THREE PHASE FAULT DETECTION SYSTEM USING IOT

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ABSTRACT

The transmission line is the most important part of the power system. Transmission lines have a principal amount of power. The requirement for power and its allegiance has grown up exponentially over the modern era, and the major role of a transmission line is to transmit electric power from the source area to the distribution network. The explosion between limited production and a tremendous claim has grown the focus on minimizing power losses. Losses like transmission loss and also conjecture factors as physical losses to various technical losses, Another thing is the primary factor it has a reactive power and voltage deviation are momentous in the long-range transmission power line. Essentially, fault analysis is a focused issue in power system engineering to clear faults in a short time and re-establish the power system as quickly as possible with minimum interruption. However, the fault detection that interrupts the transmission line is itself a challenging task to investigate faults as well as improve the reliability of the system. The transmission line is susceptible given all parameters that connect the whole power system. This paper presents a review of transmission line fault detection.

Keyword: - *Transmission Line, Three-Phase, Fault Detection, Iot*

1. INTRODUCTION

Internet of Things (IoT) has revolutionized the way we interact with our environment. With IoT, we can now monitor and control our homes, offices, and factories remotely. In this report, we will discuss an IoT-based 3-phase fault detection system that can detect faults in a three-phase power distribution system. A three-phase power distribution system is commonly used in industries to supply power to machines and equipment. This system is designed to distribute power uniformly across all three phases. However, faults can occur in this system, such as short circuits, open circuits, and ground faults. These faults can cause damage to equipment and can even lead to fires.

Looking at the current system of finding the transmission line error, there are a few problems, a few of them including a lack of skilled staff, increased risks and time-consuming processes. The automation process is known to solve many or all such problems that are common to normal processes. This is another such effort to create a simple and inexpensive solution that works for future Electric Power Transmission Plans providers and operators in different stages or channels. Transmission error detection system can detect an error. The system monitors the line fault in sequence for 3 lines namely R, Y, and B Phases. Once if fault is detected the system sends the notification to the line monitoring station, it also provides the information about the faulty line.

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. Both methods could encounter various types of malfunctions is usually referred to as a "Fault". Fault is simply defined as a number of undesirable but unavoidable incidents can temporarily disturb the stable condition of the power system that occurs when the insulation of the system fails at any point. Moreover, if a conducting object comes in contact with a bare power conductor, a short circuit, or fault, is said to have occurred. The causes of faults are many, they include

lighting, wind damage, trees falling across transmission lines, vehicles or aircraft colliding with the transmission towers or poles, birds shorting lines or vandalism.

The IoT-based 3-phase fault detection system has several benefits. Firstly, it can detect faults in the power distribution system quickly and accurately. This helps prevent damage to equipment and reduces downtime. Secondly, the system can be remotely monitored, which reduces the need for manual inspections. This saves time and money. Finally, the system can generate reports that can be used for predictive maintenance. This helps identify potential faults before they occur.

2. LITERATURE SURVEY

2.1 Saurabh Verma; Shivani Jaiswal; Aayush Rawat; Abhishek Kumar Singh.

If we look at the current system of finding the transmission line error, there are a few problems, a few of them including a lack of skilled staff, increased risks and time-consuming processes. The automation process is known to solve many or all such problems that are common to normal processes. This is another such effort to create a simple and inexpensive solution that works for future Electric Power Transmission Plans providers and operators in different stages or channels. Transmission error detection system can detect an error when the line breaks and closes power supply with the wrong line until the operator closes the entire line once it has confirmed the error. The system monitors line error 3-line sequence namely Stages R, Y, B. If an error is detected the system sends a notification to the line The monitoring channel also provides information about the faulty line and the distance the line is located broken. The system is also capable of transmitting line voltage to the monitoring station.

