

AUTOMATIC RAILWAY GATE CONTROLLING SYSTEM

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ABSTRACT

The main aim of our project is to operate and control the unmanned Railway Gate in the proper manner in order to avoid the accidents in the unmanned railway crossing. In a country like ours where there are many unmanned railway crossings, Accidents are increasing day by day. The railway gate can be operated to prevent the accidents at the level crossing in terms of speed of the train. Automatic Railway Gate control System is an innovative circuit which automatically controls the operation of Railway Gates detecting the arrival and departure of train at the Gate. This system uses ATmega328P microcontroller with the help of two sensors. It has three IR sensors which is used to detect arrival and departure of the train. In this project we are using RF transmitter and RF Receiver for the transmission of sensor output to controller which is in remote location. The first part is concern on the hardware development where all Electronic components have included .IR sensor are the input components while buzzer, DC motor and LCD display are the output components. These are controlled by the controller circuit. The microcontroller forms the main unit of the system. It receives input signal from the sensors and sends information to the gate motor driver for opening and closing the gate. Besides, the output signal Arduino will activate LCD display and alarm. The first IR sensor is fixed at a certain distance from the gate and the second sensor is fixed at the same certain distance after the gate and the third sensor is placed near the gate. The gate is closed, when the train crosses the first and second sensor and the gate is opened, when the train crosses the third IR sensor. This system deals about one of the efficient methods to avoid train accidents. The second part is based on software programming to operate the hardware structure. Program for railway gate control system is based on Arduino microcontroller with Arduino basic pro language.

Keywords- *Automatic Railway Gate, ATMEGA328P, DC motor, Level Crossing, sensors.*

I. INTRODUCTION

Railroad is of transition mode, which has an important role in moving passengers and freights. However, railroad-related accidents are more dangerous than other transportation accidents. Therefore more efforts are necessary for improving its safety.

This system is to manage the control system of railway gate using the microcontroller. The main purpose of this system is about railway gate control system and level crossing between railroad and highway for decreasing railroad –related accident and increasing safety. In addition, it also provides safety road users by reducing the accident that usually occur due to carelessness of road users and errors made by the gatekeepers.

Railways preferred the cheapest mode of transportation over all the other means. This system is designed using ATmega328P microcontroller to avoid railway accidents happening at railway gates where the level crossings. Microcontroller performs the complete operation i.e., sensing, gate closing and opening. As a train approaches the railway crossing from either side, the sensor placed at a certain distance from the gate detects the approaching train and controls the operation of the gate. This system was operated after signal received from the sensors. This signal is used to trigger the microcontroller for operating the gate motor, alarm system.

II. HARDWARE IMPLEMENTATION

The materials and components that are used in automatic railway gate control system will be discussed in the following. As in normal control design, system can be roughly divided as input, output and processing sections. The main components of system are:

1. Microcontroller

ATmega328p microcontroller is used as a main control unit to control the process of the whole system.

2. Railway Sensors

They are placed at two sides of gate and near the gate. It is used to sense arrival and departure of the train.

3. Motor Driver

IC L293D is used as a driver that are used to rotate forward or reverse direction of DC motor for opening and closing the gate.

4. LCD Display

It displays the speed of the train for the trespassers.

5. Buzzer

They are used to warn the road user about the approach of train.

6. Power supply

It is needed to provide 5V DC to microcontroller and 12V DC for motor.

