TRANSMISSION LINE FAULT DETECTION USING IOT

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***Abstract*— Transmission line failure is very dangerous to communities and can reduce the possibility of transmission. High voltage and ultra-high voltage transmission are rare, but the failure rate in some areas is higher than that of external transmission line. This model compares the line's signal voltage to a reference value in order to create a system that monitors transmission line faults. Through the Internet of Things (IoT), NODE MCU (Esp8266), information about certain fault events is transmitted to the webpage and shown on the screen. The voltage is measured by a sensor, which then transmits the result to the microcontroller IC. The microprocessor processes the signal voltage and output from the display and IoT module. Workers can decrease the likelihood of a fault by accurately pinpointing the site of the defect and identifying areas where it is most likely to occur. Shorten the period of low power when an issue arises. This piece of writing is to detect the fault location in the transmission line using the Arduino board and send it to the control center using IoT devices.**

***Keywords*—** Internet of Things (IoT), microcontroller, transmission line.

I. INTRODUCTION:

Electrical energy is divided into generation, transmission and distribution. Transmission line is considered an important part of electricity supply as it connects supply and demand. Losses in transmission and distribution lines are considered to be very high compared to other parts of the power system. Currently, electricity generation is subject to various types of violence and violence, which can affect the entire benefits and stability of the grid. Communication disruptions disrupted the supply of electricity to customers. Therefore, detection and elimination of illegal transmission must be very rapid. In addition, there is an urgent need to develop a network of connections containing useful data. which are necessary for the integration of the smart grid. Many power transmission companies often rely on voltage testers to detect faults in transmission lines. In order to achieve this purpose, the force must be determined. lines and then the fault must be removed, which requires many users to locate the fault and eliminate the fault. Wireless sensor-based transmission line monitoring provides solutions to some of these problems, such as real-time pattern recognition, faster fault detection, more accurate detection and differentiation of electrical problems from faulty equipment due to disease-based maintenance rather than disease-based maintenance planning etc.

These applications have specific specifications, such delivering very huge files quickly. The development of a dependable, affordable, and quick-responding network architecture is essential to the success of these applications. The network needs to be able to control the network's transformation and convey sensitive data, including the transmission lines' present state. A cost-optimized paradigm for real-time data transmission network architecture is presented in this research. To track the state of electrical energy in real time, meters are incorporated into a variety of electrical goods. These sensors generate a lot of data and make accurate measurements of different electrical or physical characteristics. Getting this data to the control center quickly and effectively is the primary issue that needs to be resolved in the development of the smart grid.

II. OBJECTIVE:

The main aim of this project is to design a circuit or a device which will have a capability of determining the type of fault, exact location of fault and transfer its data to the utility mobile phone and desktop of the user with the help of GPS and NodeMCU. The Main objectives of this project are

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- To simulate the system using programmable controller, current sensor and design a hardware prototype of a system for overhead transmission line.
- To monitor the system under normal and faulty conditions using NodeMCU and clear the fault as soon as identified.
- To determine the exact location of fault in the transmission line with the help of GPS and send its data to the mobile phone and desktop of user.
- To validate the system performance by applying the faults at different locations in order to check the efficiency of the system.

III. EXISTING SYSTEM:

Faults play an important role in affecting the reliability of power system. More than 80% of the power system faults occur in transmission sector which badly effect the reliability of supply and causes damage to the system. Such faults are unpredictable and can occur at any time. The long existence of fault in the system can cause serious damage to the system like an infection does to a body. Therefore in order to protect a system from such situation, the fault should be identified and cleared as soon as possible. In earlier period, the system was established which estimate the value of impedance from the data of current and voltage in order to determine the location of fault. But this method was not effective as it takes long time to determine the location of fault which is a sign of unreliability. What if there is a system which uses GPS to determine the exact location of fault and NodeMCU will be used to send all the information regarding faults to the IoT cloud server which is accessible through mobile and desktop.

IV. PROPOSED SYSTEM:

The Proposed system can only handle failures in overhead transmission lines. Because low voltage rating equipment is present and some equipment can only withstand low voltages, the hardware will operate at a specific voltage level. Climatic circumstances such as snowfall, rainfall, or windstorms can make it difficult for a device to determine the exact site of a defect, and they can also affect the device's circuit, resulting in system malfunction. The suggested system's outputs may be limited if a three-phase power supply or another module is unavailable. The mechanism will alert you to any faults at the gearbox pole or tower's two endpoints.

