

# Automatic Stopping the Train and Controlling Railway Gate by Arduino

Radhika Mansabdar<sup>1</sup> Baswaraj Gadgay<sup>2</sup> Veeresh Pujari<sup>3</sup>

<sup>1</sup>M.Tech Scholar <sup>2</sup>Research Guide & Professor <sup>3</sup>Assistant Professor

<sup>1,2,3</sup>Department of Electronics & Communication Engineering

<sup>1,2,3</sup>VTU Center for PG Studies, Kalaburagi, India

**Abstract**— In everywhere at level crossing between railroad and highways there are so many railway accidents happening due to the carelessness in manual operations or lack of workers. So, this project describes the automatic railway gate control system and also prevention of accidents by stopping the train if any object is detected on the track by using arduino uno (atmega328p) 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 uno microcontroller with the help of IR sensors. It can be divided into two parts. The first part is concern on the hardware development where all electronic components have included. IR sensors are the input components while buzzer, light indicator, DC motor, L293D driver and LCD display are the output components.

**Key words:** Arduino

## I. INTRODUCTION

In this project arduino Uno (atmega328p) microcontroller forms the main unit of the system. It receives input signal from the sensors and sends information to the gate motor driver for opening and closing of the gate. Besides, the input signal will active LCD display and alarm and stops the train which is the main part of this system. The first IR sensor is fixed at certain distance from the gate as the train passes near first sensor the alarm buzzes such that to indicate that train has arrived and the second IR sensor is fixed which is placed few distance away from the first sensor at the same certain distance after the first sensor the gates are automatically closed when train reaches the second sensor and the third sensor is attached to the train motor such that if the train detects anything on the railway track (like object, person, or animal) the train will stop immediately. And the fourth sensor is place after the gate such that after clearing the track the train passes and gate is opened automatically. This system deals about one of the efficient methods to avoid train accidents and to reduce traffic and man effort. The second part is based on software programming to operate the hardware structure.

## II. RELATED WORK

### A. Ahmed Salih Mahdi et.al

Railroad related accidents are more dangerous than other transportation accidents in terms of severity and death rate etc. Therefore more efforts are necessary for improving safety. There are many railways crossing which are unmanned due to lack of manpower needed to fulfill the demands. Hence many accidents occur at such crossing since there is no one to take care of the functioning of the railway gate when a train approaches the crossing. The main objective of this paper is to manage the control system of railway gate using microcontroller. The proposed model has

been designed using 8052 microcontroller to avoid railway accidents occurring at unattended railway gates if implemented detection of train approaching the gate can be sensed by means of two sensors placed on either side of the gate. This work utilizes the two sensors placed on either side of the gate. This work utilizes two powerful magnetic sensors is fixed at upside and similarly the other magnetic sensor is fixed at down side of the train direction. Sensors are fixed on both sides of the gate. We call the sensors along the train direction as foreside sensor and the other as after side sensor. When foreside sensor gets activated the sensed signal is sent to the microcontroller and the gate is closed and stays closed until the train crosses the gate and reaches after side sensors. When the side sensor activated and the signal about the departure is sent to the microcontroller motor turns in opposite direction and gate opens and motor stops automatically.

### B. Krishnaet.al

The objective of this paper is to control the railway tracks by using anti-collision techniques. The model of railway track controller is designed by using 8952 microcontroller to avoid railway accidents. When we go through the daily newspapers we come across many railway accidents occurring at unmanned railway crossings. This is mainly due to the carelessness in manual operations or lack of workers. And also the collision of two trains due to the same track. This model is implemented using sensor technique. We placed the sensors at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. Also an indicator light has been provided to alert the motorists about the approaching train.

### C. Sandeep Kumar et.al

Mischances in the unmanned level intersections are expanding step by step. No productive measures implemented so far in these ranges. Our paper manages programmed railroad entryway operation (i.e.,) programmed railroad door control at a level intersection supplanting the entryways worked by the guards, It manages two factors, it manages the lessening of time for which the entryway is fixed shut and also.

## III. PROPOSED METHODOLOGY & DISCUSSION

Traffic is one of the major problems now a days. In the same way the crossing of railway gate is also a tedious job for normal people. They have to wait for a long time even before and after arrival and departure of the trains. In rapidly flourishing country like India, accidents in the unmanned level crossings are increasing day by day, at present, in level crossings the railway gate is operated normally by a gate keeper after receiving the information about the train's arrival. Instead of waiting such a long time at the railway gates and to avoid accidents in level crossings this project is

proposed that controls the gate automatically without involvement of the railway level crossing gate keeper and also stops the train immediately if anything is detected on the railway track. It can also be implemented in unmanned level crossings at remote areas.

