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Smart Prepaid Electricity Energy Metering and Power Theft Control System Using Gsm

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Abstract- *In developing countries the utilities are facing difficulties in collecting electric bill in full scale. The conventional method of electricity billing involves a person from the distribution unit reading the number of units of electricity consumed in the energy meter and then preparing the bill. So the task of billing for every consumer is a time consuming job for the distribution grid and there can be errors in human reading. To eliminate all these problems ,the most convenient method is making the whole system prepaid similar to mobile phone recharge or DTH recharge. Therefore prepaid energy metering system is becoming popular for ensuring the collection of bill in advance .In this system the energy measurement and billing system is automated using ATMEGA 89S52 Microcontroller and GSM. The electricity recharge is simply done by sending an SMS through the mobile phone. The Microcontroller stores the number of units allocated and measures the energy consumed. It can also disconnect the home power supply if there is zero balance in the energy meter. The system will read the energy meter readings and also send notifications to the users mobile phone like low balance alert, recharge alert etc. Also today a huge amount of revenue is lost due to power thefts .This project also helps in minimizing the powertheft. It is a user friendly project. Wastage of energy will be reduced to a great extent. Using this project we can reduce manual effort to take the readings from the energy meter which is cost effective. The system have large scope of development that can contribute to great innovations.*

Keywords : AT mega 89S52 ,Power theft, GSM

I. INTRODUCTION

The conventional method of electricity metering involves a person from the distribution unit reading the number of units of electricity consumed in the energy meter, conveying this information to the distribution unit and then preparing the bill according to the units consumed for a fixed amount of time. This can prove quite tedious as it involves various tasks like reading, then preparing the bill. Still accuracy cannot be guaranteed as there can be errors in human reading. Even though digital meters are being replacing conventional electromechanical meters and provide much accurate readings, still the problem of deliberately making a false reading can exist (political reasons). Despite this, the task of billing for every consumer is a time consuming job for the distribution grid. Also the consumer can deliberately consume more amount of power than required and still refrain from paying the bill and nothing can be done to severe the electric power supply. To eliminate all these problems, the most convenient method is making the whole system prepaid similar to a mobile phone recharge or a DTH recharge.

II.LITERATURE SURVEY

As cellular networks are came into existence in 1970's for increasing the number of frequencies which in turn lead to the development of AMPS(Advanced Mobile Phone System). AMPS is analog based communication comes under 1st generation where as GSM comes under the category of 2nd generation. In GSM we are transmitting the data is in the form of digital and we are intimating the people by sending messages(SMS) to the mobile phone. The GSM module consists of a SIM card (Subscriber Identity Module).The messages are sent to the phone number which is configured or stored inside the SIMcard through SMS at the time of initializing the GSM. This messages can also be viewed by the LED display. The

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main purpose of using GSM is long range of communication which is up to 35KM range.

III. Proposed Method

As 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 prepaid energy billing meter in which the energy meter reading and billing are automated by using AT89C52 Microcontroller and gsm module. 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 GSM. The system first accepts account recharge and allows to use only limited units of energy as per recharge and then the microcontroller program deducts the recharge amount as per the load usage. As soon as the balance of the system becomes zero the system cuts the power supply to the house. 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 GSM modem that allows the operator to recharge the meter remotely using am SMS message. 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 system ia a multipurpose project which reduces powertheft to a greater extent.

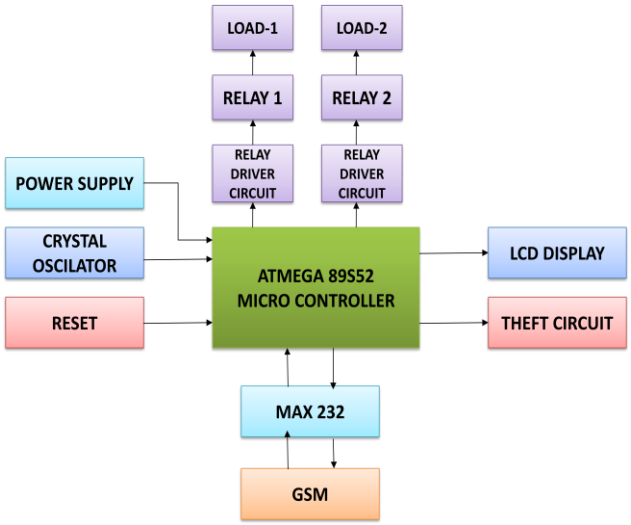


Fig.1.,Block Diagram

IV. HARD WARE DESCRIPTION

ATMEGA 89S52:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory.

