DESIGN OF WIRELESS ELECTRIC POLE FAULT DETECTION SYSTEM WITH CURRENT LEAKAGE PROTECTION SYSTEM

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Abstract - The electrical power system comprises many sections in which the transmission system is one of the most important, as it ensures the end-to-end supply of electricity to consumers. However, the faults are some undesirable and unavoidable events in transmission lines either natural or manmade. This research is about automatic power line fault detection which can detect, locate, and clear the faulty line and transmits a message to the required person. The physical identification of faults in lines especially during natural havoc is dangerous and tedious, and the continuous monitoring and controlling of the line aren't possible. This makes the present power line system unreliable. Our project of ours identifies the fault by variation of current and voltage variation at each node, calculates the distance between the faulty node to the station, and the GSM and IoT technology conveys the message to the lineman or control room. With this application, the system can be made more reliable as well as labor and maintenance costs would be reduced. Enhanced safety and reduction in time and efforts to clear the fault to add to the convenience.

Index Terms- Power transmission lines, Automatic Fault Detection, Location of faults, GSM, Monitoring and Control, IOT technology.

I. INTRODUCTION

The electrical distribution system installation in the vast geography and demographic dividend of India itself is a difficult task, and maintaining a continuous uninterrupted supply is an uphill task. Transmission lines efficiency ensures end-to-end consumer reliability. In long transmission lines, the occurrence of a fault is inevitable but its timely detection and rectification are possible. In our research, we enable the lineman or the control room to pinpoint the faulty line by receiving a message and switching off the line in case of a short circuit in the pole. This ensures the safety of linemen, reduces maintenance effort and time enhances reliability, especially during tough weather**.**

1) Objectives

The objective of our research is simple: to make the transmission lines and distribution system more intelligent, efficient, and safer. In the current scenario if any fault occurs on poles and lines physical detection and clearing are required, by our research we can pinpoint the fault position and hence can be cleared effectively. We aim at making this technology available in the pan-India transmission line network. This project will enable the real time analysis, detection and corrective steps for the continuity of electricity in the transmission line irrespective of climate and human interventions.

2) Problem Statement

Transmission lines are prone to various types of faults either due to natural or manmade circumstances. Today the detection and clearing of such faults require a physical check by a lineman. This makes the process tedious and unsafe, especially during harsh weather. The conventional method of detecting the fault location on a high voltage transmission line is very risky and hazard to the operator. Also the atmosphere, they are more susceptible to major faults. India are still not having that much infrastructure having causing overloading conditions especially in summer time.

3) Proposed Solution

Our research makes it possible to switch off a pole if the current is short-circuited to the ground and detect the exact faulty line with an SMS-based alert system that relays the exact faulty line to the lineman or control room**.** This improves the efficiency, safety, and reliability of the transmission line system.

II. LITERATURE SURVEY

Long-stretching transmission lines maintain the continuity of the power supply therefore any fault there could take a lineman significant effort to detect. By utilizing the distance and impedance variation relations in this research we can spot the exact location of the fault. Thereby making it safer and easier for the linemen to do maintenance. (1)

Manual detection of faults in the unsparing weather of India which ranges from sand deserts to high hills along with the complexity of the network laid is one of the most tedious and treacherous tasks. Therefore, by automatic pole fault detection, we do away with physical detection and rectification of pole and power lines faults. (2).

The point of fault and the point where the maintenance team resides is usually far by, thereby making it difficult to find and make necessary arrangements for it. Therefore, by making use of GSM technology we can relay the exact fault type and distance to the concerned authorities. This makes the overall system more reliable and efficient. (3).

