

Line Breakage Fault Monitoring System with Auto SMS in EB Distribution System

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ABSTRACT

The Electric Power System is divided into many different sections. One of which is the transmission system, where power is transmitted from generating stations and substations via transmission lines into consumers. A smart GSM based fault detection and location system was used to adequately and accurately indicate and locate the fault had occurred. This will ensure a shorter response time for technical crew to rectify these faults and thus help save transformers from damage and disasters. The system automatically detects faults, analyses and classifies these faults and then, calculates the fault distance from the control room using an impedance-based algorithm method. Finally, the fault information is transmitted to the control room. In conclusion, the time required to locate a fault is drastically reduced, as the system automatically and accurately provides accurate fault location information. By using this project, we can detect the faults of three phase transmission lines one can monitor the Temperature, Voltage, Current by means of GSM modem by sending message.

Keywords: Global System for Mobile Communication.

1. INTRODUCTION:

Power system is classified into power generation, transmission and distribution. Transmission network is considered to be one of the vital parts of power system, as it connects the supply and the demand. The loss in transmission and distribution network is considered to be very high, compared to other parts of power system. Currently, the electric power infrastructure is highly vulnerable against many forms of natural and malicious physical events, which can adversely affect the overall performance and stability of the grid. The faults in the transmission network obstruct the supply of power to the consumer. Usually when a fault occurs in the transmission line it will not be seen unless it is severe. But gradually these small faults can lead to transformer damage and destruction to human life. It can also start a fire. At present in India, a system is not notified us the fault in real time when a fault occurs. What worrying about is not having a real-time system, this can lead to damage to the underlying connected devices and become a threat to the humans around us. In order to avoid such incidents to the maximum extent, maintenance or checking of the transmission lines

are generally carried out on a frequent basis. This leads to increased manpower requirement. The fact remains that the real intention of this is not met as many a times line failure may be due to rain, toppling of trees which cannot be predicted. Hence the transmission network fault identification and clearance should be very fast. To overcome these, this project is proposed an Internet of Things based Transmission Line Multiple Fault Detection and Indication to EB. Whenever the preset threshold is crossed, the microcontroller instantly initiates a message to be sent to the area lineman and the Control Station stating the exact pole to pole location. This helps us to realize the real time system. This will ensure a shorter response time for technical crew to rectify these faults and thus help save transformers from damage and disasters. A smart GSM based fault detection and location system is used to adequately and accurately indicate and locate where fault has occurred. The system uses a current transformer, a voltage transformer, PIC 16F877 Microcontroller, RS-232 connector, and a GSM modem. The system automatically detects fault, analyze and classify these faults and then, calculate the fault distance from the control room using an impedance-based algorithm method. Finally, the fault information is transmitted to the control room by IOT technology.

2. PERMEABLE

A developing country mainly needs a power transmission to improve their growth economically. Especially India, Sri Lanka and other developed countries are transmitting a power line throughout wires. A power source is the basic requirements for human life to do their own activity. A people directly depend upon the power resources. Somehow, power sources cause human beings indirectly. The power transmission is occurred due to natural disasters or manmade mistakes and other many conditions those outcomes may causes a human being. To avoid such that accidents, prevention is better. This system uses 89s51 Microcontroller, a Global system modulation and relay. From using these essential components to discover a defect position, examine and categories these types of defects and then auto tripping where the fault are occurred. The collections of information are transmitting to control person. This system mainly focuses to human careless makes an accident. If the control person not

properly acts, the accident will occur. So that using a relay to shut down the whole units before sending a set of details to control person and this can protect to save the human beings.

3. LITERATURE SURVEY

A fault detection and locate the exact spot where the line has occurred is also the main abstract of the previous system. A system only identify where the fault has occurred and may not auto trip the whole units. If the auto trip is not present, the control persons come to fault area and repair the post as soon without making any hazards for others and themselves. These are the main drawbacks for the previous system. The human beings are also affected even when the prevention system as implemented. The maintains of component are not possible in previous systems. Somehow the components are affected due to natural disasters or artificially. The long distances of street are not suit a low level radio frequency. Such that, move to high level radio frequency transmission are better to use. The peoples can't able to understand the situation in which the power has broken. The previous systems are not introducing a display a defect to the moderate people. Here this system using a liquid crystal display to broadcast a collection of information in which the types of faults and accurate spot. The previous systems are also utilizes a global system modulation to telecast the message of the set of details in which kinds of faults, defect position or particular post and area to the control room. But this system is also doing the same steps and further makes a call to higher authority when the control person is not taking a decision to repair the fault as soon. These are main merits to protect the human life from the power line occurred. The proposal system is protecting the human beings at every critical situation and anytime. This system is not consuming more cost and its better efficiency than existing one. The existed systems get a more sources to operates and economically enrich. The collection of details is telecast a message to control person, auto tripping the whole units before sending a message and display a defect to the unknown people, In addition to makes a call to higher authority after certain time of periods when the control are not satisfactorily act. These are the main function are added in this project to save the human beings from the power transmission or distribution line has occurred.

