Microcontroller Based Prepaid Electricty Billing System

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ABSTRACT: Now a days, most of the people find very difficult to pay electricity bill (EB).Energy consumed by the subscriber are not accurately measured through the manual method and leads to loss to the EB department. The existing system reduces the manual work and easy payment of the bill through the internet. Internet payment is expected to some connectivity problem leads to non-payment of the EB charge disconnection of the supply.
The proposed system introduces a prepaid card as like a mobile recharge card. The card will hold the total amount of energy that are required by the consumer. The card is used to charge the system and the customer able to use up to the limit. once the card limit crossover 50% of the amount a warning bell and an SMS is sent to the user to recharge the meter. The proposed system reduces the man work and leads to high accuracy and save power loss and also reduces the power theft.

KEYWORDS*: Microcontroller, GSM, Energy meter, prepaid card, Buzzer, LCD.*

I. INTRODUCTION

Now a day, number of people increased in a great extent by using electricity. The power consumption can be measured by using billing system. In traditional billing system, the monthly power bill for consumers is calculated from the post-paid meter reading based on the consumption of the electricity. But the main disadvantage of the traditional system of energy meter is non-accuracy and also to visit door –to- door, to read the meter for billing purpose. The maintenance of the power consumption in the traditional billing system is hard to handle. It also requires more amount of time and more labor to analyze the energy consumption and also to generate the bill. The manual operator cannot find the malpractices that are carried out by the consumer to reduce the energy meter or the power supply. Some of the system is based on the prepaid but it requires the smart card to recharge it which depends on the interface or internet.
In this paper we propose a method by using GSM network which neglects the need of internet. The purpose of this system is monitoring and controlling the energy consumption for prepaid customers using their recharge card. The recharge card which is preloaded with the energy meter usage values and the recharge card is connected with microcontroller as well as with energy meter and lamp is connected to the microcontroller. Load is turned on due to the electromagnetic radiation while the meter is recharged then the LCD clearly displays the recharged units and an SMS is also sent to the particular mobile phone as the recharge is successful and also a intimation is send to the particular phone when 50% of energy is consumed.

II. LITERATURE SURVEY

[sapna Ganurkar, pravesh Gour; 2014]
In this paper a prepaid energy meter based on using a recharge card in variable ranges of rupees. The recharge is done by entering the pin in the keypad and the meter is charged with the particular amount. In this system Buzzer is used which just produce the alarm sound which is available inside the room.
**[Subhasis Kar, Sayantan Dutta, Anusree Sarkar; 2014]**

In this paper a method is used to develop and design of prepaid energy meter based on SMS technology. A message is coded so that some amount of energy left and consumer will get an SMS to their mobile phone. In this recharge can be done only from the particular place (home) by using keypad.

[Dr.K.Sheelasobanarani, S.Dinesh Raja,B.Dhanaraj,K.Manickam,K.Karthick Raja; 2014]
This paper demonstrates the use of prepaid energy system. Here only the SMS is send to a particular mobile phone. The recharging process cannot be done by any other place; it can only do in a specific place.

