RASPBERRY PI BASED AUTOMATIC RAILWAY GATE CONTROL AT LEVEL CROSSING USING IMAGE PROCESSING

Mrs.P.Kusuma Vani[1], T.Bhagya Sree[2],P.SumanLatha Rao[2], K.V.Sravani[2], V.VenkataRamana Murthy[2].

[1] Assistant Professor of ECE, Raghu Institute Of Technology,Visakhapatnam, India
[2]UG Students of ECE, Raghu Institute Of Technology, Visakhapatnam, India

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Abstract – About a million people have died over the past five years in unmanned railway crossing all over the world. At least 1/3rd of the railway crossings are unmanned due to their remote placement and less traffic. **The Automatic Railway Gate Control System Using Advanced Technology** focuses on systematic traffic control of railway gates that are both manned and unmanned. The AutomaticRailway Gate Control System Project makes use of a Raspberry Pi to control the whole circuit. Two servomotors are used to close and open the railway gates. And instead of IR sensors an effective cam is used to sense the object more effectively like a human eye. With thehelp of this project we will be working on Raspberry Pi along with the Python program to implement identifying different objects in the image captured by the cam connected to the Raspberry Pi. This project would be a next level for the existing system and helps the upcoming technologies to give the feasibility of enhance the methods of developing this system all over the country.

Keywords: Raspberry pi, Cameras, Python

1. INTRODUCTION

The railway system is most widely used mode of transportation in India which makes the railway safety crucial aspects for its operation. It is one of those modes of transport that has to face lots of challenges due to human errors such as level crossing accidents. The traffic at the level crosses is controlled by manually operated gates by the gate keeper. In order to avoid the errors caused by the human interventions, the proposed work in the paper introduces a concept of automatic opening and closing of railway gates at the level crossing. The accident at level crossing is one of the major challenges faced by the Indian railways for which lots of ideas and efforts have be employed to overcome this major issue. We proposed a new system for the automatic control of railway gates using Raspberry Pi.

2. LITERATURE SURVEY

Automatic Railway Gate Control System through reference paper research, these are the papers we have considered for our research.

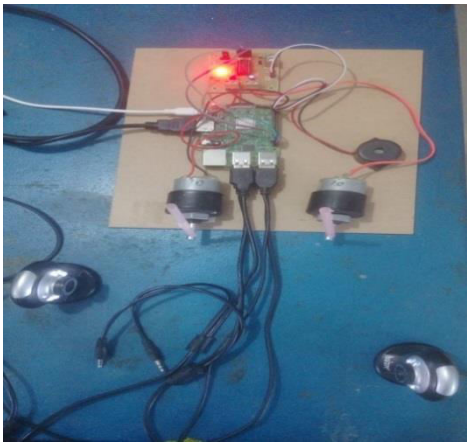
2.1 AUTOMATIC RAILWAY GATE CONTROL USING MICROCONTROLLER 8085:

This paper utilizes two powerful IR transmitters and two receivers; one pair of transmitter and receiver is fixed at upside (from where the train comes) at a level higher than the human being in exact alignment and similarly the other pair is fixed at downside 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 railway.

2.2 AUTOMATIC RAILWAY GATE CONTROL BY ARDUINO:

In this proposed system, sensors are used to detect the train arrival and departure. The system uses three different sensors to control the train arrival and departure. Arduino is used to program the sensors. In this proposed model the servo motor is used for monitoring of cross way and IR sensor is used to detect the motion of objects near by the cross way, which when detects the Automatic Railway Gate Control Using Arduino.

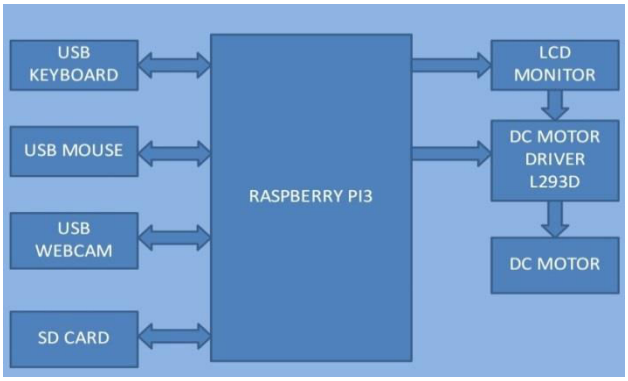
3.PROPOSED MODEL



Our proposed model describes about Raspberry pi based Automatic Railway Gate Control At Level Crossing Using image processing. The Automatic Railway Gate Control System makes use of Raspberry Pi to control whole circuit. The main objective of our project is to close the railway gates while the train approaches it, so as to block vehicles from going across the track. As soon as the train moves further away from the railway crossing, the gates must automatically open to allow vehicles to cross the track.

4. BLOCK DIAGRAM

The Block Diagram consists of a Raspberry Pi3 model, USB Keyboard, USB Mouse, USB, Web Cam, SD card, DC Motor Driver, DC Motor and a LCD Monitor.



4.1 RASPBERRY PI3 MODEL:

Raspberry Pi is a mini computer that was specifically created to make tech learning easier. It has a lot of components for computer based projects like USB ports, an Ethernet port, an SD card slot, Wi-Fi Antenna, and many more. The Raspberry Pi3 Model B is the latest version a tiny credit card size.