4. OBJECTIVE

The objectives of the thesis are,

- (i) To realize digital protection and alerting systems.
- (ii) To construct a prototype and implement the sensor based mechanical breaking and tripping alert with gsm technology system.

- (iii) To evaluate its performance and validate the simulated response obtained in this system.

5. BLOCK DIAGRAM

The block construction and some of the basic details are discussed in this chapter. The block are given here.

- ✓ Power supply
- ✓ Microcontroller
- ✓ Current sensor
- ✓ Relay module
- ✓ GSM module
- ✓ Lcd display
- ✓ Buzzer

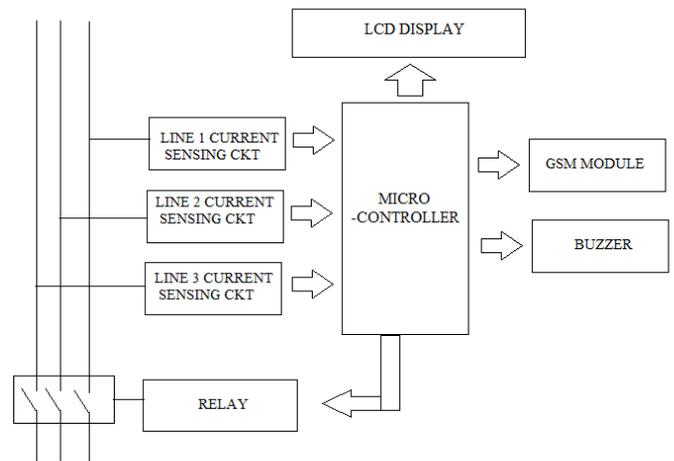


Fig 5.1 Block Diagram

5.1 BLOCK DIAGRAM EXPLANATION

5.1.1 POWER SUPPLY

The power supply unit is responsible for providing electromotive force (EMF) to power the circuit components that make up the system.

The power supplies were designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices.

The system requires two power supply system, a 5V/500mA dc supply to power the microcontroller and a 12V/4000mA to drive the relay and the motor (load).

In order to achieve this, two center tap Ac 220/240V, 50Hz. Dc $2 \times 12V/1.5A$ transformers were connected in parallel to double the output current of the dc supply

5.1.2 MICROCONTROLLER

The microcontroller section constitutes the control and monitoring unit which is responsible for handling all the system operations. It receives data from the input unit processes it and then transmits the processed information to the appropriate unit where they are to carry out one function or the other .The microcontroller used in the

fabrication of the electronic access control system is the AT89c52 a variant of the 8051 microcontroller architecture, it comes with a wide range of features which makes it accessible to a wide range of applications

5.1.3 CURRENT SENSOR

Its like small simple circuit for the help of sense the current flow in conductor. The circuit are around by the conductor.

5.1.4 RELAY MODULE

It works on the principle of an electromagnetic attraction. When the circuit of the **relay** senses the fault current, it energizes the electromagnetic field which produces the temporary magnetic field. ... The current flows through the coil produces the magnetic field around it. It's used to control the load on off in this project.

5.1.5 GSM modem

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. It will be used to send the message to the predefined number of the otherized persons.

5.1.6 LCD DISPLAY

An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16x2 LCD display is a very basic module commonly used in DIYs and circuits. The 16x2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5x7-pixel matrix. The used to monitoring purpose of this system.

6. CIRCUIT DIAGRAM

The line break monitor and alerting system circuit constructed with the help of proteus simulation software. The connection and the used components details are discussed here.

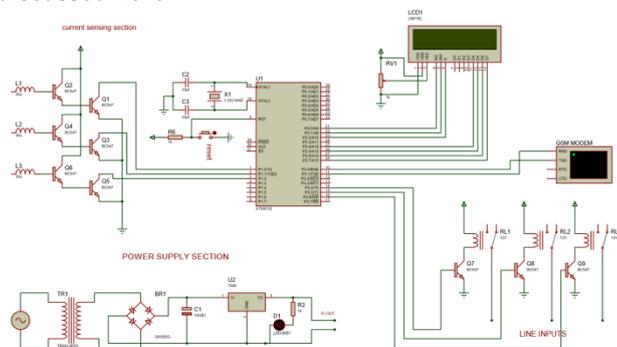


Fig 6.1 Over All Circuit Diagram

The total system getting the power from the power supply section. The power supply section contains the step-down transformer and rectifier, filleter, voltage regulator

