

Automated Underground Cable Fault Detection and Location System using Arduino and Ultrasonic Sensors

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Abstract: *This project presents a smart and cost-effective underground cable fault detection system using an Arduino microcontroller and a potential divider network to accurately locate faults in underground power lines. By measuring voltage drops along the cable, the system calculates the distance to the fault, significantly reducing excavation time and repair costs. It detects both line-to-line and line-to-ground faults, improving fault identification and system response. The integration of ultrasonic sensors enhances accuracy and adaptability in real-world environments. The system displays real-time fault data on an LCD and can be expanded with communication modules such as GSM or Wi-Fi for remote monitoring and instant alerts to maintenance teams. Designed to be user-friendly and highly efficient, the system reduces human effort and minimizes disruption in power distribution. Additionally, it supports proactive maintenance strategies by enabling early fault detection before severe damage occurs. This automated solution is ideal for use in urban infrastructure, industrial complexes, and smart city applications, where reliable and uninterrupted power supply is critical. Overall, the project not only strengthens the reliability of electrical networks but also contributes to the development of intelligent grid systems by offering a scalable, precise, and technologically advanced fault detection mechanism*

Keywords: Underground Cable Fault Detection, Arduino Microcontroller, Voltage Divider Network, Real-Time Monitoring, Line-to-Line and Line-to-Ground Faults

