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Automatic Railway Gate Control System Using Arduino

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ABSTRACT:Many people have died over the past 5 years in unmanned railway crossings everywhere the planet . At least one or two of the railway crossings are unmanned due to their remote placement and less traffic. The Automatic Railway Gate Control System using Arduino & IR Sensor focuses on systematic traffic control of railway gates that are both manned and unmanned. This project will not only make the system more reliable & precise, but also save the authorities from hiring man power to do the job. You may take it as a onetime investment. The Automatic Railway Gate system Project makes use of an Arduino Uno to regulate the entire circuit. One Servo motors are wont to open and shut the railway gates. Four IR sensors are used for sensing the arrival or departure of train. The main objective is to shut the railway gates when the train approaches it, so on block vehicles from going across the track. As soon because the train moves further faraway from the railway crossing, the gates will open automatically and vehicles can cross the railway tracks

**KEYWORDS:** Railway gate, level crossing, unmanned, gate, Arduino Uno.

I. INTRODUCTION

Sometimes there is crossing which occurs in between the road. It is a type of hinderance between the roads many times intersection. The term also applies when a light rail line with separate right-of-way in reserved track crosses a road in the same fashion. Other names include railway crossing, railroad crossing, road through railroad, train crossing or grade crossing. Early level crossings had a lag man in a nearby booth who would, on the approach of a train, wave a red flag or lantern to stop allaric and clear the tracks. Manual or electrical closable gates that barricaded the roadway were later introduced. The gates were intended to be a complete barrier against instruction of any road traffic onto the railway. In the early days of the railways much road traffic was horse drawn or included livestock. It was thus necessary to provide a real barrier. Thus, crossing gates, when closed to road traffic, crossed the entire width of the road. When opened to allow road users to cross the line, the gates were swung across the width of the railway, preventing any pedestrians or animals getting onto the line. With the appearance of motor vehicles, this barrier became less effective and the need for a barrier to livestock diminished dramatically. Many countries therefore substituted the gated crossings with weaker but more highly visible barriers and relied upon road users following the associated warning signals to stop.The project we propose is to avoid railway accidents happening at unattended railway gates, if taken in a positive way. Designed using Arduino a level higher than a human being in exact alignment and similarly the other pair is fixed at down side of the train direction. Sensor activation time is so adjusted by calculating the time taken at a certain speed to cross at least one compartment of standard minimum size of the Indian railway.

II. OBJECTIVES

There are mainly two types of level crossing they are manned level crossing and unmanned level crossing. Mostly transport used by people in India is railways since it is the cheapest mode of transportation and have capacity to carry a large amount of people in efficient manner. When we go through the daily newspapers, we come across many railway accidents occurring at unmanned railway crossings obstacle on track system. This is mainly due to the carelessness in manual operations or lack of workers. To reduce this problem of fatality rate we come up with a solution for the same. Using simple electronic components, we have tried to automate the control of railway gates. As a train approaches the railway crossing from either side, the sensors placed in the track at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. As a train approaches the railway crossing from either side, the sensors placed in the track at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. When the wheels of the train move over the track there will be creation of vibration the sensor-1 senses the vibration and sends the signal to Arduino to indicate train arrival. The ultrasonic sensor placed at the front end of train detects the obstacle and also other train approaching from opposite side. When there is an obstacle it senses the object and send signal to the Arduino to convey close /open the gates.
The accidents at railway gate level crossing and also due collusion are avoided by implementing this system.
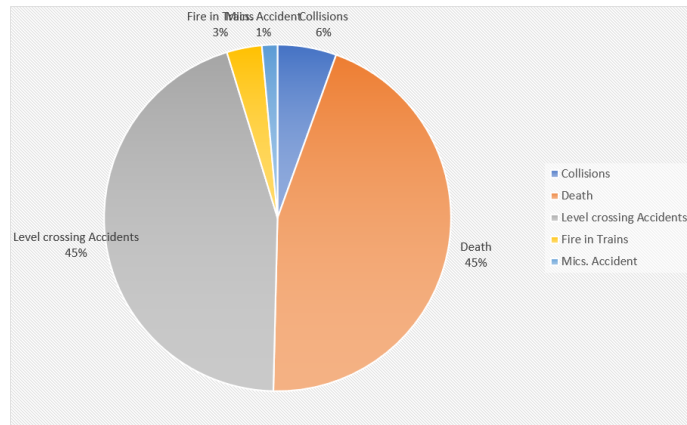
Fig1: pie chart of accident percentage

