AUTOMATIC RAILWAY GATE CONTROL SYSTEM

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Abstract— *This paper focuses on how to make the Railway level crossing system to a automated system. About a million people have died over the past 6 years in unmanned crossings all over the world .At least a minimum number of railway crossings are unmanned due to their remote placements and less traffic. The proposed system focuses on the systematic traffic control of railway gates that are both manned and unmanned. This system makes use of an Arduino to control the whole circuit. The main objective of the proposed system is to close and open the railway gates to block the traffic when the train approaches and moving further away.*

Index Terms- Train, Level crossing, Arduino

I. INTRODUCTION

In India, the major ways of transportation used are roads and railways, many a times the both are crossing over. For the smooth running of both, there are over bridges are used where there are major movement of vehicles. And in some places there are gates provided for controlling the crossover of both and other major cases none is provided that lead to accidents. In a big populated country like India, accidents are a daily crisis that is being faced by the people. Most of these accidents are road accidents, few percentages of these accidents occur on the railway level crossings. To prevent these accidents on the railway level crossing the automated system is proposed.

The operation of railway gates at level crossings hasn't been reliable nowadays.The road users have to wait for a certain long time before the arrival of the 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. Then there's the importance of automatic , The chances of accidents are higher and more reliable operation is required.

The proposed system is an arrangement of physical components which sense the arrival of the train and make the gate pull up and pull down automatically. As the train approaches to the level crossing from either side, the sensors placed at a certain distance from the gate detect the arrival train and gradually controls the operation of the gate. To prevent the accidents, sensors placed at certain distance from the gate will detect the departure of the train. The signal about the departure is sent to the Arduino, which in turn operates the motor and opens the gate. And, the traffic light will signal RED to alert the arrival of Train and then Timer runs and Buzzer buzzes alerting the traffic of the arrival of the train. The siren will alert this closing operation. After the Train crossed away, then the gate will open from its close state and the traffic light will turn into Green while the siren continues to buzz till the gate is totally open for the traffics to pass. Thus, the time in which the gate get closed is less compared to the manually operated gates since the gate is closed depending upon the telephone call from the previous station.
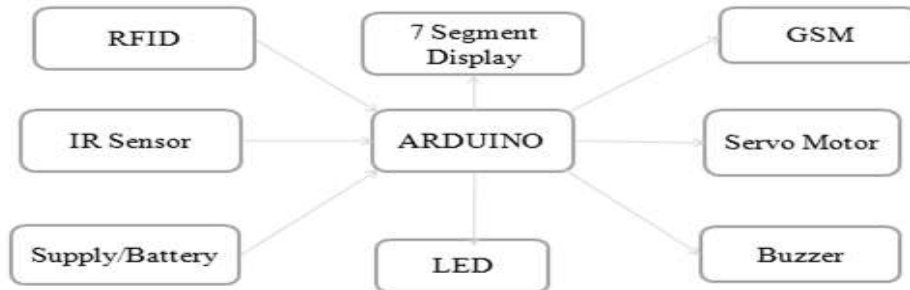
II. OBJECTIVE

The major objectives of the project is to provide a safe environment for the smooth running of the both the railway transport system and the road transport system, and to reduce the accident that happening on these areas. It will reduce the delay time of the opening and closing of the gates. The project mainly done to automate the existing system that uses manual labor for the operation. The project reduces the manual labor thereby reducing the manual error that may occur during the operation of the system. It also reduces the manual time delay.
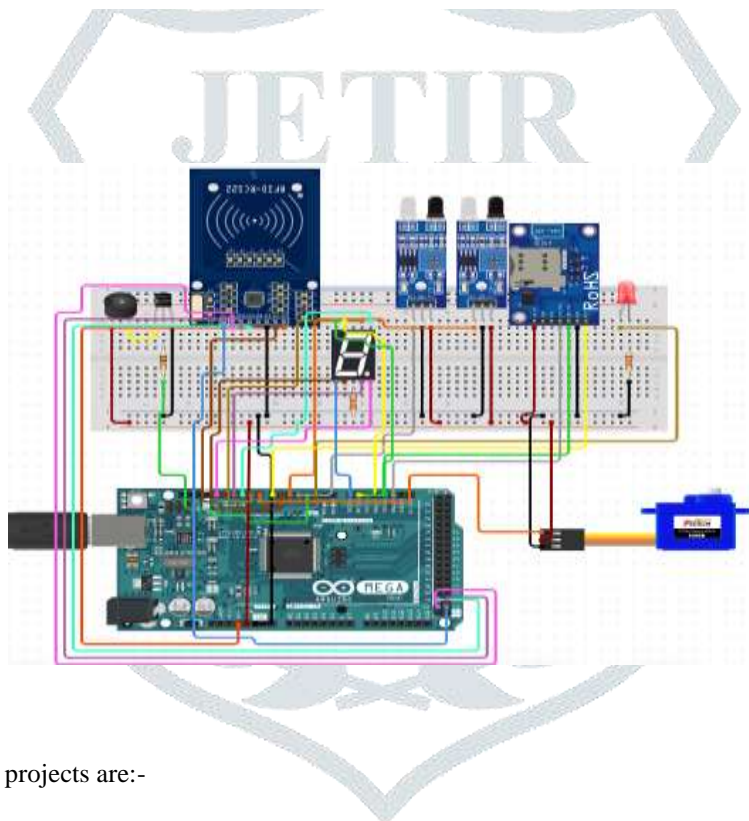
III. PROPOSED SYSTEM

