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IR based application for automatic railway gate control systems

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Abstract
The "AUTOMATIC RAILWAY GATE CONTROL SYSTEM" with IR based application and ARDUINO NANO to systematic traffic control of railway gates that are both manned and unmanned. In Generally, there are manual gate control system which are maintained by person. As vehicles are increasing day by day it has become more difficult to control the gate manually. As a result, often accident occurs and many people become injured badly and sometimes it becomes very serious when people died due to this type of accidents. So, this work can help us to reduce accidents in our country by introducing automatic railway control system.In this work deals with one IR sensor, the sensor is fixed at certain distance of the gate, that is before the train arrive and after the train departure. Place the servo motor with a barrier attached to it so it can move up and down easily. Provide the power supply to ARDUINO so that the machine starts working. When the train arrives the sensor detects it and servo barrier blocks the crossing and when the sensor detects that the train goes away the servo barrier opens. In this way, the system works.

I. INTRODUCTION:

The railway system is most commonly used transportation mode in India. And railways preferred the cheapest mode of transportation compared to other transportation. In the rapidly flourishing country like ours, accidents at rail road crossing are increasing day by day. Railway safety is a crucial aspect of rail operation over the world. When we go through newspapers, we come across many railway accidents occurring at different railway level crossings and many people are dying and it causes severe damage to life and property. The place where rail track and highway/road intersect each other at the same level is known as "Level Crossing". Automatic railway gate control 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 a train approaches at the railway crossing from either side, the sensors placed at a certain distance from the gate detect the approaching train and accordingly controls the operation of the gate. To avoid accidents, sensors placed at a some distance from the gate detect the departure of the train. The signal bout the departure is sent to the Arduino nano, which in turn operates the motor and opens the gate. Thus, the time for which the gate closed is less compared to the manually operated gates. If reliability is high, as it is not subjected to manual errors. For the railway, the automatic gate controller has focuses on two main areas are information transmission and gate controlling. Problems related to information transmission concern train detection and fast

transmission of this information to control unit. Problems related to gate controlling very sophisticated and challenging. They comprise presence of train, immediate closing and opening of gates.

II. LITERATURE REVIEW:

- ✓ Saifuddin Mahmud et al [1], author's aims to provide an automatic railway gate at the level crossing replacing the gates operated by the gate keeper by detecting train and stuck on the level crossing, generating corresponding alert signal and controlling the gate. The controller unit determines whether the obstacle is train or stuck and takes necessary steps by controlling the gate, alarm generator and signal lights. Experimental studies show that the proposed methodology provides a more cost effective, reliable and simpler railway gate controller than existing dominant work.
- ✓ K. Pavani et al [4], author's discussed an Automatic Railway Gate control system, which utilizes the Microcontroller in the plan. This paper will build up a model of an entryway at the level intersection that runs consequently by utilizing a microcontroller, aside from that the interfacing program additionally had been produced for the integration part. The activity utilizing a microcontroller that coordinated with different circuits included, for example, power supply, IR sensor, motor, motor driver and LCD. All the circuits will join to show the activity of the microcontroller (AT89S52). This framework will make enhancements towards the programmed activity and diminishes human contribution, when there are issues that happened with ordinary entryway control system.
- ✓ M. Duraishanmugapriyan [11], author's aims to operate and control the unmanned Railway Gate in the proper manner in order to avoid the accidents in the unmanned railway crossing. 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. Hardware kit was designed and implement using IR based control. Program for railway gate control system is based on Arduino microcontroller with Arduino basic pro language.

RESEARCH METHODOLOGY:

PROPOSED SYSTEM:

- In Proposed system we are implementing IR based application for automatic railway gate control system.
- We are using IR sensor to detect an object by the distance .
- Whenever,the train arrives IR Sensor detects it and sends signal to arduino, and arduino sends output to motordriver to drive the motor in clockwise and anti-clockwise direction to close and opens the gate.

BLOCK DIAGRAM:

This system makes use of a ARDINO NANO, We will see the working of the simple Automatic railway gate control system project. The automatic railway gate control system project makes use of an arduino nano to control the whole circuit. Servo motor is used to open and close the railway gates.The sensor is fixed at certain distance of the gate, that is before the train arrive and after the train departure. The motor rotates in clockwise and Anti-clockwise direction to open and close the gate. As the sensor is placed at a particular distance away from the gates ,when the train arrives the gates automatically closes so that we can avoid accidents.Here, IR sensor is used to detect the object and the arduino nano is used to send the information to motor driver. Then the motor driver sends the signal to motor to open and close the gates.When the train cuts the IR rays of sensor ,the rays get reflected back on the photodiode and the information is sent to the arduino nano. The arduino nano drives the dc motor in clockwise direction and the gate will be closed. Similarly, when the sensor detects the departure of the train, then again information is sent arduino nano . The arduino nano rotates the motor in anti-clockwise direction and gates will be opened.