V. BLOCK DIAGRAM:

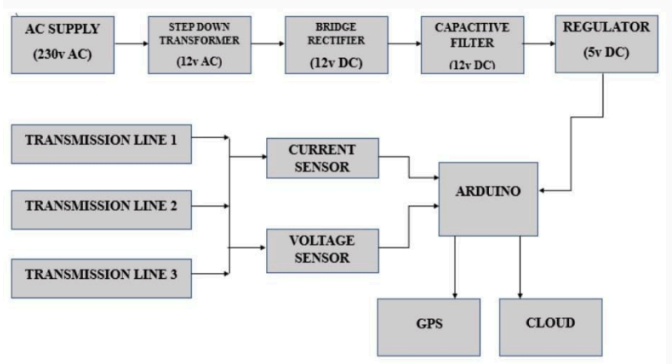

Fig.1 Proposed Block Diagram

VI. FLOWCHART:

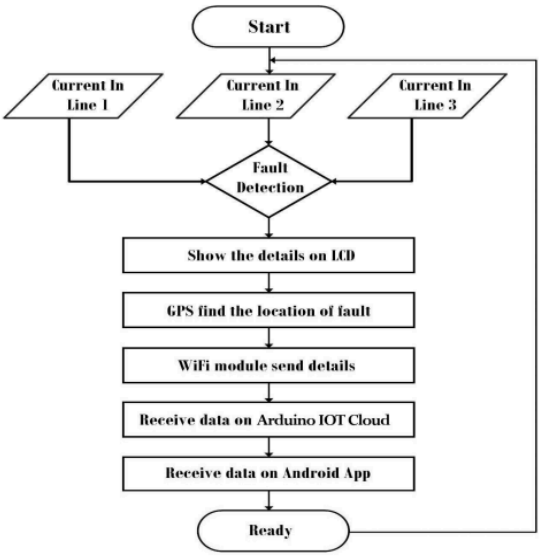

Fig.2 Flow Chart operations

VII. SIMULATION

Version 8.12 of the Proteus Software is used to develop this schematic circuit. This schematic shows how the four current sensors (ACS712), 16X2 LCD, 1K 10W 16 resistors, and Arduino UNO, buzzer are connected in accordance with the circuit layout.

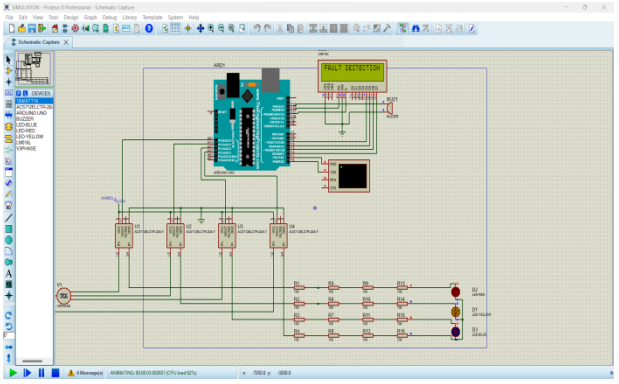

Fig.3 Proposed Simulation Diagram Using Proteus software

The Components used in the Simulation are

1. Arduino UNO
2. Buzzer
3. Liquid Crystal Display (LCD)
4. Resistors
5. LED – Blue, Yellow, Red
6. Current sensor (ACS712)
7. Buzzer
8. Connecting Wires

VIII. SIMULATION RESULTS:

Case: 1 Single Line to Ground Fault Whenever any of the single line is short with ground wire single line to ground fault occurs. The LCD shows type of fault (single line to ground fault) and in which line fault is occurred with providing the distance of the fault.

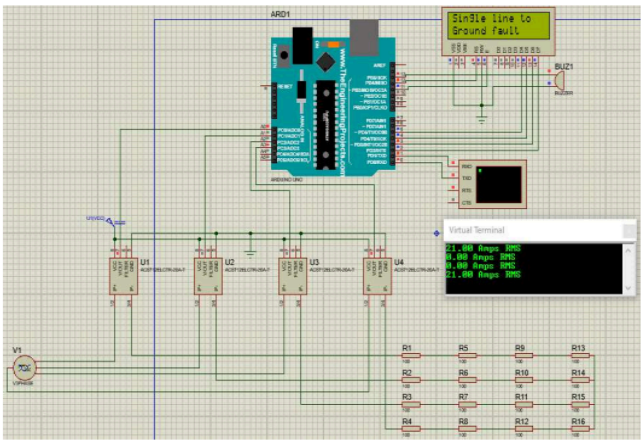

Fig. 5. Proteus Software Simulation with L-G Fault

Case: 2 Line to Line Fault The figure below shows that the line to line fault occurs when two lines are short with each other. The LCD shows type of fault (line to line fault) and in which line fault occur with providing the distance of the faults.

