

Railway Anti-Collision System, Auto Track Changing and Phis Plate Removal Sensing

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Abstract: *The proposed Railway Anti-Collision System is a microcontroller-based safety mechanism designed to prevent train collisions and enhance operational efficiency through the integration of ultrasonic sensing, RF communication, automatic track switching, and physical plate (PHIS) removal detection. Utilizing the PIC18F4520 microcontroller as its core, the system continuously monitors the distance between trains or obstacles using ultrasonic sensors, communicates real-time data via HC-12 wireless modules, and activates necessary responses such as rerouting or alerts via buzzers and LCD displays. An intelligent decision-making algorithm determines whether to trigger automated track changes or issue collision warnings. The system also detects the status of physical plates on the tracks, indicating potential faults or obstructions. By implementing technologies such as motor drivers for track actuation, buzzer-based alerts, and potential future integration with AI, LIDAR, and centralized monitoring systems, this solution not only addresses immediate railway safety challenges but also lays the foundation for smart, scalable, and autonomous railway management. The system aims to contribute to the long-term goal of zero-accident railway networks by combining real-time sensing, automation, and intelligent control in a cost-effective and adaptable framework..*

Keywords: Railway Safety, Anti-Collision System, PIC18F4520, Ultrasonic Sensor, Automatic Track Switching

