

**Automated Platform Safety System**Ms. K. Pranathi¹, G. Varsha Shree²¹Assistant Professor, ²UG Scholar, Department of Electronics and Telematics, G. Narayanamma Institute of Technology and Science, Hyderabad, India - 500104

Abstract—Accidents often happen at railway stations due to unauthorized track crossing by passengers, often resulting in severe injuries. The Automated Platform Safety System is meant to add safety for passengers by preventing them from intentionally accessing the track path in unsafe areas. This system consists of motorized grills put on the edge of the platform, acting as a physical barrier. These grills open automatically only when a train reaches the platform. At all other times, the grills remain securely closed, restricting access to the tracks. This system works on sensors, microcontrollers, and automated motors. Ultrasonic or IR sensors are used to detect approaching and departing trains, giving this information to a central microcontroller. This signals are processed by a microcontroller and operate grills in sync with train arrivals and departures.

Keywords—Railway Safety, Automated Platform Barrier, Train Detection, Sensor Integration, ESP32

I. INTRODUCTION

At railway stations, it's all too common to see passengers rushing across the tracks to catch a train or save a few minutes often ignoring the clear signs and announcements urging them to use the footbridge or subway. Whether it's out of habit, urgency, or lack of proper infrastructure, this risky shortcut remains a major cause of accidents. To tackle this persistent issue, the Automated Platform Safety System steps in with a smarter, safer solution one that doesn't rely on constant human supervision. Instead, it uses automation to guide and protect passengers.

The system includes motorized gates or barriers along the platform edge that stay locked until a train arrives and only open when it's safe to board. Powered by AI-driven train detection, real-time IoT monitoring, and solar energy, it works around the clock to keep everyone safe. In emergencies, there's an override mechanism to ensure flexibility when needed. What makes it even more passenger-friendly are the multi-language voice announcements, LED safety indicators, and a system that looks after itself through predictive maintenance. It's designed not just for safety, but also for convenience quietly reminding people to make better choices, without getting in their way. In short, it's a thoughtful step toward making our stations not only smarter but also much safer for everyone.

II. LITERATURE SURVEY

Several railway safety systems have been proposed to reduce accidents and improve passenger safety. A sensor-based railway platform control system was developed using microcontrollers, IR sensors, ZigBee, wireless sensor networks, and vibration sensors for railway accident prevention. However, issues such as sensor damage, communication failure, and environmental conditions were reported as limitations [1]. An automated railway crossing system was proposed using IoT and sensors to reduce accidents at railway crossings [2]. Another system combined automatic railway gate control with track-crack detection using IR sensors, motors, GPS, and IoT-based monitoring [3]. A novel IoT-based railway platform safety system was developed using IR sensors and an automated gated mechanism. The gates open when a train enters the platform and remain closed at other times to restrict passengers from entering the railway track [4]. Based on these studies, the proposed Automated Platform Safety System uses an ultrasonic sensor, ESP32 microcontroller, DC motor, buzzer, and LCD display to automatically control a platform barrier according to train detection.

Table 1. Comparison of existing System with Proposed System

Parameters	Existing Model	Methodology
Components	Microcontroller, IR sensors, Motor	ESP32, Ultrasonic sensor, DC motor, Buzzer, LCD
Sensors	IR sensor, vibration sensor, wireless sensor network	Ultrasonic sensor
Control	Sensor-based automatic control Complex system with additional	ESP32-based automatic control Simple, compact, easy to install and
Compatibility	communication modules	operate

III. METHODOLOGY

The proposed system uses an automated platform safety mechanism to prevent passengers from unauthorized access to railway tracks. The system consists of a train detection subsystem and an automated barrier control subsystem. The train detection subsystem uses an ultrasonic sensor to continuously detect the presence of an approaching train by measuring the distance between the sensor and the detected object. The detected information is transmitted to the ESP32 microcontroller, which acts as the central processing unit of the system. The ESP32 processes the sensor input according to the predefined control logic and generates appropriate control signals for the motorized platform barrier.

When a train is detected at the platform, the microcontroller operates the DC motor to control the safety grill, allowing safe passenger movement during the required period. When the train is not present, the grill remains closed to restrict access to the railway track. A buzzer is incorporated to provide an audible warning to passengers, while an LCD display indicates the current system status such as train detection and barrier operation. The integrated operation of sensors, microcontroller, motor, buzzer, and LCD provides an automatic platform safety mechanism with reduced dependence on manual monitoring.

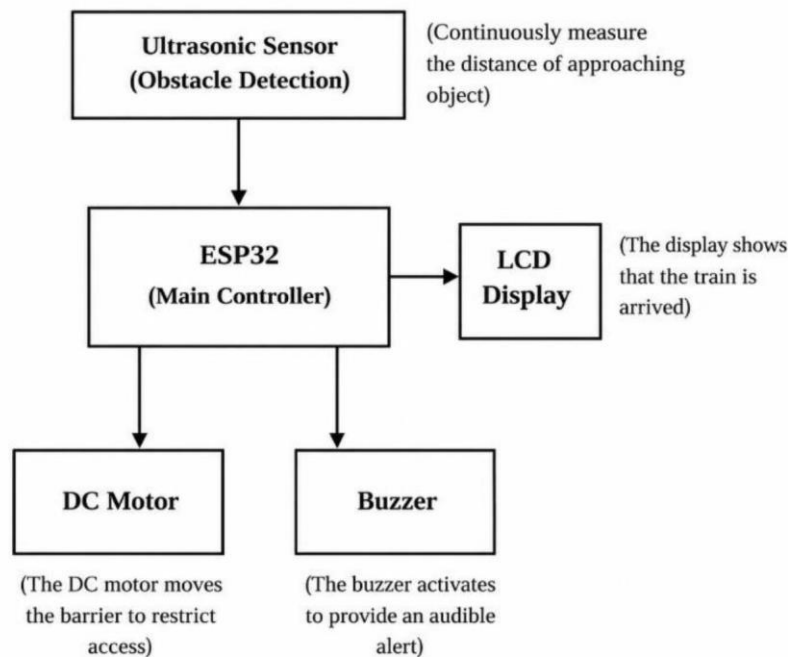


Figure 1. Block Diagram of Train detection and barrier control

IV. RESULTS

The ultrasonic sensor continuously measures the distance of the approaching train. When the train enters the predefined detection range, the sensor sends a signal to the ESP32.

