



Automatic Railway Gate Control and Track Fault Detection System

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ABSTRACT: In Everywhere at level crossing between railroad and highway there are so many railway accidents happening due to the carelessness in manual operations or lack of workers. So, this paper describes the automatic railway gate control system using ARDUINO for saving precious human lives and preventing major disasters in railway track. Railway gate may be saved for the road users to prevent accidents in terms of train speed at level crossing. This system uses ARDUINO with the help of sensors. It can divide into two parts. Many accidents in railway line is due to the railway track fault. These accidents cause gross damage to our vital property. So, it required more effort for improvement of reliability and Safety standards.

KEYWORDS: Automatic Railway Gate, Railway track monitoring system, Level Crossing, Sensors, ARDUINO, DC motor, GPS, GSM ,IR sensors,

I.INTRODUCTION

Railroad is one of transition mode, which has an important role in moving passengers and freights. However, railroad-related accidents are more dangerous than other transportation accidents. Therefore more efforts are necessary for improving its safety. This system is to manage the control system of railway gate using the Microcontroller. The main purpose of this system is about railway gate control system and level crossing between railroad and highway for decreasing railroad-related accident and increasing safety. In addition, it also provides safety road users by reducing the accidents that usually occur due to carelessness of road users and errors made by the gatekeepers. Railways preferred the cheapest mode of transportation over all the other means. This system is designed using Arduino to avoid railway accidents happening at railway gates where the level crossings. Arduino performs the complete operation i.e., sensing, gate closing and opening. As a train approaches the railway crossing from either side, the sensors placed at a certain distance from the gate detects the approaching train and controls the operation of the gate. This system was operated after signal received from the sensors. This signal is used to trigger the Arduino for operating the gate motor, alarm system and light indicators. This system also can be used in parking gate controlling and sliding door system. The abstraction of this system is to provide the advanced control system available to everywhere. Generally, railway track fault is occurring due to natural climates or any other mechanical damage. This cause unnecessary railway accidents and damage our valuable property of railway. So, for reduction of railway accidents we think one of the idea. By using an autonomous railway track crack detection device, we can reduce railway accidents and save people life. So, the project relates to reduce railway accidents by using autonomous railway track crack detection vehicle for finding railway crack. When the track is detected its latitude and longitude values are send as a message to mobile phone. Then IR sensor is used for the surveying process . This system is designed using Arduino, IR sensors and Bluetooth to perform railway safety monitoring system.



II.SYSTEM MODEL AND ASSUMPTIONS

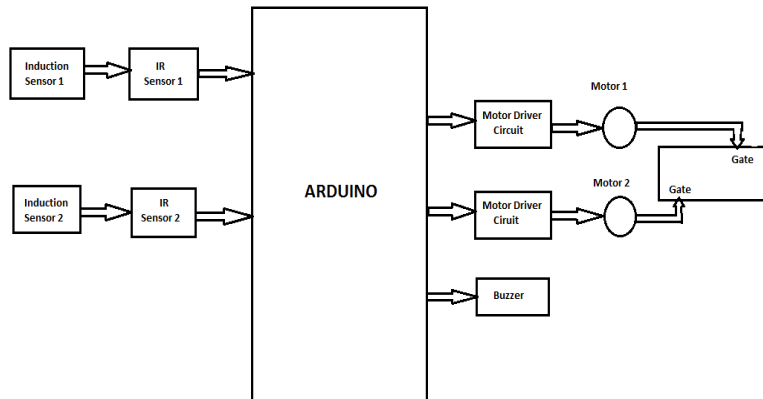


Fig: - 1 BLOCK DIAGRAM OF AUTOMATIC RAILWAY GATE CONTROL

Automatic Railway Gates Operation

In India the average maximum speed at which a train moves is 91.82km/hr and the minimum speed of a passenger/goods train is 59km/hr. Hence the ideal distance at which the sensors could be placed to detect the arrival and departure of the train is 3 Km from the level crossings and thus the gate will not be closed for more than 5 minutes. The proposed technique uses two IR sensors (IR1, IR2), one 16x2 LCD, an ULN driver, a relay, a DC motor and one Buzzer (B) for the automation process of railway gates operation. The proposed system is practically experimented as a working model prototype. The major components used in the model are an 80cm diameter railway tracks, a toy train, two IR sensors, a dc motor with which the gate operates, the traffic signals, GSM Modem to convey message and buzzer to indicate the arrival of train to the traffic. Gate operation: An IR sensor is placed at a distance either side of the level crossing. The toy train passes the first sensor and when it is detected by the sensor, a RED LED glows at the level cross indicating the traffic that the gate is about to close and closes the gate with the help of motors. When the second sensor senses the departure of the train the LED will turn off and the gates will open.