III. SYSTEM ANALYSIS

BLOCK DIAGRAM
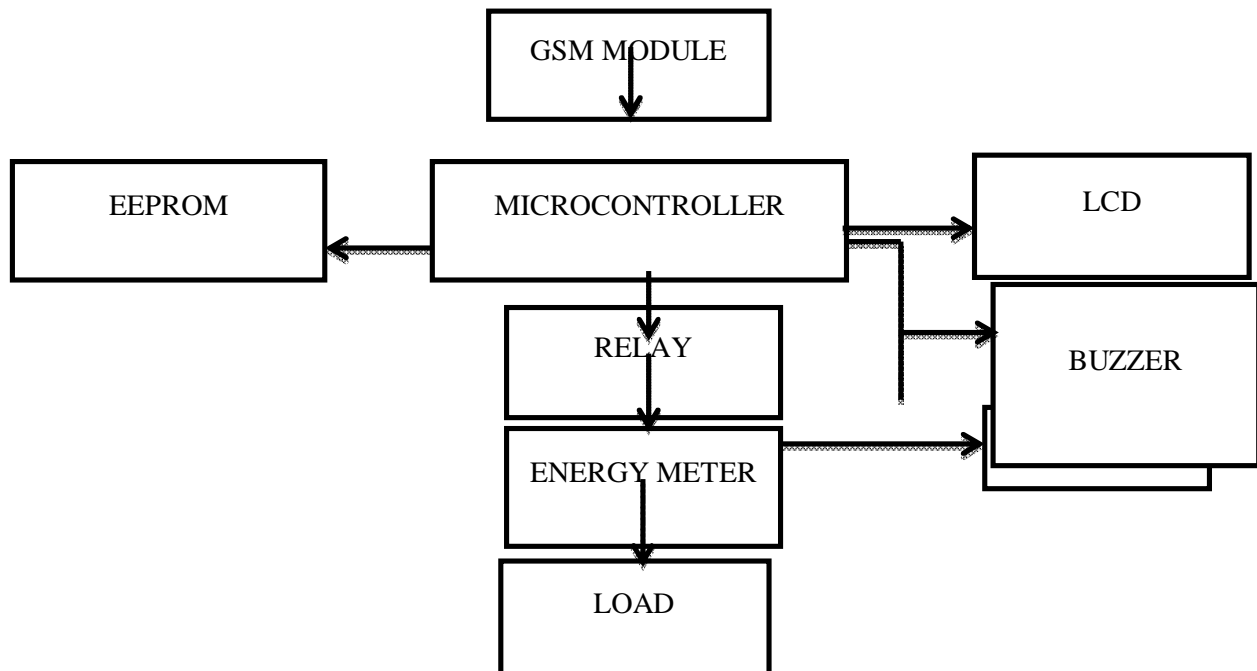
GSM stands for Global System For Mobile Communication. GSM is AN open and digital cellular technology used for transmittal mobile voice and information services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system exploitation time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the information, then sends it down through a channel with 2 completely different streams of consumer information, every in its own specific interval. The digital system has a capability to hold sixty four kbps to a hundred and twenty Mbps of knowledge rates.

POWER SUPPLY

The microcontroller and associated electronic equipment needs 5V provide whereas the relay needs a twelve Provide. one 12V adapter connected to the mains turn out DC 12V output usable for the relay and this voltage is additional undergone a positive fastened transformer IC 7805 leading to a 5V DC output usable for the microcontroller and alternative logic electronic equipment. The adapter performs the functions of rectification and filtering. Load is connected across 220V ac provide.

MICROCONTROLLER

In this paper, PIC microcontroller is used. Early models of PIC had store (ROM) or field-programmable read-only storage for program storage, some with provision for erasing memory. All current models use non-volatile storage for program storage, and newer models permit the PIC to reprogram itself. Program memory and information memory square measure separated. Information memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program directions vary in bit-count by family of PIC, and should be twelve, 14, 16, or twenty four bits long. The instruction set additionally varies by model, with a lot of powerful chips adding directions for digital signal process functions. The hardware capabilities of PIC devices vary from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with separate I/O pins, ADC and DAC modules, and communications ports like UART, I2C, CAN, and even USB.

LCD

LCDs square measure most well-liked as show devices compared to semiconductor diode attributable to lower power consumption, flexibility in show content and compact structure appropriate for embedding within the hardware unit. LCDs work on the principle of modification in orientation of the liquid crystals as a result of incident lightweight.

Polarized liquid crystals permits lightweight to experience indicating lightweight shades and disoriented liquid crystals block passage of sunshine, thereby creating those regions look dark. digital display displays are available in completely different sort like Numeric LCDs, alphabetic digital display and Graphic digital display etc. Here we have a tendency to use 20X4 alphabetic digital display, which implies we will show up to four lines with twenty Characters in an exceedingly line.

RELAY

Relay board consists of 3 SPDT relay and a relay driver ULN 2803. ULN 2803 could be a unipolar relay driver IC with most output voltage 50V and output current 500mA. It contains eight Darlington combine transistors, every having a peak rating of 600mA and may face up to 50V in off-state. Outputs could also be paralleled for higher current capability.

ENERGY METER

An energy meter could be a device that measures the number of electrical energy consumed by a residence or associate electrically battery-powered device. Electric utilities use electrical meters put in at customers' premises to live electrical energy delivered to their customers for request functions. They're generally label in request units, the foremost common one being the kW-hr [kWh]. They're typically scan once every request amount.