Fig.2.,ATMEGA 89S52

GSM Modem:

GSM means Global System for Mobile Communications. It is a digital mobile telephony system that is widely used all over the world. It operates at either the 900 MHz or 1800 MHz frequency band.

Fig.3., GSM SIM900

MAX 232:

MAX232 is an integrated circuit which converts the signals from the RS232 serial port to the proper signal which are used in the TTL compatible digital logic circuits. The **MAX232** can convert the signals like RX, TX, CTS, and RTS and it is a dual driver/receiver

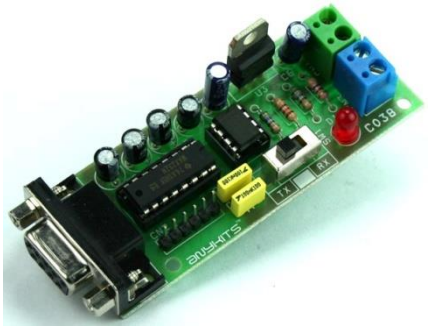


Fig.4., MAX 232

16*2 LCD Display:

In 1968, RCA Laboratories developed the first liquid crystal display (LCD). Since then, LCD's have been implemented on almost all types of digital devices, from watches to computer to projection TVs .

Fig.5., LCD Display

Power supply:

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current

Relay Driver Circuit:

A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply.

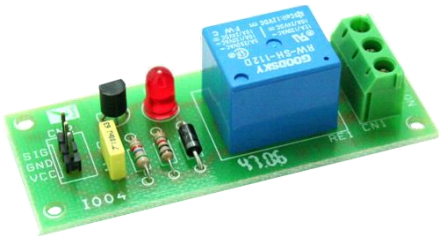
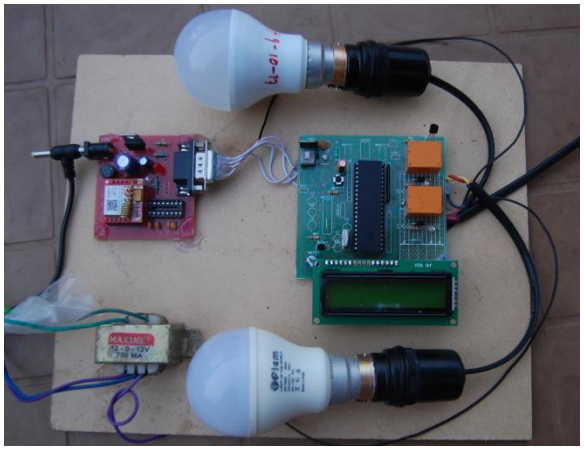


Fig.6., Relay Driver Circuit:

Power Theft Circuit:

Power theft is one of the most important issue in our country. It hampers functioning of industries and factories, due to shortage of power supplied to them. It causes shortage of power supply to homes. It leads to loss of revenue by Government as individual enterprises may opt to install their own power generators, increases corruption in form of bribes and many more.