III. BLOCK DIAGRA

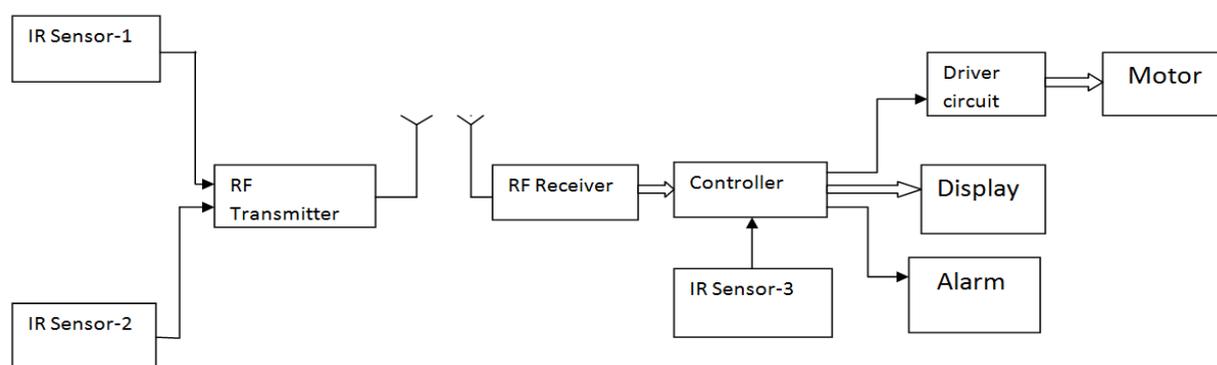
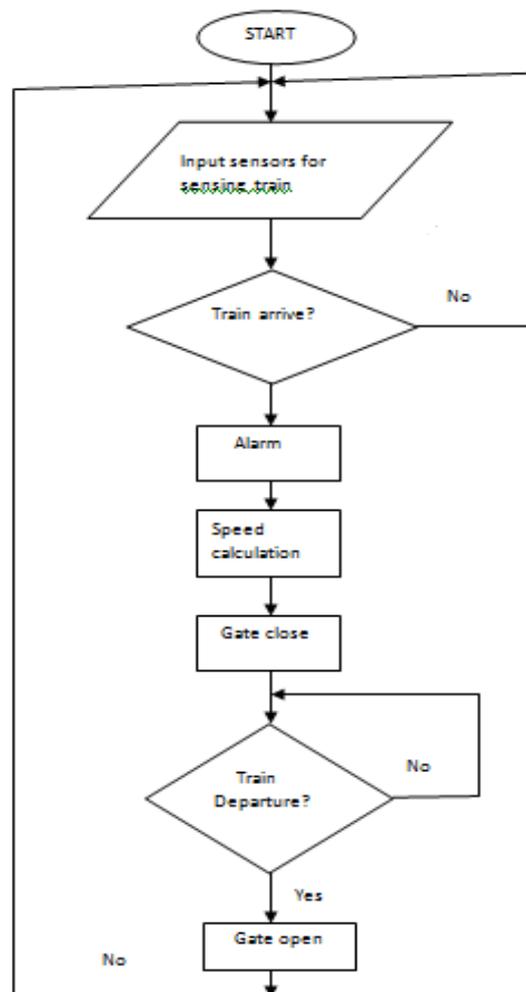


Fig:-1 Proposed block diagram

In this one ATmega328p is used for the following functions

1. To sense the arrival and departure of the train
2. To open and close the railway gate automatically by using driver ic and a motor.
3. Buzzer for warning the road users.
4. Display the speed of the train with LCD modules.

A motor driver ic is used to drive the motor of the gate in clockwise and anticlockwise direction for opening and closing of the gate. Arduino controls all the system. The main program of the railway gate control system is written in ATmega328P microcontroller and which is created by Arduino Basic pro programming language.



FLOW CHART

IV. ALGORITHM

The algorithm used in the flow chart

STEP 1: Start

STEP 2: Set the input sensor for sensing train.

STEP 3: Check for the arrival of the train by the sensors. If the train is sensed go to step 4 and step 5 otherwise step 3.

STEP 4: Calculate and display the speed of the train.

STEP 5: Make the warning signal for the road users.

STEP 6: Close the gate.

STEP 7: Check for the train departure by the sensors. If the train is sensed go to next step. Otherwise repeat step 6.

STEP 8: Open the gate.

STEP 9: Go to step 2.

