

Simulation for Smart Generator Monitoring System using Microcontroller

R. Vidhya¹ A. Dhandapani² S. Yuvaraj³ N. Harikrishna⁴ K. Naveenkumar⁵ S. Mohanraj⁶

¹Assistant Professor ^{2,3,4,5,6}U.G. Student

^{1,2,3,4,5,6}Department of Electrical & Electronics Engineering

^{1,2,3,4,5,6}Info Institute of Engineering, Kovilpalayam, Coimbatore, India

Abstract— The electrical power systems are extremely huge and complex networks. By which in many countries and nations continuous an uninterrupted power supplies still a necessary factor. Due to which the electrical load may get damage. Our project mainly focuses the monitoring of EB source and alternate source (generator) through microcontroller. The power failure and generators fault is monitored to take reflex action and trips the supply to load through a relay. The monitoring parameters of generator like Fuel level, Oil level, Temperature, Current, Voltage regulations are informed to the authorized personnel through GSM in mode of SMS that alerts the person for fault occurred. These data's can be stored in the EEPROM memory port.

Keywords— Microcontroller (PIC16F877A), GSM Modem (sim900), fuel Level sensor (fuel gauge), Temperature sensors (LM35)

I. INTRODUCTION

The use of generators is very mandatory now-a-days for the essential outcome of the load by giving the continuous and uninterrupted supply of power to the load. These generators are widely used for this purpose in almost in all the sectors for efficacy. But still there are some of the drawbacks encountered by the operators and the owners i.e., fuel theft, generator maintenance, capturing real time data, data collection and analysis issues and more over human dependencies becomes an vital issue. Through the implementation of the Microcontroller with programmed chip the major difficulties on operating the generator can be minimized. This system becomes valuable when the power failures, interrupted supply of power etc., occurs. Sensors for each electrical parameter are set and it displays the situation of the generator instantly using the PIC controller. Relayed circuit is ensured for the tripping process on supply to the load to protect the load for being damaged when any type of fault occurred.

This project is backboned with the GSM technology, where all the instant data from the generator set is transmitted to the mobile phone through message service, where authorized person will handle with the information intimated him via mobile. Information like fuel level, temperature, oil level, voltage and current can be transmitted.

The system provides the solution to the complex wired network by remotely controlled benefits. Thus whenever the fault encoded by the controller kit the intimation to the mobile is sent immediately and the reflex action can be performed by the personnel to fix the problem to run the generator in a steady state

II. BLOCK DIAGRAM OF PROPOSED METHOD

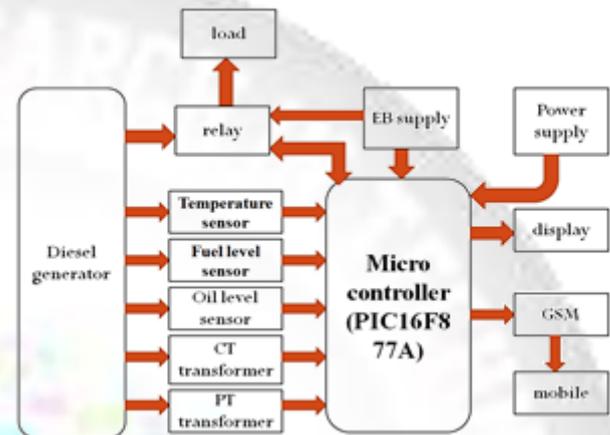


Fig. 1: Block diagram for proposed method

III. SYSTEM CONFIGURATION

Figure.1. shows the system has two main divisions of hardware and software sections. The data's and the fault in the hardware section is optimised and send information to the mobile through GSM by the software module. Hardware is the combination of the diesel generator, relay, current transformer, potential transformer; sensors are vital for the system to perform our projections and the software of programmed PIC controller which compare the values in the hardware and informs the authorised person through GSM communication

