



DISTRIBUTION LINE FAULT DETECTION AND INTIMATION USING GSM

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Abstract- This project is locating fault in a power distribution line is a complicated and severe problem in power system. This is designed with micro controller, GSM mobile, Driver circuit, control circuit interfaced with GSM modem. It is useful for remote monitoring and control of multiple stand-alone distribution transformers plants. In normal conditions, the system records and periodically reports the overall performances, whereas, in case of incorrect behaviours , it immediately informs the operators. Moreover, through appropriate instructions, users are able to modify some elements of the plant and the settings of the measurement system. In order to adapt the system to the specific operative conditions, several means of communications and plant configurations. The work described is a development of Microcontroller-based Protection of Electric Distribution system for the purpose of effective monitoring and sending information of distribution system. However, for a more general, flexible and cost-effective implementation, the remote communications are based on a powerful GSM networking is designed when the voltage through the line falls below a programmed voltage, an immediate indication is provided by the microcontroller through the GSM modem. The interfaced GSM modem will receive the signal and to send data from Distribution side to the substation and to the line patrol staffs as a message.

Keywords:Microcontroller,GSM,Remote Monitoring

I. INTRODUCTION

The consumption of electricity is increasing at much faster rate. Losses in distribution system are much higher than losses in transmission side and also fault are more frequent in distribution side. The survey indicates that 80% of the consumer's service interruptions are due to failures in distribution networks. Detecting and locating fault in power line is very necessary for healthy operation of power system. In distribution line multiple faults detection and indication to Electricity Board (EB) deals with the problem of detecting the fault in the transmission lines and the automatic. Intimation to EB. This project deals with the design and fabrication of power supply, microcontroller and Global System for Mobile Communication(GSM) modem. This proposes greatly reduces the manpower, saves time and operates efficiently without human interference.

II. FAULT DETECTION IN POWER SYSTEM

Detecting and locating fault in power line is very necessary for healthy operation of power system. In electrical power line fault often occur many times making the power system unreliable. In this the using wireless sensor for detecting fault which includes phase to phase, short circuit and mainly line to ground fault in power line for better reliable and optimum operation of the system is presented. In the proposed concept power line is divided by WNS (wireless sensor network) nodes that could sense the faulty condition in power line, display to operator as well as send SMS through GSM modem to service engineer. This concept successfully analyze the asymmetrical faults which occurs in power line. In Wireless Sensor Network (WNS) current sensor ACS712 interfaced with Arduino mini pro converts the analog measured current value into digital form and then transmits the data to the main primary node through nRF24I01 transceiver. Parameters calculated in Arduino ATmega328

UNO transmits data to control panel or substation so that immediate action can be done with the help of GSM technology.

2.1 TYPES OF FAULTS

The design of systems to detect and interrupt power system faults is the main objective of power-system protection. The faults can be divided into Seven types. They are shown below.,

- a. Transient fault
- b. Symmetric fault
- c. Asymmetric fault

(a). Transient fault

A transient fault is a fault that is no longer present if power is disconnected for a short time and then restored; or an insulation fault which only temporarily affects a device's dielectric properties which are restored after a short time. Many faults in overhead power lines are transient in nature. When a fault occurs, equipment used for power system protection operate to isolate the area of the fault.

(b). Symmetric Fault

A symmetric or balanced fault affects each of the three phases equally. In transmission line faults, roughly 5% are symmetric. This is in contrast to an asymmetrical fault, where the three phases are not affected equally.

(c). Asymmetric Fault

An asymmetric or unbalanced fault does not affect each of the three phases equally. Common types of asymmetric faults, and their causes:

1. Line-to-Line :-
A short circuit between lines, caused by ionization of air, or when lines come into physical contact, for example due to a broken insulator.
2. Line-to-Ground :-
A short circuit between one line and ground, very often caused by physical contact, for example due to lightning or other storm damage.
3. Double Line-to-Ground :-
Two lines come into contact with the ground (and each other), also commonly due to storm damage.

III. EXISTING SYSTEM

In distribution system most of the losses are caused by fault and theft. In this paper the focus is on single phase to ground fault in power line. When single phase to ground fault occurs, it becomes significant to detect fault quickly and with accuracy. It becomes challenging for the power company to detect and repair the fault as quickly as possible. Protection systems are designed to identify the location of faults and isolate only the faulted section in order not to damage the whole equipment in power system. In the proposed concept with the use of wireless sensor network exact location of fault can be diagnosed. There by providing optimum operation of electric power. The objective of this paper is to provide with a simple way to detect the fault and show the exact location of occurred fault which will ultimately lead to optimum operation of the whole system and to improve the reliability of distribution network.

IV. PROPOSED SYSTEM

Distribution line multiple faults detection and indication to Electricity Board (EB) deals with the problem of detecting the fault in the distribution lines and the automatic intimation to EB. The project deals with the design and the fabrication of Power supply, Rectifier, Boost converter, Three phase inverter, Microcontroller and GSM modem. The electric distribution network the

microcontroller interact with the power lines and sends message what kind of fault held in the line through the GSM modem. In this the man power is reduces from the finding the fault where it is. The ultimate objective is to monitor the distribution line status continuously and hence to guard the fault of distribution line due to the constraints such as overvoltage, under voltage, SLG, DLG faults. If any of these does occurs then a message will be sent to the designed controlling unit or substation.