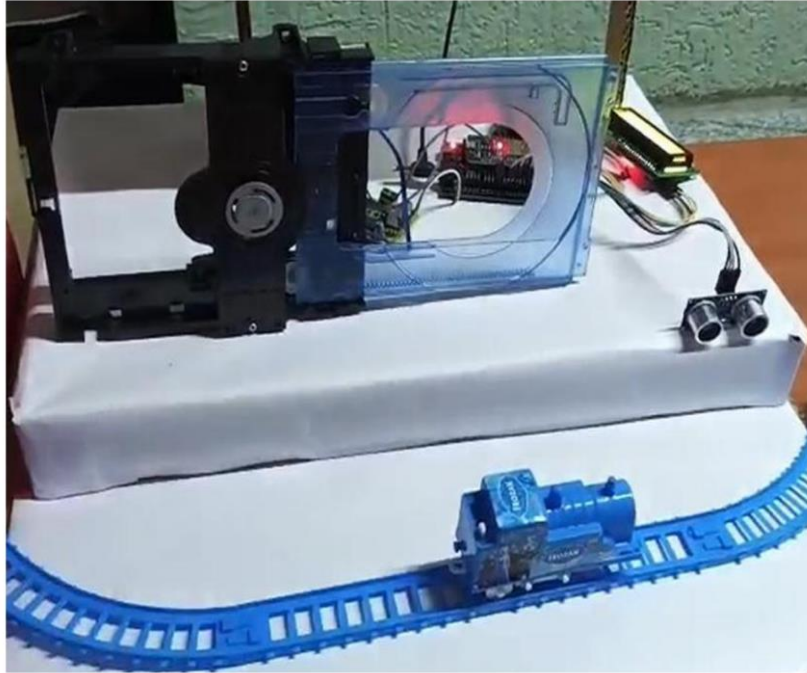


Figure 2. Automated platform safety system prototype Train detection by ultrasonic sensor

The ESP32 processes the sensor signal and displays “TRAIN ARRIVED” on the LCD. The LCD provides a clear visual indication of train arrival to the passengers.

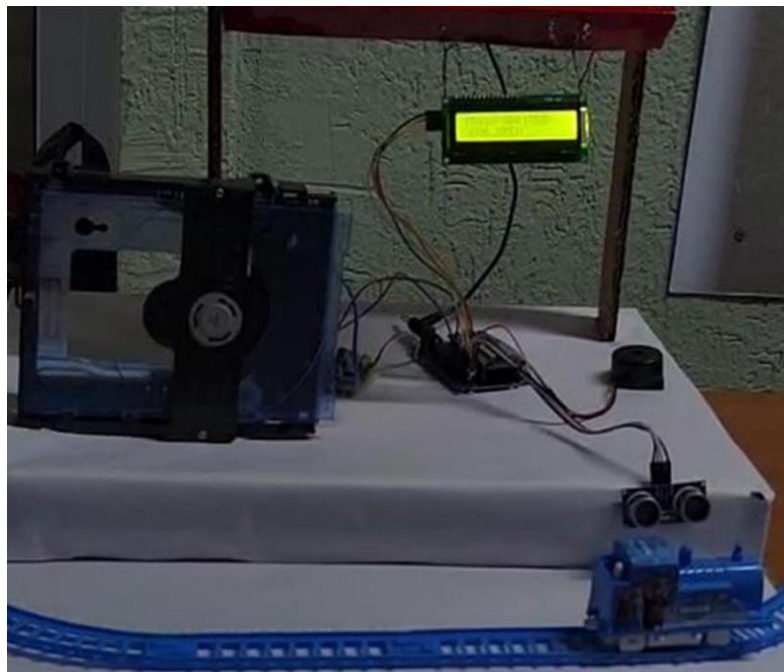


Figure 3. Train detection by using LCD Display

V. CONCLUSION

The Automated Platform Safety System is designed with a clear purpose: to protect lives and prevent accidents at railway stations by effectively managing access to the tracks. With the use of motorized gates, this system offers a practical yet innovative solution, ensuring they remain closed at all times except when a train is safely arriving or departing. By doing so, it eliminates the possibility of unauthorized or unsafe crossings, creating a secure environment

for all passengers. This safety measure not only reduces the risk of tragic accidents but also encourages passengers to adopt safer behaviors, like using foot over bridges or subways. It serves as a proactive approach to addressing safety concerns at stations, moving beyond reminders and warnings to provide a physical barrier that actively enforces protection. The heart of this system lies in its advanced technology. Ultrasonic sensors are employed to detect train movement in real-time, ensuring the gates operate accurately and seamlessly. By responding dynamically to station activity, the system eliminates the need for manual intervention, making it both efficient and hassle-free to maintain. Its automated functionality ensures reliability, day in and day out, without adding a layer of operational complexity.

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