III. CIRCUIT DIAGRAM

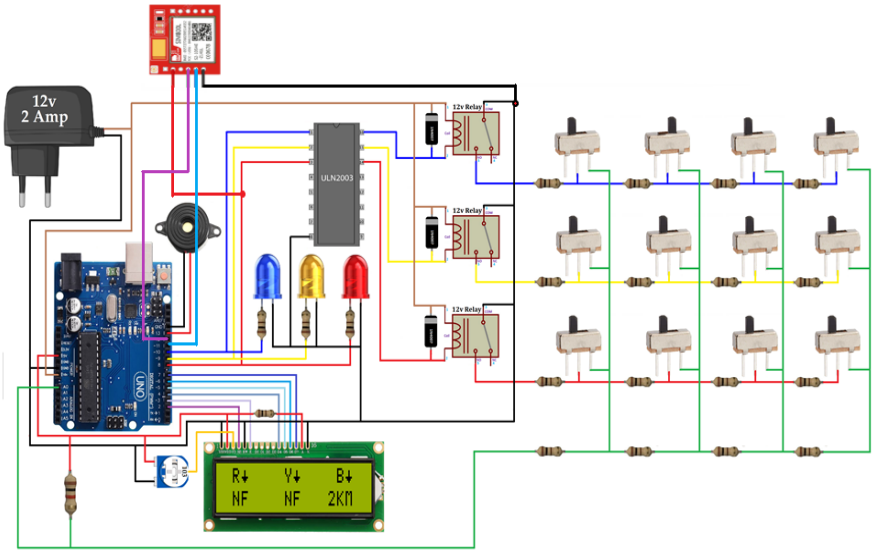

Figure 1: Circuit diagram

Transmission line and distribution system difficulties were highlighted in order to overcome those, we use a system of a relay, GSM, and LED display all in sync with Arduino Codes. This combination enables us to not only detect and inform but also to clear the pole-to-ground short circuit current fault. Beforehand knowledge of fault and its type gives the maintenance authorities enough time and space to take necessary steps.

IV. WORKING PRINCIPLE

The project consists of two modules connected to the GSM module in sync, these are line fault detection and pole fault current detection. For part-1 we manually switch the pole representing line fault. The line on which the fault is detected is shown in the LED, similarly by the GSM, and Arduino codes' exact line location is forwarded to the predefined phone number. The wire from the pole is connected representing the short circuit current on the pole due to natural or manmade faults.

For part-2, we short-circuit this pole current wire with the wire connected to the module, representing the detection of the pole fault current. Immediately the current in the pole is switched off for twenty seconds, the LED represents the pole fault and GSM relays the message on the predefined number for the fault.

V. MODE OF OPERATIONS

We now understand how the model works.

Firstly, when the power is turned ON, the LCD will display "MAJOR PROJECT Fault Detection" in screen as shown in Fig 4.1. And also the GSM module will send the SMS to the registered mobile number.

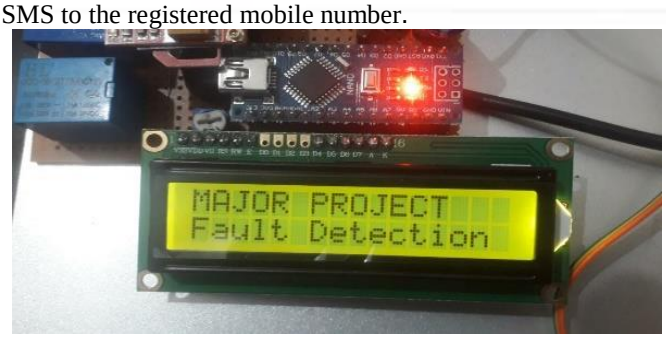

Figure 4.1: Operation Begin

After this, whenever there is any kind of fault in a line, the LCD will display as shown in Fig 4.2. Along with this the GSM module will send a message to the registered mobile number.

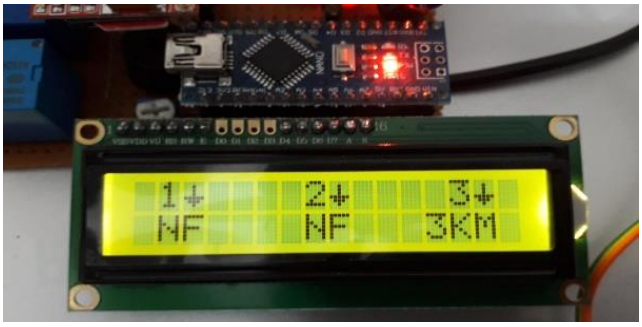

Figure 4.2: Fault at pole 3 at 3km

When there is no fault in a line, the LCD will display as shown in Fig 4.3.

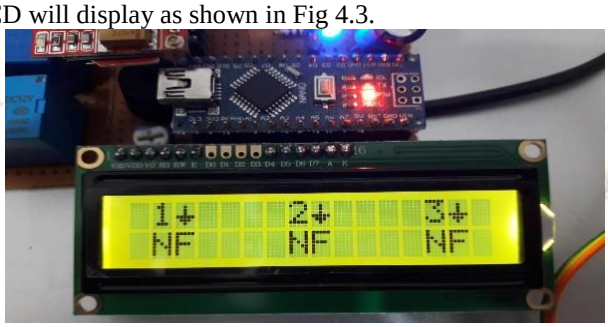

Figure 4.3: No fault at line

Also in this project we also show the current leakage in a pole. Whenever there is any current leakage in a pole, immediately the system will stop and the LCD will display as shown in Fig 4.4.Along with this GSM module will send a SMS to the registered number.