Within the rapidly flourishing countries with high population using railways like India accidents within the unmanned level crossings are increasing day by day. No fruitful steps are taken to the current point in these areas. The above chart shows the percentages of accident. Where as we can see total of 45% of accidents happen due to level crossing and 45% people also die due to such types of crossing. So we can say that it is a crucial problem in the way of making smart country as it occurs as hinderance in between the plan.

III. METHODOLOGY

We use four sensors in the project as two pairs of two sensors, these sensors are kept in the both side of level crossings gate. All the sensors are connected to Arduino.A one servo motor is used to open and close the gates, and also the buzzer is used to signal i.e. alert the arrival of the train. All Components are connected to Arduino Uno. We recommend the use of Arduino Uno in this project since it is a good choice to make and it has all the required properties and modifications compared with other boards available.

When train arrives from any side, it first crosses the sensor1 after that cross the sensor2, in this way Arduino close the gate by sending the signal to servo motor. When train departure from any side it first crosses the sensor2 after that cross the sensors, in this way Arduino open the gate.If the track is clear then servo motors will do nothing but if a train arrives on either side of the track then distance measured by one of the sensors will vary from the previous distance. In this way we will get informed about the arrival of the train and in no time, Arduino will set its digital pins 7 and 8 to HIGH.

Servo motors are used in the gate because it is very easy to use and does require a motor driver IC or circuit. Servo motor has three pins. The first pin is PWM, second is Vcc and third is GND. This pins connected to motor driver as per require motor rotates at the fixed angle according to duty cycle of signal.
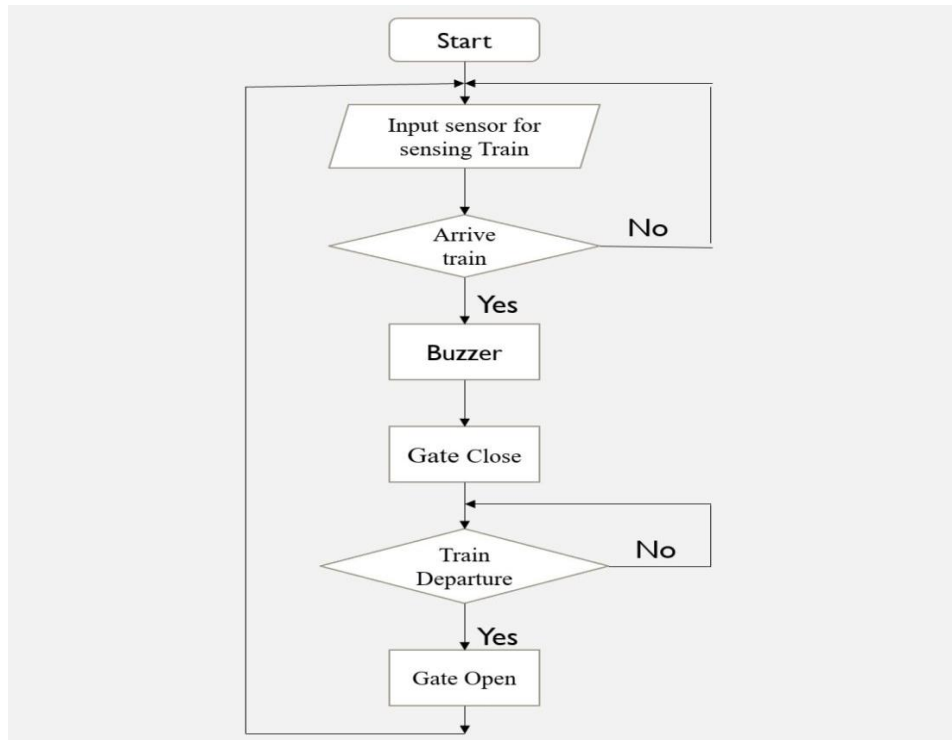
Fig2: flow chart of the proposed system