4.1 BLOCK DIAGRAM

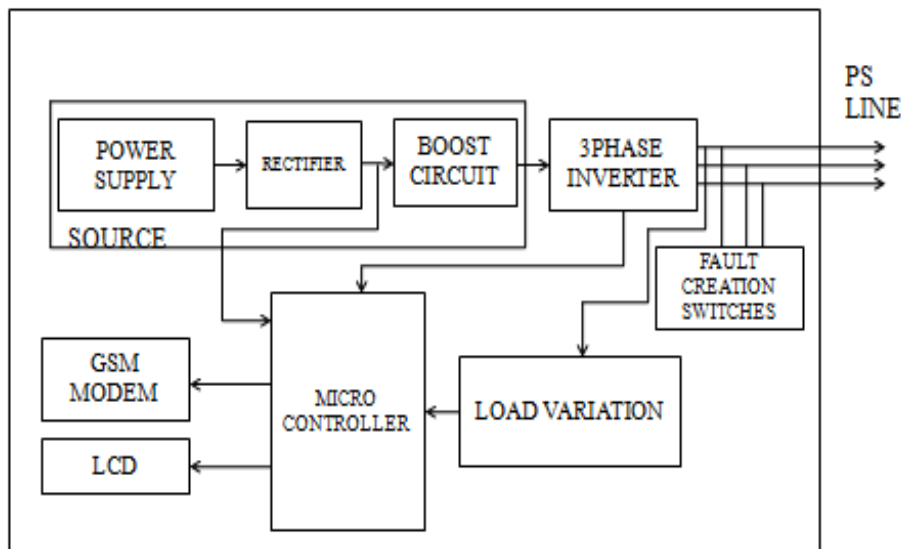


Figure 1. Block Diagram

V. WORKING

The working of distribution line fault detector and intimate using GSM is based on the microcontroller. In this the distribution line consist of 220v, 50 Hz supply, as that we can't use the 220 v supply directly to the working kit. So instead of that we are using the step down transformer for step down the input voltage into 12 v ac supply which makes as the supply voltage to the kit.

The 12 v step down voltage from the transformer is given to rectifier which converts the ac supply into dc supply for the purpose of only the dc source or supply is used as the source for the microcontroller. After converting as dc supply, the boost circuit which we are using is used to boost up the voltage if necessary (or) regulates the same voltage level. To run a microcontroller it is in need of driver circuit and control unit.

Driver circuit

Driver circuit provides pulse to the microcontroller by using TLP250 IC. In this we are using seven switch and they get supply from center tapped transformer. The tlp250 IC which get input current gets 5mA, but the output supply current is increased into 11mA and the output voltage is 10-35V. So, we are using in this micro controller.

5.2 Control Unit

Control unit which is used in microcontroller to control device when it attains the maximum or minimum level of voltage from the rated voltage. This rated voltage is programmed in the microcontroller. This program gives the instruction to the GSM modem. In this we are using PIC16F877A as microcontroller. The integrated circuits(IC) contained both processor and peripherals (Timers, ADC, USART, EEPROM, I2C, SSP, PSP) are inbuilt is called PIC microcontroller. In this pic controller the pin RA0, RA1 and RA2 are the pins which are used for the load input which the load variation is set down through this pin only. If the load is varied by using of these three pins it will be triggered the micro controller to run.

Microcontroller has been programmed to sense the fault and send the fault location to the particular person by uses of GSM. This GSM sends the message about a particular location of a fault that occurs in a distribution line.

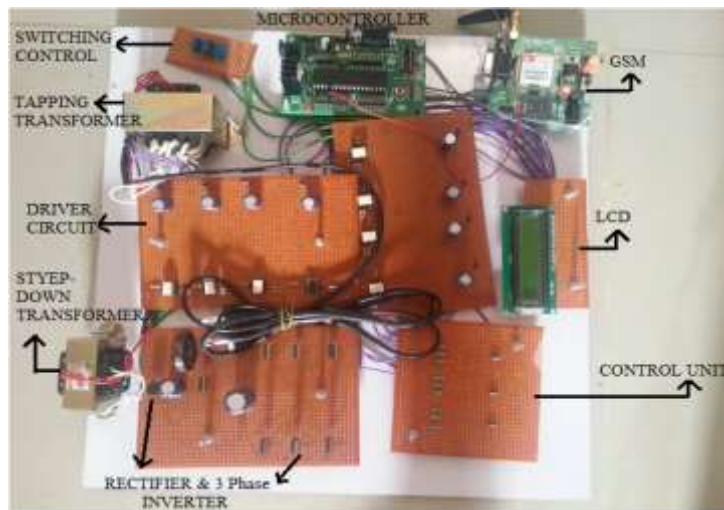


Figure 2. Working Kit

The result from the hardware is sending messages to the mobile phone is shown in the figure.

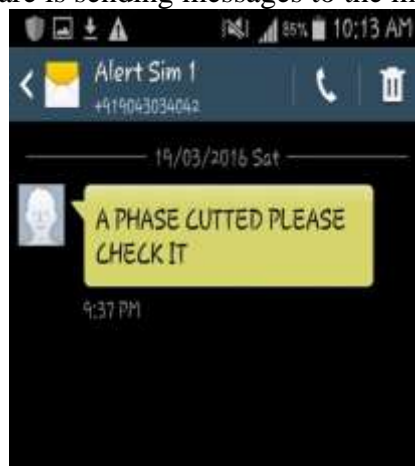


Figure 3. Result In GSM Mobile

VI. CONCLUSION

Detecting the area where the fault is occurred is difficult. Using microcontroller and GSM bases method is reliable to detect and intimate the fault. In the short time we can able know the fault and rectify immediately. The man work is reduced and don't need to walk along through the power line to know the location of the fault. The GSM can sends messages instantly to the power station and the required person want to send. The message costs are done by the mutual agreement with the telecommunication companies in India (i.e., Bsnl, airtel, Vodafone, etc.). The microcontroller is cheaper in cost and working efficiency is high and also it stands upto 100⁰ Celsius. The proposed method is efficient method to detecting and intimating the faults through the distribution line.

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