2.2 Krushna Nikam, Vishakha Baviskar, Jaydeep Patil, Mohit Mahajan, Manish D Mahale

In transmission line 85-87% faults of power system occur in these overhead Transmission line. In this paper, we discuss about various Method to control the fault generated in transmission line and solve this in real time. The heart of this module is Aurdino and IOT based software this will detect the fault, and exact location of fault also which type of fault. It Will shows in display and software also be in this information is transmitted to the control room.

2.3 Praveena Anaji; Anjum Banu; Abhilasha S; Niveditha P A.

There are numerous sections to the electric power system. One of these is the transmission system, which transports power from generating stations to substations and then to customers via transmission lines. Malfunctions are commonly referred to as Faults. A fault is simply described as a series of unpleasant and unavoidable events that might momentarily disrupt the power system's stable condition when the insulation breaks at any point. Lightning, Trees falling on transmission lines, Automobiles or Aircraft colliding with transmission towers and Birds shorting lines are all causes of faults. The causes and effects of defects, as well as several fault detection technologies, will be examined in this paper. The power system equipment is severely damaged as a result of these problems.

2.4 Sonam Chopade; Chetan Gedam; Abhishek Anturkar; Shrutika Gajbhiye; Honey Kamble; Amol Manker

The three-phase fault detector and analyse system is designed to differentiate the type of fault occur in power system, enhanced with the Internet of Things (IoT) by using the combinations of Arduino and Wi-Fi module. All sorts of electrical substation that supply the electric to the users like industrial or residential may have some failures due to fault that may be temporary or permanent. However, due to problems like system take a longer time to detect the type of fault and also required manually to reset off the fault make the existing protection system not efficient in supply energy to consumer. The system can be used three single phase transformers those are wired in star input and star output also three transformers are connected in star input and delta output that having 240 volts input and 12 volts output. Then, ESP NodeMCU is used as controller and also act as device that connect to the IoT system when fault is detected. The devices then link with the Blynk application User will get the i notification from Blynk application when the fault is occurred Using these devices, user could find automatically after a short-lived interruption in a provisional fault from the tripped situation in case of eternal fault.

2.5 Dr. C. S Hiwarkar, Shimanshu S. Shinde, Akshay J. Landge

The electrical energy device is cut up into many special sections. One in all is the transmission mechanism, wherein Power is transmitted from producing stations and substations through transmission strains to customers. Both strategies Should numerous kinds of malfunctions are generally stated as a \"Fault\" Fault is described as a number of unwanted however Unavoidable incidents can temporarily disturb the strong circumstance of the power system that occurs while the insulation of the System fails at any factor. Furthermore, if a carrying out object comes in

contact with a bare power conductor, a quick circuit, or Fault. The causes of faults are, lighting stroke, human error, wind damage, timber falling or wines plants throughout transmission Strains, aircraft crash on the transmission line, birds shorting traces, or vandalism. At some point in this study, the causes and consequences of faults Within the overhead transmission strains have been the maximum target of the research.

