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Title: SMART RAILWAY CROSSING TO PREVENT RAILWAY ACCIDENTS

Volume 08, Issue 03, Pages: 142–147.

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SMART RAILWAY CROSSING TO PREVENT RAILWAY ACCIDENTS

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ABSTRACT:
The objective of this project is to automate railway gates without human beings and to prevent railway accidents. At present level railway gates are operated manually by a gate keeper. The gate keeper receives the information about the arrival of train from a near station. This human intervention can be avoided by automating the process. In sometimes the train is late due to some reason the gates remain closed for long duration and causing dense traffic near the gates. This project is designed with RF transmitter and receiver, RFID Reader, Arduino, Raspberry pie, camera, buzzer, LCD display, IR Module, Servo Motors and play back module. In our proposed model the RF transmitter and RFID Reader are placed on train. When the train arrives the RFID Reader reads the tag, then the RF Transmitter transmits the information about the arrival of train through antenna and the RF Receiver placed at the railway crossing receives the information about the arrival of train and gives information to the Arduino. Arduino will control the servo motors to open and close the railway gates. The LCD display also placed at the crossing to alert the passengers by displaying distance of train from railway crossing. The voice module also placed to alert the passengers. If the passengers trying to cross the gate even after the voice indication about the arrival of train then they will automatically get the fine with the help of camera and Raspberry pie. The touch plates on the track also gives information about the presence of human beings on the track.
Keywords: automation, obstacle detection, receiver and transmitter

1.INTRODUCTION:

At present transportation plays a major role in every human life. There are many ways of transportations like Roadways, Airways and Waterways. The Railway system is the most commonly used transportation in India and one of the best transportations. But there are more accidents due to human negligence of closing railway gates.The major challenge faced by the Indian Railways is the increasing accident rate at the level crosses. When we go through the daily newspapers we come across many railway accidents occurring at manned railway crossings.This is for the most part because of the imprudence in manual tasks or absence of specialists.

In the present scenario there are two types of railway crossings:

1.Manned

2.Unmanned

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Many accidents occur due to the manual operation of the entire system.The existing system involves the manual gate operation by the gate keepers based on the signals received from the control room. The human mistakes, for example, delay in illuminating the watchman about the landing of the train, delay in the entryway activity by the guardian, obstruction stuck in the level cross and so forth prompts the expanding rate of mishaps at the level cross. Therefore the railroad entryway computerization framework plans to manage two things. It reduces the total time taken for the gate operation at the level cross and also ensures the safety of the passengers at the level cross during when the train passes. The reduction in the direct human intervention during the gate operation in turn helps to reduce the collision and accidents at the level cross. Since the entryway tasks are computerized dependent on the sensors, the ideal opportunity for which the gate is closed is less.The paper accordingly expects to build up a programmed railroad entryway control framework which is secured and verified than the existing manual frameworks.So to reduce the problem of this railway accidents we automated the opening and closing of railway gates.In addition to this the train driver doesn't know any information about the presence of human beings so that we are placing touch plates on the track to detect human beings.The main motivation of doing this project is the recent railway accident in Amritsar. To reduce such type of railway accidents we are placing touch plates to detect humans on the track and gives an indication to the driver.The passengers will try to cross the gate even after the indication of arrival of train so that we are placing camera and if anyone will trying to cross gate after indication they will automatically get fine with the detection of their vehicle plate number using camera. So that no one should cross after indication.

Fig 1:Real time example

Limitations of existing system:

- Chances of human error
- Time consuming
- A lot of human resource is required

The rest of the paper is organized as follows. Section2 describes the review of previous papers. Section3 and 4 describes hardware and software tools used in our system respectively. Section 4 describes the system architecture and flow chart. Section5 describes experimental results and section6 describes the conclusion and future scope.

2.RELATED WORK:

IR based automatic railway control [1]. Magnetic sensors placed underground are less affected by environmental changes and recognizes the direction of movement of vehicles [2]. Jeong [3] defined the railway auto control system using OGSi and JESS. In [4], a detailed introduction about the present railway technology is presented. It discusses the disadvantages of manually activated railway signals and the railway warnings at the level cross. The train detectors acts as the major component

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in the train automation system. Ultra-Wideband Radar System for Detection at Railway Crossings. Due to limitations of IR system, the radar system is proposed at the crossing. GPS & GPRS Based Detection System[5], Many systems were proposed based on sensor but they were successful up to some extend only. Video-Analysis Based Railway Road Safety System, in this system, video camera is installed at the crossing. The basic frame work is of image processing based railway crossing surveillance. It will send the pictures of the crossing to the locomotive drivers. The risk path is defined in this system. Introduction to raspberry pi and about pin configuration[8]. Pin configuration and introduction about Arduino[9].