The proposed system uses IR sensors which have very high efficiency. These IR sensors are placed near the rail line at the both side of the level crossing. These sensors which are placed at certain distance from the level crossing detect the train

coming from either direction to the level crossing. Then the informationof the trains arrivel is passed to control unit , the control unit switches on the red light, generates an alarm and then closes the gate immediately. The sensors on the either side determine whether the train passes a limited distance or not from the level crossing. If passes the signal is given to the controller ,then switches on the green light, stops generation of alarm and pull the gate up.Our proposed system is very simple and in expensive with respect to other system but its performance is very laudable and excellent

IV. BLOCK DIAGRAM

V. CIRCUIT DIAGRAM

VI. COMPONENTS

The components used in the projects are:-

A. Arduino

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins.The use of arduino in the project is to control tal the components. It is the brain of the project.
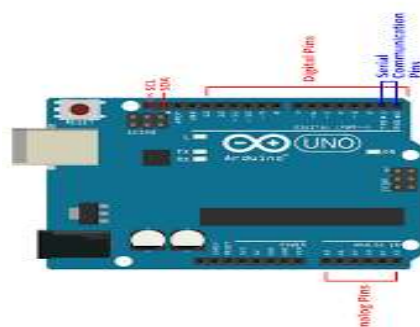

Fig-2

B. IR Sensor

It is the one the key element used in the hardware for the identification of the train.It is an electronic device, that emits in order to sense some objects of the surroundings.Thesesensors can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor.
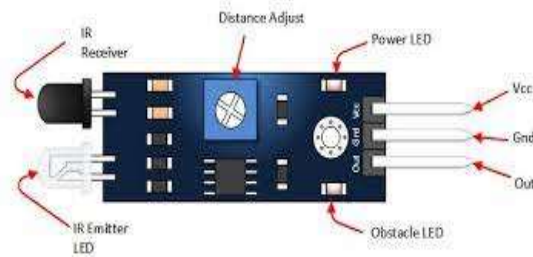

Fig-3

C. Servo Motor

This device has a closed-loop mechanism that incorporates positional feedback to control the rotational or linear speed and position. This **motor** is controlled with an electric signal, either analog or digital, which determine the amount of movement which represents the last command position for the shaft.The role of the servo motor in this system is to operate he closing and opening of the railway gate.

Fig-4

D. GSM Module

This device is a wireless modem that works with a GSM wireless network.The major difference in them is that a dial-up modem sends snd receive the data thorugh a fixed telephone line on the other hand a wireless modem sends and receives data through radio waves.This module can be an external device or a PC CARD.Here we use the module for the transmission of the train status with the train nformation by the RFID sensors.

Fig-5

E. Buzzer

The buzzer is a sounding device that can convert audio signals into sound signals. This is widely used on alarms, computers, printers and other electronic devices..This is mainly divided into piezoelectric buzzer and electromagnetic buzzer, denoted by the letter "H" or "HA" in the circuit.Here the buzzer is introduced to alert the traffic the train will be arriving soon and the gate will be closed.

