

Design and Development of SMS Based Generator Start/Stop System

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ABSTRACT : This paper offers an integrated SMS alert and remote control system for a generator. This unit can be integrated into any diesel generator. The Generator can be Started or Stopped by sending an SMS to the generator from anywhere in the world. Used in conjunction with the alert, the generator can be turn on and off even if the owner is not at home or the office when the lights go out. The SMS unit is mounted inside the generator housing (space permitting) and runs off the generators battery. When the generator is in automatic mode it will start-up when the power fails and in doing so sends an SMS to operators predetermined phone number. The methodology used was the principle of serial communication with embedded system. Sim900 was used as the GSM module and 8051 microcontroller was program, the simulation of the schematics diagram was done using Proteus 8.4 software. The microcontroller code was done using keil compiler and the hex file was transfer to proteus software for simulation.

The unique SMS Alert and command system allows users to quickly and easily control their Generator worldwide, with the knowledge that problems can be sorted out quickly and efficiently. In addition to that, the security system allows for safe and secure use without interference.

Keywords: Generator, 8051, Microcontroller, KEIL, SMS, SIM900

I. Introduction

This Paper is a very good example of embedded system as all its operations are controlled by intelligent software inside the microcontroller. The aim of this paper is to control i.e. to ON/OFF of generator, the electrical or electronic appliances connected to this system from anywhere in the world. For this purpose user can use any type of Mobile. This way it overcomes the limited range of infrared and radio remote controls[5]. Using the convenience of SMS, this paper lets you remotely control equipment by sending plain text messages, such as "abcdn1", "abcdnaf3", "abcdf57n142"— all of which can be pre-programmed into the controller and easily remembered later. It can control up to eight external devices Short Message Service (SMS) is defined as a text-based service. That enables up to 160 characters to be sent from one mobile phone to another. In a similar vein to email, messages are stored and forwarded at an SMS centre, allowing messages to be retrieved later if you are not immediately available to receive them. Unlike voice calls, SMS messages travel over the mobile network's low-speed control channel[7].

"Texting", as its also known, is a fast and convenient way of communicating. In fact, SMS has taken on a life of its own, spawning a whole new shorthand language that's rapidly Many industries have been quick to make use of this technology, with millions of handsets currently in use. As new models with "must have" features hit the market, older models become virtually worthless and if not recycled, end up in landfill[8].

II. Review of Related Works

Amit sachen et al have discussed the user can send commands in the form of SMS messages to read the remote electrical parameters. This system also can automatically send the real time electrical parameters periodically (based on time settings) in the form of SMS. This system can be designed to send SMS alerts whenever the Circuit Breaker trips or whenever the Voltage or Current exceeds the predefined limits. This project makes use of an onboard computer which is commonly termed as microcontroller [1].

Mallikarjun et al proposed this system is a specially designed computer system that is completely encapsulated by the device it controls. The embedded system has specific requirements and performs pre-defined tasks. The diesel generator is used when electricity is not readily available, or when power failures occur due to natural disasters such as typhoons or floods, or during other unexpected crises. Generally, the diesel generator operates

in analog. The analog type controller cannot be processed precisely due to the distortions and noises coming from the data. In order to increase data accuracy, the controller needs to be digitalized [2]

Vimalraj et al have described a distribution transformers have a long service life if they are operated under good and rated conditions. However, their life is significantly reduced if they are overloaded, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. This system provides flexible control of load parameters accurately and also provides effective means for rectification of faults if any abnormality occurs in power lines using SMS through GSM network [3].

Andriy Palamar et al proposed the system the Cellular phone containing SIM (Subscriber's Identifying Module) card has a specific number through which communication takes place. The mode of communication is wireless and mechanism works on the GSM (Global System for Mobile communication) technology. Here, the communication is made bi- directional where the user transmits and also receives instructions to and from the system in the form of SMS [4].

III. Methodology

The method used for the design and implementation are as follows

a. Power supply stage

Step 1: Connect one of the ac section of the bridge rectifier to the ac output of the transformer

Step 2: Connect the other terminal of the ac output of the bridge rectifier to the ac output of the transformer

Step 3: Connect the ac input of the transformer to 220v ac power source

Step 4: Connect the positive terminal of the bridge rectifier to the positive terminal of c1

Step 5: Connect the negative terminal of the bridge rectifier to the negative terminal of c1

Step 6: Connect the positive of c1 to the input of 7812

Step 7: Connect the negative of c1 to the ground of 7812

Step 8: Connect the output of 7812 to the input of 7805 and bias with the positive of c2 to prevent the capacitor from heating and to allow a stable voltage

Step 9: Connect the ground of 7805 to the ground of 7812

Step 10: Measure your output voltage

Step 11: The 12v output voltage will be measured from the 7812 and the 5v output will be measure from 7805

b. Programming of the gsm module

The programming of the gsm module was done using the ATCommand Instruction.