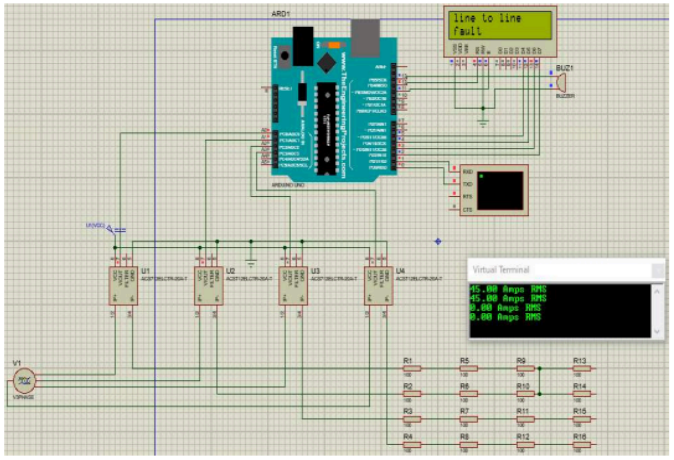

Fig. 6. Proteus Software Simulation with L-L fault

Case: 3 Double Line to Ground Fault The figure below shows that the double line to ground fault occurred when two lines are short with each other and are in contact of ground wire. The LCD shows type of fault (double line to ground fault) and in which line fault occurred with providing the distance of the faults.

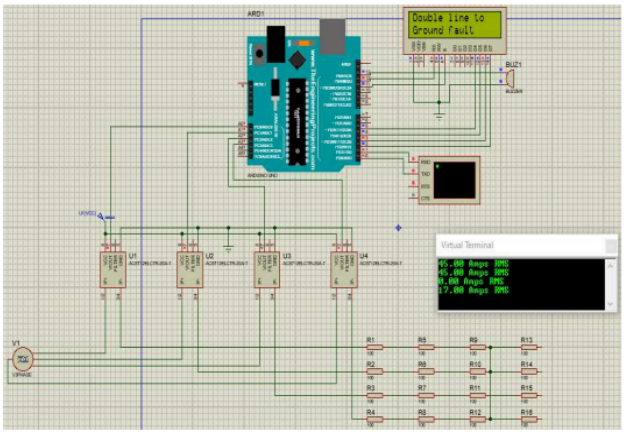

Fig. 7. Proteus Software Simulation with L-L-G fault

Case: 4 Three Phase Fault The figure below shows that the three phase fault occurs when three lines are short with each other. The LCD shows type of fault (three phase fault) and in which line fault occurred with providing the distance of the faults.

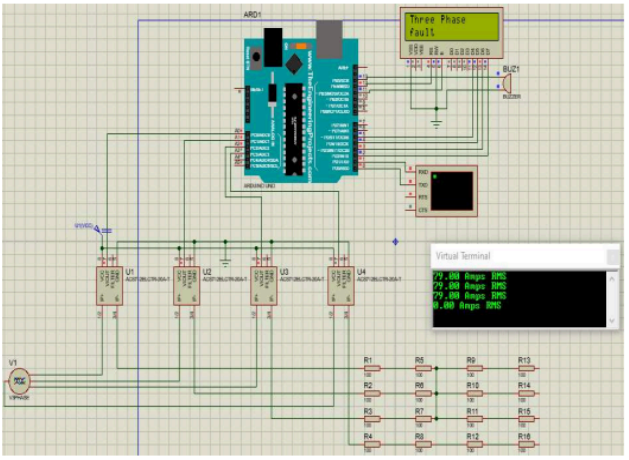

Fig. 8. Proteus Software Simulation with Three Phase fault

IX. CONCLUSION

The process is designed to solve customer problems. This article contains a method to check transmission line fault. In this article, sensors are used to identify symptoms that cause the network to fail. Detected problems will be communicated to the relevant authorities via SMS. The communication technology used in the plan will be used more in the future as the development of the country increases. Using this method we can see the error and solve it easily. It is reliable, can detect the fault of the three-stage transmission system and store data. It works in real time, so we save all data files and avoid transmission problems in the future.

X. FUTURE SCOPE:

The following can be used in future.

- ➢ Used in transmission line
- ➢ Used in distribution line
- ➢ Underground Line Fault Finding
- ➢ Data Recording
- ➢ Work with a real-time reaction
- ➢ Larger coverage area than the current system at a lower cost
- ➢ cost efficient
- ➢ Devices enable by wireless communication
- ➢ Number of components are used
- ➢ Economically reliable and low cost

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