

DESIGN AND IMPLEMENTATION OF MONITORING AND ALERTING ELECTRICAL LINE SYSTEM

Dr.SANDHYARANI.M

Associate Professor,
AAR MAHAVEER ENGINEERING
COLLEGE ,
m.sandhyarani.ece@gmail.com

MURALI SAGGARLA

Professor and Principal,
AAR MAHAVEER ENGINEERING
COLLEGE
smuralichinna@gmail.com

Abstract: *The main aim of this paper is to observe and be alert for the faults occurred in transmission lines like fluctuations in voltage, open circuit and short circuit. As the electric transmission line is spread widely at long distance location is become difficult to monitor, control the power supply in the transmission line. So, we proposed and implemented this system. In this paper the voltage above normal voltage condition is indicated as high voltage and voltage below normal voltage is indicated as lower voltage. When the two wires are shorted, the output is shown as the short circuit. Finally when the wire is disconnected or connection is interrupted then the output is indicated as open circuit occurred. By this system we can observe the fault indication on LCD display and be alerted by buzzer sound.*

Keywords: *transmission line ,short circuit ,open circuit.*

1. Introduction

Transmission lines are spread over the large area hence it is impossible to check the problem in transmission lines. This paper detect the type of error occurred in transmission lines. This total system consist some hardware components as mentioned in hardware description. Transmission lines are pair of conductors that transfer electrical signal from one place to another place. There are various types of transmission lines being used. For example, coaxial cable, twisted pair cable and optical fiber.

A transmission line is used for the transmission of electrical power from generating substation to the various distribution units. It transmits the wave of

voltage and current from one end to another. The transmission line is made up of a conductor having a uniform cross-section along the line. Air act as an insulating or dielectric medium between the conductors.

For safety purpose, the distance between the line and ground is much more. The electrical tower is used for supporting the conductors of the transmission line. Towers are made up of steel for providing high strength to the conductors. For transmitting high voltage, over long distance direct current is used in the transmission line.

Open-wire transmission lines are the conductors having 2 lines (wires), that are separated by dielectric medium whose, one end connected to the source and other to the destination.

These are low cost and simplest form of transmission lines. But, their installation cost is somewhat higher as well as its maintenance sometimes becomes difficult due to the change in atmospheric conditions.

Coaxial cable lines are formed when a conducting wire is co-axially inserted inside another hollow conductor.

These are termed as coaxial as the 2 conductors share the same axis. These are widely used in applications where high voltage levels are needed.

Wave-guides are the transmission lines used for signal transmission at microwave frequencies. These are basically hollow conducting tubes as they somewhat resemble like coaxial cable line but do not have centre conductor as present in coaxial cables.

For the transmission of a signal having a high-frequency range over short as well as long distance, transmission lines are used. At the same time, this reduces the loss of power during transmission. These are also used in stub filters, in stub matching technique and in voltage transformer. Sometimes there may occur some sudden faults such as fluctuation in voltage or breakage in lines and collision between two lines in transmission lines. Due to some reasons like when the devices that require higher load extensively used, when there is continuous change in voltage, when the two wires are disconnected from each other and when there is bypass of electrical signal in the transmission line. Extreme cases of voltage fluctuations can cause heavy damage to our life and property. There are various factors that affect the transmission line system internally and also externally. So, transmission lines have to be protected for a smooth working of the system and to reduce the risk of damage to the normal household devices. So, here we propose a system for monitoring and alerting electrical transmission lines based on micro-controller. By this system we can observe the fault indication on LCD display and be alerted by buzzer sound.

2. Existing system

In existing circuit breakers system, we can only break the connection of the transmission line when a fault is occurred, but we cannot determine what type of fault is occurred in transmission line. There are some different type of faults can occur like short

circuit, open circuit and voltage fluctuations.

The circuit breakers are works as when circuit breakers capture or detect any fault occurred in transmission line it directly cuts the power supply to the transmission line and this is commonly done using the mechanical energy stored within breakers.

