

Recommendations for future are as follows:

•Instead of GSM networks, some other means of communication should be used.

•In case of GSM, there must be security of GSM so that it can't be hacked.

•Power factor must be measured by different techniques.

• Linking of the data received by GSM to computer and developing a program which incorporates the tariff related to specific consumer and calculating the bill directly on the computer. In this way the computer will calculate the bill directly using the data received through GSM network.

• Smart energy Meter can be modified for the detection of illegal use of electricity.

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