IV. BLOCK DIAGRAM

The implemented system consists of a Arduino as main processing unit for the entire system and all the sensor and devices can be connected with the Arduino. The sensors can be operated by the Arduino Uno board to retrieve the data from them and it processes the analysis with the sensor data and get constant vibrations through sensors connected with it.
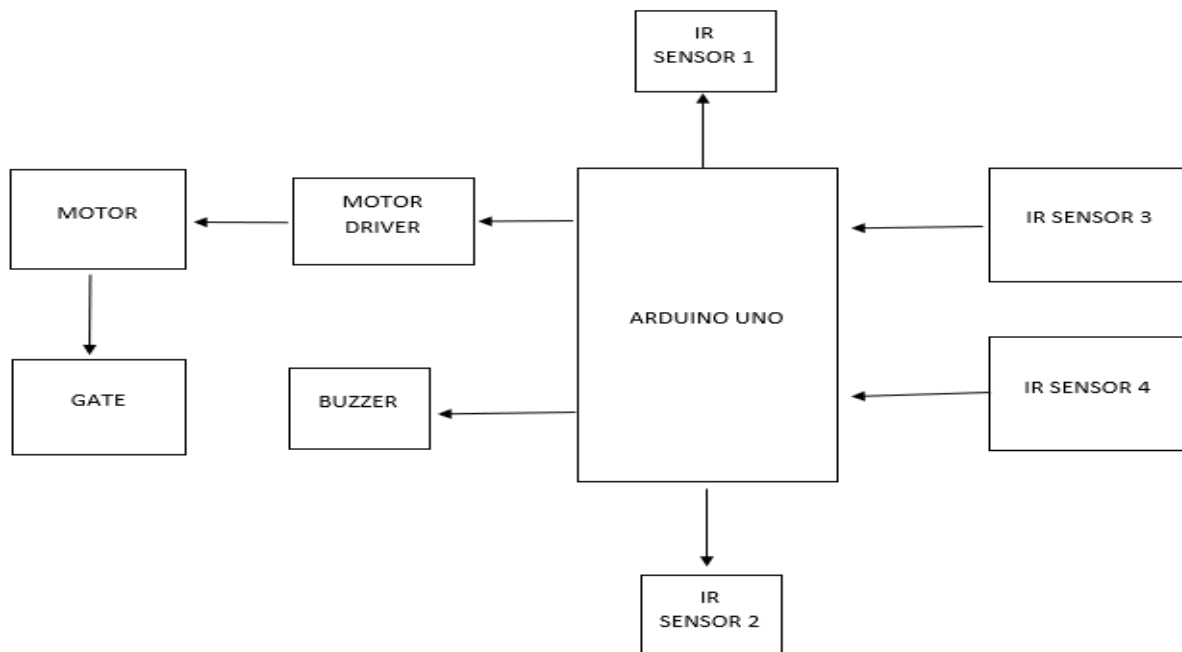
Block Diagram:

Fig3: Block Diagram

V. EXPERIMENTAL RESULTS

From 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, Ultrasonic sensor, a servo motor with which the gate operates, 4 LEDs as the traffic signals, buzzer to indicate the arrival of train to the traffic. Gate operation: An IR sensor is placed at a distance of 25cmon 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 servo motors. When the second sensor senses the departure of the train the LED will turn off and the gates will open. Obstacle detection: Any obstacle on the track is detected by placing an Ultrasonic sensor on the frontend of the train and the presence of obstacle on the track is notified by a signal at the control room. The train movement is then controlled based on the presence of the obstacle on the track and obstacle detection.
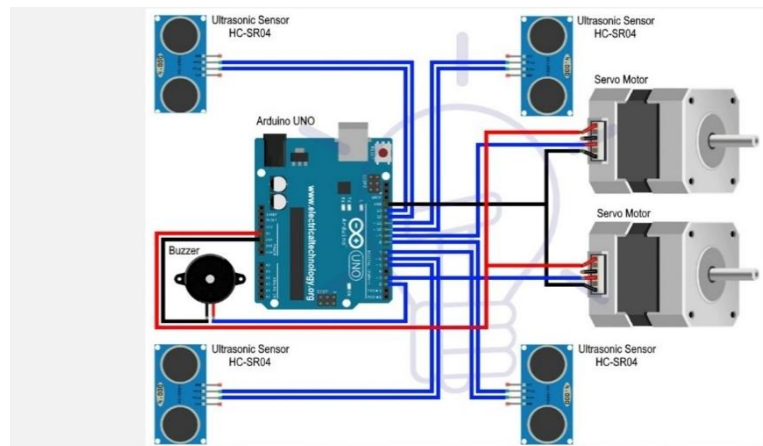