3.HARDWARE COMPONENTS:

- Arduino
- RFID Reader and tags
- RF Transmitter
- RF Receiver
- LCD display
- Servo motors
- Raspberry pie
- Camera module
- Play back module

4.SOFTWARE TOOLS:

- Arduino IDE
- Python

5.SYSTEM ARCHITECTURE:

In India the maximum speed at which a train moves is 91.82km/hr and the minimum speed of a passenger/goods train is 59km/hr. Subsequently the perfect separation at which the sensors could be put to distinguish the arrival of the train is 5km from the level cross and the departureof the train is 1km and in this way the gate won't be closed for over 8 minutes [6].

The block diagram of proposed is as follows.

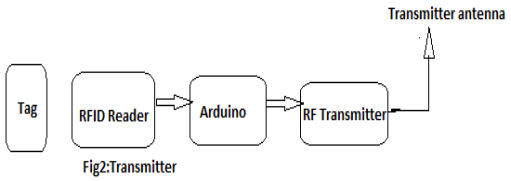

Fig2:Transmitter

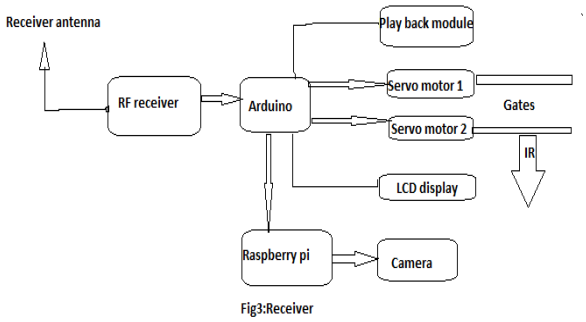

Fig3:Receiver

5.1 Transmitter:

In this proposed system the RFID reader on the train detects the tag and information about the arrival of train is transmitted using RF transmitter.

5.2 Receiver:

Then the RF receiver receives the information about the arrival of train and gives this information to the Arduino. Then Arduino controls play back module, LCD display and servo motors.

5.3 Safety measures before closing the gate:

Firstly the red LED will glow to indicate the passengers to stop cross the railway crossing. The voice indication is also given about the status of the train using play back module. The distance of train from the crossing is also displayed on the LCD display and the buzzer activates[7].Then slowly servo motors start closing the gate. If no vehicle found below the gate it will closes completely. As the people won't

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stop even for so many indications about arrival of train and they are still try to cross the gate. To prevent these scenarios we are placing IR module below the gate. If any vehicle detected when gate closing then servo motors stop and the camera module activates and take the photograph of vehicle number and that pic will be send to them and they have to pay fine. This indication is also provided at the railway crossing so that they won't cross after indication about the arrival of train. The status of the opening and closing of gates is also given to the driver as notification. The departure of train also detected by RFID reader and the servo motors opens the gate. Recently the annual Dussehra festival ended in a tragedy in Amritsar, Punjab because of railway accident as administrative negligence and public apathy towards safety took at least 60 lives and maimed many. A train moved down people watching the celebrations.They were on the tracks unmindful of the approaching train. So to prevent such railway accidents we are placing touch sensors on the track and if human being present on the track a notification is given to the driver to take necessary action.

5.4 Flow chart:

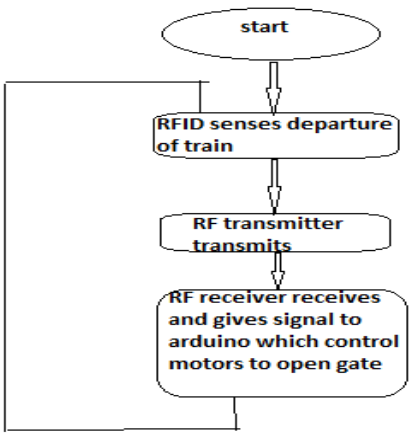

Fig:4 Flow chart to open gate

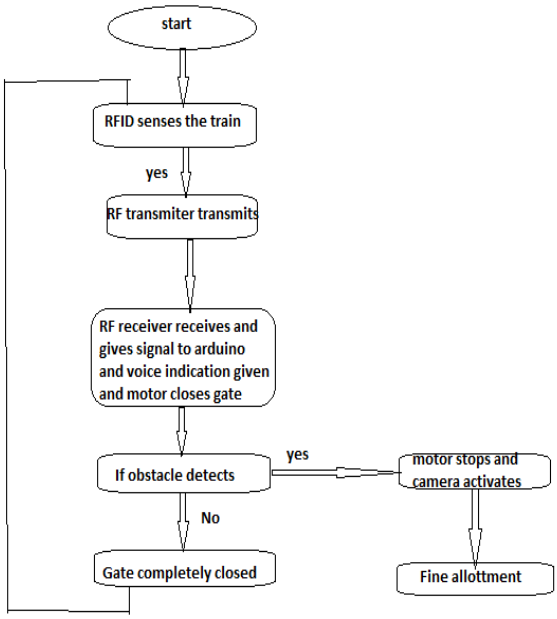

Fig:5 Flow chart for gate closing

6.RESULTS:

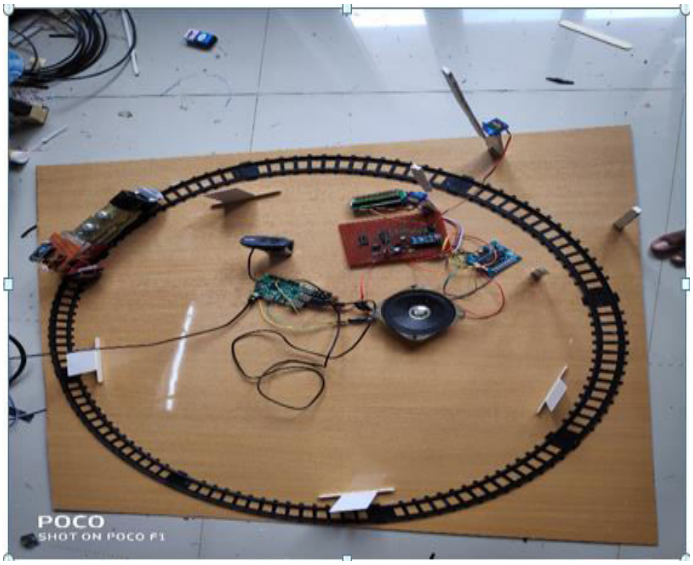

Fig6: Figure of kit

Fig7: When train is at 5km

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Fig8: When train is at 3km

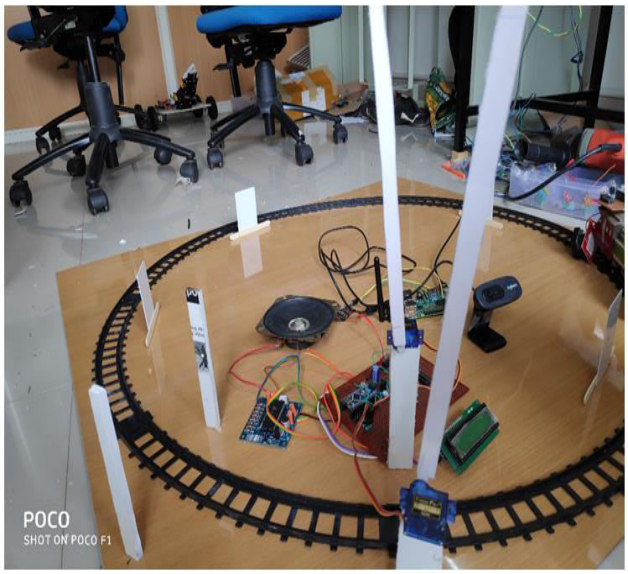

Fig9: The gate is in open condition

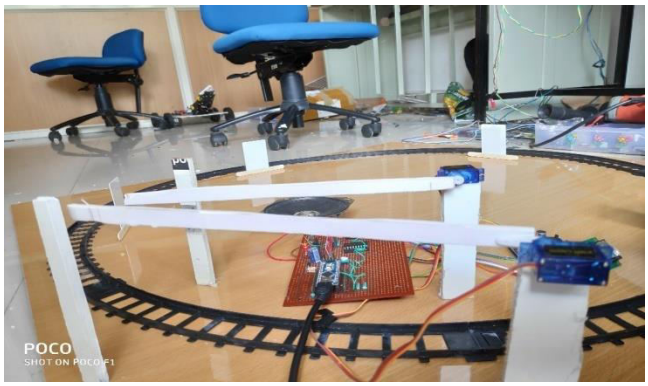

Fig10: The gate is in closed condition

7.CONCLUSION AND FUTURE SCOPE:

Automatic railway gate control system is centered on the idea of reducing human involvement for closing and opening the railway gate which allows and prevents cars and humans from crossing railway tracks. The railway gate is a cause of many deaths and accidents.Consequently, mechanizing the entryway can realize a ring of safety to controlling the gates. Human may make faults or mistakes so automation of railway gates will reduce the chances of gate failures. Automation of the closing and opening of the railway gate using this proposed model reduces the accidents to a greater extent. The obstacle detection system implemented reduces the accidents which are usually caused when the railway line passes through the forest. Most of the times greater loss has been caused when animals cross the tracks.In future we also improve this system to detect the faults in the track and gives information to the driver about the location of track fault using ground connection. Pressure sensor can be extended to the present work to reduce small errors. We also improve to provide a way to ambulances if they arrive at the time of closing the gate and it will depends on the time and possible only when there is enough time to cross the ambulance before the train comes. As a future scope of work, our system can be implemented in real time by fixing the current limitations using new technologies.

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