

# DYNAMIC PREPAID ENERGY METER WITH SMS BASED DEVICE CONTROL

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**Abstract**— The aim of the project is to minimize the man power and to restrict the usage of electricity. It also aims at reducing the power theft. The revolutionized energy meter informs the consumer about exact consumption and billing through SMS by using GSM technology. A GSM modem uses a regular SIM card for controlling the application and recharge purpose. The consumer can see their profile and even can update that tax rate by using the software which will be automatically get updated on the display screen. The energy meter also finds the unauthorized usage of the power. We can ON or OFF the power supply of the load from anywhere by using SMS. If the balance reaches to threshold value then GSM technology automatically alerts the consumer to recharge by SMS.

**Index Terms**— Energy meter, Global system for mobile technology, Microcontroller ATMEL 89S52 family.

## I. INTRODUCTION

Traditionally the meter reading power consumption is done by human operator and it is time consuming. The operator was used to go from houses to houses for taking reading, hence sometimes the error get produced. Now-a-days the number of consumers using electricity goes on increasing which leads to the increase in the usage of electricity, due to which it is difficult to handle the billing system by a human operators. The current system can detect the power theft rarely. Presently the consumers are facing the problems like receiving due bills for that whose payment has already made as well as the poor quality of electricity even if the bill is already paid.

In the present billing system there is manual process of meter reading, updating the records and billing the consumer. At the consumer end there is no perspective of knowing the bill until the end of the month neither are there any chance for one to understand his daily power consumption. We are suggesting a technology where consumer could know the bill anytime he want. And accordingly he could manage his monthly budget also the consumer has face many problems with current procedure of provider According to existing meter reader system the unit is calculated manually by clicking a picture of the

meter and is then send to the central station for billing after the unit has been manually entered into the system by the data entry operator. Also there is difficulty in locating all the houses where meters are installed and mostly to identify meters located in rural areas. According to consumer point of view there is no facility provided of knowing their current consumption units or either they have to calculate it manually. There is also no facility to compare the consumption units, all this process are manually maintained which is big burden for them. The RF meter had been implemented, but it needs satellite according to this, problem will occur to placed it. The many of energy meter had been implemented are prepaid but they needs smart card to recharge it the internet and computer interference is required in this condition. Presently, the GSM network is used eliminate the requirement of internet. SIM900 is the advanced version of the GSM modem which is used frequently now-a-days for communicating purpose. The paper deals the feature of revolutionized energy meter where we can get the consumption of power as well as the amount consumed on the LCD display. By using GSM technology the SMS can be send to the customer for making recharge if the balance of the prepaid SIM is below the cut-off, new tax rates can be update, power theft can be detected and power ON & OFF of the load when not required. Hence the purpose of this is to save the electricity and minimize the man-power. Our meter has regular SMS sending facility. Here power supply is cutoff by using switch instead of relay. The LCD display shows unit consumed as well as balance as per balance is deducted from SIM.

## II. METHODOLOGY

A standard electronic energy meter is used. The blinking LED seen on the front panel is directly proportional to the power consumed. More the power drawn faster becomes the LED blinking pulses. One sensor is placed above such blinking LED to derive the real time units consumed whose output goes to an 8051 microcontroller. Whenever the LED blinks, it then gives an interrupt signal to the microcontroller of the 8051 family and thus the program of the

microcontroller counts the pulses and displays the reading on the LCD duly interfaced to the microcontroller for every minute/daily/weekly or monthly as programmed which is sent to the cell phone of the user by an SMS through a GSM modem, which is interfaced to the microcontroller via a level-shifter IC and RS232 link. The desired cell number is auto saved on the microcontroller over a missed call by the user for sending SMS to that number only. We use EEPROM for storing data. The prepaid card which is recharged it acts as input to microcontroller. Power supply is off using switch when recharge amount is used up by consumer also when balance is low, it sends message on our mobile. After every 10units will consume, there is one message to consumer that will help to know power theft. The step down transformer which converts 230V to 12V is used. GSM modem is serially connected to microcontroller by using interfacing devices MAX232 and DB9 connector. MAX232 is an integrated circuit that converts signals from an RS232 port to signals suitable for use in TTL compatible digital logic circuits. LCD display is parallel connected to microcontroller. LCD display is used to display power consumed as well as balance amount. In order to achieve the best performance and accurate detection, three different units are designed and implemented.