Table 1: ATCOMMAND Instruction

Command	Description
AT	Check if serial interface and GSM modem is working.
ATE0	Turn echo off, less traffic on serial line.
AT+CNMI	Display of new incoming SMS.
AT+CPMS	Selection of SMS memory.
AT+CMGF	SMS string format, how they are compressed.
AT+CMGR	Read new message from a given memory location.
AT+CMGS	Send message to a given recipient.
AT+CMGD	Delete message.

Source: Developed with Labview Software(www.labview.com)

c. Programming of the microcontroller

The following steps were implemented

Step 1: The component used are 33pf capacitor, at89s52, 11.0592mhz crystal, 10uf 16v, 10k resistor, reset button

Step 2: Mount a 40pin ic socket onto the veroboard

Step 3: Connect 11.0592mhz crystal across pin18 and pin19

Step 4: Connect the 33pf across the crystal

Step 5: Connect the reset button

Step 6: Download keil on the internet and install it

Step 7: Program the sms based generator start/stop using embedded c

Step 8: Compile the program, testrun, debug and generate hex file

Step 9: Load the hex file into the chip with the help of burner

ORG 00H

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MOV R0,#10
MOV R1,#10
MOV R2,#10
MOV R3,#10
MOV TMOD,#01H
MOV TCON,#00H
MOV TL0,#F4H
MOV TH0,#FFH
SETB TR0
;#####;
;      START OF MAIN PROGRAM      ;
;#####;
L1:  JNB TF0,L1
     CPL P1.0
     CLR TF0
     MOV TL0,#F4H
     MOV TH0,#FFH
     DJNZ R0,L1
     CPL P1.1
     MOV R0,#10
     DJNZ R1,L1
     CPL P1.2
     MOV R1,#10
     DJNZ R2,L1
     CPL P1.3
     MOV R2,#10
     DJNZ R3,L1
     CPL P1.4
     MOV R3,#10
     SJMP L1
;#####;
;      END OF MAIN PROGRAM      ;
;#####;

```

END

d. Connection of the generator to the embedded device

The device can be used with any type of generator . it was used with both key starter and the one that are not using key. Some other condition was also observed based on demand. The output of the device was connected to H-BRIGE before connecting to a generator.

e. Relay Driver Section

The relay driver used for this paper is uln2003. It can withstand high current/voltage. Connect pin28 of the ic socket to pin1 of the ic. The output of the ic was taken at pin16. Pin16 was connected to the relay as indicated in the diagram in fig 1

f. Complete Circuit Diagram

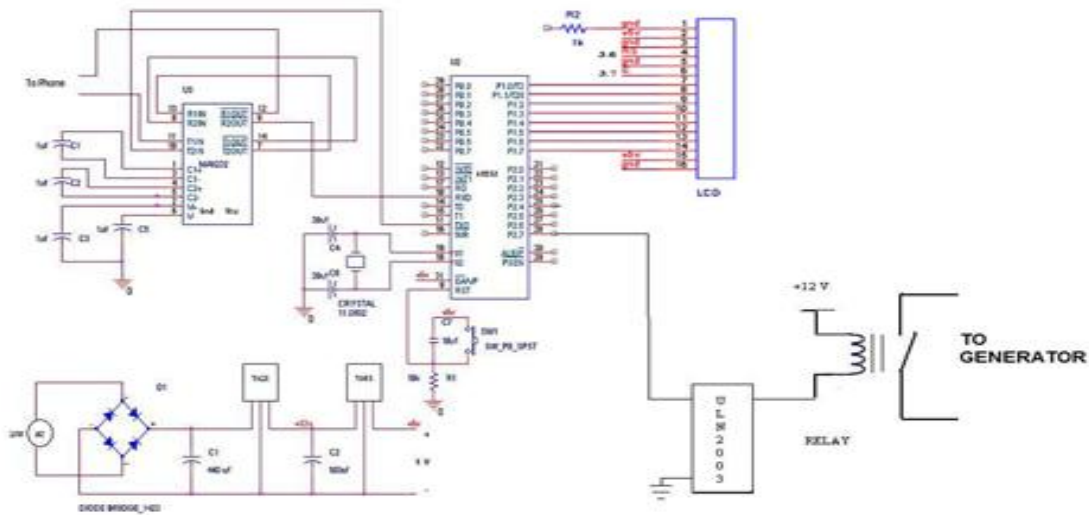
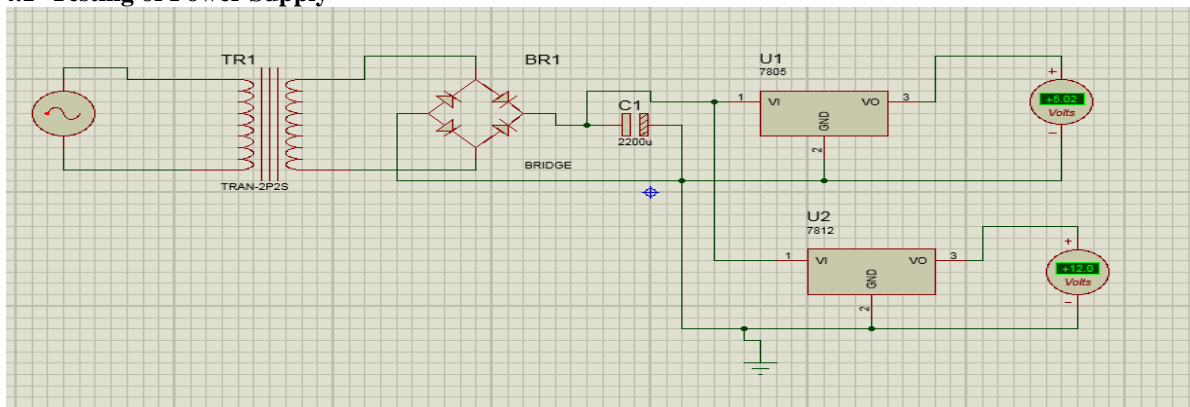


Fig 1: Developed Circuit Diagram of SMS based Generator
 Source: designed with Proteus Software (www.proteus.com)

GSM (SMS) Controlled DC Motor is automatic control system which capable of receiving a set of command instructions in the form of Short message service and performs the necessary actions like Start , Stop and speed control. I will be using a dedicated modem/mobile at the receiver module i.e. with the robot it self and send the commands using SMS service as per the required actions. The mobile unit which is dedicated at the motor driver is interfaced with an intellectual device called Micro controller so that it takes the responsibility of reading the received commands in the form of SMS from the mobile unit and perform the corresponding predefined tasks such as motor start, stop, motor direction and speed control at different levels etc.

IV. Test and Result

4.1 Testing of Power Supply



4.2 Testing of the Generator Unit