Fig-6

F. LED

In short, a light-emitting diode (LED) is a semiconductor device which emits light when an electric current is passed. The Light is produced when the particles which carries current combine together within the semiconductor material.
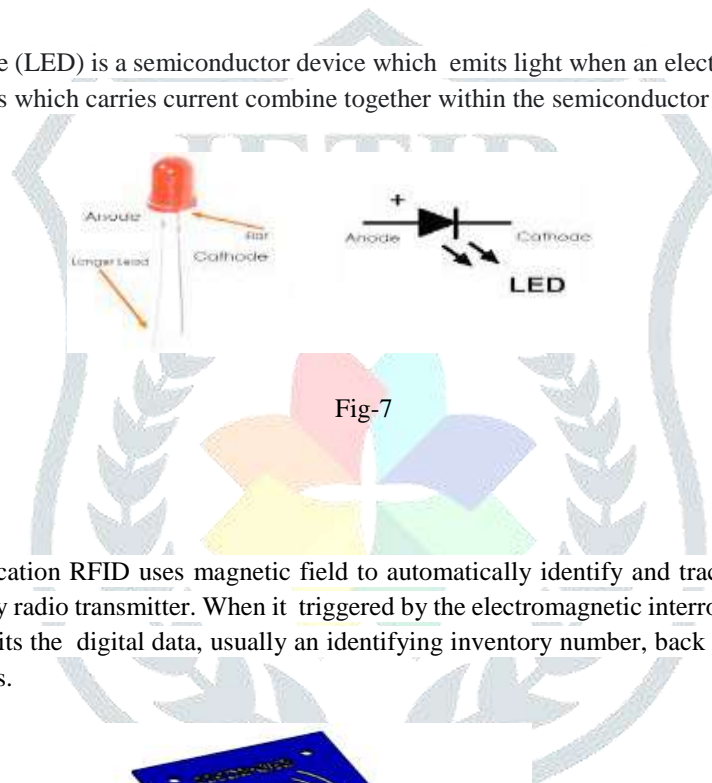

Fig-7

G. RFID Sensors

Radio frequency identification RFID uses magnetic field to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transmitter. When it triggered by the electromagnetic interrogation pulse in a nearby RFID reader device, this tag transmits the digital data, usually an identifying inventory number, back to the device. This number can be used tit ark inventorygoods.
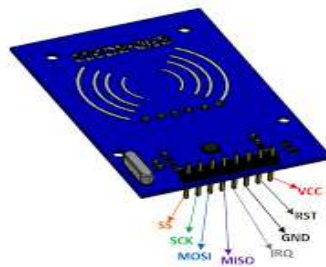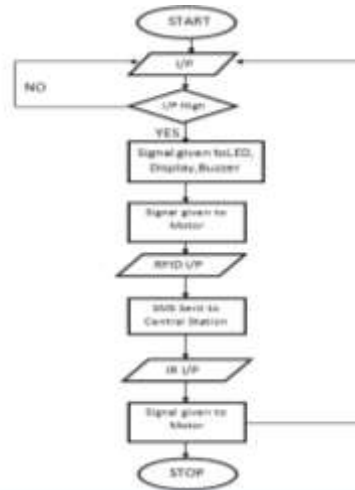

Fig-8

VII. Working

First, when the train arrives the IR sensor senses a send the signals to the arduino. The arduino sends the signal to the buzzer, the seven segment display and the LED. The LED turns red, the buzzer rings and the seven segment display starts the countdown. The arduino is synced to the seven segment display's countdown i.e, the countdown time is given as a delay for the arduino. After the delay arduino gives the signal to the servo motor to rotate. During the passing of the train the RFID reader reads the details of the train and sends the SMS to the central station server. When the train passes the other IR sensor, it sends the signal to the arduino, the arduino then sends the signal to the servo motor to rotate and LED to turn green.

Flow Chart

VIII. Conclusion

To save the human life and vehicles from miserable train accidents is a challenge of the era of modern science and technology. The above proposed system is introduced. The results exhibit that it is one of the expedient approach for secure railway system. The IR sensors detect the train and stuck on the level crossing very quickly and communicate with the control unit. The control unit takes proper steps which lead the train and vehicles movements either to move forward or to stop to avoid collision. Consequently, this is able to play a great contribution to the railway gate automation with reliability and lower cost.

IX. Future Scope

Image detection can be used for more precise, with the help of cameras. Damage detection can be included that help us to automatically detect any issues with the system. Thermal for animal detection and suitable radiation for moving them away, that help us reduce the accidents in the area of the gate.

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