



SAFETY GRILLS TO AVOID RAILWAY PLATFORM ACCIDENTS

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Abstract— The primary objective of this research is to proactively prevent train accidents, mitigating the potential for costly injuries and fatalities. Particularly relevant for railway departments, this project addresses the pressing issue of train accidents, which are more prevalent in countries like India. The system relies on Ultrasonic Sensors to continually monitor the distance of approaching trains. When a train nears the platform, a camera captures its image, triggering the activation of a green led as a signal to passengers. Simultaneously, the grills open through a servo motor, ensuring safe boarding. Conversely, when the train departs and moves away from the platform, the ultrasonic sensor detects this change, activating a buzzer to signal passengers. Additionally, the grills are automatically closed using the servo motor, enhancing safety measures. This integrated approach not only improves train safety but also enhances the overall efficiency of railway operations, contributing to a safer and more secure transportation environment.

Keywords: Raspberry pi, Ultrasonic sensors, buzzer, LED's, Camera, Servo motor.

INTRODUCTION

The rail transport mode is formed simpler and efficient by the very fact that it connects the foremost populated areas at increasingly high speeds, providing social bond at local level and establish an important think about land use planning at the national, European and international levels. The rail sector thus needs to ensure its security against accidents and suicides occurring on its property so as to supply continued service and maximum reliability. An important means to realize this goal is that the analysis of the initiatives already taken in different countries to address these events. Responses can't be easily transposed

from one country to a different as they take into account specific cultural and sociological phenomena; Furthermore, they depend upon the socio-political organization of a rustic and therefore the resultant allocation of responsibilities and competences. This paper describes general preventative measures targeted to scale back railway suicides and trespassing accidents, and it describes them in terms of their capability to effectively minimize accidents, their cost-effectiveness and their incorporation within the railway transport system as an entire.

A particular case is that the grade crossing, which is the interface between two very different transport modes. Moreover, accidents at level crossings are mostly linked to human errors committed by road users. It is thus arduous to define the responsibilities' borders in this case, and therefore the approaches went to ensure safety are somewhat different from those used at other parts of the railway infrastructure. The paper is organized as follows, some relevant statistics on railway safety are presented and analysed so as to spot the most trends, the measures went to protect railway infrastructure and avoid accidents are presented and discussed details the particular case of level crossings and therefore the specific measures dedicated to them, we conclude the study while exposing the most prospects of our add this field.

I. EXSTING SYSTEM

There isn't a widely standardized safety grill system exclusively designed to prevent accidents on railway platforms. Safety measures on railway platforms are often a combination of physical infrastructure, technological solutions, and public awareness campaigns. Here are some common methods and features that contribute to platform safety: Platform Edges and Markings: Clear markings are often present

on the platform to indicate the safe standing distance from the edge. Passengers are advised to stand behind these markings to maintain a safe distance. **Physical Barriers:** Some railway platforms have physical barriers, such as railings or low walls, to prevent accidental falls onto the tracks. These barriers act as a deterrent and provide a clear boundary. **Surveillance Cameras:** CCTV cameras are commonly installed on railway platforms to monitor passenger behavior. These cameras can act as a deterrent to unsafe activities and provide valuable footage for investigating incidents. **Public Announcements:** Regular announcements over public address systems remind passengers to exercise caution, stand clear of the platform edge, and be aware of oncoming trains. Announcements may also provide safety instructions during emergencies.

➤ PROBLEMS WITH EXISTING SYSTEM:

Railway platforms are prone to accidents caused by passengers falling onto the tracks, leading to severe injuries or fatalities. These accidents often occur due to overcrowding, lack of barriers, or insufficient safety measures in place. Despite existing safety protocols, incidents continue to pose significant risks to passenger safety, necessitating a more robust solution to prevent such accidents.

PROPOSED SYSTEM

In the proposed system, we aim to enhance railway safety by integrating various sensors and actuators to provide real-time alerts and visual indicators to passengers waiting on the platform. A crucial component of this system is the use of a web camera to detect the arrival of a train. When a train is detected by the camera, a signal is sent through a buzzer to alert passengers of the approaching train.

Simultaneously, an ultrasonic sensor is employed to measure the distance between the train and the platform. As the train approaches the platform, the ultrasonic sensor detects decreasing distance, triggering the activation of a red LED to visually signal passengers about the train's proximity. This serves as a warning for passengers to prepare for boarding or to remain vigilant.

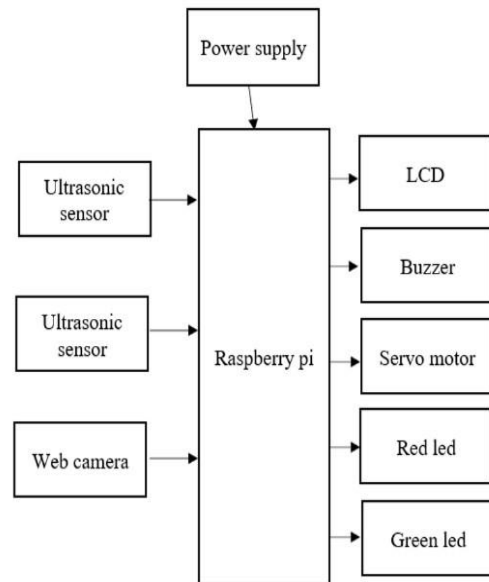


Figure: Block diagram proposed system

To further enhance safety measures, a servo motor is utilized to control the opening of safety grills or barriers on the platform. When the train is close to the platform, the servo motor opens the grills to allow passengers to safely board the train. Additionally, this status is displayed on an LCD screen, providing passengers with visual confirmation of the platform's readiness for boarding.