3. BLOCK DIAGRAM

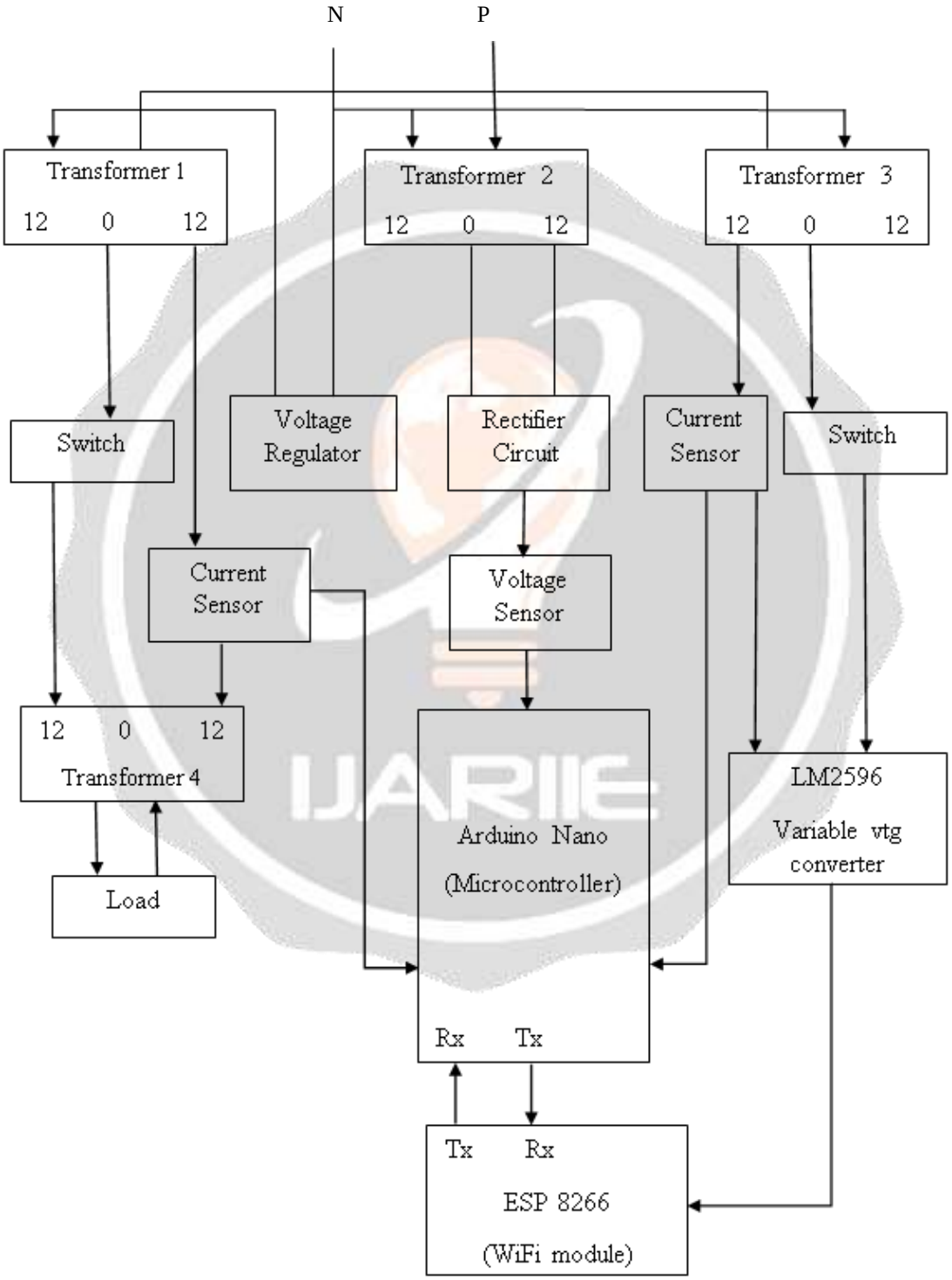

Fig -1: Block Diagram of System

4. CONNECTION DIAGRAM

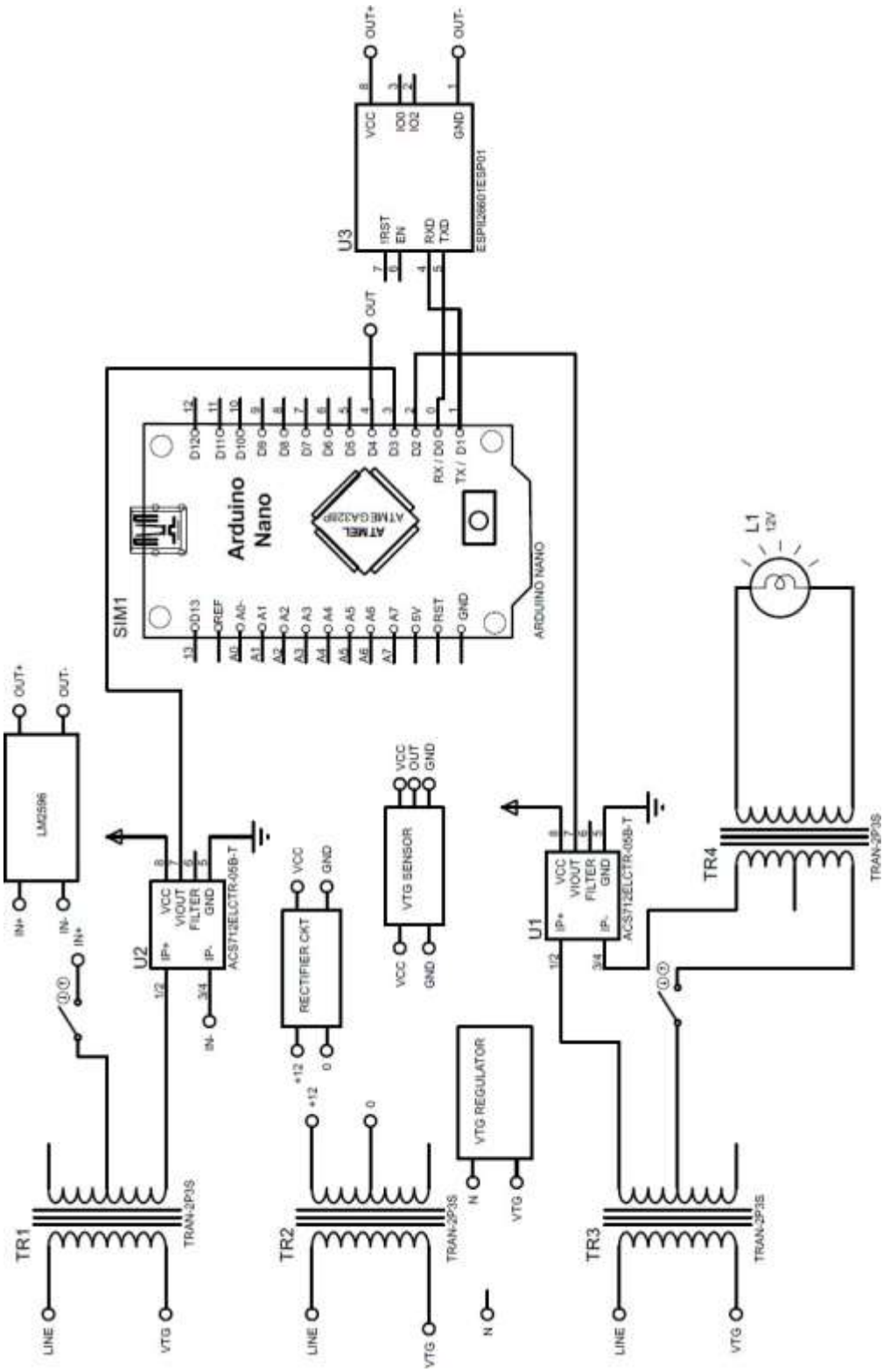

Fig -2: Connection Diagram of System

5. RESULTS

5.1 Simulation Results

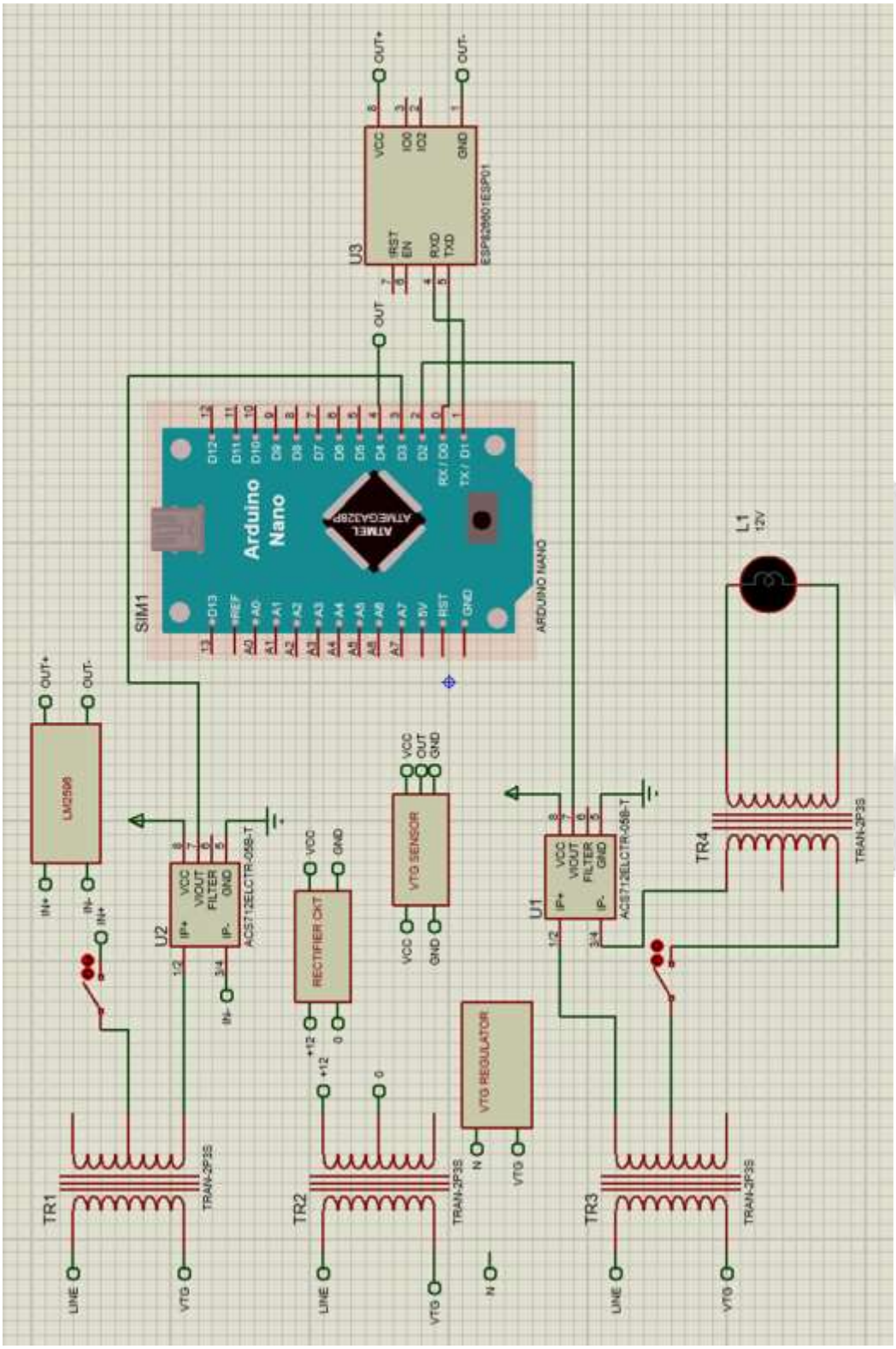

Fig -3: Simulation Results

5.2 Results of Hardware testing

Table-1: Results of Hardware Testing

Test ID	Description	Expected Results	Actual Result	Status
01	To check whether usersuccessfully connected innetwork	User should successfully connected in network	User has successfully connected innetwork	PASS
02	Sensor	System should receive values form sensor	System is receivingdata form sensor	PASS
03	Sensor values store in database	Sensor values uld store indatabase	Sensor values hasstore in database	PASS
04	ect SensorData	If sensor gives wrong values, system shouldshow error	System has shown error	PASS
05	System performance	System shouldperform as per requirements	System able performam requirements	PASS
06	Connection to network dataprotocol	System should able to connect tonetwork protocol	System is connected to network protocol	PASS
07	Microcontroller received the data	Microcontrollershould receive the data	Microcontroller has received thedata	PASS
08	Delay time management	System should give quick response to user	System is giving quick response touser	PASS
09	Notification touser on display	System shouldable to give notification to user on display	System is giving notification to user on display	PASS
10	System Accuracy	System shouldperformance features with accuracy	System able to perform featureswith accuracy	PASS