EXPERIMENTAL KIT



V. FLOW CHART

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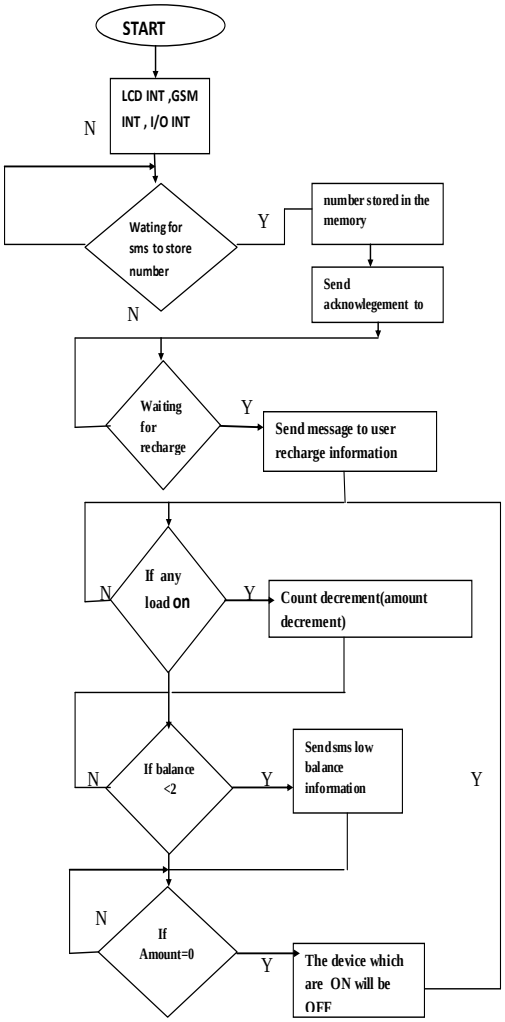
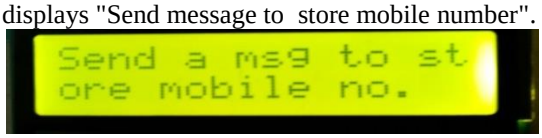


VII. RESULTS:

Firstly insert the sim card into the SIM 800 GSM module. Firstly the LCD displays "GSM IS INITIALIZING"

After the GSM initialization is completed then the lcd displays "Send message to store mobile number".



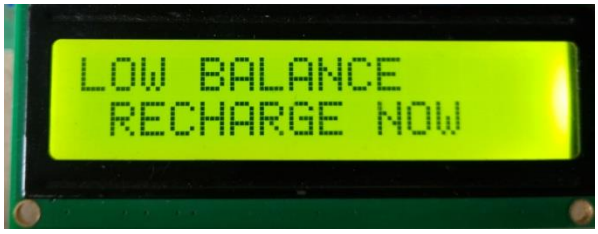
After the configaration of the mobile number to the sim card is finished it sends message to the mobile phone as well as the lcd screen displays "recharge to use electricity"

We can recharge the electricity balance simply by sending an SMS through the cellphone to the GSM module which consists of the SIM card. System receives the message and extracts the recharge amount and updates the balance of the system.

DISPLAYING AMOUNT AND UNITS

The micro controller stores the number of units allocated and measures the number of units consumed

The microcontroller program deducts the recharge amount as per the consumption of load power.As soon as the balance of the system becomes low the system sends a notification to the users mobile phone regarding low balance alert.



WHEN POWER THEFT OCCURED

Any tampering attempts can be easily detected and a message will be sent to the user through the mobile.

VIII. ADVANTAGES

The following are the advantages of proposed method:

- It is highly accurate as the whole idea of reading the units and then billing manually or any other means is eliminated.
- Consumer cannot escape from paying the electricity bill and the State Electricity Board gets free from debts.
- On the consumer front, the tedious task of paying the bill and waiting anxiously for the bill is eliminated.
- Wastage of energy is diminished as now only the required energy will be consumed as allotted.Consumer will know about his daily electricity usage.
- The smart prepaid energy meter can monitor the overall energy consumption and any tampering attempts are actually of no use and can be detected if still prevalent and an SMS notification will be sent to the user regarding power theft attempt.

IX. CONCLUSION

This project can reduce the manual efforts of take the readings from the energy meter which is cost effective .it reduces man power and This system has large scope of development that can contribute to great innovations.

X. FUTURE SCOPE

In future we can enhance this system for Water and Gas Billing System, Shopping malls, Home appliance automation, Residential town ships, Commercial buildings, Employee quarters etc..It is a user friendly project and cost effective method.

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