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Arduino Based Electric Meter using GSM

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Abstract: Every system in our surrounding is becoming automated and making our life easier. Our idea is to develop an automated electricity billing system which is very useful in our daily life. The main motive to design the project is to create an automatic system to generate electricity bill. The whole module will keep an eye on the electric bill and the arduino micro-controller unit will be used to keep record of all units. As soon as the month end will be complete the total units consumed will be calculated and accordingly the bill is generated and display on the LCD. The captured image is in processed and meter reading are extracted. The bill amount is calculated and send to consumer as SMS via GSM module. A copy of SMS is then send to electricity board for documentation purpose. The current system of energy billing is error prone and also time consuming. Errors get faced at every stage of energy billing, thus to overcome for this drawback to smart energy meter.

Keywords: Arduino micro-controller, Arduino IDE, LCD, Energy Meter, GSM Module, Embedded C platform, potentiometer, Connecting wires

I. INTRODUCTION

As being a digital Indian, these days our consumers who are not satisfied with services provided by the electricity board. Now a day's an employ from electricity office comes to every house monthly, takes the meter reading and submits these readings to main Office these readings are use to produced billings these readings are use to generate bill. Due to some human or natural causes there are chances of errors. For example for long period the house is closed then the average is taken by the electric board, in such cases the consumer

Secondly if the weather conditions are not good the manual billing is slowed down. And hence automated electricity billing system can be an alternative and effective method of data collection, data processing and calculations of bills. It is a technique of automatically collecting meter reading, image processing and transferring the bill amount one to the consumer and another to the electricity mode as SMS using GSM module.

Arduino IDE is a very powerful tool and cross platform for extensive computations..The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supports a integrated software library from the writing project, which provides many common input and output procedures.

II. RELATED WORK

In literature, different methods are reported for the automatic electric meters through many points of view. Here, in this section, we are summarizing few of the methods related to the automatic electric meter.

Birendrakumar Sahani, Tejashree Ravi, Akibjaved Tamboli, Ranjeet Pisal. IOT Smart Energy Meter. We can see a person standing in front of our house from electricity board, whose duty is to read the energy meter and handover the bills to the owner of that house every month. This is nothing but meter reading. According to that reading we have to pay the bills. The main drawback of this system is that person has to go area by area and he has to read the meter of every house and handover the bills. Many times errors like extra bill amount or notification from electric board even though the bills are paid are common errors. To

overcome this drawback we have come up with an idea which will eliminate the third party between the consumer and service provider, even the errors will be overcome.

III. COMPONENTS

A. Arduino AT2560

Arduino is a micro-controller board based on the AT2560 open source prototyping based on easy to use software/hardware programming platform based around Atmel AVR cores combines a rich instruction set with 32 general purpose working registers all the 32 registers are directly connected to the Arithmetic logical unit, allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting format is more code efficient while achieving throughputs up to ten

times faster than conventional CISC micro-controllers. Arduino is licensed by LGPL or GPL. which is compatible for windows, MAC OS, Linux.

B. Energy Meter

Energy meter are classified into two ways digital and analog. Over year ago, an analog meter have used where the probability of errors is most and the fault tolerance is less. Energy meter or watt-hour meter is an electrical instrument which is use to measures the amount of electrical energy consumed by the consumers. Energy meter have been prototyped in such a way that it calculates taxes and tariff rates, unit price, maximum and minimum load which demands DC and stores all these dynamic values in non volatile memory EEPROM. Utilities is one of the electrical departments, which install these instruments at every place like homes, industries, organizations, commercial buildings to charge for the electricity consumption by loads such as lights, fans, refrigerators and other home appliances.

Energy meter measures the rapid voltage and currents, calculate their product and give instant power. This power is integrated over a time interval, which gives the energy utilized over that time period.

C. GSM Module

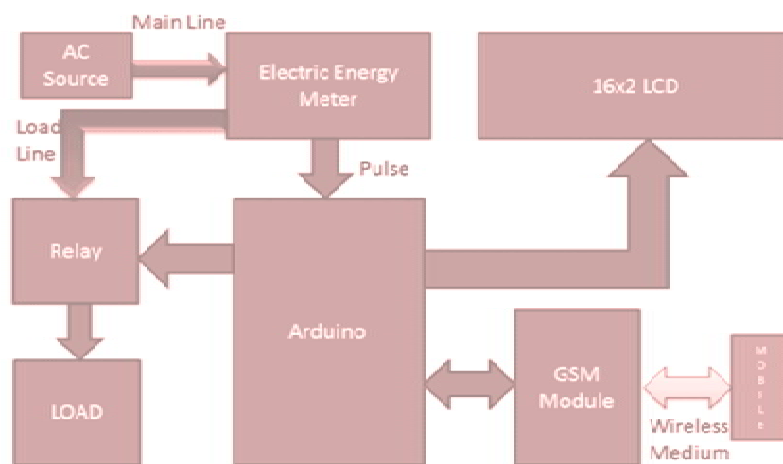
GSM Module or a GPRS module is a chip or circuit that is used for starting communication between a computing machine and a mobile device and a GSM or GPRS system. GSM or GPRS modem RS232 is built with dual band GSM/GPRS engine size 900a works on frequencies 900/1800Mhz. The GSM/GPRS modem is having inbuilt TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS voice as data transfer application using this modem we can make audio calls SMS read SMS attend the incoming calls and internet etc.

GSM module has features such as it can have availability of dual band and also baud rate can be configured manually and it can also have availability of sim card holder.

D. LCD Display

A liquid crystal display (LCD) is an eight segment display which has two registers namely command and data. LCD is a thin flat display number of color or monochrome pixels. Command register stores command instructions whereas Data registers stores the data that to be displayed on the LCD.

IV. WORK FLOW



- A. The project requires a GSM Modem, static energy meter, potentiometer and meter micro-controller for automatically sending a message about their power consumption details to the customer's mobile phones and it gives advantage of avoiding manual billing.
- B. The pulses from the load are given to the micro-controller which will continuously count and after calculating the bill it will give the command automatically to the GSM Modem to send a message to the customer's mobile which can only operable via customer and billing office.

V. CONCLUSION

A smart energy meter reading and controlling with the help of GSM module and arduino for keeping an eye on energy consumption has been developed. It avoids the human causes, provides efficient meter reading which avoid the tariff errors. Following developed system also gives information about daily, monthly and yearly power uses. It also gives details regarding daily power consumption which will help to manage their power uses. The following developed module is flexible reliable and secure because only authorized person can use the module.

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