

Automatic Control on Railway Gates Using IoT

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Abstract – Majority of the people like to travel in trains because it is affordable comfortable and fastest mode of transportation. In spite of large usage of railways, It is still not developed in technology in certain areas like level crossings. level crossing gates are still manually operated and many unmanned railway gates are present. Railway gates are mainly used to save the road users to prevent accidents from occurring. In every level crossing there are so many of the railway accidents are occurring due to the carelessness and lack of experienced workers. The main objective of this project is to control and operate the railway gate automatically and prevent accidents to save precious human lives. It helps to prevent accidents from occurring and reduce the manual labour. Here, we use Arduino and IR sensor. IR sensor use the IR transmitter to pass the arrival of train information, IR receiver receives the information and pass it to the micro controller. Arduino use the DC motor to close or open the gate.

Index Terms – Arduino, DC motor, DC controller, IR sensors LCD display, Siren.

1. INTRODUCTION

Railways is the very cheapest mode of transportation all around the world and most people prefer to travel in it and it is easiest and fastest transportation even for goods. So, the most of the people prefer trains. It is very difficult to maintain and easy to occur the accidents. Train accidents having serious repercussion in terms of loss of human life, injury, damage to railway property. These consequential train accidents include collisions derailments, fire in trains, and accidents at level Crossings. According to the US Department of Transportation, there are about 5,800 train crashes each year in the United States, and past five years the accidents are increasing rapidly. From the past six years 43.5% of accidents causing at the level crossing in the India. Most of which occur at railroad crossings.

In general, Railway gates are closed or opened manually by a gate keepers. The information about arrival of train for opening or closing of the gate is received from the near station. But some railway crossings are totally unmanned and many railway accidents occur at the unmanned level crossings. so as to reduce these accident and increase the safety we proposed these system.

IOT

A machine to machine language is known as IOT. IOT connects the physical world to the Internet so that you can use data from devices to increase efficiency and productivity.

2. PORPOSED MODELLING

The main hardware used in railway gate automation is enlisted below.

Microcontroller

We use Arduino nano as micro controller it is board friendly and easy to handle it works on mini USB-B cable instead of a normal one c.



Figure 1 Arduino nano

DC motor

All the functions of railway gate like opening and closing can be done by using dc motor. It L293D is used to control dc motor for functioning.

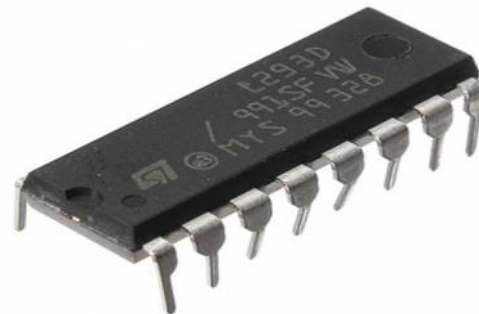


Figure 2 L293D controller



Figure 3 DC motor

IR sensors

These are the most efficient sensors available in market. They track the velocity of the train and IR transceiver connected with photodiode, photo transmitter and transmits signal. The receiver converts the received radiations to a corresponding electric current the value depends on intensity of radiation.

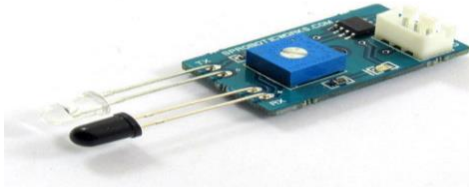


Figure 4 IR sensor

LCD display

It is used to display the distance between train and railway gate. It can be seen by people staying on both the sides of the gate.

Siren

It will start an alarming sound and used to alert people that train is coming. It is loud enough to alert the people in 100 meters.