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 accidents. Transportation manages the control system of railway gate using the microcontroller. The main purpose of this system is about stopping of the train immediately and 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

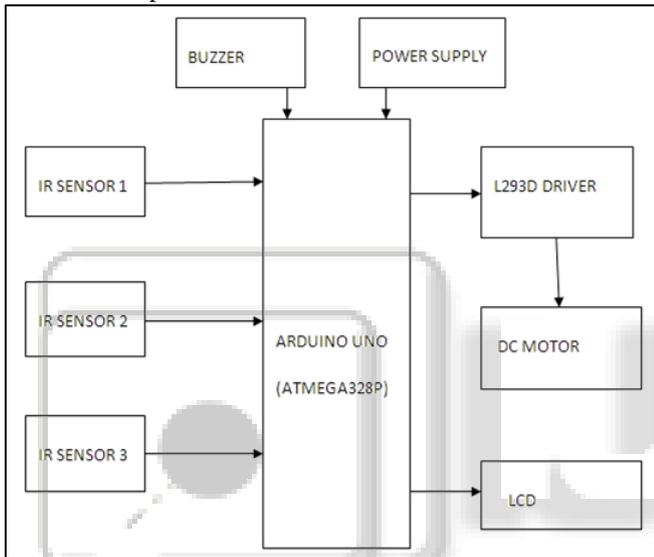


Fig. 1: Block Diagram of the System

The main components of system are:

- 1) Microcontroller: ARDUINO UNO microcontroller is used as a main control unit to control the process of the whole system.
- 2) Railway Sensors: They are placed at two sides of gate. It is used to sense the arrival and departure of the train and also to stop the train.
- 3) Motor Driver :The DC MOTOR uses the four transistors motor driver circuit that are used to rotate forward or reverse direction of DC motor for opening and closing the gate.
- 4) Sensor: This IR Proximity Sensor is a multipurpose infrared sensor which can be used for obstacle sensing, color detection, fire detection, line sensing, etc and also as an encoder sensor. The sensor provides a digital output.
- 5) LCD Display: It displays the railway gate open or close section and warning message for road users.
- 6) Figure shows overall block diagrams for railway gate control system by using ARDUINO UNO microcontroller. So, this microcontroller is used to operate the following function of the railway gate control system:
- 7) To sense the arrival and departure of the train

- 8) To open and close the railway gate automatically by using two dc motor
- 9) Buzzer and light signal for warning the road users
- 10) Display the status of the railway gate system with LCD modules

A motor driver circuit is used to drive the gate motor for opening and closing gate. This system uses buzzer and light signal for warning the road users. The arduino UNO microcontroller controls all the system. The main program of the railway gate control system is written in ARDUINO UNO microcontroller and which is created by arduino compiler

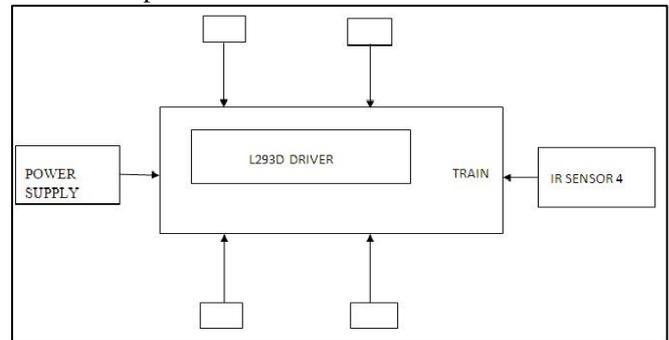


Fig. 2: Block Diagram of the Train

The above Figure shows the block diagram of the train such that the block diagram consists of arduino nano microcontroller , l293d motor driver , dc motor , and IR sensor as shown in block diagram the IR sensor is fixed to the train .motor for stopping the train .We have M1 and M2 as gearless motors and W1 and W2 as wheels of the train .and train is runs by 9v battery . The IR sensor detects if anything comes on the track (like any object, or person, or animal) if anything is detected then the train stops immediately and to prevent accidents.

Microcontroller 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 microcontroller for operating the gate motor, alarm system and light indicators.

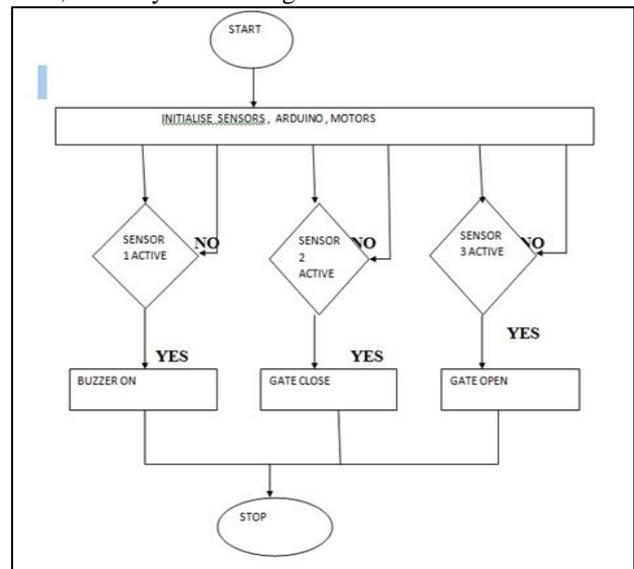


Fig. 3: Flow Diagram of Controlling Railway Gate

Fig 3 shows the flow diagram of the system for controlling the railway gates automatically .so firstly initialize the sensors, arduino and the motors. After initializing if the sensor 1 is active then the buzzer turns on indicating that train has arrived if not then check for again initialize step. If sensor 2 is active then the gates closes automatically if not then go to initialize step. If sensor 3 is active then the gates opens automatically if not then initializing is required.

