

Railway Anti-Collision System and Auto Track Changing System

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Abstract: *With the rapid growth of railway networks, ensuring passenger and train safety has become a pressing concern, especially in densely trafficked routes. This project introduces a smart Railway Anti-Collision and Auto Track Changing System built using the ESP32 microcontroller, which features inbuilt Wi-Fi for efficient and reliable wireless communication. The system utilizes ultrasonic sensors to detect obstacles or other trains on the track in real-time. An onboard keypad allows operators to input commands or configurations, while an emergency switch provides manual override capabilities during critical situations. An LCD display continuously updates the operator on system status and detection outcomes. Upon detecting a possible collision, the system processes sensor data and either issues alerts or autonomously controls a track-changing mechanism via the L293D motor driver, thus redirecting the train to a safe path. This embedded solution integrates hardware and software to reduce collision risks and human error, offering a practical, scalable, and cost-effective method for enhancing railway safety and operational efficiency.*

Keywords: Railway Safety, ESP32, Auto Track Changing, Ultrasonic Sensor, Collision Detection

