IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 1, March 2025

Underground Cable Fault Detector

S. D. Korde, R. V. Thakare, D. S. Kahandhal, S. B. Shinde, O. R. Thakare
Diploma in Electrical Engineering
Matoshri Aasarabai Polytechnic, Eklahare, Nashik, India

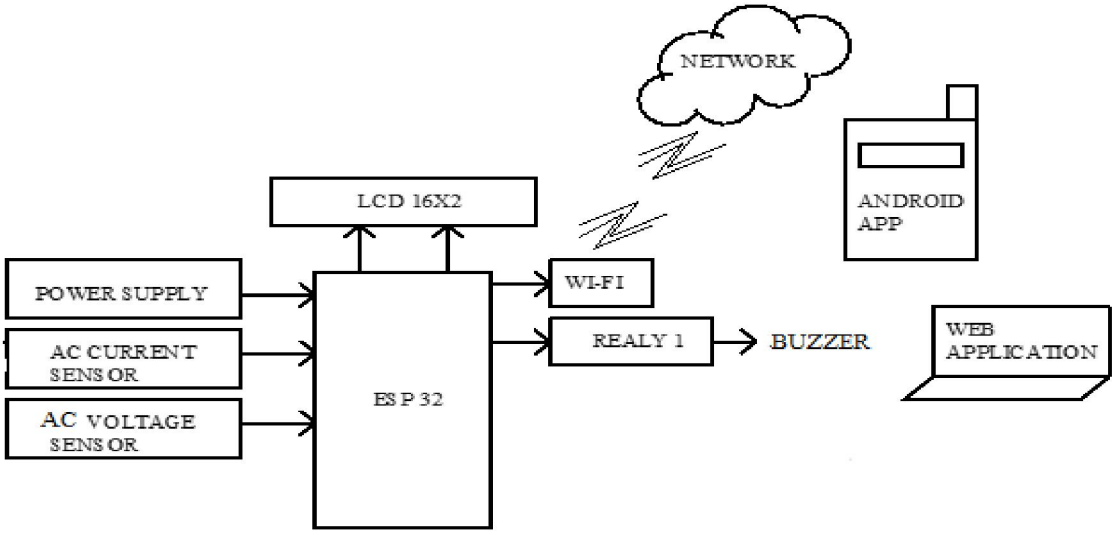
Abstract: *The project aims to develop an IOT-based underground cable fault detector system designed to identify faults in underground electrical cables. The system uses various sensors to detect fault conditions such as short circuits, open circuits, or cable insulation failure. The data collected from the sensors is transmitted over the Internet to a monitoring system, allowing for real-time fault detection and remote monitoring. This approach reduces the need for manual inspection, saving time and improving the reliability of underground cable systems.*

Keywords: IOT, Underground Cable, Fault Detection, Sensors, Wireless Communication, Real-time Monitoring.

I. INTRODUCTION

Underground cables are widely used in electrical distribution systems as they are less exposed to environmental damage than overhead lines. However, detecting faults in underground cables remains challenging due to their inaccessibility. Traditional methods for detecting faults are time-consuming and require manual inspection, which often leads to long downtimes and high maintenance costs. This research paper proposes an IOT-based system for automatic fault detection in underground cables.

By integrating Internet of Things (IOT) technology with a fault detection mechanism, this project aims to offer an efficient and cost-effective solution for real-time monitoring and early fault detection in underground cables. The IoT-based system will provide a way for maintenance personnel to identify problems quickly and accurately, reducing downtime and improving service reliability.



BLOCK DIAGRAM OF IOT BASED UNDERGROUD CABLE DETECTOR

DOI: 10.48175/568

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 1, March 2025

II. PROBLEM STATEMENT

The main issue with traditional fault detection in underground cables is the inability to pinpoint the exact location of the fault without digging up the cable. Furthermore, manual inspections are prone to errors, leading to delayed repairs and higher operational costs. With the increasing demand for reliable electrical supply systems, an efficient and automated fault detection system is crucial to maintaining underground cable infrastructure.

III. OBJECTIVES OF THE STUDY

The primary objective of this project is to design an IOT-based underground cable fault detection system that achieves the following goals:

- **Fault Detection**: Detect faults such as short circuits, insulation failures, and breaks in underground cables.
- **Real-time Monitoring:** Provide real-time updates on cable conditions to a remote monitoring system
- **Location Identification**: Identify the approximate location of the fault to reduce the time spent on manual
- inspection and digging.
- **Cost Efficiency**: Minimize the cost of manual inspection and repair by automating the fault detection process.