FUNCTIONAL DESCRIPTION

Functional diagram of the specified paid energy meter is shown in fig . This method is intended supported PIC Microcontroller that acts as an information process and gear. The present electrical device is connected asynchronous and also the potential electrical device in parallel with the road. 2 comparators area unit used as Zero Cross Detectors for the present and voltage signals. The zero cross detected signals of the present and voltage area unit applied to Logical circuit that encompass EX-OR gate. It offers output once each the signals area unit completely different. Then it's applied to timer in Microcontroller and from that worth we are able to calculate Power issue worth. The output from the potential electrical device is additionally taken as input of a exactness rectifier to convert 5V AC voltage to a 5V DC voltage. The corrected voltage is then applied to the microcontroller and equally current worth is applied to microcontroller through exactness rectifier. The LCD is employed for the aim of displaying the present, voltage and also the remaining units. Through GSM Energy Meter will be Recharged and used till the units become zero. once units becomes zero Relay are open and there'll be no power offer for the load. At constant time GSM sends message to shopper. Keyboard is employed to alter the mobile range outwardly for convenient purpose. Proteus package is employed for simulation. Proteus combines mixed mode SPICE circuit simulation, animated parts and chip models to facilitate co-simulation of complete microcontroller based mostly styles. High-tech PICC Compiler may be a superior compiling program for the PIC microcontrollers
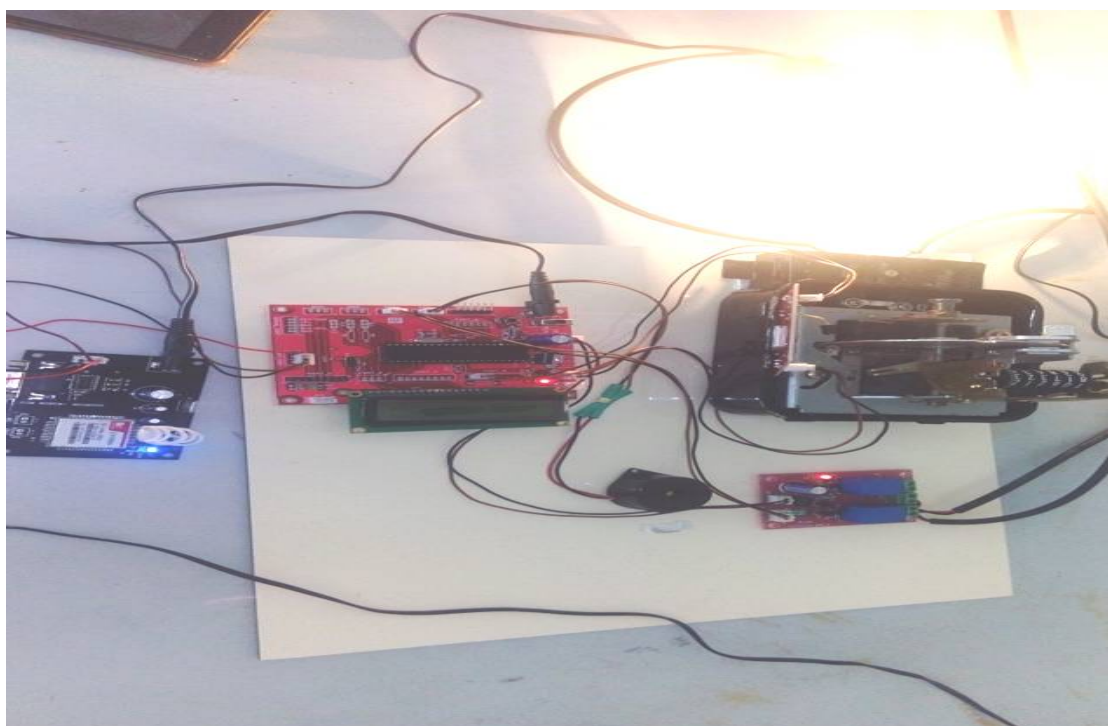
V. RESULT

VI. CONCLUSION

GSM primarily based energy meter is simple to put in and beneficial for each energy supplier and client. This reduces revenue price and reduces the human errors and issues like over running of the meter, over load. This ends up in reduction of outstanding dues. This device improves usage level and energy monitoring. In the gift work paid energy meter system is designed to unendingly monitor the meter reading and to pack up the facility provide remotely whenever the recharged units become zero. It avoids the human intervention, provides economical meter reading, avoid the asking error and scale back the maintenance price. It displays the corresponding information on Mobile for user notification.

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