The Generator can be Started or Stopped by sending an SMS to the generator from anywhere in the world. Used in conjunction with the alert you can decide when to turn on and off your generator even if you're not at home or the office when the lights go out. The SMS unit was mounted inside the generator housing (space permitting) and runs off the generators battery. When the generator is in automatic mode it will start-up when the power fails and in doing so sends an SMS to UP TO 5 predetermined phone numbers. An SMS can then be sent back to the generator using a predetermined "code" and command. The code allows to safe guard the generator from malicious SMS have to turn it on and off. If the generator has a problem when running it will again send an SMS to up to 5 users notifying them of the problem encountered. When the generator is shuts down the user is also notified, allowing them to confirm that the generator has successfully shutdown. The unique SMS Alert and command system allows users to quickly and easily control their Generator worldwide, with the knowledge that problems can be sorted out quickly and efficiently. In addition to that, the security system allows for safe and secure use without interference

4.3 Testing of the Load with Generator

System is controlled by SMS commands: start, stop, status, timer on, timer off.

- i. Requesting "status" it returns: Load in Amps (which tells me that the pump is working fine), running time, and whether timer is currently activated or not.
- ii. The generator starts up connected to a small load, about 0.4A for a ceiling fan, but is disconnected from the pump. The startup sequence is:

Step 1: Give start signal to generator

Step 2: Check current sensor to see if output is more than 0.4A, if not shut down generator and send error message that generator failed to start

Step 3: Wait for 2minutes

Step 4: Close pump relay

Step 5: Check current sensor to make sure the pump came on, if not shut down generator and send error message.

Step 6: The shutdown sequence is in reverse and also uses the current sensor to make sure everything is off as it should be.

V. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

There are so many industries which need 24 hours power. So they develop their own mini power plants. If there are any faults in main system at that time we make manual operation to run mini power plant generator. Due to this there is so much time consume. Here, if we provide this system so there are no needs of manual operation and we get constant power in very short time. We can get the feedback from generator, whenever the fuel level goes below the normal level. The same thing is applicable for any change in temperature of the system. Also if any parameter goes below the preset limit, also a feedback message is there from the circuit and also generator stop to working. This procedure is applicable in any kind of fault also

5.2 Recommendation

We are interfacing the circuit with GSM module so that generator can be operated from remote place. In this system if we send sms (START), the generator starts working and if we send sms (STOP), the generator stops working. Also, we can get the feedback from generator, whenever the fuel level goes below the normal level. The same thing is applicable for any change in temperature of the system. To achieve this, testing will need to be carried out to create a useful system. The report consists of a background into the area of 8051 microcontroller and mobile communication, how they are interfaced to each other and AT (Attention) commands set used in communication. The microcontroller pulls the SMS received by phone, decodes it, and recognizes the Mobile no. The switches on the relays attached to its port to control the appliances. After successful operation, controller sends back the acknowledgement to the user's mobile through SMS. Future work can focus on fault diagnosis of the generator using embedded system and developed a NEURO FUZZY expert system

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