International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Intelligent Railway Platform Alignment System Using Sensors

Ms. M. JHANSI

Assistant professor, Dept. of ECE

Sri Venkateswara Institute of Technology

G. NAVEEN KUMAR[1], M. PAVITHRA[2], S. SRAVANI[3], T. L. DINESH[4], M. POORNIMA[5] M. SAI PRANEETH[6]

[1,2,3,4,5,6]STUDENTS

Department of Electronics and Communication Engineering

Sri Venkateswara Institute of Technology, Anantapur-515722, Andhra Pradesh, India.

Abstract -Indian Railways contributes a major share in our country's economy. It helps to mobilize goods and passengers throughout the nation, contributing a remarkable part to India's development. Public safety is of utmost importance in the transportation sector, particularly in stations. One of the main disadvantages of Indian railway stations during peak hours, it becomes more rushed and difficult for senior citizens and Persons with disabilities (PWD) to use the staircase and elevators. So, they are crossing the platforms through tracks and they walk much distance from one end to another end, and during the time of crossing, accidents may occur. After analyzing the problem statement, an Intelligent Railway Platform (SRP) is proposed in response to the difficulties faced by senior citizens and PWD. This creative design uses a microcontroller-driven retractable bridge connecting the two main platforms. The advanced sensors detect the approaching and departing trains, and it communicates through RF technology to Arduino and servo motors, resulting in the opening and closing of the mobile bridge. The SRP aims to improve the safety of passengers and also make them more comfortable, which is especially advantageous for persons with mobility issues.

Keywords- Railway Systems, H-Bridge, IR sensors, DC Motor, Crystal oscillator, LCD

1. INTRODUCTION

The recent survey from social analytics said that the most disadvantage in Indian railway is climbing up the overhead steps for the physically challenged people. Our proposed system mainly deals with the rectification of this disadvantage. We are introducing the new concept of Artificial Railway Platform. For a successful approach we are using three IR sensors and for execution we are using Dc motor and for controlling we are using an Atmega16 microcontroller.

2. LITERATURE SURVEY

By implementing the Railway Track Pedestrian Crossing between the Platforms, we aim to alleviate the challenges faced by senior residents or handicapped individuals when using bridges. Presently, bridges serve the primary means of platform crossing. This project focuses on automating the opening and closing of mobile platforms within the trains. Typically, these mobile platforms connect two platforms, enabling passengers to traverse from one platform to the another. Sensors positioned on both sides of the track to facilitate this process [1].

This system has been introduced to automatically close or open the mobile platforms between the two tracks. Currently, these platforms serve as a connection between two platforms, enabling passengers to move from one platform to the another. The primary objective of this project is to prevent accidents commonly caused by crossing railway tracks to reach another platform, while also making platform access easier for physically disabled people. [2].

This current scenario highlights railways as the cost-effective mode of transportation. Gradually railway accidents are increasing by carelessness of crossing railway tracks. This paper proposes the novel smart railway track system primarily designed to aid physically disabled and elderly individuals. This system operates automatically within railway platforms, where two

platforms are typically linked by mobile platforms for passenger movement. [3].

3. PROPOSED METHODOLOGY

This project is used for automatically closing or opening the mobile platforms in between track trains. Generally, the mobile platform connects the two platforms through which the passenger can walk on the platform to reach the next platform. Sensors are placed on the two sides of the track. If the train reaches one sensor the mobile platform will detect and automatically close and allow the train to go through the tracks and when the train leaves the second sensor the mobile platform will detect and automatically open the bridging platforms. The microcontroller will sense the presence of the train by using infrared sensors. So, on sensing the train on one path, the microcontroller will give pulses to the DC motor to close the mobile platform automatically. Microcontroller, measuring the distance for two railroads. In this project we use ultrasonic sensors to detect the trains or objects in the front and back of the train. It is used to measure the distance between the two objects. If any cracks occur in the track it means alerting sent to the nearest station or control room and ultrasonic sensor measures the distance between the two objects if there is any problem it is not opening.

A small variance found message which contains coordinates of that particular place will be sent to the nearest station or control room with the help of IOT. This project is to be made in order to change the system of crack detection using IR sensors in railways which can be resulted out as not only cost-effective,good accuracy and time saving facility.