1. Interfacing microcontroller with GSM module:
2. Interfacing LCD with microcontroller.
3. Interfacing microcontroller with energy meter.

### III.FUNCTIONAL BLOCKDIAGRAM

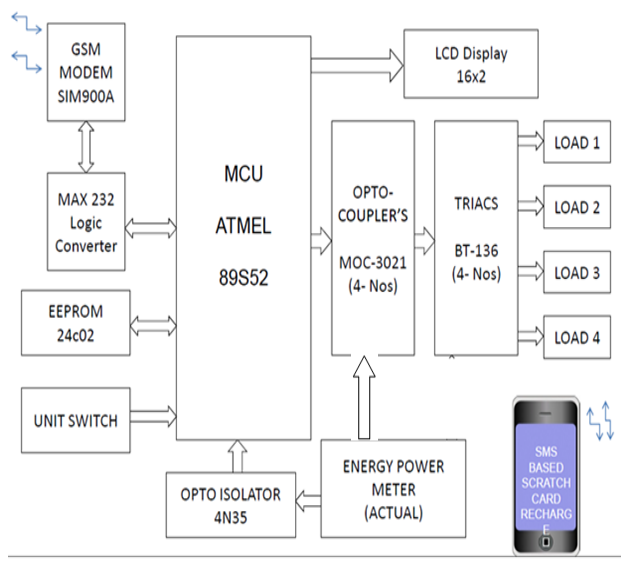


Fig.3.1: Block Diagram

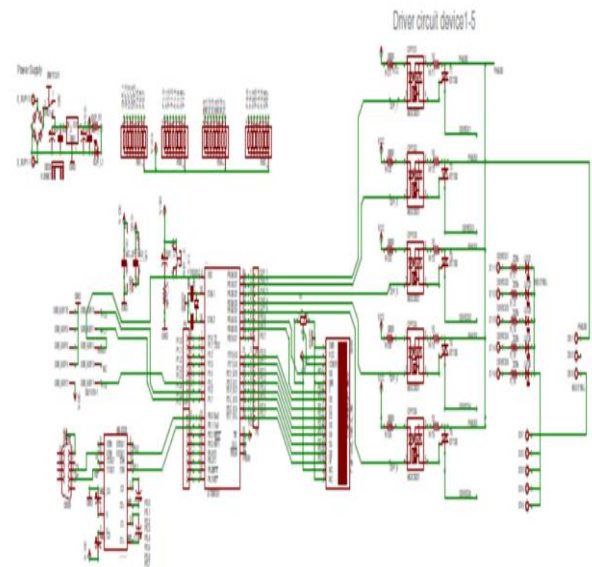


Fig.3.2: Circuit Diagram

### IV.WORKING

89S52 acts a main control unit for the proposed system.

Following are the blocks used for the system working:

- 1) TRIAC'S BT136 used to switch AC loads which support upto 4A of current flow at 230V AC. A three terminal device mainly main terminal1,2 and gate controls the AC load switching. Gate is the main control terminal, which causes the flow of current through the TRIAC.
- 2) Opto-coupler: MOC3021 provides isolation between gate of triac and microcontroller. Protecting microcontroller from access voltage and current.
- 3) GSM SIM900A provides a wireless link to the given system. SIM900a is generally interface to the microcontroller. Modem supports RS232 logic level. MAX232 acts as a logic converter between microcontroller and modem. Modem operates using AT commands.
- 4) 16X2 LCD is used to display balance unit to the user. It is connected in 8bit mode with microcontroller.
- 5) Energy meter is used to account the energy consumption. Meter is connected to the microcontroller using opto coupler 4N35.
- 6) 7805 is voltage regulator used to convert higher voltage to +5V DC for microcontroller to other logic IC's.
- 7) DB104/107 is a bridge rectifier used to connect 12AC to DC from the stepdown transformer.

