

ABSTRACT

Electric arc faults on trolley wires of electric trains can cause equipment damage, communication disruptions, and safety risks, making early detection crucial. However, accurately detecting this phenomenon in operational train systems remains challenging. This study aims to develop an electric arc detection system using the Random Forest method. The system is designed with a microcontroller and PZEM 017 sensor to measure current and voltage.

Data is processed to generate average and standard deviation values, which are then analyzed using a machine learning algorithm and linked to a mobile application as a user interface. Based on feature importance, the average voltage and standard deviation of voltage have the greatest influence on detection.

Testing under static conditions achieved 100% accuracy for Normal, Arc Flash, and No Contact conditions with 10 trials per condition. The accuracy classification test on the implemented system yielded an overall accuracy of 95.60%. This system is expected to serve as a solution to enhance the operational reliability of electric trains through early arc fault detection.

Keywords: *Electric Arc Fault, Random Forest, Electric Train, PZEM 017 Sensor.*