



AUTOMATED RAILWAY CROSSING

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ABSTRACT: - Railroad systems are in operation by hand-operated gatekeeper. More than 50% of train accidents occurs due to operating errors at train intersections. But there is no perfect or unique solution to this problem. In this project has proposed a system of automatic rail crossing using Arduino Uno technology. For this we will use IR sensors for tracking the train and these sensors placed on the threshold for a distance calculated from the basis of the type of train and the speed of the train. once arriving Trains are detected by IR sensors, when the sensors receive the train signal, the signal light turns red and the crossing level gate is closed and the warning signal (buzzers) will be played, the train crosses the railway line again each time the IR sensor detects the train of the train and after this it sends signal to microcontroller and then microcontroller executes and sends this signal to servo motor. The system is implemented through Arduino uno, servo motors and IR sensor. Through this program we will reduce accidents held in high-rise areas. Thus the man's power could not be reduced. In general Railway gates are opened and closed manually by a gate keeper. But some railway crossings are totally unmanned and many railway accidents occurs at unmanned level crossings. To avoid the human interventions at level of crossing completely, we need to automate the process of railway gate control.

IndexTerms: - Introduction, Literature Review, Existing system, Proposed System Methodology, Implementation of Proposed system Result, Conclusion, References.

Keywords: - IR sensor, Arduino Uno, automated railway gate, Servo motor, level crossing.

INTRODUCTION

The railway systems in India and other countries are the most widely used and effective and one of the least expensive modes of transportation. There are thousands of trains running every day. Under the railway lines system, it is unlikely to stop some critical situations or emergencies that occur during the operation of train. Each year around 20,000 people lost their lives due to the danger of crossing the railway line/tracks. The System being used today in the Indian railway at intersections is not reliable and secure. The train gates are hand-operated with a gatekeeper where any communication misunderstanding happens while sending the train status to the gate keeper this will lead to accidents when crossing the railway lines and route. Now the solution is not the best and most effective way to manage the rail gates and is very flawed.

The area where the railway track or highway / road intersect at the same level is known as "level -overpass". There are two types of level crossing namely Manned level crossing and Unmanned level crossing. Trains are the cheapest mode of transportation preferred over all other modes. As we pass through the daily newspaper. we encounter many train accidents that take place on unoccupied railroad crossings. This is mainly due to negligence in manual labour or lack of staff. In this paper we have also come up with a solution for this. Using Arduino and simple electronic devices we have tried to automate railway control. As the train approaches the railway line crossing the sensors placed at a certain distance from the gate finds the train controlling the operation of the gate.

The second most important problem is manual railway crossing system is that cars have to wait extra time crossing a railroad or train from where it falls at the station. In manual systems the gate guard will close the crossing gates where the train is at a distance of 10km from at the station and open the gates of the train behind the train departs from the station and travels 10km away from

the crossing station. When the train leaves the station there will be no chance of causing accidents and vehicles can go now. To avoid the human intervention at level of crossing completely, we need to automate the process of railway gate control.

