Design and Implementation of GSM Based Power Supply Control

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Abstract- *GSM Based Automation Energy Meter Reading System with Instant Billing. This paper proposed new based technique for metering purpose using this technique we can access data globally for managing & billing purpose. According to this technique interfacing of Arduino & GSM is done through respective module pins. This GSM module is interface directly to the remote central office through GSM network these data processing units communicate to the user to have an information about their billing this system is highly effective that it is eliminate drawbacks of conventional system & communication.*

Keywords- GSM; Arduino; Power Contro; Energy Bill; Smart meters.

I. INTRODUCTION

Today power generation cost recovery is major issue. Our model will overcome today's manual cost recovery system problem. Conventional method is when consumer do not pay the electricity bill or make delay of payment then utility cut power supply manually which require more time also human delay take the place.

We are introducing our project with Arduino, GSM Module, Relay and Interfacing of this equipment to Control the Supply of the user if the bill payment is not done within the certain limit of time. This will ensure that there will no delay in bill payment and which will reduce human effort.

II. PROBLEM STATEMENT

In current power system scenario, the control of power supply provided from the utility to customer is fully manually. If users due the payment exceed more than desired duration then the fine charged to the customer or they have to cut the power manually which includes labor cost and is time consuming.

Though there are the smart meters but to replace every conventional meter with smart meter is difficult job, more time processing, & will require huge amount of initial cost. To overcome this problem our one model can control

more than eight customer user. Also this will require less initial cost. more than eight customer electricity meter. Also this will require less initial cost.

III. WORKING PRINCIPLE

In our project, Arduino is used for controlling whole the process. Here we have used GSM wireless communication for controlling mains power supply given to the customer. We send some commands like "#A.l1 on*", "#A.l1off*".After receiving given commands by Arduino through GSM, Arduino send signal to relays, to switch ON or OFF the mains power supply using a relay driver when the electric bill not paid in given duration of time.

IV. CIRCUIT COMPONENT

a. Arduino UNO
b. GSM sim800C Module
c. Relay 12 volt AC – 40 A
d. wires
e. LCD
f. Power supply
g. mobile

In this model we have used a prefix in command string that is "#A.". This prefix is used to identify that the main command is delivering next to it and * at the end of string indicates that instruction has been ended.

When utility send SMS to GSM module by Mobile, then GSM receives that SMS and sends it to Arduino. Now Arduino reads this SMS and extract main command from the received string and stores in a variable. If match occurred then Arduino sends signal to relay via transistor switch for turning ON and OFF the energy meter of the user and relative result also prints on LCD. Here in this project we have used 4 loads for demonstration. Maximum current rating of relay is to be selected so that it can handle maximum load of customer.
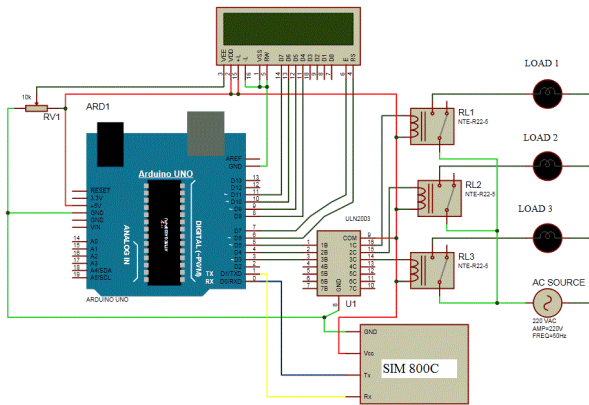
Fig.1. Circuit Diagram

V. CIRCUIT DESCRIPTION

Mainly there are four component Arduino UNO, GSM SIM 800C, Relay circuit & LCD. Arduino work on 5 volt dc supply it read the command from gsm & respective program in GSM on the basis of command make the respective arduino pin high or low which give 5 volt or 0 volt which will given to transistor for switching purpose of relay which work on 12 volt & which will make respective load ON or OFF.

VI. POWER SUPPLY

We required 5 volt DC two source & 12 volt DC one source. To get such output from 230 volt AC first we need to step down AC voltage from 230 volt to 15 volt AC. To convert into DC we need a bridge rectifier. With only DC bridge pulsating DC output is present at output to get constant DC output we need to add a capacitor in parallel with a proper value of capacitor by taking the current output.

7805 for +5 volt.
7812 for+12volt.

VII. RELAY CIRCUIT

Arduino output signal is of 5v on such small voltage relay can't operate . Relay required 12v coil to energized. So externally 12v coil is given to energized by external supply. So transistor is used in this case. By the transistor switching method Relay is operate. Transistor 2n222 is used.

- 30~40A switching capability
- NO: 40A 240VAC
- NC: 30A 240VAC
- COIL: 12VDC
- PCB coil terminal

- Design to support heavy load
- 2.5KV dielectric strength (between coil and contacts)
- Dust protected types available

VIII. GSM MODULE

GSM module SIM800c is has used in the project. It is like a mobile phone with all the facilities of receiving a message. It is communicated and programmed with AT commands.GSM has 5 output/input pin which can perform following function- audio input and output pins (for mic & speaker), control pin for mute, also to load the particular program one pin, power pin-ground pin, transmitter Tx & receiver pin Rx. RX and TX pins are used for the serial communication with the arduino. There are various AT commands to check the signal strength and connection and SIM status etc. Here the Hyper Terminal is used to initially interface with the computer to check the module. It also has an antenna to receive the GSM signal from the user's phone.

SIM800C

Supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. SIM800C features GPRS multi-slot class10/class12 (optional). SIM800C is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, EGSM900MHz, DCS1800MHz and PCS1900MHz.

42 SMT package are on SIM800C, and include all hardware interfaces between the module and customer's boards. SIM800C can achieve almost all the space requirements in customers applications, such as smart phone mobile devices with a small dimension of 17.6*15.7*2.3mm

- Include 3 lines serial port
- Audio channel which include a mic input and a speaker output.
- General purpose input and output.
- Single SIM card interface.
- Support Bluetooth.

SIM800C is designed for power saving so that the current consumption is as low as 0.6mA in sleep mode.

- GSM : 850,900,1800 and 1900MHz
- RAM : 32Mega bit
- Bluetooth : (need software support)
- FLASH : SIM800C (24Megabit)
- Power supply : 3.4V ~4.4V DC
- Power saving : 0.88mA
- SMS storage: SIM card memory
- External antenna : Antenna pad
- Support SIM card: 1.8V - 3V

IX. CONCLUSION

According to this technique interfacing of Arduino & GSM is done through respective module pins. This GSM module is interface directly to the remote central office through GSM network this data processing unit communicate to the user to have an information about their billing this system is highly effective that it is eliminate drawbacks of conventional system & communication.

X. RESULT

- Power cut-off with efficient, fast & reliable technique.
- Cost efficient System.
- Time saving in operation performed by the device.

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