Fig4: Circuit connection

VI. CONCLUSION

TheAutomatic railway gate control system is centred on the idea of reducing human involvement for closing and opening the railway gate which allows and prevents accidents near level crossing. The railway gate is a cause of many deaths and accidents. Hence, automating the gate can bring about a ring of surety to controlling the gates. Human may make errors or mistakes so automating this process will reduce the chances of gate failures and reduces the errors made by gate keepers. The accidents are avoided at place where there is no person to manage the railway crossing gates. Here we use the servo motor to open and close the gates automatically when it rotates clockwise or anticlockwise direction to operate the gate automatically. In the obstacle detection part the ultrasonic sensor sensed the obstacle and the train stops as soon as the obstacle detection message is conveyed to the nearby railway station as well as for the train operator. So, through this system any obstacle on track can be detected and accident can be avoided and also the message as been conveyed to the concerned. By using this method we can reduce the number of accidents occurring due to railway gate incompatibility.

VII. FUTURE WORK

As the accidents due to railway level crossing and the obstacle can be avoided in real time by implementing this system and the whole process is completely automatic. In future the features like wireless system can be implemented in the real time operation. In real time operation vibration sensors can be used in place of IR sensors for the detection of arrival and departure of train. So, the vibration sensor serves better when compared to the IR sensors for the real time. And also the GPS system can be implemented and interfaced with the circuitry. GPS system ensures that the correct location of the obstacle can be sent to the nearby railway station through GSM modem. This helps to get the exact location of the obstacle so that the work for the clearance of obstacle can be done faster.

VIII. ACKNOWLEDGEMENT

REFERENCES

1. Atul Kumar Dewangan, Meenu Gupta, and Pratibha Patel, "Automation of Railway Gate Control Using Micro-controller, International Journal of Engineering Research & Technology, pp.1-8, 2012.

2. Gunyoung Kim, Kyungwoo Kang, "Railway Gate Con- trol System at Railroad-Highway Grade Crossing in Korea".

3. Pradeep Raj, "Increasing accidents in the unmanned level crossing of the railways", 2012.

4. www.arduino.cc/reference [8]. Karthik, Krishnamurthi, Monica Bobby, Vidya V, "Sensor based automatic control of railway gates", International Journal of Advanced Research in Computer Engineering & Technology.

5. . SangitaN.Guja, JagrutiR.Panchal, LalitaK.Wani, "Improving safety with obstacle detection and track following car using sensor, GPS and GSM", International Journal of Research in Engineering and Technology.

6. R.Gopinathan and B.Sivashankar, "PLC based railway level crossing gate control", International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE). ISSN: 0976-1353 Volume 8 Issue 1 –April 2014.

7. Ahmed Salih Mahdi, Al-Zuhairi, "Automatic Railway Gate and Crossing Control based Sensors & Microcontroller", International Journal of Computer Trends and Technology (IJCTT), Volume 4, Issue 7, July 2013

8. J. Banuchandar, V. Kaliraj, P. Balasubramanian, S. Deepa, N. Thamilarasi," Automated Unmanned Railway Level Crossing System", in International Journal of Modern Engineering Research (IJMER) Volume.2, Issue.1, Jan-Feb 2012 pp-458- 463

9. Krishna, ShashiYadav and Nidhi, "Automatic Railway Gate Control Using Microcontroller", Oriental Journal Of Computer Science & Technology, Vol.6, No.4, December 2013.

10. Fred Coleman, Young J. Moon, Trapped Vehicle Detection System for Four Quadrant Gates in High Speed Rail Corridors, Transportation Research Record, 2011.