Railway Gate Control System

MRS. AARTI[1], RAHUL SAHA[2], YASH GEHLOT[3], AVINASH NAINI[4]

Assistant Professor, Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.

Student, Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.

Student, Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.

Student, Computer Science and Engineering, SRM Institute of Science and Technology, Chennai.

ABSTRACT

The objective of the paper is to provide an automatic railway gate. The automatic railway gate will be at a level crossing replacing the gates operated by the gatekeeper. The system reduces the time for which the gates remain closed. This type of gates can be employed in an unmanned level crossing where the a threat. This system works on a micro-controller based control.The proposed system uses ATmega 16A micro-controller.With the help of IR sensors .The arrival and leaving of the system is monitored and the gate is operated accordingly.

Keywords: *ATmega16A,I R Transceiver, Micro- controller, Automatic railway gate control system*

I. INTRODUCTION

The paper deals with a topic of much contemporary relevance. It proposes a unique and economical method for improving the safety of our level crossings.Road accidents at railway gate is a leading cause of death and injury worldwide. If we go by recent surveys conducted by Indian Railway. It is found that around 17% of the total railway accidents happening across India are crossing accidents, of which majority of them occurs at passive railway crossings. The operation of railway gates at level crossings hasn't been reliable nowadays. Primarily, the road users had to wait a very long time before the arrival of a train. Sometimes even after the train is left, the bystanders have to wait till the gate keeper opens the gates again.. And secondly the chances of accidents that usually made by the more. So comes the importance of automatic chances of accidents are higher and more reliable operation is required. Since, the operation is automatic, error due to manual operation doesn't pose

railway gate control system. In this project, we detect the arrival of trains and warn the passerby's about the arrival of the trains. If no obstacle is found, a green signal is given for the train to pass. Otherwise, a red signal is given to slow down or halt the train in any case. After the obstacles are cleared, the gate is closed and train is passed .We will make sure that as the train passes, the gates reopen without much delay. The system deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed. Secondly, to provide safety to the passerby's by reducing the accidents. In the automatic railway gate control system, at the level crossing, the arrival of a train is detected by the sensor placed near to the gate. Henceforth, the time for which it is closed is less compared to the manually operated gates and also reduces the human labour that comes into play.

II. INTERFACING OF SERVO MOTOR

A servo is a mechanical motorized device that can be instructed to move the output shaft attached to a servo wheel or arm to a specific position .Inside the servo box is a dc motor mechanically linked to a position feedback potentiometer, gearbox, electronic feedback control loop circuitry and a motor drive electronic circuit as shown in fig2.1

Fig 2.1 Components of the system.

Servos are controlled by sending a pulse of variable width through them. The control wire is used to send this pulse. The parameters for the pulse is that it has a minimum pulse, a maximum pulse, and a repetition rate. Given the rotation constraints of the servo, neutral is defined to be the position where the servo has exactly the same amount of potential rotation in the clockwise direction as it does in the counter clockwise direction. It is noteworthy to keep it in the back of our mind's that different servos will have different constraints on their rotation. But they all have a neutral position, and that position is always around 1.5 milliseconds (ms).

Fig 2.2 Showing servo with Micro-controller

The angle is determined by the duration of a pulse that is applied to the control wire. This is called Pulse Width Modulation(PWM).The fig
2.2 shows the interfacing of servo with micro- controller.The servo expects to see a pulse every 20 ms. The length of that pulse will determine how far the motor turns. For example, if a 1.5 ms pulse will make the motor turn to the 90 degree position (neutral position).When these servos are commanded to move they will move to the position and hold that position. If an external force pushes against the servo while the servo is holding a position, the servo will resist from moving out of that position. The maximum amount of force the servo can exert is the torque rating of the servo. Servos will not hold their position forever though; the position pulse must be repeated to instruct the servo to stay in position.

When a pulse is sent to a servo that is less than

1.5 ms, the servo rotates to a position and holds its output shaft to some number of degrees to counter clockwise from the neutral point. When the pulse is wider than 1.5 ms the opposite occurs. The minimal width and the maximum width of pulse that will command the servo to turn to a valid position are functions of each servo. Different brands, and even different servos of the same brand, will have different maximum of each servo. Different brands, and different servos of the same brand, will have different maximum and minimums outputs. Generally, the minimum pulse will be about 1 ms wide and the maximum pulse will be 2 ms wide.

Another parameter that varies from servo to servo is the turn rate. Turn rate is the time it takes the servo to change from one position to another. The worst case turning time is when the servo is holding at the minimum rotation and it is commanded to go to maximum rotation. This can take several seconds on very high torque servos

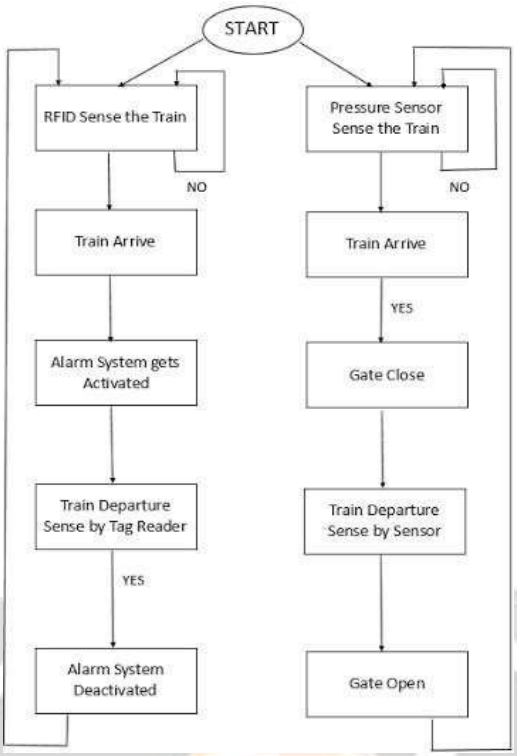

Fig 2.3 Flow Diagram of Working Gate.