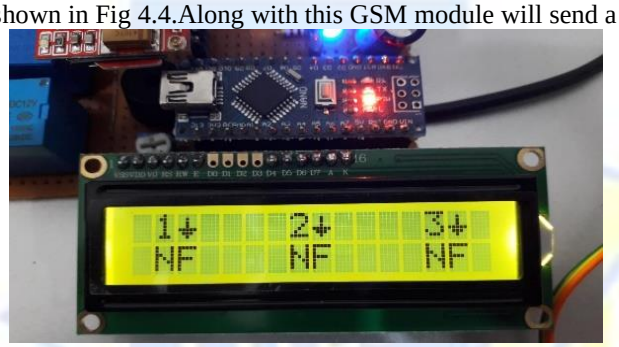

Figure 4.4: Current Leakage at line

At last Fig4.5 presents the final form of the project circuitry.

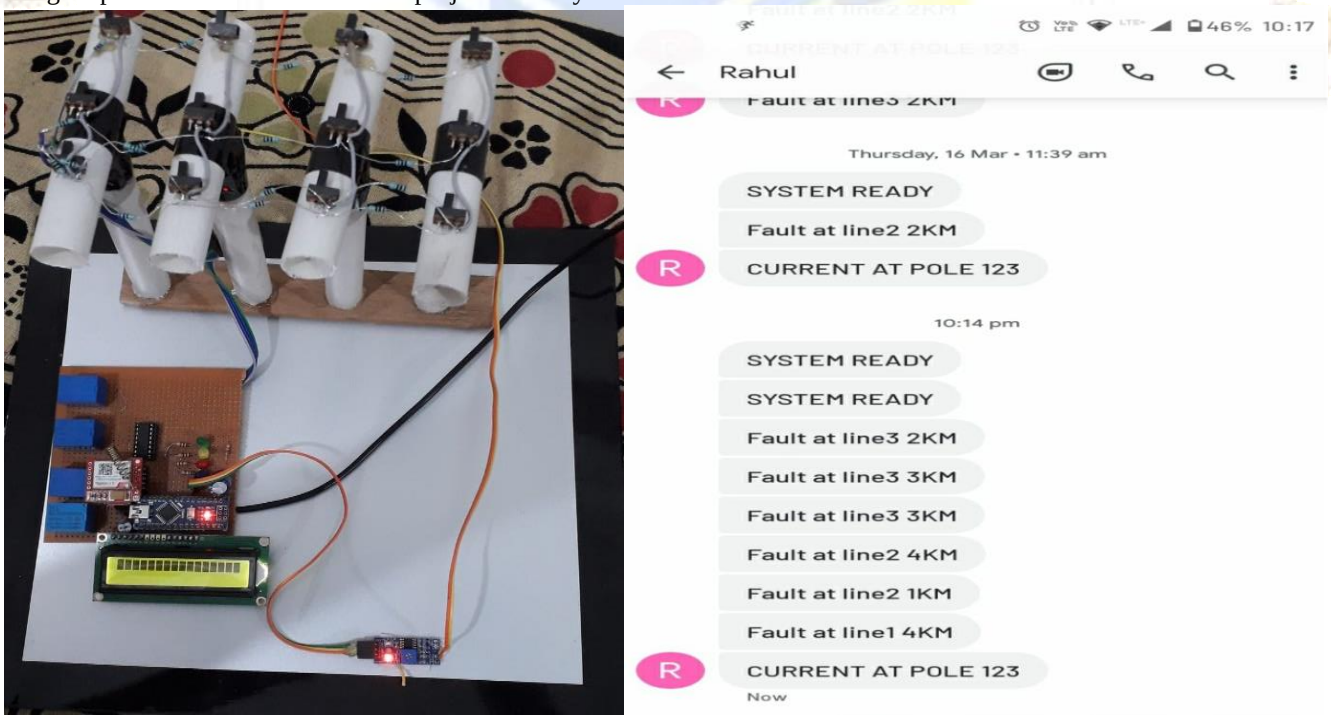

Figure 4.5: Final Circuitry & Result

VI. CONCLUSIONS

India is home to 140 crore people, and transmission and maintaining a continuous supply of electricity is difficult and costly. Distribution lines in India are long and complex hence susceptible to faults by various forces, the detection and clearing of faults require significant human effort and time which sometimes leads to electrically induced accidents. Through our project, we can detect specific transmission lines and poles where the fault has occurred, simultaneously by GSM technology alerting the lineman or designated person about the same. This not only brings down the human effort for detection by switching off the pole if the fault current is transmitting through the pole makes the system safer. Therefore, the continuity of electricity can be effectively managed for many consumers, with more efficient utilization and safety of human resources.

VII. REFERENCES

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