HARDWARE REQUIREMENTS:

- ✓ IR Sensor
- ✓ L293D Motor Driver
- ✓ ARUDINO NANO
- ✓ Toy Train
- ✓ Power supply
- ✓ LCD
- ✓ Buzzer

IR SENSOR:

FIG1: IR SENSOR

ARDUINO NANO:

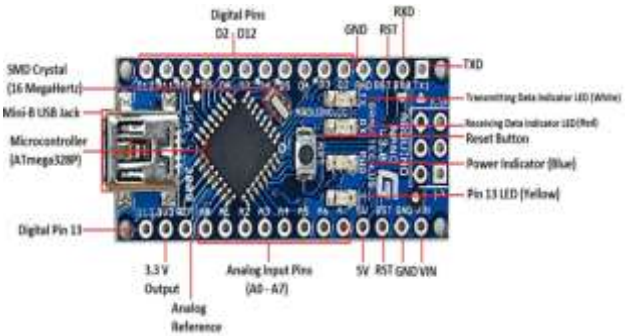

Fig-2: Hardware component Arduino Nano

The Arduino Nano is open-source hardware! The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

LM293D MOTOR DRIVER:

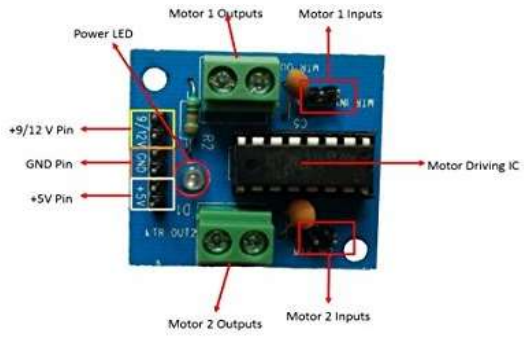

FIG3: MOTOR DRIVER

III. FINDING AND DISCUSSION:

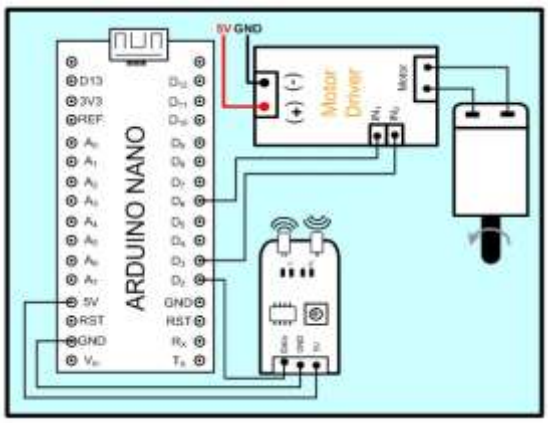

Fig-4 :Circuit Diagram

IR Sensor:

- Data goes to D2 on arduino.
- GND goes to ground pin on arduino.
- 5v goes to 5v on arduino

Motor Driver:

D3 goes to input2 of motor driver.
D6 goes to input1 of motor driver.

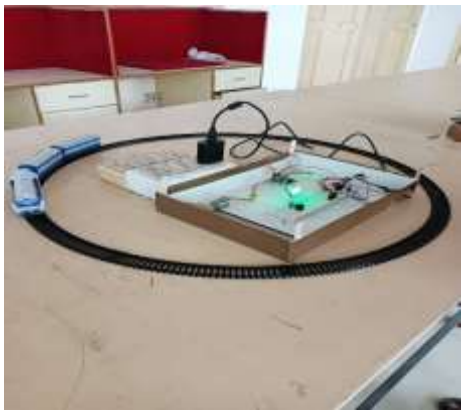

Fig5: Hardware Implementation

IV. CONCLUSION AND FURTHER RESEARCH:

Automatic gate control system an effective way to reduce the occurrence of railway accidents. This system can contribute a lot of benefit either to the road users or to the railway management. As the system is completely automated, it avoids manual errors and thus provides ultimate safety to road users. By this mechanism, presence of a gatekeeper is no necessary and automatic operation of the gate through the motor action is achieved.

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