IV. FLOW OF PROCESS

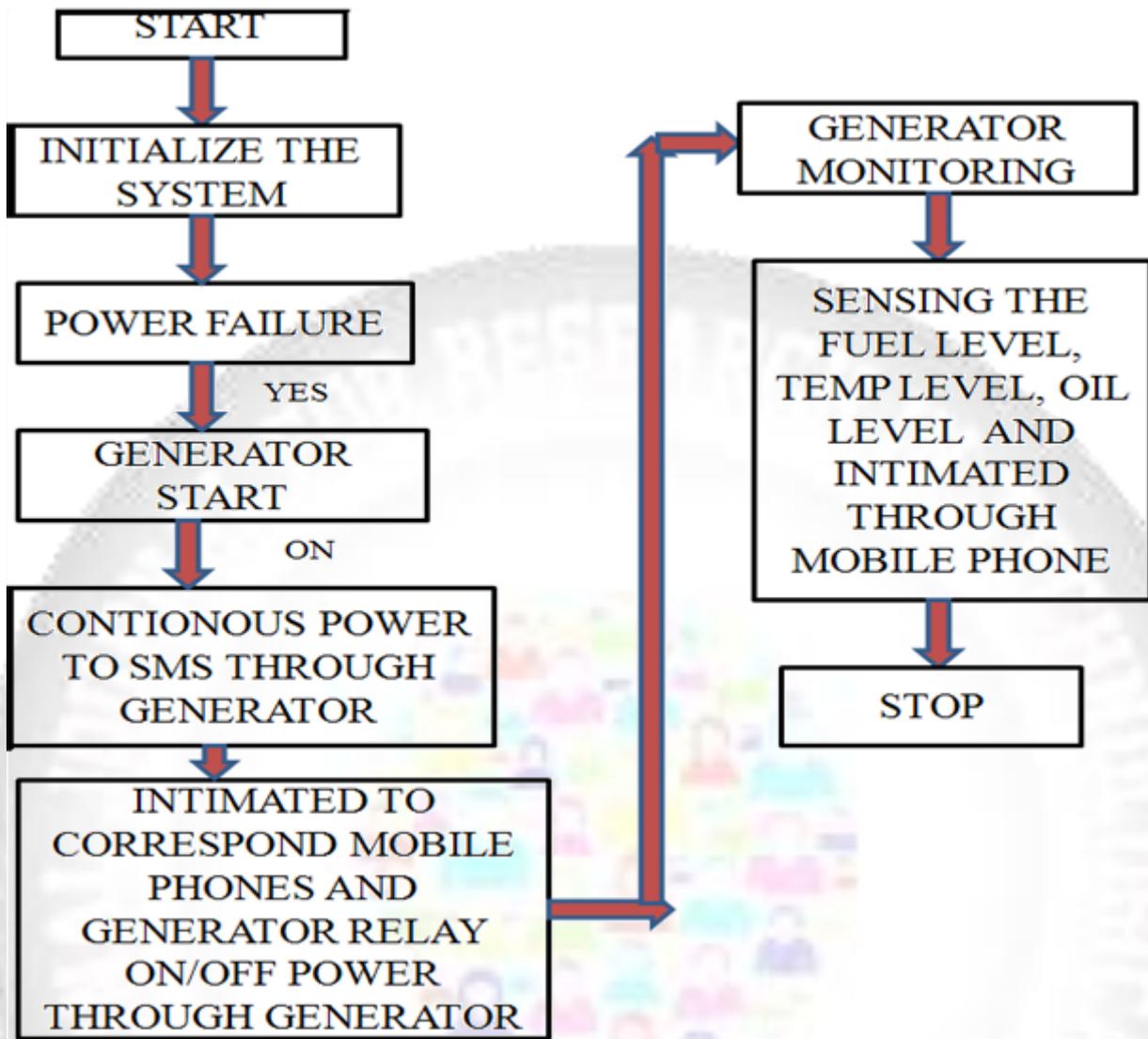


Fig. 2: Flow of process

V. SIMULATION ENVIRONMENT

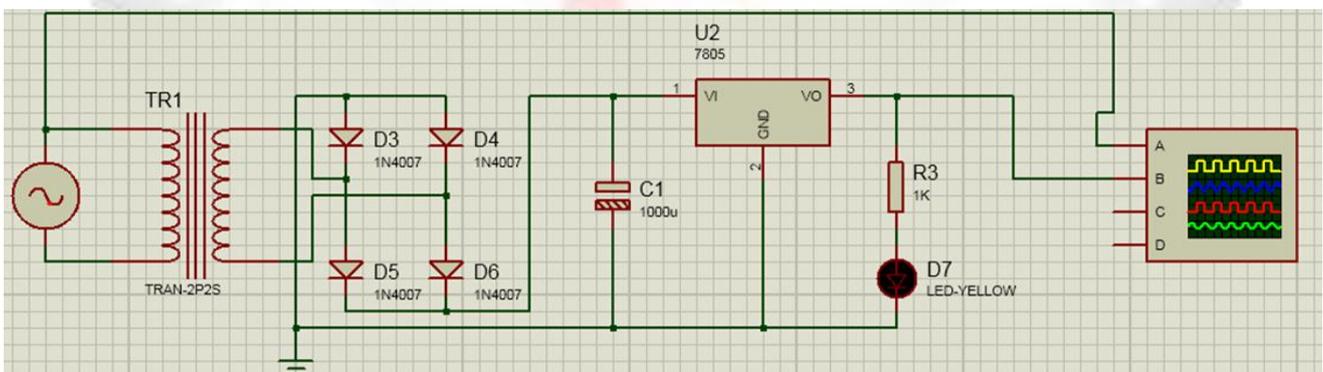


Fig. 3: Simulation circuit for Power supply

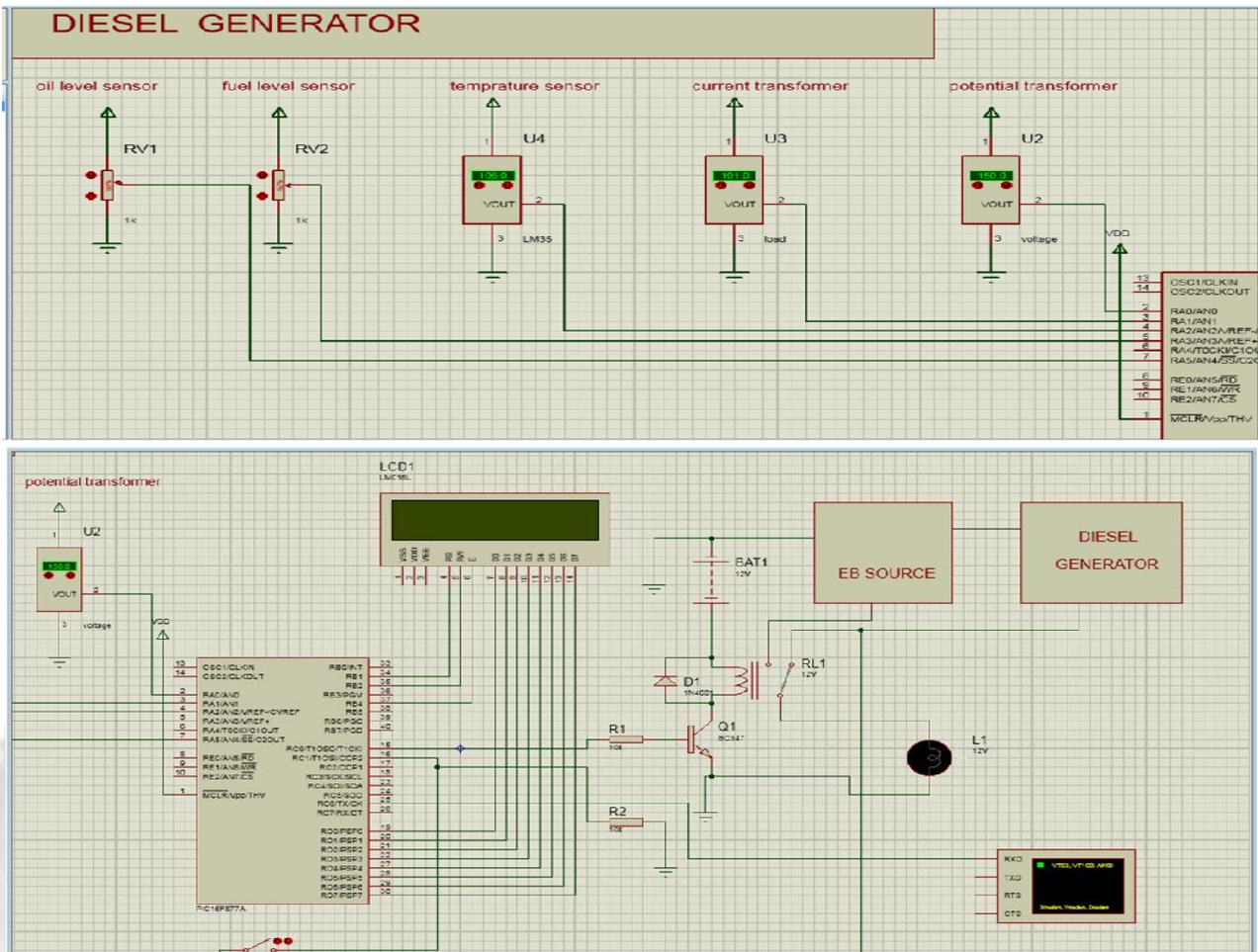


Fig. 4: Simulation circuit for sensors and diesel generator

Figure 3 represents the purpose of 5V power supply is to provide supply for the microcontroller unit (MCU). Power supply is supplied with a single step down transformer. In both these power supplies the 230V input supply is stepped down by the step down transformer. In the next stage it is converted in to dc 5V by using a bridge rectifier.

Figure 4 represent the simulation of sensors for diesel generator. Sensors like oil level, fuel level, temperature sensor, current transformer and potential transformer sensor are used. Values for these sensors are pre-defined using the controller kit. It senses the value of all parameters continuously and detects the fault when generator parameter increases or decreases to the standard value. These values are compared by the microcontroller and send the intimation through GSM.

The proposed method of the system to control diesel generator. PIC (Peripheral Interface Controller) series microcontroller has been enhanced where the sensor sends the current value of the generator parameter and PIC controller compares the value and displayed. When EB source is not available GENSET is automatically runs to substitute the power supply .The PIC16F877A controller transmits the data's collected to the mobile through GSM.