LITERATURE REVIEW

- I. **KARTHIK KRISHNAMURTHY MONICA BOBBY, ET.AL (2015)** he studied on and about the “Sensors based automatic railway gate”. This paper helps to deploy a system that automates gate operation at level of crossings using microcontroller and detect collisions at the level of crossing the components which is used for the automates of railway gate are sensors that is infrared sensors. An IR sensor detects radiation to detect movement in an environment. This paper concluded that automatic railway gate control system is pointed on the idea of deducting human involvement for closing as well as opening of the railway gates which avoids automobiles and humans from crossing railway tracks. Hence, automating the gate can bring about a ring of surety to controlling the gate.
- II. **ANIL M.D. ET. AL (2014)**, he researched “Advanced Railway accident prevention and controlling System Using Sensor Networks” in which he Talks about the increasing railway traffic mass across the world and in such circumstances how to manage. The system uses components that are IR sensors, fire sensors, Zigbee technology and embedded systems which also prevents accidents as well as control track management. When the train arrival is at a distinctive side then transmitter IR sensors create their suitable hint and then at the equal time the receiver IR sensor receives their signal and makes railway into stopping position.
- III. **M KIRUTHIGA. ET. AL (2014)** study on "Wireless communication system for railway signal automation at unmanned level". He analyses the accidents at unmanned level crossing and collision of trains running on same track where the accidents are more in railway. Such mishap cause heavy human causality and damage to Train therefore he proposed to develop full proof system to avoid such accidents. Automatic termination of unmanned gate reduces the time for which the gate is being kept closed and provides safety to the road users by reducing accidents.
- IV. **BARRY JESIA G, HARRISON J. E (2008)**, he authorize “Series of Injury because of Transport Accidents Involving Railway Train”, he analysed and compared the train accidents, hospitalization hold back, etc. It gets in to additional representation of statistics. The danger of significant accident, based on distance cosmopolitan, is ten times bigger for passengers travel by automotive compared with passengers travelling by rail. The mean reason of keep in hospital for a transport accident involving a railway train was four days that were longer than the mean length of keep for all External causes of injury.
- V. **SIDDH.ET.AL. (2015)** he come out with researched an “automatic railway gate control system using IR and pressure sensor along with voice declaration”. Last seven previous Year (July June) Derailments Accidents Train Running into Obstruction Others Accidents Total Numbers of Accidents happening of the International Conference on Industrial Engineering and Operations Management Bangkok, Thailand, March 5-7, 2019 © IEOM Society International system allows the gate to be closed or opened impulsive as soon as the train arrives or leaves railway-road level crossing. Microcontroller was used to activate the siren to aware the people who may be near or on the track. And closing or opening the gate by rotating the servo motor.
- VI. **KOTTALIL.ET AL. (2014)** developed an automated railway gate at level crossings substituting the conventional gates maintained and operated by the gate controller. The system work through microcontroller. The sensors being used here is also IR sensors. Train arrival and departure as well as gate controlling operation is monitored automatically.
- VII. **BALAMURUGAN .ET. AL (2017)** developed an automated railway gate controlling mechanism at the level crossings. Automated railway gate controlling is based on 8051 microcontroller and designed about operations on level crossings in the country as well as in the world.
- VIII. **ACCORDING TO GOPINATHAA.ET AL. (2014)** in developing countries like India, disasters in the unguarded railway gate level crossing rising rapidly. The authors introduced a PLC based railway level crossing gates control using PLC, stepper Motors, vibration sensors and signal lights. The huge time required for manual gate opening and closing mechanism is saved while assuring safety to road users by diminishing the accidents.
- IX. **DHAYGUDE.ET.AL. (2018)** developed an automatic gate controlling system using Microcontrollers. The automated operation of the gates opening and its closing at the train level crossing was done by using the IR sensors which were located on both sides of the road. They also used DC motors to function the gate opening and its closing. Most of the existing sensors technologies namely IR sensors, vibration sensors and ultrasonic sensors have their own disadvantages. Ultrasonic sensor’s sensing precisions is likely to be affected by temperature variations on around 5-10 degrees and more.
- X. **10.MR. RAHUAL JAISWAL**, “Automatic Railway Gate Control System”: IJECS Volume 05 Issue 5 May 2016, this paper proposed a system where it deals with two things. He talk about the reduction of time for which the gate is being kept closed and then, to provide safety to the road users by reducing the accidents. It has combine the IR sensors and transmitters with the Servo motor components giving a reliable and safe circuit with more accuracy in locations.

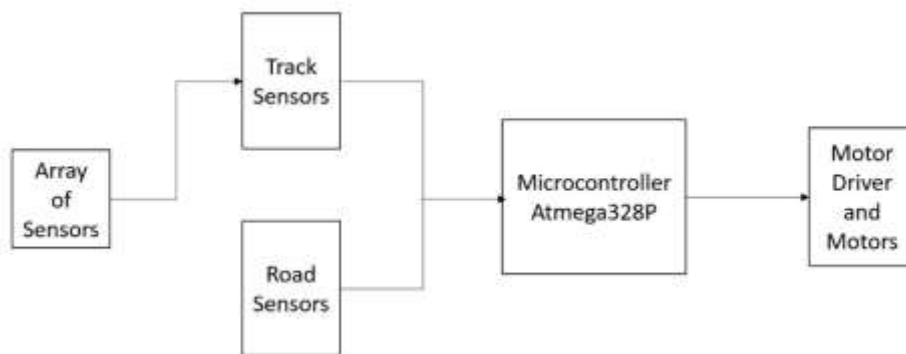
EXISTING SYSTEM

In India, Railway Crossing stations are handmade used by the railway operator. the operator is responsible for using the gates according to arrival and departure of the train. At arrival and departure of the Train, once travel details are sent to the gate operator via communication tools. The current system is very error prone which tends to more accidents at the railway level crossing. Train information shared from one cross of the system to another where the train is moving at the crossing station. More than 50% of train accidents occur at train level crossing due to the many existing errors of existence the system used by Indian Railways. Accepted approach with the Indian railway system is not safe and such it causes more accidents every year

PROPOSED SYSTEM METHODOLOGY

We have proposed a reliable program that can reduce the number of accidents that occur at intersections and the reduction of waiting times crossing stations. In our system we use 4 IR sensors and a pair of IR sensors are used for detection of train arrival at both directions and other pairs of Sensors are used to detect train movements in both directions. In India, there are many types of trains travelling on tracks daily such as goods, commuters and exhibits etc. The maximum speed of the train is estimated at 97Km / Hr and the minimum train speed is estimated at 50 Km / Hour. Considering all types of trains and trains accelerates the ideal distance to find a train by IR sensors approximately 6Km to 7Km from the crossing station and the same with the ideal distance to get a train from an ultrasonic sensor about 2Kms to 3Kms from the cross of the train. The system is made up of IR sensors, Servo Motor, LED Signals, Buzzer, Arduino Uno and software using Arduino IDE.