11	Sensor	System shouldreceive values form sensor	System is receivingdata form sensor	PASS
12	System outputtest	System should give all the outputas per programming	System is give all theoutput as per programming	PASS
13	Detect whether GSM sending thedata or not	Sensor should send the data to the micro controller	Sensor should send the data tothe micro controller	PASS
14	Fault gateway	Sensor should able to detect the frequency of flowing current	Sensor should able todetect the frequencyof flowing current	PASS
15	Scanning thetype of fault	System shouldable to scan which type of fault occurred	System should able to scan which type offault occurred	PASS

6. ADVANTAGES

- Real-time monitoring: An IoT-based system allows for real-time monitoring of the power grid, allowing for early detection and prevention of faults.
- Reduced downtime: By detecting faults early, an IoT-based system can help reduce downtime, which can be costly for industrial and commercial applications.
- Improved reliability: With real-time monitoring and early detection, the system can improve the reliability of the power grid, ensuring a consistent power supply.
- Reduced maintenance costs: Traditional fault detection systems require regular maintenance and inspection, which can be time-consuming and costly. IoT-based systems can reduce these costs by automating the monitoring process.
- Increased safety: Faults in the power grid can pose a safety hazard, especially in industrial settings. An IoT-based system can help reduce the risk of accidents and injuries by detecting faults before they cause harm.