VI. SIMULATION RESULTS

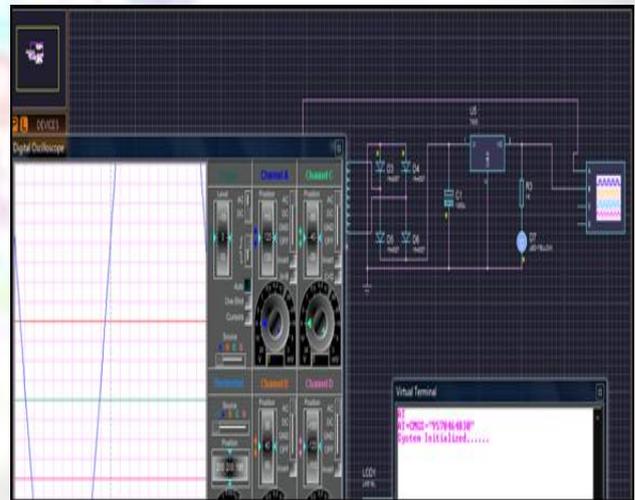


Fig. 5: Output for Power supply

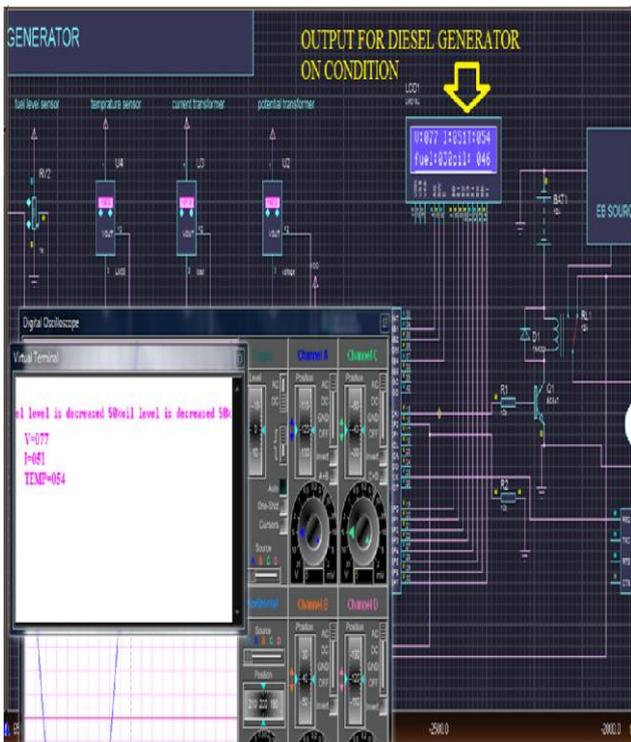


Fig. 6: Generator ON Condition

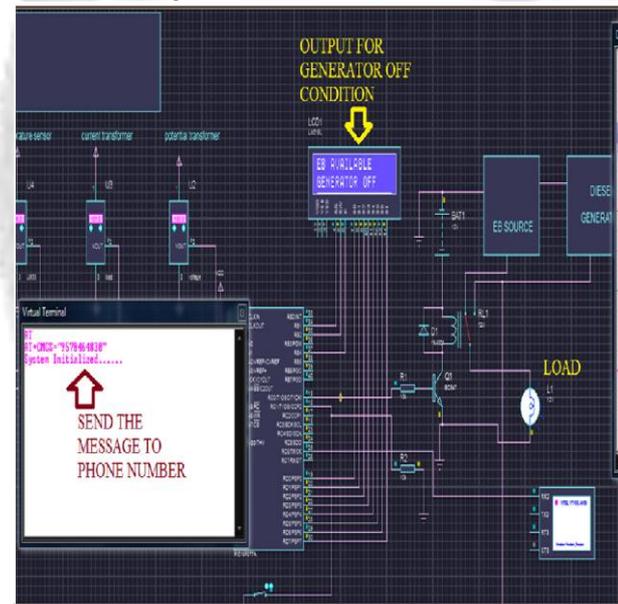


Fig. 7: Generator off condition

Figure 5 explains the output on simulation for the generator in OFF condition, when EB source is available. Microcontroller displays that EB source is supplying the load on a LED display. Relay plays a vital on giving the supply to the load either EB source or alternate source.

Figure 6 shows the Generator On condition simulated when EB source is not available. The relay converts the supply source to alternator to supply the load. The information on diesel generator parameter are sensed and displayed to the LED display. Also when the fixed values on the parameter are collapsed then the GSM module alerts the authorised person to take reflex action.

Figure 7 gives the step downed voltage on 230v ac supply to 5v ac supply. Now bridge rectifier converts the 5v ac supply to 5v dc supply to feed the microcontroller kit

VII. CONCLUSION

This project is very much useful in the freedom of the operator for the betterment of the monitoring of the generator through GSM. The proposed system is well constrained, flexible and secured tool which offers the service at anywhere and anytime. Embedded controllers with PIC controllers are capable of monitoring, controlling and sensing the parameters of generator. This system provides the information of the generator is in normal or abnormal condition using GSM communication. This embedded controller has a wide scope of application on home appliance, industrial projects etc

REFERENCES

- [1] Amit Sachan, "Microcontroller based Based Substation Monitoring and Control System with GSM Modem" IOSRJournal of Electrical and Electronics Engineering, ISSN: 2278-1676 Volume 1, Issue 6 (July-Aug. 2012).