So, by using this monitoring and alerting the transmission line system we can identify which type of fault is occurred in transmission line and we get information about fault on LCD display and a sound is created via buzzer.

3. Implementation

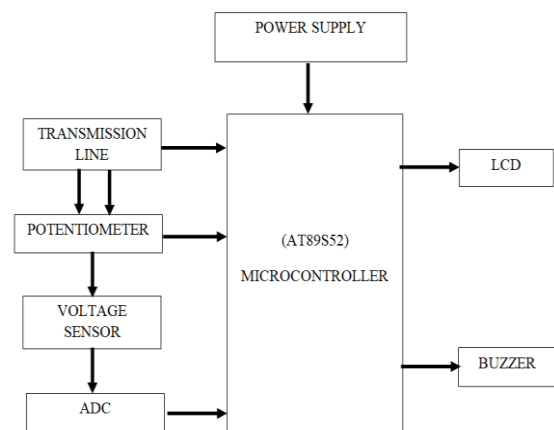


Fig 1: Block Diagram of Monitoring and Alerting Electrical Line System

This system consists of various components and they are power supply, potentiometer, voltage sensor, ADC, LCD display and buzzer.

The power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage(no frequency) with the amplitude of +5V and

+12V for various applications. Then this power supply is send through a 7805 regulator to send only 5v dc power supply to the micro-controller. This supply cannot be given directly to the controller hence there is an ADC converter is used to convert the analog data into digital data.

Before ADC, there is voltage sensor used to sense the voltage varied by potentiometer and the data is sent as input the ADC converter for further process. Potentiometer is used to give a testing input voltage for checking the voltage variation conditions like high voltage and low voltage.

A micro-controller consists of a powerful CPU tightly coupled with memory, various I/O interfaces such as serial port, parallel port, timer or counter, interrupt controller, data acquisition interfaces like A/D converter, D/A converter integrated on single silicon chip. This micro-controller is used to process the input data and give the quick commands to the components connected to the output port.

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 LCD translates a display with 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5x7 pixel matrix. This LCD display is used to show the output processed by micro-controller.

Piezo buzzer is an electronic device commonly used to produce sound. Light weight, simple construction & low price make it usable in various applications like car/truck reserving indicator, computers, call bells, etc. Piezo buzzer is based on the inverse principle of Piezo electricity discovered in 1880 by

Jacqued and Pierre curie. It is the phenomenon of generating electricity when mechanical pressure is applied to certain materials. This buzzer is used to alert the control room about the fault.

Results

Here we designed and implemented a monitoring and alerting the transmission line system which gives indication on changes occurred in transmission line like open circuit, short circuit and voltage fluctuation. The result of the project is given in below figures



