

Smart Electrical Pole Monitoring System

Dnyaneshwari Dhananjay Zambare¹ Gaytri Shivaji Katarjakar² Rutuja Rajebhau Honde³
Kirti Ashok Bhosale⁴

^{1,2,3,4}Department of Electronics and Telecommunication Engineering
^{1,2,3,4}Jayawantrao Sawant Polytechnic, Pune, India

Abstract — This paper presents a Smart Electrical Pole Monitoring System designed to detect the presence of electrical current in street light poles and prevent accidental electric shocks. In many public areas, leakage current in damaged or faulty poles can cause serious injuries or fatalities. The proposed system continuously monitors the current flow in the pole using appropriate sensors. If abnormal current or leakage is detected, the system immediately activates a visual or audible alert to warn nearby people. The system is cost-effective, easy to install, and suitable for urban as well as rural areas. This solution enhances public safety by providing real-time monitoring and early warning. The proposed model can be further integrated with IoT technology for remote monitoring and improved maintenance management.

Keywords: Electrical Safety, Leakage Current Detection, Smart Monitoring System, Electric Shock Prevention, IoT Based Monitoring, Public Safety

I. INTRODUCTION

Electricity plays a vital role in modern society, especially in public infrastructure such as street lighting systems. However, damaged electrical poles, faulty wiring, and leakage current can create serious safety hazards for pedestrians. During rainy seasons or due to poor maintenance, electric current may flow through the metallic body of street poles, increasing the risk of accidental electric shocks. Many incidents occur because people are unaware of the presence of live current in such poles.

To address this issue, a Smart Electrical Pole Monitoring System is proposed. The system is designed to detect the presence of current or leakage in electrical poles and provide an immediate alert to prevent accidents. The proposed system continuously monitors electrical conditions using sensors and warning indicators. This solution aims to enhance public safety, reduce electrical hazards, and provide an efficient monitoring mechanism for municipal authorities. The system is simple, cost-effective, and can be implemented in both urban and rural areas.

II. SYSTEM OVERVIEW

The Smart Electrical Pole Monitoring System is designed to detect the presence of electrical current or leakage in street light poles to prevent accidental electric shocks. The system consists of a current sensor, microcontroller unit, alert mechanism (buzzer/LED), and power supply unit.

The current sensor continuously monitors the electrical flow in the pole. If leakage current or abnormal voltage is detected, the sensor sends a signal to the microcontroller. The microcontroller processes the data and activates an alert system such as a buzzer or warning light to inform nearby people about the danger.

The system operates in real-time and ensures quick detection and response. It is compact, low-cost, and easy to install on existing electrical poles. The proposed model improves public safety and helps authorities identify faulty poles for timely maintenance.

III. METHODOLOGY

The methodology of the proposed system is based on detection, processing, and alert generation. The system is installed on an electrical pole to continuously monitor the presence of current or leakage.

First, a current sensor is connected to the pole to detect the flow of electrical current. The sensor continuously measures the current level and sends the data to the microcontroller. The microcontroller analyzes the received signal and compares it with predefined safe threshold values.

If the detected current exceeds the safe limit or leakage current is present, the microcontroller immediately activates an alert mechanism such as a buzzer or LED indicator. This provides a warning to nearby pedestrians and prevents accidental electric shocks.

The system works in real-time and requires minimal maintenance. It is designed to be energy-efficient, cost-effective, and suitable for both urban and rural areas.

IV. RESULTS



V. ADVANTAGES

- 1) Improves public safety
- 2) Detects leakage current quickly
- 3) Gives instant warning (buzzer/LED)
- 4) Low cost and easy to install
- 5) Reduces risk of electric shock

VI. LIMITATION

- 1) Only monitors poles where sensors are installed.
- 2) May require regular sensor calibration for accuracy.

- 3) Limited coverage in very large areas without multiple installations.
- 4) Dependent on power supply; system may fail during power outage.
- 5) Alerts are local; without IoT integration, remote monitoring is not possible.

VII. HARDWARE COMPONENTS LIST

- 1) Mini electrical pole (Iron Rod)
- 2) Battery
- 3) PVC pipe
- 4) Aluminium Wire
- 5) PCB Board

VIII. FUTURE SCOPE

- 1) Integration with IoT for remote monitoring.
- 2) Automatic reporting to municipal authorities for maintenance.
- 3) Mobile app alerts for pedestrians and authorities.
- 4) Expansion to street lights, transformers, and high-voltage lines.
- 5) Incorporation of solar-powered sensors for energy efficiency.

IX. CONCLUSION

The proposed Smart Electrical Pole Monitoring System effectively detects leakage current and prevents accidental electric shocks. It provides real-time alerts, enhances public safety, and is cost-effective and easy to install. This system can be implemented in urban and rural areas to reduce electrical hazards and improve maintenance efficiency.

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