III. IR TRANSCEIVER

IR transceiver is used for determining the arrival and departure of the trains. This is done by using IR Transceivers in which presence of train is detected as logical zero.

A. Transmitter

The Infrared Emitting Diode (IR333/H0/L10) is a high intensity diode, molded in a blue transparent package. The device is spectrally matched with photo- transistor, photo-diode and IR receiver module. It finds applications in IR remote control units, smoke detectors, free air transmission systems etc.

B. Receiver

The IR LED converts the incident IR radiations to an equivalent electric current. This which when passed through a resistor results in a certain amount of voltage drop. This value of voltage will depend upon the intensity of incident IR radiations or in other words, the distance between IR transmitter and receiver. The receiver is connected in reverse bias in the circuit. The IR rays emitted by the transmitter get reflected back after hitting the target. Receivers covert this received radiations to a corresponding electric current.

IV. CIRCUIT DIAGRAMS AND OPERATION

One of the major advantages of this system is its simple circuit and working principle. The circuit is divided into three parts. First, one of them is the micro-controller section. Second is the IR sensor section, this section is kept on rail and the third is the servo motor which is used to operate the gate . All of them are discussed in detail in coming sections.The fig 4.1 shows the detailed circuit diagram of the system. By employing the automatic railway gate control at the level crossing the arrival of train is detected by the sensor placed on either side of the gate at about 5kms from the level crossing.Thus giving enough impetus for the daily passerby's to be cleared off any danger within an available window of time. Once the arrival is sensed, the sensed signal is sent to the micro-controller and it checks for possible presence of vehicle between the gates, again using the sensors kept on either side of the railway gate. Subsequently, buzzer indication and light signals on either side are provided to the passerby indicating the closure of gates. Once, no vehicle is sensed in between the gate the motor is activated and the gates are closed. But, for the worst case if any obstacle is sensed it is indicated to the train driver by signals(RED) placed at about 2km and 180 meters, so as to bring it to halt well before the level crossing to avoid any substantial loss to property or human life.

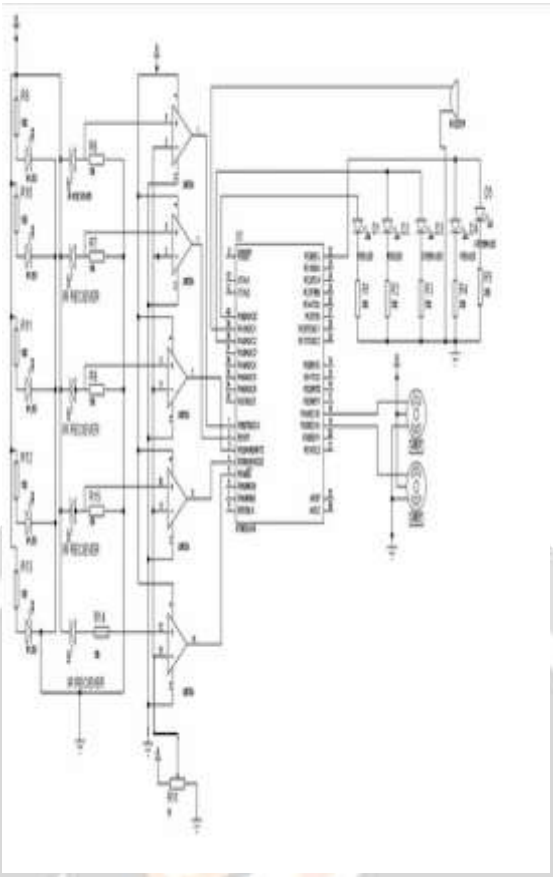

Fig 4.1 Circuit Diagram for the Automated Railway Crossing system

V. RESULT

Following results have been obtained from the implementation of the proposed system:

1) *Wide Control Range*-The pressure sensor could sense the train and at the same time RFID also senses the train, which gives the information about the train like speed, location etc.

2) *High Reliability*- The proposed system is highly stable and reliable as the pressure sensor and RFID tag remain unaffected from any climatic behavior and also performs fast operations.

3) *Easy Implementation*-The system can be easily implemented, it follows simple procedures to perform operations at low operating costs.

4) *Independent Components*- In any worst case scenario, if any of the three components failure to respond or work under proper condition, the rest two will work, making the system go on as such.

VI.CONCLUSION

This paper concludes that the alarm system based on Servo motor, Pressure sensor and RFID improves the reliability of automatic railway gate control system. It also gives the speed and location of the train, for which it would be more efficient in gauging the estimated arrival time(ETA) of the train from the railway gate itself for better handling of the traffic.

VIII.FUTURE SCOPE

This proposed model suffers from the drawbacks that it cannot be used for very high speed trains and at the hilly areas where the pressure sensor may not perform correctly, henceforth the future work can concentrate on making it possible work on high speeds too.

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