IV. SYSTEM OVERVIEW

4.1 Components of the System

The IOT-based underground cable fault detection system consists of the following key components:

- **Sensors:** The system uses various types of sensors such as current sensors, temperature sensors, and voltage sensors to monitor the health of the cable.
- **Current Sensor**: Detects any abnormal current flow due to short circuits or insulation failure.
- Temperature Sensor: Monitors the temperature of the cable to detect overheating, which could indicate a fault.
- **Voltage Sensor**: Measures voltage levels to ensure there are no irregularities, such as an open circuit.
- **Microcontroller**: The microcontroller (e.g., Arduino or Raspberry Pi) collects data from the sensors and processes it. It also communicates with the cloud server for data storage and analysis.
- **Wireless Communication Module**: A Wi-Fi or GSM module transmits sensor data to the cloud platform for remote monitoring.
- **Cloud Platform**: The cloud platform (such as AWS, Google Cloud, or ThingSpeak) stores data, performs analysis, and generates alerts when a fault is detected.
- **User Interface (UI)**: A mobile app or web-based dashboard displays real-time data and sends notifications about detected faults to users

V. METHODOLOGY

5.1 Design Process

1. Research and Selection of Components: The first step involved researching various sensors and selecting the most suitable ones for monitoring underground cables. After selecting sensors, the appropriate microcontroller and communication module were chosen to ensure compatibility and efficiency.
2. System Integration: After obtaining all the components, the sensors were integrated with the microcontroller to gather real-time data. The wireless communication module was used to transmit the data to the cloud.
3. Development of Cloud System: A cloud-based platform was set up to store data from the IOT system. This platform is responsible for analyzing the data and triggering alerts when faults are detected.
4. User Interface Development: A simple user interface was designed to allow the monitoring team to view the cable status and receive real-time alerts.

VI. CONCLUSION

The IOT-based underground cable fault detection system offers an efficient and reliable solution for monitoring underground cables. The real-time fault detection, remote monitoring, and location identification capabilities of the system provide significant benefits, including reduced downtime and cost savings. This system has the potential to

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
Volume 5, Issue 1, March 2025

revolutionize the way underground cables are maintained and monitored, improving the overall efficiency and reliability of electrical distribution networks.

VII. ACKNOWLEDGMENT

I take this opportunity to thank all those who have contributed in successful completion of this Capstone Project work. I would like to express my sincere thanks to my Guide :S.D ,KORADE who has encouraged me to work on this Capstone project and guided me whenever required. We also would like to express our gratitude to our H.O.D. :G.P:KALE Principal Prof. A. S. RELKAR for giving us opportunities to undertake this Capstone project work and his constant inspiration and keen interest to make the Capstone project and presentation absolutely flawless. In MATOSHRI AASRABAI POLYTECHNIC NASHIK. At the last but not the least we would like to thank our Teaching staff member, Workshop staff member, Friends and family member for their timel co-operation and help.

REFERENCES

[1]. Faisal T. Abed, and HAIDER T. ALRikabi1 "Using IOT Applications for Detection and Monitoring of Underground Cable Fault" IOP Conf. Series: Materials Science and Engineering 1184 (2021) 012003.

[2]. ADITYA BHAD, HARSHAL BAWANE, GAURAV RAMTEKE, HARSH CHAHANDE, ASHISH BONDE, Mr.AVINASH WELANKIWAR "IOT based underground fault detection and locator system" International Research Journal of Modernization in Engineering Technology and Science Volume:04/Issue:12/December-2022

[3]. VIVEK KR VERMA, MAYANK Kumar, KUSHAL Patel, PANKAJ Kr Singh KUSHWAHA, SHASHI KR Sharma "Underground cable fault detection using IOT" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 07 | July 2020 www.irjet.net

[4]. M.M.AMARNATH, B.GANESH Ram, MR.V.CHANDRASEKARAN, MR.G.MOHAN Ram "IOT based on underground cable fault identification using arduino" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 08 Issue: 04 | Apr 2021 www.irjet.net

[5]. Ch. SAMPOORNA, K. VENKATA VAMSI, G. BHANU TEJA, P. PENCHAL KUMAR, "IOT based underground cable fault detection" Journal of Emerging Technologies and Innovative Research (JETIR) © 2023 JETIR April 2023