When the train passes near the first sensor the sensor senses the train and alerts the alarm indicating that train has arrived. When the train passes the second sensor which is kept few distance away from the first sensor as soon as the train passes the second sensor the dc motor automatically closes the gate. When it passes the third sensor the gate automatically opens the gate.

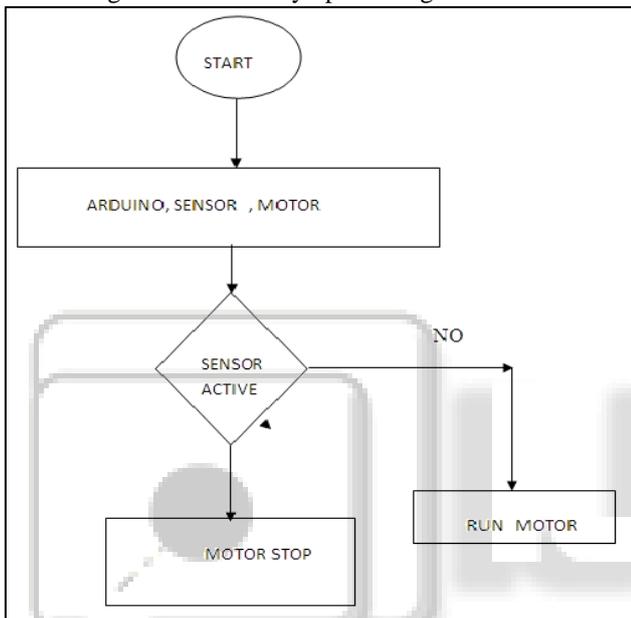


Fig. 4: Flow Chart of the Train

#### IV. EXPERIMENTAL RESULTS



Fig. 5: Image of Alerting System Displayed on LCD

Alerting the system by buzzing the alarm which is displayed on LCD as shown in the above figure.



Fig. 6: Image of Closing of Gate Displayed on LCD

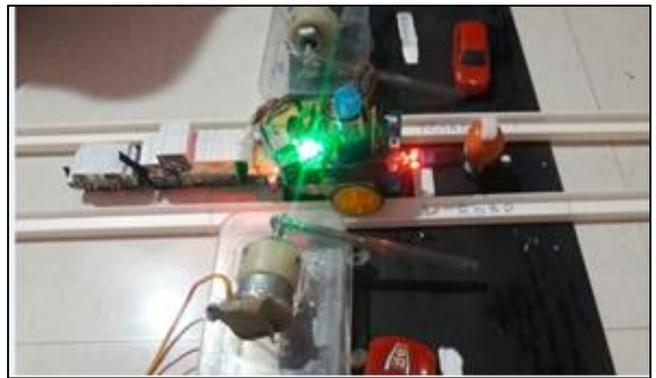


Fig. 7: Image of detection of object on the track



Fig. 8: Image of opening of the gate displayed on the LCD.

#### V. CONCLUSION

Hence the unmanned railway gates operate according to the data input from sensors to microcontroller .First an alarm is triggered and then the gate is operated and then the train is stopped. The arrival and departure of the train is done by the sensor set.

- The main focus is to reduce the time for which the gate is being kept closed.
- Second expectation is to provide safety for the road users by reducing the accidents.
- To reduce the traffic.
- And to reduce man effort.

#### REFERENCES

- [1] Vikash Kumar (2017) et.al,"Design and implementation of automatic railway gate operator", International Journal of Science Research and Development, ISSN No 2313:1324, PP No 526-534.
- [2] Karthik Krishnamurthi(2015),"Sensor based automatic control of railway gates", IJSRD, ISSN No: 2318-1662, PP No: 436-439.
- [3] Hninee Ngwe(2014),"Automatic Railway Gate Control System Using Microcontroller", Research gate scholars publications", ISBN No: 3236:1337, PP No 136-139.
- [4] Acy M. Kottalil et al(2014), "Automatic Railway Gate Control System" IIEI Journals, Special Edition 2015.
- [5] Krishna, ShashiYadav et.al(2013), "Automatic Railway Gate Control Using Microcontroller", Oriental Journal Of Computer Science & Technology, Vol.6, No.4,
- [6] Brij Bihari Chaubey et.al (2016), "Automatic Railway Gate Control System", International Journal of Engineering and Computer Science ISSN: 2319-7242 Volume 5 Issue 5 May 2016, Page No. 16599-16602.
- [7] Prof. M. S. Wagh et.al (2017), "Automatic Railway Gate Control System Using RFID with High Alerting System", International Research Journal of Engineering

and Technologye-ISSN: 2395 -0056 Volume: 04 Issue:  
04 Apr -2017 p-ISSN: 2395-0072.

- [8] Vikash Kumar, Prajit Paul, Nishant kumar, Pratik kumar Sinha, Sumant Kumar Mahato, "Automatic Railway Gate Controller with High Speed Alerting System," Vol. 4, Issue 5, May 2015.