3.1 Block Diagram

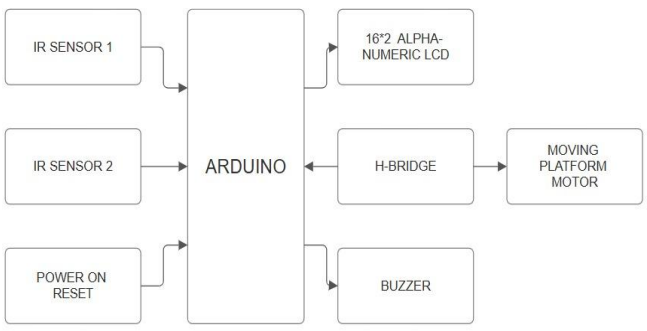


Figure 1: Block Diagram

POWER SUPPLY

The regulated power supply is connected to the input circuit. The alternate current input i.e., 230V from the mains supply is stepped down by the transformer to 12V and it is fed to a rectifier. The output obtained from the rectifier is a pulsating direct current voltage. So, in order to get a pure direct current voltage, the output voltage from the rectifier is fed to a filter to remove any alternate current components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant direct current voltage.

IR SENSORS

The infrared sensor is one kind of electronic component, used to detect specific characteristics in its surroundings through emitting or detecting IR radiation. These sensors can be used to measure the heat of a target and its motion.

i.IR SENSOR 1

It is placed at one end of the Station.

ii.IR SENSOR 2

It is placed at another end of the Station.

ALPHANUMERIC LCD

An alphanumeric LCD display supports the I2C. It is used to read or write data. It has an easy interface which can be used with microcontrollers such as Arduino. It provides a cost-efficient solution for adding a 16*2 White on RGB Liquid Crystal Display into the project.

H-BRIDGE

An H-bridge is an electronic component that allows a voltage to be applied across a load in either direction. It is used to control the direction of rotation of a DC motor.

DC MOTOR

A DC motor is an electrical machine that converts direct current electrical energy into mechanical energy. It works on the principle of electromagnetic induction, where an electric current generates a magnetic field, producing a torque that rotates the motor's shaft.

ARDUINO

It is an open-source electronics platform that enables users to create interactive electronic projects. Arduino consists of a microcontroller board, a programming language, and a development environment.

3.2 System Architecture & Working Principle:

To run our system we need 5V power supply, so we will be taking 230v Ac and we use a step down transformer to reduce the voltage and a bridge rectifier to convert AC power to DC power and a 7805 voltage regulator to obtain 5V as output. In this project we will be placing an IR sensor at a certain distance from the entrance of the platform and similarly another one is placed at the exit of the platform. This sensor identifies the arrival and departure of the train and updates the information to the microcontroller. Initially the speaker board has to be set to recording mode and by using the mic the information about the platform that has to be announced through the speaker will be recorded. Here we will be having two cases.

Case-I :(Arrival of train)

Before the arrival of the train a temporary bridge is connected between two platforms. When the train passes the IR sensor at Entrance, IR led produces the rays, this rays gets reflected with the surface of the obstacle (train) and captured by the photodiode which indicates the presence of obstacle. We use a comparator to compare both the responses and binary results are passed to the microcontroller. As the information is obtained from the sensor which is placed at the entrance, the microcontroller sends the information to the H-bridge. As the information is obtained from the sensor which is placed at the entrance. The bridge should be closed. So that this H-bridge passes the information to the dc motor to rotate in anticlockwise direction. Then the dc motor rotates and the temporary platform gets closed. Then the train reaches the platform.

Case-II: (Departure of train)

Now the train leaves from the platform. The IR led produces the rays, these rays get reflected to the surface of the obstacle (train) and captured by the photodiode

which indicates the presence of the obstacles. We use a comparator to compare both the responses and binary results are passed through the microcontroller. As the information is obtained from the sensor which is placed at the exit, then the microcontroller passes the information to the H-bridge. As the information is obtained by the sensor which is placed at exit. The bridge should be open. Thus the Dc motor rotates in a clockwise direction. So that the platform will be open and now passengers can go through it and reach the next platform. In this we are using a buzzer to alert the passengers regarding the announcement. We will be announcing the status of the platform using the speaker. (i.e., platform open or platform close).