V. CIRCUIT DESCRIPTION

A. IR Module

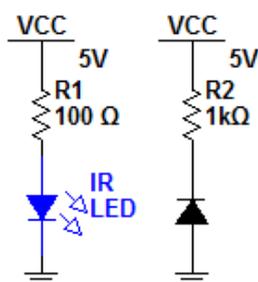


Fig:-2 IR Transmitter and Receiver

IR sensor is used to sense the arrival and departure of the train. We are using three IR sensors. First sensor is placed at certain distance from gate and the second sensor is placed after first sensor. The distance between two sensors is 600meters. The third sensor is placed near the gate. If the train crosses the first sensor then the output from the sensor is high. Otherwise the output is low. The sensor after crossing two sensor speed calculated and based on the speed gate will be closed. After the third sensor is crossed, gate will be opened.

B. Wireless transmission

We are using RF Transmitter and RF Receiver to reduce the wiring cost. Because distance between the gate and first sensor is nearly 2km.

C. Gate controlling

12 v dc geared motor and IC L293d is used to operate the gate for opening and closing of gate. IC L293d is used to operate the gate in forward and reverse motion. When the second pin is high the motor will rotate in forward direction and when the seventh pin is high the motor will rotate in reverse direction.

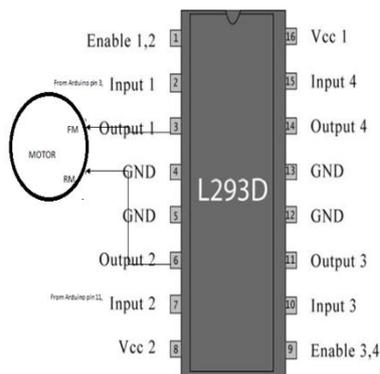


Fig:-3 Gate operation

D.LCD Module

The speed of the train is displayed to the road users. The distance between two sensors is 600 meters and the timer will be on when the sensor1 is high and timer will be off when the sensor2 is high. The time can be taken from the timer output. The speed can be calculated by the following formula $Speed = Distance/time$

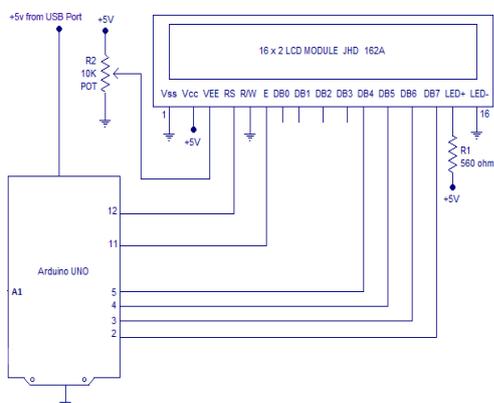


Fig:-4 Speed of the train display

E.Buzzer

It will give alarm signal to the road users about the arrival and closing of gate.

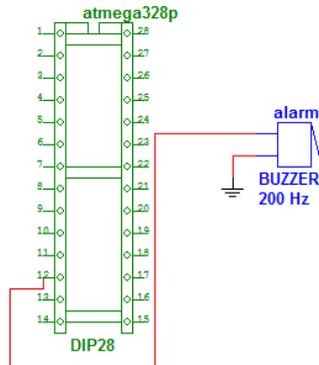


Fig:-5 Alarm for road user

VI. RESULT

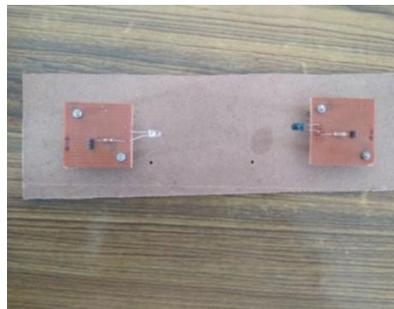


Fig:6 IR transmitter and Receiver



Fig:-7 Gate Operation

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