Conversely, when the train departs and moves away from the platform, the ultrasonic sensor detects an increase in distance, triggering the activation of a green LED. The green LED serves as a signal to passengers that the train has departed, and it is safe to move away from the edge of the platform.

Furthermore, the servo motor is utilized again to close the safety grills once the train has departed, ensuring the platform is secure and safe for passengers. Similar to the red LED status, the closing of the grills is displayed on the LCD screen, providing passengers with visual confirmation.

This integrated system not only enhances safety for passengers by providing real-time alerts and visual indicators but also ensures efficient boarding and departure processes. By employing a combination of sensors, actuators, and visual indicators, the proposed system aims to mitigate potential risks and improve overall railway safety protocols. As technology continues to advance, further enhancements and refinements can be made to optimize the system's performance and effectiveness in ensuring passenger safety at railway platforms.

➤ **ADVANTAGES**

- 1.Prevention of Platform Gap Incidents:
- 2.Enhanced Passenger Safety
- 3.Visual and Tactile Warning

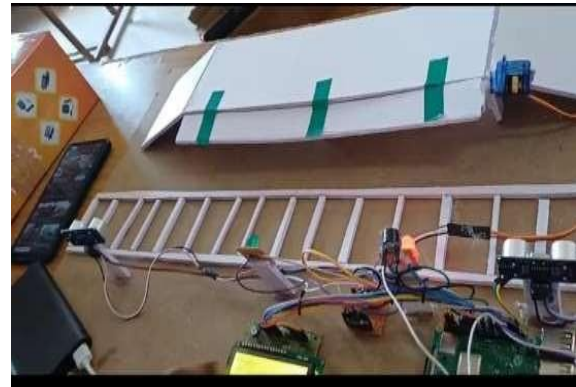


Figure : Grills Open

The green led will be glow and then the grills are open by using servo motor. when the grills are open it provides safety to the passengers.

IV.RESULTS AND DISCUSSIONS



Figure: closed condition

In the starting position the grills are closed at the platform and red led will glow on .It leads to no passenger's to cross the railway track.

Here the device's ultrasonic sensors and camera is used to detect the train.



Figure: Train left

When the train away from the platform which is detected by camera and ultrasonic sensors that shows in the LCD display as "train left".



Figure: Train detected

When train enters to platform it will detected by ultrasonic sensors and camera, which is shown in LCD display as "Train Detected".



Figure: Grills Closed

After leaving the train from the station the grills were closed which leads to stop passengers to not cross the platform which announce through buzzer.

V. CONCLUSION AND FUTURESCOPE

In conclusion, this research project addresses a critical concern in railway safety, with the overarching goal of preventing train accidents and thereby reducing the associated human and financial toll. The focus is on implementing a comprehensive system that utilizes various technologies, including Ultrasonic transceivers, Buzzer, LEDs, Servo motors, and an LCD display, to enhance safety measures at railway platforms.

The integration of Ultrasonic sensors and Load cells allows for real-time monitoring of a train's position and weight, enabling the system to respond dynamically to ensure passenger safety. As the train approaches, the system activates a series of signals, including a buzzing sound, a red LED glow, and the opening of safety grills through a Servo motor. This not only alerts passengers but also provides a visible indication of the potential danger.

Conversely, when the train departs and moves away from the platform, the system signals this change by activating a green LED, closing the safety grills through the Servomotor, and updating the information on the LCD display. This synchronized approach aims to minimize the risk of accidents and creates a safer environment for passengers during boarding and disembarking.

The relevance of this project is underscored by the prevalence of train accidents in India, despite having the third-largest railway system globally. The proposed system not only addresses the immediate safety concerns but aligns with the Indian government's suggestion of raising platform heights to mitigate accidents caused by the platform gap.

Railway departments can derive substantial benefits from the implementation of this project. The cost-effective and practical nature of railways, especially in India, makes investing in safety technologies a worthwhile endeavor. By adopting this comprehensive safety system, railway departments can significantly reduce the frequency of accidents, injuries, and fatalities, contributing to an overall improvement in the safety standards of the Indian railway system.

FUTURE SCOPE

Integration with IoT Technologies: Incorporating Internet of Things (IoT) technologies can enable real-time monitoring of platform occupancy, train schedules, and passenger flow, allowing for dynamic adjustment of safety grill deployment based on demand and traffic conditions.

Enhanced Sensor Technology: Advancements in sensor technology, such as proximity sensors and cameras, can improve the accuracy and responsiveness of the system, enabling it to detect potential hazards and deploy safety grills more efficiently.

Integration with Train Control Systems: Collaborating with train control systems can facilitate seamless communication between trains and platform safety systems, allowing for coordinated actions such as synchronized opening and closing of doors and safety grills.

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