WORKING PRINCIPLE :

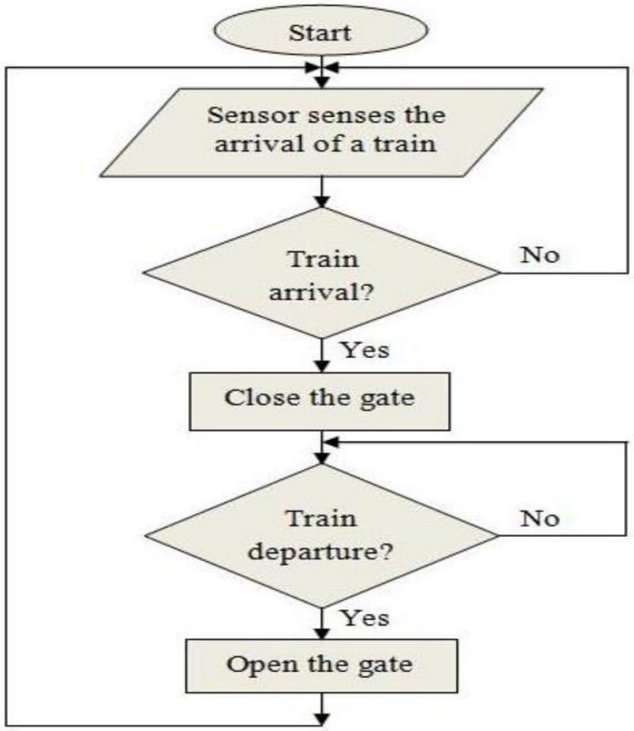


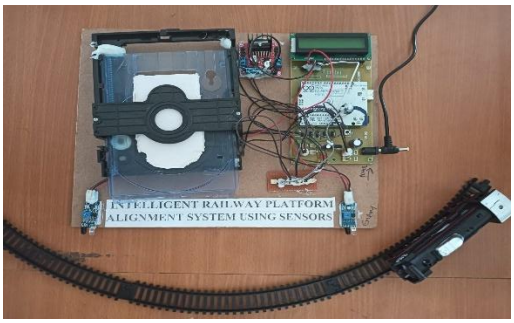
Figure 2: Flow Chart of Working of proposed system

The algorithm for opening and closing of the platform is as follows:

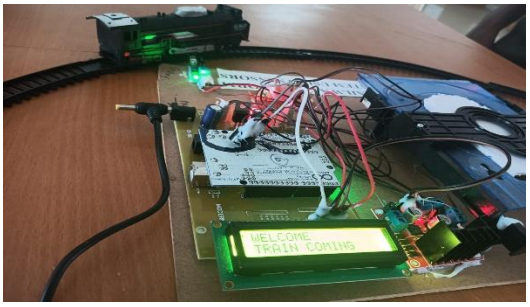
Step1: Start.
Step2: Turn ON all the IR sensors.
Step3: Initially the train is on the platform. After certain the time train leaves the platform.
Step4: IR sensors present on the exit senses, and it sends to the signal to the microcontroller.
St1ep5: Then the mobile platform opens. And update to the information of the Blynk application.
Step6: When the train approaches to the platform it passes through the IR sensors at the entrance.
Step7: The IR sensors are present on the extreme ends senses it sends the signal to the microcontroller.
Step8: When the mobile platform closes and update to the information of the Blynk application.

4. RESULTS

Experimental setup



Train Arriving- Platform is closed.



Train departure from station-Platform will open

Table : Detailed analysis of SRP with existing works

S. No	Framework	Drawbacks	Advantages of SRP
1.	Auto Railway Platform control using sensors.	Reduced accuracy because it detects all objects crossing the sensor.	In SRP, vibration vibration sensors and hall effect sensors are used to detect the train and its direction accurately.
2.	Sensor based smart railway Accident Detection and Prevention system for smart cities using real time mobile comm-unication.	The maintenance and installation of LTE modules is very high.	RF technology i.e Transmitter and receiver are used.
3.	Train detection to improve closing time of level crossing.	works only when there is no interference in the system.	The processing of sensor values and comparatively less and faster.

5. CONCLUSION

In this paper we use the brilliant office for the physically challenged people in railway intersections to cross the platform without utilizing flyovers and elevators. By using this project, we can avoid collisions. Indian railways can use this project to enhance the service to the people. This framework changes the Indian Railway Systems. This framework gives completely programmed control. We have tested this kit, and it is working properly.

6. FUTURE SCOPE

Implementing machine learning algorithms can optimize the scheduling of movable bridges based on historical data, passenger traffic patterns, train schedules and maintenance techniques are used to ensure continuous operation of SRP. The Application Programming Interface (API)- Integration can augment the functionality of the SRP by integrating it with a train tracking application using the Railway API. This integration may empower the SRP to precisely identify the exact platform. To enhance user experience and provide real-time updates on the operation of the SRP,

display boards can play a crucial role in maintaining efficient communication and ensuring a smooth, user-friendly railway experience.

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