IR sensors are used to detect train arrival and departure. Servo Motors is used for re-opening close the railway gates. LED lights are used as traffic signals while crossing the railway track and Buzzer signal are used to warn cars about the arrival of the train.



Block diagram of proposed system

IMPLEMENTATION OF PROPOSED SYSTEM

This section includes the detail circuitry operation of the project, the significance of the components used in the project and the relationship between the different interfaces in our project. The main mishaps are due to collision between trains and vehicles to avoid that, the arrival of a train or vehicle near the crossing is detected by the appropriate sensors. The data from the sensors is then sent to microcontroller which will assess the input and send necessary signals.

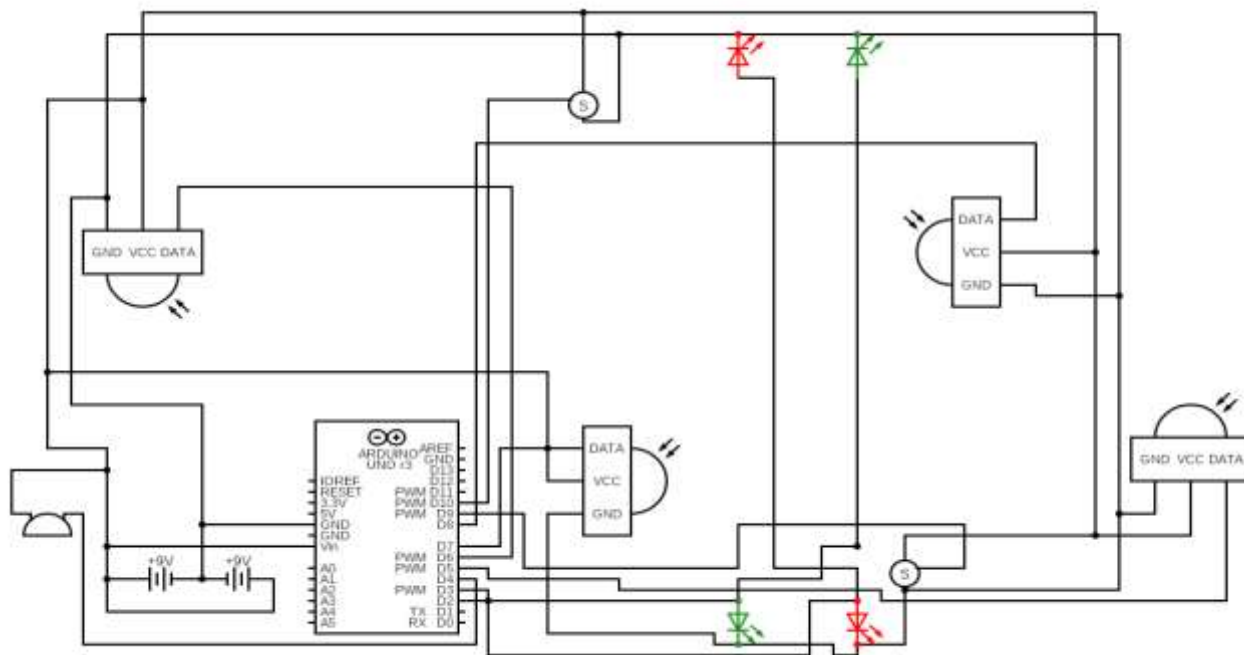
The motors and the motor drivers are the actuators which execute the signals. From the microcontroller and control the flow of traffic based on the cases identified. The gates which is operated by the servo motors are opened initially. Now lets us look at the different cases that the system might have encountered while is running.

Case- 1: - In the first case there is no train passing through the railway track as the result in which neither track sensor senses any obstacle. In this case the gate must remain open to all free flow of vehicle across the track.

Case-2: - In the second case the train is arriving from the right and no vehicle sensed by the road sensors. In this case the gates must close and remain close the train passes the crossing.

Case-3: - In the third case the train is arriving from the right and the vehicle still crossing the railway track at this point the gate must stay open for a big period to allow the vehicle to pass and enclose.

Case-4: - In the fourth case both track sensors are sensing the presence of a train which means that is the train is stationary at the track or moving pass sensor in either case both the gate remain close and the corresponding input and output to be considered are 1 and 0.



Circuit diagram of proposed system

RESULT

This program uses Arduino UNO and various other components. This circuit is made up of a number of components including the Arduino UNO board, IR sensor, LED, Buzzer connected system, servomotor, and other wires as a connection.

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Final project implementation of proposed system

CONCLUSION

The automatic rail crossing system is an effective and best solution to the problems that occur in a system used by Indian trains. This program offers superior benefits to road and railway uses managers. This program minimizes the risks involved occurs at intersections and reduces waiting time of high-speed rail crossings. As this the system does not require any human resources at all made in any remote and rural areas there is no railway guard. The proposed system is used servo motors to lift the gates and these are very reliable and accurate to raise or lower the gate with specified angle rotation. Finally we will conclude that the proposed system will have high, reliability performance and lower cost compared to existing ones currently in use.

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