3. IMPLEMENTATION

It's implementation is kind of a tough one and must be done with great care. At First the IR sensors must be placed at a distance from the railway gate based on calculating the process speed it is better if it is placed at 300meters or more distance from the gate. Then the sensors are connected with transceiver where the status like distance and speed of the train data can be transferred this signal is received by the receiver and it decodes the signal and updates the information with the microcontroller. As soon as the information is received by the microcontroller it alerts all the devices parallelly. It intimates the dc controller to close the gate the dc controller use dc motor to close the gate, The siren also starts beeping and based on information from the micro controller the LCD screen displays the distance and speed if the train. In some cases if the dc motor does not work the alarm starts beeping and LCD screen displays the distance to alert the neighbourhood people. There is another IR sensor placed away from the station when the train crosses it intimates the transceiver and it transmits a signal and receiver receives the signal and decodes the signal and transfer the data to the microcontroller. Then microcontroller gives signal to the dc motor either to open or close the gate based on the information dc controller either opens or closes the gate using dc motor. In parallel it also on or off the buzzer based on the data given by the receiver. It also turn's on the LCD display if the train is approaching and automatically turns of after the train leaves. This difference of when to on and when to off the devices connected to the Arduino board will be

understood by the board based on which IR sensor is activated. Let us consider there are two tracks at a railway gate. Both for opposite directions. Based on the direction the first sensor that the train crosses is taken as IR1 and the other sensor which crosses later is taken as IR2. Based on this representation the Arduino board can distinguish the sensors and for number of tracks increases and the number of sensors will also be

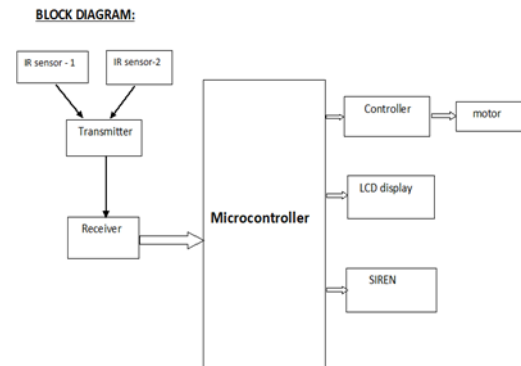


Figure 5 System Architecture

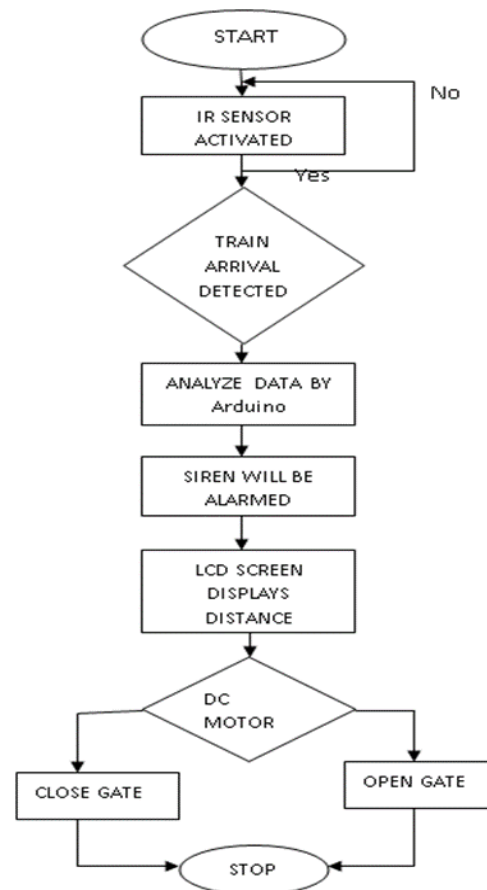


Figure 6 Flow chart

ALGORITHM

Step-1: The process is started.

Step-2: Either of the two sensors will be activated.

Step-3: Train arrival is detected and a signal is transferred using transceiver.

Step-4: Receiver receives the signal and decodes it into data and transfers to Arduino.

Step-5: Siren will be arrived based on the data received.

Step-6: Distance of the train from the gate will be displayed on LCD screen.

Step-7: Dc motor either closes or opens the gate based on the instructions from DC motor.

Step-8: The process will be stopped.

4. CONCLUSION

The automation level crossing for unmanned is done by using micro-controller Which is connected by using IR sensors, IR transmitter and DC motors. The circuit was able to control the railway gate absolutely. The circuit was tested and it worked effectively. With our project we can prevent the maximum number of accidents occurring at the railway gate and it is unnecessary to travellers to wait for long time during the passage of train. The

DC motor can close and open the gates automatically when it is rotated anticlockwise or clockwise direction. The LCD display shows the speed of the train.

Since the design is completely automated it can be used even in forest areas where no line man or station master is present.

Railway sensors are placed at either sides of gate, it will close the gates and prevent the wild animals enter into the track .it can help to save the wild animals.

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