also. The primary side of the transformer are connected the 230V AC source and the secondary side connected to the input of the rectifier. The rectifier output connecter the filleter section. In this section contain the 100 MFD capacitor. The current sensing section having transistor and inductive coils. Each current sensor having 2 BC547 transistor and 1 inductor coil. The emitter terminal of the Q2 transited is connected the base terminal of the Q1 transited. The Q1 transistor collector terminal collected the VCC and Q2 emitter pin connected the GND and the output getting from the collector terminal of the Q1 transistor. Each current sensor is having the above connection. Wee are using at89s52 microcontroller ic for in this project. Its 40 pin IC package and its having 4 digital ports. Like as port 0, port1, port2, port3. The 20th pin is GND and 40th pin is VCC. Its operating voltage is 5V dc supply it getting the power from the power supply section. the oscillator section having 11.0592 MHZ crystal oscillator and anti-parallel two 33pf fared capacitors. We are use in this project 16X2 display for help of monitoring purpose. The display are getting the data is from the microcontroller. The date pin are D7, D6, D5, D4 are getting from the 24,25,26,27 pins of the microcontroller. The control pin of the En and RW are getting from the por2. We are using gsm modem for communication module in this project and its type is sim800L.The RX and TX pin of the gsm modem connected the TX and RX pin of the microcontroller pin number 10,11. The relay modules are used for the tripping purpose. The relay module having two parts one is relay coil and another one is switching transistor. The collector terminal of the BC 547 connected the coil 2 terminal of the relay coil and coil 1 terminal connected the 5C dc source and emitter terminal connected the GND. Each relay coil are having same connection in this circuit. The line inputs are connected the common terminal of each coils. Each line is having separate relay coil common.

Whenever the power is on the microcontroller system start to reset the sensing and tripping section. if the normal conditions the current sensor section are given the high signals like as digital 1. So the relay module are normally close condition so there is no problem found in the circuit lines. If the line will be breaking the current sensor are given the low output like as digital 0. The microcontroller read the signal of the current sensor section and compare the predefined data. If the condition If up normal the relay coil are going to the tripping condition like as normal open condition. So no current flow throw the line and load so the load or line will be protected. At the time of the same operation microcontroller send the SMS via help of gsm module. The SMS will be reached the predefined mobile number in the c programming of integrated chip. The all the function are done with the help of predefined program using keil compiler. If the line will

be repaired the system was required to reset. The reset button also presents in this system.

Application

- ✓ High voltage distribution lines
- ✓ Industrials power distribution areas
- ✓ we use it use this local eb distribution and complicated electricalnetwork presented areas.

Advantages

- ✓ simple operation
- ✓ Prototype
- ✓ Low cost and effective output
- ✓ This system can move into next level generation of power line safety and protection. This prevention system also considered the workers of electrical power repair/installer.

7. GSM MODULE

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.



Fig 7.1 GSM system

There are various cell sizes in a GSM system such as macro, micro, pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

Time Division Multiple Access

TDMA technique relies on assigning different time slots to each user on the same frequency. It can easily adapt

to data transmission and voice communication and can carry 64kbps to 120Mbps of data rate.

7.1 GSM ARCHITECTURE

A GSM network consists of the following components:

- **A Mobile Station:** It is the mobile phone which consists of the transceiver, the display and the processor and is controlled by a SIM card operating over the network.
- **Base Station Subsystem:** It acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as a interface between the mobile station and mobile switching centre.
- **Network Subsystem:** It provides the basic network connection to the mobile stations. The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Home Location Register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipments wherein each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

Features of GSM Module:

- Improved spectrum efficiency
- International roaming
- Compatibility with integrated services digital network (ISDN)
- Support for new services.
- SIM phonebook management
- Fixed dialing number (FDN)
- Real time clock with alarm management
- High-quality speech
- Uses encryption to make phone calls more secure
- Short message service (SMS)

The security strategies standardized for the GSM system make it the most secure telecommunications standard currently accessible. Although the confidentiality of a call and secrecy of the GSM subscriber is just ensured on the radio channel, this is a major step in achieving end-to- end security.

7.2 GSM Modem

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer

through serial, USB or Bluetooth connection. A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

8. CONCLUSION

The proposed project inherits all drawbacks of the existing system. Here, in this project we have designed a GSM based transmission line monitoring and indication system that sends information of the same to control room via SMS. The implemented system design mainly concentrates on the distribution system. It provides the way to detect the faults such as wastage of energy and power theft. The system continuously monitors various parameters of the system. It also helps to detect the fault at the appropriate time and hence avoids illegal use of electricity. Automatic monitoring, analyzing and recording is done on the PC screen through hyper terminal. The project has continuous monitoring system integrating the GSM communication technology and the microcontroller technology. It also represents the hardware architecture and the software flow. The implementation of the system will save large amount of electricity and thereby electricity will be available for a greater number of consumers in a highly populated country such as India.

9. FUTURE SCOPE

In future, this project will enhance the fault detection in underground cables using Raspberry PI. It helps to detect which type of fault occurred and exact location of fault also.

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