- [2] Mallikarjun Sarsamba "The Load Monitoring and Protection on Electricity Power lines using GSM Network"International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 9,September 2013 ISSN: 2277 128X. American Journal of Electrical Power and Energy Systems 2015; 4(4): 45-50 50
- [3] S.Vimalraj, Gausalya.R.B, "GSM Based Controlled Switching Circuit between Supply Mains and Captive Power Plant"International Journal of Computational Engineering Research, Vol, 03, Issue, 4.April 2013.
- [4] Andriy Palamar "Control System for a Diesel Generator and UPS Based Microgrid", Scientific Journal of Riga Technical University Power and Electrical Engineering, Volume 27, 2010.
- [5] Kwang Seon Ahn "Digital Controller of a Diesel Generator using an Embedded System" International Journal of Information Processing Systems, Vol.2, No.3, December 2006.
- [6] Henrik arleving "ways to cut power generator maintenance"the journal, December 2013.
- [7] Chetan Patil, Channabasappa Baligar, "Base Transceiver Station (BTS) Safety and Fault Management", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-3, Issue-7, December2013.
- [8] Y Jaganmohan Reddy, Y V Pavan Kumar, K Padma Raju, Anilkumar Ramsesh, "PLC Based Energy Management and Control Design for an Alternative Energy Power System with Improved Power Quality", International Journal of Engineering Research and Applications (IJERA) ISSN: 2248- 9622 Vol. 3, Issue 3, May-Jun 2013.
- [9] Alper T. Alan "A Field Study of Human-Agent Interaction for Tariff Switching", Agents, Interaction and Complexity Group, University of Southampton, Southampton, UK.
- [10] J. Pierce and E. Paulos. Beyond energy monitors: interaction, energy, and emerging energy systems.