Fig 2: Prototype of system in ON state

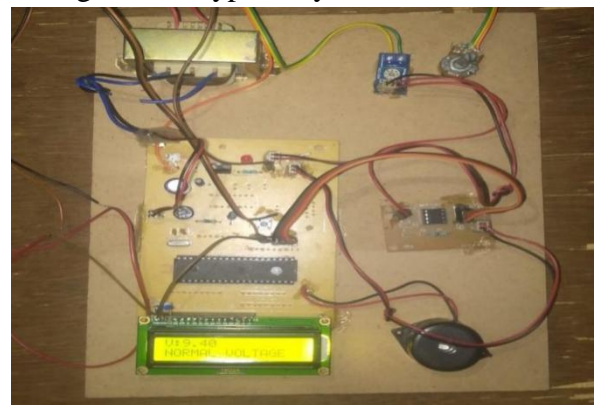


Fig 3: System in normal voltage state

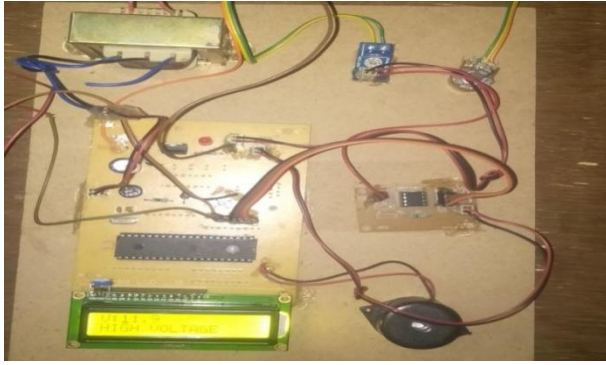


Fig 4: System in high voltage state

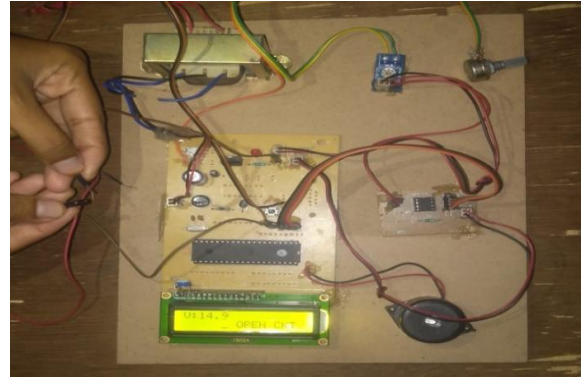


Fig 7: System in open circuit state

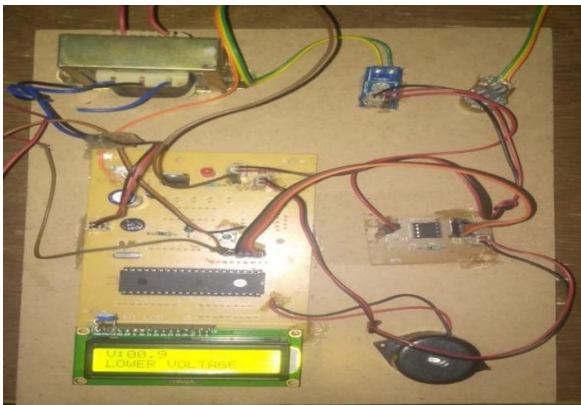


Fig 5: System in low voltage state

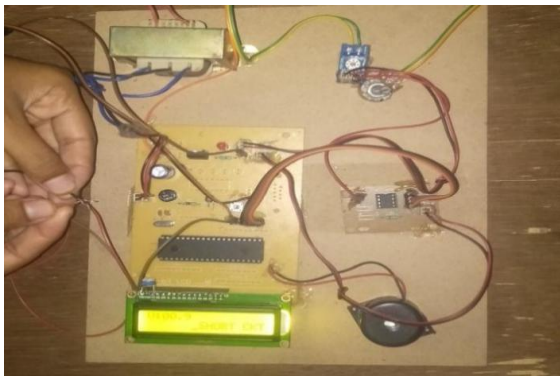


Fig 6: System in short circuit state

Advantages

- This system reduces the manpower required for examine the problems occurred in transmission line.
- It minimizes the risk of big hazard by alerting before the occurrence.
- It requires less components and it occupies less space.
- It is cost effective and it is a portable device.

Applications

- It is a system which can be used in industry power plants.
- It can be used in domestic power supply units for reducing the losses occurred by the voltage hazards.

Conclusions

We designed and implemented monitoring and alerting electrical transmission line system. In this system we are detecting the voltage fluctuations, open and short circuit faults that occur in transmission lines which lead to heavy hazards or equipment damage. This system can be used to get the alert about the damage occurred in the transmission lines.

Future Scope

This proposed system is developed to monitor and alert the electrical transmission lines. This system can be developed by using new technologies like IOT and it finds various applications in electrical fields. We cannot connect this system directly to the high voltage transmission lines. But by using the high range sensors and other components we can enlarge this system to use in the high voltage electrical transmission line system.

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