- Data analysis: An IoT-based system can collect data on power faults. This can help in improving the overall efficiency of the power grid.
- Scalability: IoT-based systems are highly scalable, allowing for easy expansion and integration with other systems. This makes it easier to adapt to changing power demands and infrastructure requirements.

7. APPLICATIONS

- Power generation and distribution: IoT-based fault detection systems can be used in power generation plants and electrical substations to monitor and detect faults in the power grid. This can help improve the efficiency and reliability of the power supply.
- Manufacturing: In manufacturing facilities, IoT-based systems can be used to monitor and detect faults in the machinery and equipment. This can help prevent breakdowns and reduce downtime, improving productivity and reducing costs.
- Oil and gas: In the oil and gas industry, IoT-based systems can be used to monitor and detect faults in the pipelines and processing equipment. This can help prevent leaks and spills, reducing the risk of environmental damage and improving safety.
- Transportation: IoT-based systems can be used in transportation systems such as trains and airplanes to monitor and detect faults in the electrical systems. This can help improve safety and prevent accidents.
- Smart homes and buildings: IoT-based systems can be used in smart homes and buildings to monitor and detect faults in the electrical systems, including lighting and heating. This can help reduce energy consumption and improve efficiency.
- Data centers: In data centers, IoT-based systems can be used to monitor and detect faults in the power and cooling systems. This can help prevent downtime and data loss, ensuring the continuous operation of critical systems.

Overall, IoT-based 3-phase fault detection systems can be applied to any industry that relies on electrical systems and equipment.

8. CONCLUSIONS

This paper proposes a model designed to solve consumer problems using Arduino and IoT software. The model can easily detect the type of fault and solve it effectively. The prototype model works quickly and accurately, and helps to avoid future problems in transmission lines. Overall, this model provides an efficient solution for fault detection, which can benefit both consumers and the power industry.

9. FUTURE SCOPE

The prototype module or project described in this paper has great potential for future implementation and use. It can save a significant amount of time and resources in fault detection and location, making it a valuable asset for the power industry. In addition, it can serve as a reference for future base protection system implementations in transmission line systems. Compared to SCADA, this system is highly reliable and can signal the mobile app through an IoT-based system. This system provides the exact fault location and enables quick fault clearing, making it a unique and highly useful project for the future.

10. REFERENCES

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