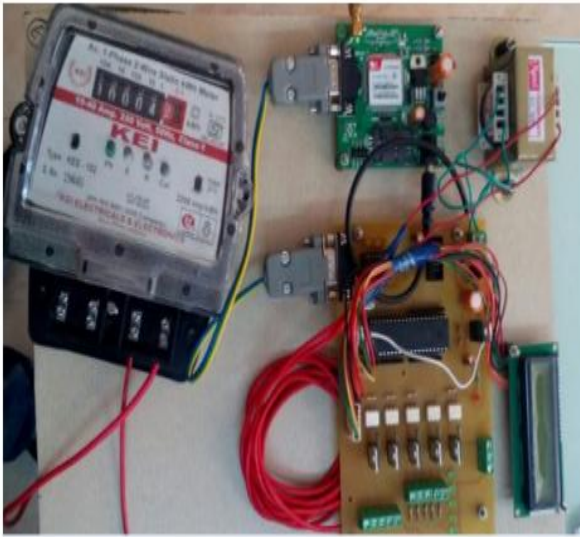


Fig.3.3: Hardware part

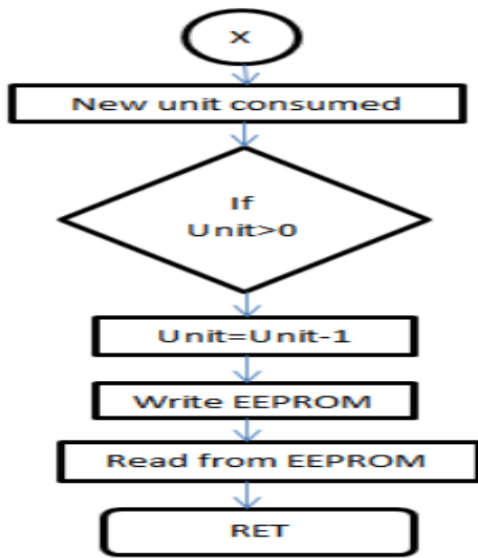


Fig.3.4:Flow Chart of unit consumption external routine

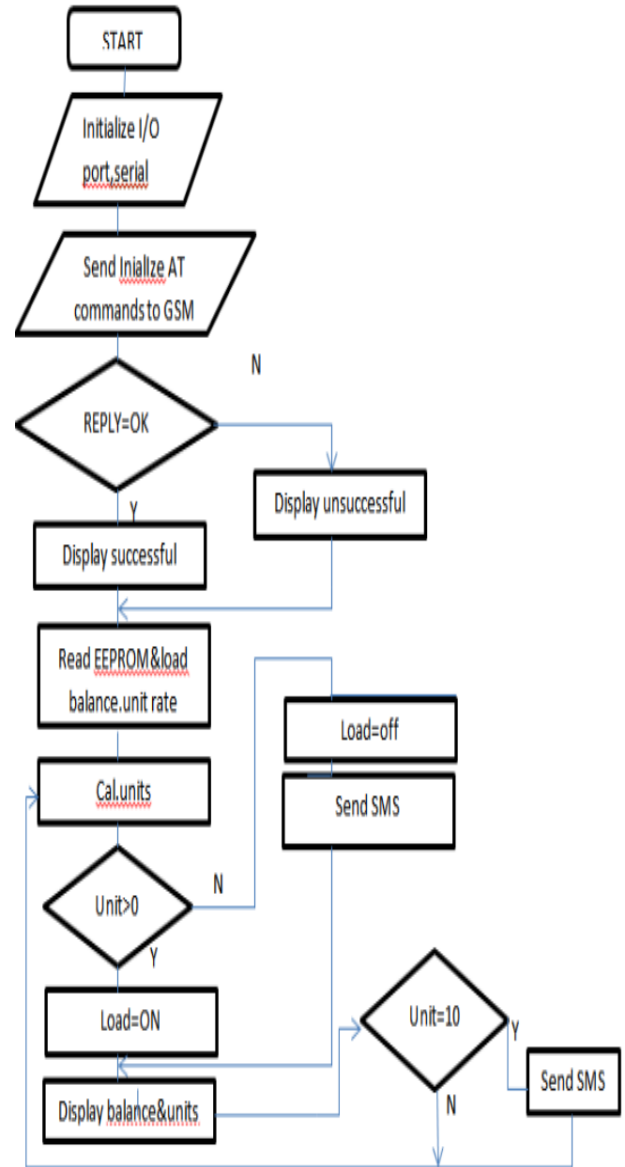


Fig.3.5:Flow Chart of main program

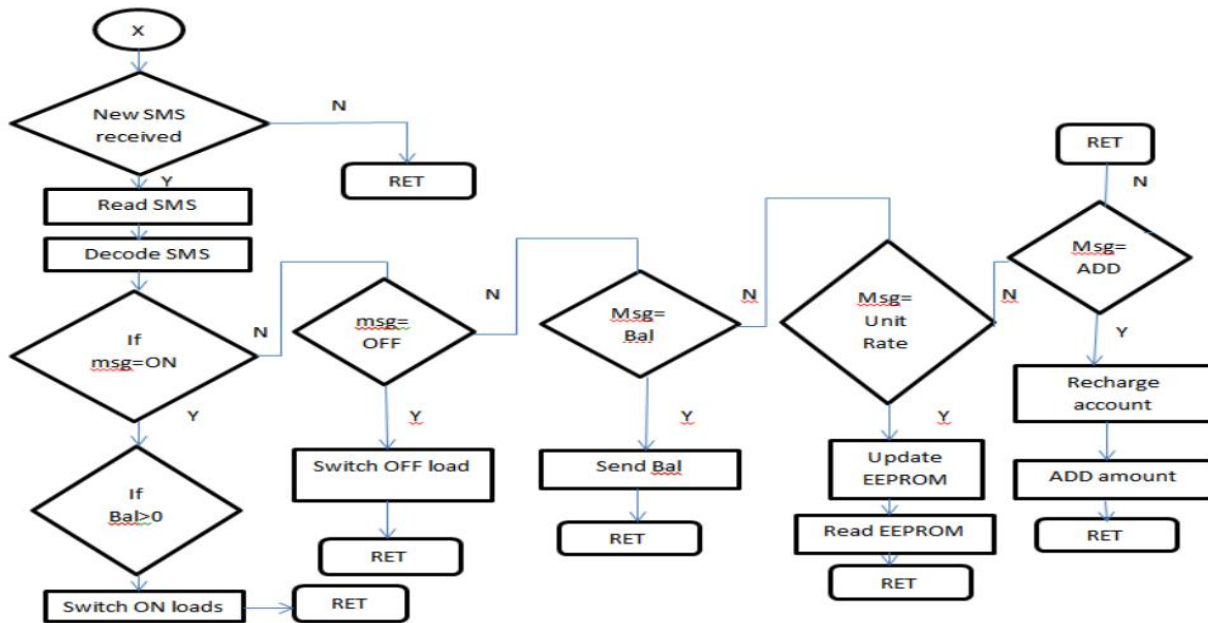


Fig.3.6: Flow Chart of GSM SMS Serial Routine

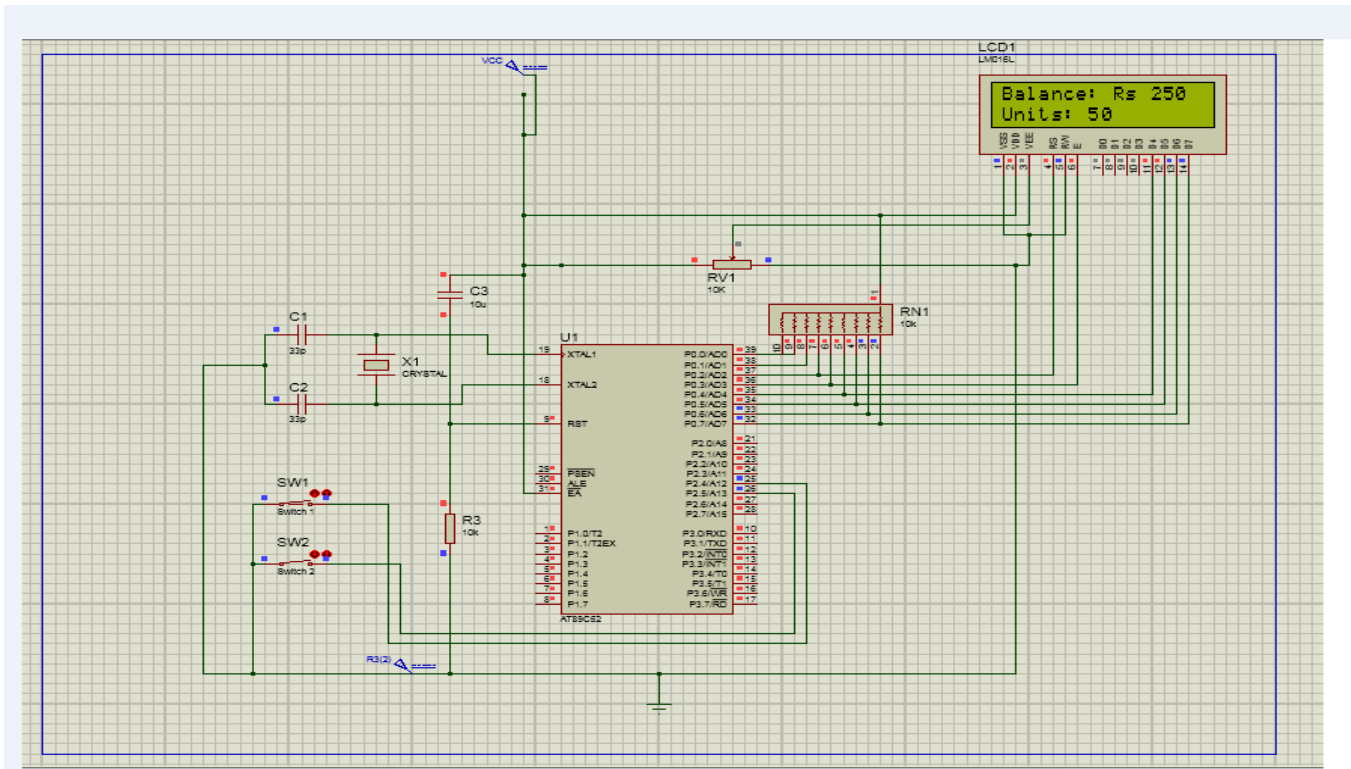


Fig.3.7: Proteus Circuit Diagram

#### IV.CONCLUSION

The implementation of this project helps consumer to know exact power consumption that will help to manage the budget. The regular SMS sending feature is used to know the details of our meter at anytime we want. We OFF the unusable electricity simply by forwarding message from anywhere to GSM SIM module and also we can recharge our meter by sending message. Our energy meter is the SMS based device control. Prepaid card system is very beneficial to consumer instead of billing process. Microcontroller performs all function and displays exact consumption and billing. This instant billing system is able to detect power theft. Consumer pay for electricity before use. It reduces the wastage of power. The Energy provider check status of our meter and all details with the help of GUI software and also update the tax rate whenever it changes.

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