

3-Phase Transmission Line Fault Detection

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Abstract: *Transmission lines carry power across hundreds of kilometers, but faults strike without warning—storms, trees, insulation aging. Finding them fast matters; every minute of outage costs money and trust. We built a detector that thinks. ESP32 applies low test voltage, measures what comes back, calculates resistance, translates to distance. Short circuit, open line, ground fault—pattern recognition identifies type. Relay isolates damaged section before damage spreads. LCD shows local status; cloud shows everywhere else. No crew driving lines hunting visually. No guesswork on phone calls. Exact kilometer displayed, repair team dispatched precise, downtime minimized. Automated because humans sleep, systems shouldn't.*

Keywords: ESP32, Transmission Line, Fault Detection, IoT, Relay, Smart Grid, Resistance Measurement