4.2USB mouse:

If you prefer to use a Bluetooth Keyboard and Mouse, you could just get a Bluetooth Adapter.

4.3 SD Card:

The micro SD card must have at least 8 GB of storage.

4.4 DC Motor Driver:

The L293D series of three terminal regulators is available with several fixed output voltages making them useful in wide range of applications. The L293D series is available in an aluminum TO-3 package which will allow over 1.0A load current if adequate.

4.5 Camera:

An internet protocol camera, commonly referred to an IP camera, is a digital video camera much like web cam, which transmits and receives data over a network.

4.6 Monitors:

Unlike CRT monitors, LCD monitors display information well at only the resolution they are designed for, which is known as the native resolution. Typical brightness ratings range from 250 to 350 cd/m2 for monitors that perform general-purpose tasks.

5. WORKING

The input/output modules are interfaced to the Raspberry Pi. The input part, keyboard and mouse are used to pass the commands to the Raspberry Pi and webcam to capture image which are stored in Secure Digital Card and is also used to compare an image from those stored in database. On the other hand the output part consists of monitor, DC motor followed by its driver L293D and motor. We need to connect the monitor in order to verify the image captured by the webcam which will be used for detecting the entity. Python based commands are provided as an input to the Raspberry Pi in order to save the images in the external SD card. Hence here by using Python code the images are captured and displayed on the monitor. If image captured is a train then a buzzer is used to give indication and then LED starts blinking and motor starts rotating and the gates get closed and after sometime the gates get opened.

6. RESULTS

Fig 1. Proposed Model after connections

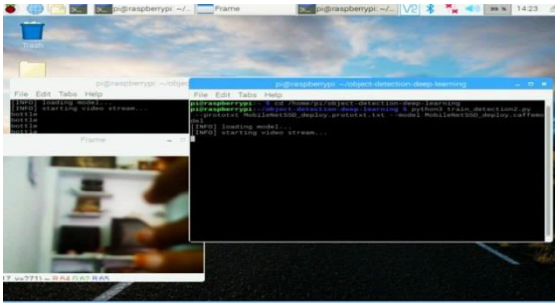


Fig 2. Terminal to give commands to run the code

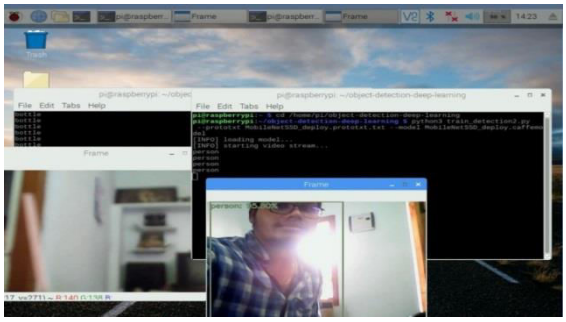


Fig 3.Results after detecting a person

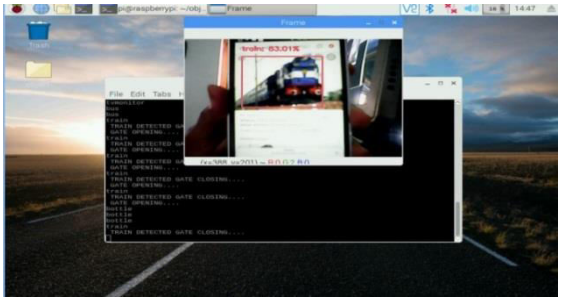


Fig 4. Results after detecting a train

7. ADVANTAGES

An Automatic Railway Gate Control is implemented with very simple hardware and easy control. Automatic Railway Gate Control System reduces the time for which gates remained closed. No human intervention is required. This makes its running cost very low compared to manned gates. Automatic operation prevents errors due to manual operation.

8. CONCLUSION

The automation of railway gate ensures that the opening and closing of railway gate should be on the right time though there is a delay in train schedule which also helps in considerable reduction of dense traffic jam at railway crossing. The working of IR sensors can be more challenge for this system since it can be affected by the animal or any other environmental obstacle. This can be overcome by use of Image Processing technique for the implementation of this system.

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BIOGRAPHIES

P.Kusuma Vani pursued M.Tech from Nishita college of Engineering and technology, Hyderabad. Presently working as Assistant Professor at Raghu Institute of Technology, Visakhapatnam, AndhraPradesh, India.

T.BhagyaSree pursuing B.Tech in Electronics and Communication Engineering from Raghu Institute of Technology, Visakhapatnam, AndhraPradesh, India

P.SumanLathaRao pursuing B.Tech in Electronics and Communication Engineering from Raghu Institute of Technology, Visakhapatnam, AndhraPradesh, India

K.V.Sravani pursuing B.Tech in Electronics and Communication Engineering from Raghu Institute of Technology, Visakhapatnam, AndhraPradesh. India

V.V.R.Murthy pursuing B.Tech in Electronics and Communication Engineering from Raghu Institute of Technology, Visakhapatnam, AndhraPradesh, India