



Automatic Railway Gate using Arduino

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ABSTRACT

Create an ARDUINO-based automated railway gate system to improve rail road crossing efficiency and safety. To stop illegal crossings, the system will use sensors to identify oncoming trains and automatically close the gates. Real-time control and monitoring are ensured by integration with ARDUINO, which adds to the robust and intelligent railway gate management system.

Keywords: programming, servomotor, Arduino and IR sensor

1. Introduction

This report explores the implementation of a railway gate system using Arduino, detailing the hardware components, software programming, and operational aspects.

We delve into the significance of such systems in improving railway safety, reducing human errors, and enhancing traffic management. Additionally, we examine the potential for data collection and analysis to further optimize gate operations and contribute to the broader field of transportation management.

Throughout this report, we will present an in-depth look at the design, functionality, and benefits of Arduino-based railway gate systems. We will also discuss their potential for expansion and integration with emerging technologies to ensure safer and more efficient railway crossings.

1.1. Objectives

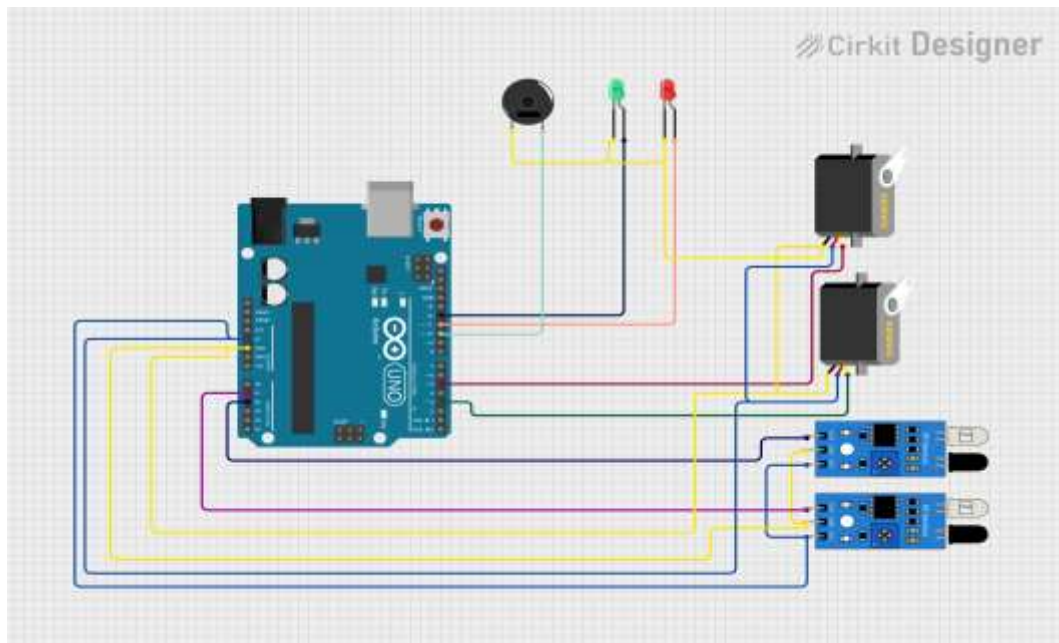
Develop an Arduino-based automatic railway gate control system with a focus on safety, real-time train detection, user-friendly interface, energy efficiency, reliability, integration with signaling systems, remote monitoring, cost-effectiveness, compliance with standards, and scalability.

1.2. Literature Survey

Al. Ameen Nizamuddin, Syam Krishn. KS, Jeffin. John, Jasmine. B, Anju. CS [1]. This paper focuses on how to make the Railway level crossing system to an automated system. About a million people have died over the past 6 years in unmanned crossings all over the world. At least a minimum number of railway crossings are unmanned due to their remote placements and less traffic. The proposed system focuses on the systematic traffic control of railway gates that are both manned and unmanned. This system makes use of an Arduino to control the whole circuit. The main objective of the proposed system is to close and open the railway gates to block the traffic when the train approaches and moving further away.

B. G. Ashok, V. Priyanka, T. Shyam Sundara Rao, M. Amit Kumar, U. Rakesh [1], It has been noticed that a lot of fatalities of lives occur every day due to manually operated rail gates. These happen mainly at places where the rail road passes through a city, locality or unmanned gates of the crossing zones. Currently, gatemen mainly operate on the assumption of a train departure schedule from the station to reach a crossing zone. Accidents are more likely to happen in such cases, causing severe damage to human lives and properties near the rail crossings. This project presents the development and implementation of an automatic rail gate control system as well as real-time monitoring of train and obstacle detection. This project also suggests the effectiveness of real-time information of train position. The main objective of the proposed humanitarian project is to ensure the efficiency, quality, time management, and most importantly public safety, using wireless-based communication network for the development of the railway industry.

1.3. Block Diagram



1.4. Working

Detecting oncoming trains, controlling the gate, and signaling its status are all done in a methodical manner while operating an automatic railway gate with an Arduino board.

Attach an IR sensor to the Arduino so that it may be used to identify if there are any trains on the railroad track. The Arduino receives distance data. from the sensor.

Include a servo motor to regulate the railway. gate's movement. In reaction to the presence of the train, the servo motor opens and closes the gate. Incorporate red and green LEDs to show the gate's status visually. The red LED illuminates to indicate that the gate has closed because of train detection. On the other hand, the green LED turns on when the gate is open.

Utilizing the Arduino IDE, write a program to read data from the IR sensor. The servo motor will close the gate and turn on the red LED if the sensor picks up a train within a predetermined range. Use the servo motor to open the gate and turn on the green. LED if no trains are spotted.

Implement a loop in the Arduino code for continuous monitoring. This guarantees that the gate position is appropriately adjusted by the system when it continuously checks for the presence of trains. Optimize the automatic railway. gate's performance by adjusting parameters including the detection distance, gate closing/opening speed, and LED signaling time.

The automatic railway gate employing ARDUINO efficiently reacts to the presence of trains by integrating these components and making sure that calibration is done correctly. This increases safety and efficiency at railway crossings.

1.5. Results

With an arduino-based automatic railway gate system, trains may be accurately detected using an ultrasonic sensor, and the servo motor quickly closes the gate. Clear visual indications regarding gate status are provided by the combination of red and green LEDs..

1.6. Conclusion

This approach improve traffic flow, reduces the need for human intervention at railroad crossings, and provides a reliable and responsive method. Sustained performance requires ongoing maintenance and monitoring, which represents a major improvement in the automation of railway. infrastructure.

1.7. Reference

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