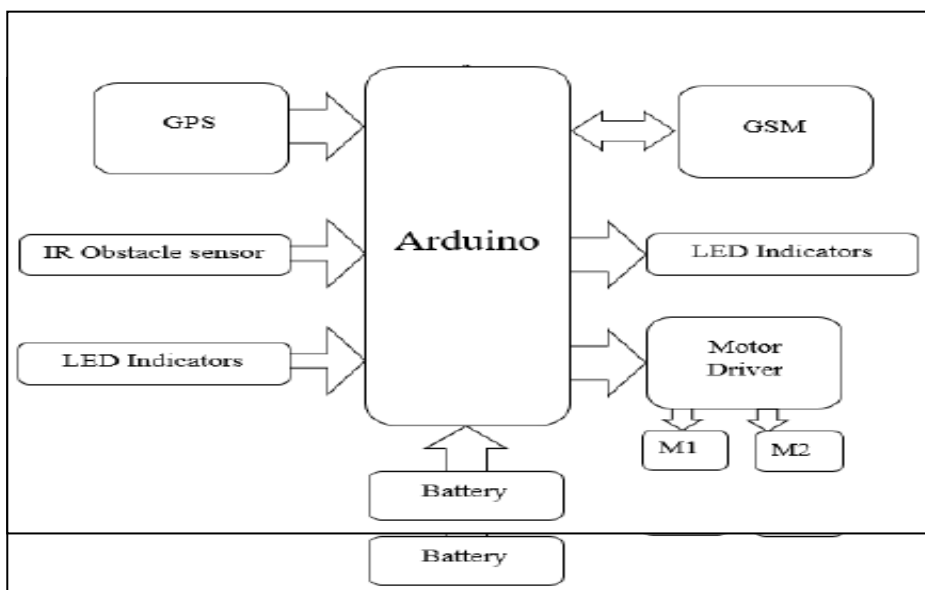


Fig: - 2 BLOCKDIAGRAM OF RAILWAY TRACK FAULT DETECTION SYSTEM

**Working:**

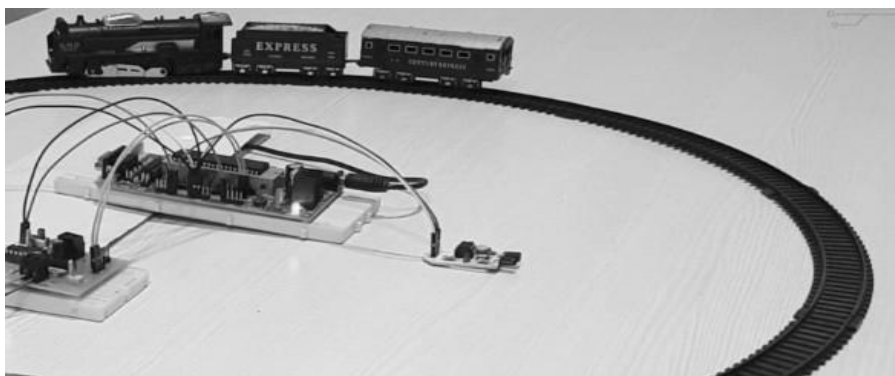
The block diagram shows basic construction of railway track fault detection system which is used for crack detection. The central component of this project is Arduino. The main objective of the project is to define any railway track fault using this system, which can be implemented in by Railway. The proposed of this project is simplify the railway line maintenance and easy to find the fault. The main design of the autonomous track detection vehicle and Arduino software related to it are very simple and can be easily adopted by the present system. The current system has railway laborers walking on the railway tracks and detecting the fault manually. This requires a lot of time and labor. In some countries railway crack detection is carried out using LDR sensors. In its placed we are using IR sensor for railway track crack detection. When the vehicle is Powered On, it moves along the model track. The IR Obstacle sensors monitors the condition of the tracks. When a crack is detected by the IR sensor the vehicle stops at once, and the GPS receiver triangulates the position of the vehicle to receive the Latitude and Longitude coordinates of the vehicle position, from satellites. The Latitude and Longitude coordinates received by GPS are converted into a text message which is done by Arduino. The GSM module sends the text message to the predefined number with the help of SIM card that is inserted into the module. Once crack is detected the message has been successfully sent to the number, the vehicle stops its movement.

III.ADVANTAGES

- Quick tracking of the cracks on the railway tracks and can rectify easily.
- Easy to automate unmanned level crosses.
- Can avoid accidents due to trains coming on the same tracks.
- Reduces chances of human error.
- Safety and quality of services.

IV.APPLICATIONS

- To automate unmanned level crosses.
- To track cracks on railway tracks.
- Helps to reduce man power.

V. RESULT AND DISCUSSION**Fig: 3: RESULT**

- We are implementing simple autonomous vehicle for detection of railway tracks crack. But here we can see the sensing speed of sensors is less accurate. So, some time it will be failing to detect the crack. Overall speed of our autonomous vehicle is also less. In rainy season and any different atmosphere is not working properly and fail to detect the crack. The design is expected to be robust and cost effective and will also function efficiently. This



method will be helpful in regular track checking as it is more convenient than the handheld checking system. The main purpose of this system is about railway gate control system and level crossing between railroad and highway for decreasing railroad-related accident and increasing safety.

VI.CONCLUSION

The proposed system is highly reliable, effective and economical at dense traffic area, suburban area and the route where frequency of trains is more. Using automatic railway crossing system, we improve the rail road transportation facility by reducing the chances of occurrence of accidents at unmanned level crossings and providing immense safety. Also this technique has fast operation than older system, it saves a lot of time as it is automated whereas manual systems take time for the line man to inform the station master to close and open the gate which will consume a considerable amount of time. Crack Detected with Longitude & Latitude Position the Indian railways are the largest rail passenger transport in today's world and it is the back bone of the country transport infrastructure. The main problem about a railway analysis is detection of cracks in the structure. If these deficiencies are not controlled at early stages they might lead to a number of derailments resulting in a heavy loss of life and property. The proposed Railway track fault detection system automatically detects the faulty rail track without any human intervention. . By this proposed model find the exact fault location in rail track and which will takes the remedy action immediately so that time many people lives can be saved. The method can be implemented in large scale in the long run to facilitate better safety standards for rail tracks and provide effective testing infrastructure for achieving better results in the future.

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