Automated Signaling For Railway Crossing

Team Members

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Agenda

- Introduction to arduino
- Abstract
- Module Identification
- Architecture Diagram
- Equipment Identified
- Time Line Chart
- References

1. Introduction

- Introduction to Automatic Railway Gate Control.
- Basics of arduino.
- What is Arduino software (IDE) ?
- Specifications of Arduino (Why Arduino ??).
- About Sheilds.
- Functioning of control system.

Abstract

The main aim of our project is to automatize the railway crossings in order to avoid accidents due to human negligence.

In general, Railway gates are opened and closed manually by the gatekeeper.

Some railway crossings are totally unmannered and many railway accidents occur at these unmannered level crossings.

To avoid the human intervention our project (Automated railway gate control system is very useful which helps to automatically open and close the railway gate upon arrival and departure of the train.

2. Module Identification

Arduino Uno R3:

It is a microcontroller board based on removable (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins(of which 6 are PWM outputs and 6 are Analog input . R3 is the 3rd , latest and revised of Arduino Uno.

Power Supply:

An external voltage must be supplied to the board. The recommended voltage rating is 7v to 12v . Additionally it has a regulator of 5v.

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LED lights:

Led lights are like indicators that glow when the train is approaching and leaving from the crossing.

DC Motor:

DC motor has a key role in opening and closing of the gates. As the sensor recieves the information of the train, it is forwarded to the arduino further it is analysed and sent to the DC motor to open/close the gate.

Continued……

IR Obstacle sensor:

It is the sensor used to detect the obstacle. This is a reflecting sensor. It has a source and reciever adjacent to each other. When there is no obstacle the IR radiations pass through. But if there is an obstacle then the IR radiations are reflected approaching the reciever indicating an obstacle.

L293D Motor driver:

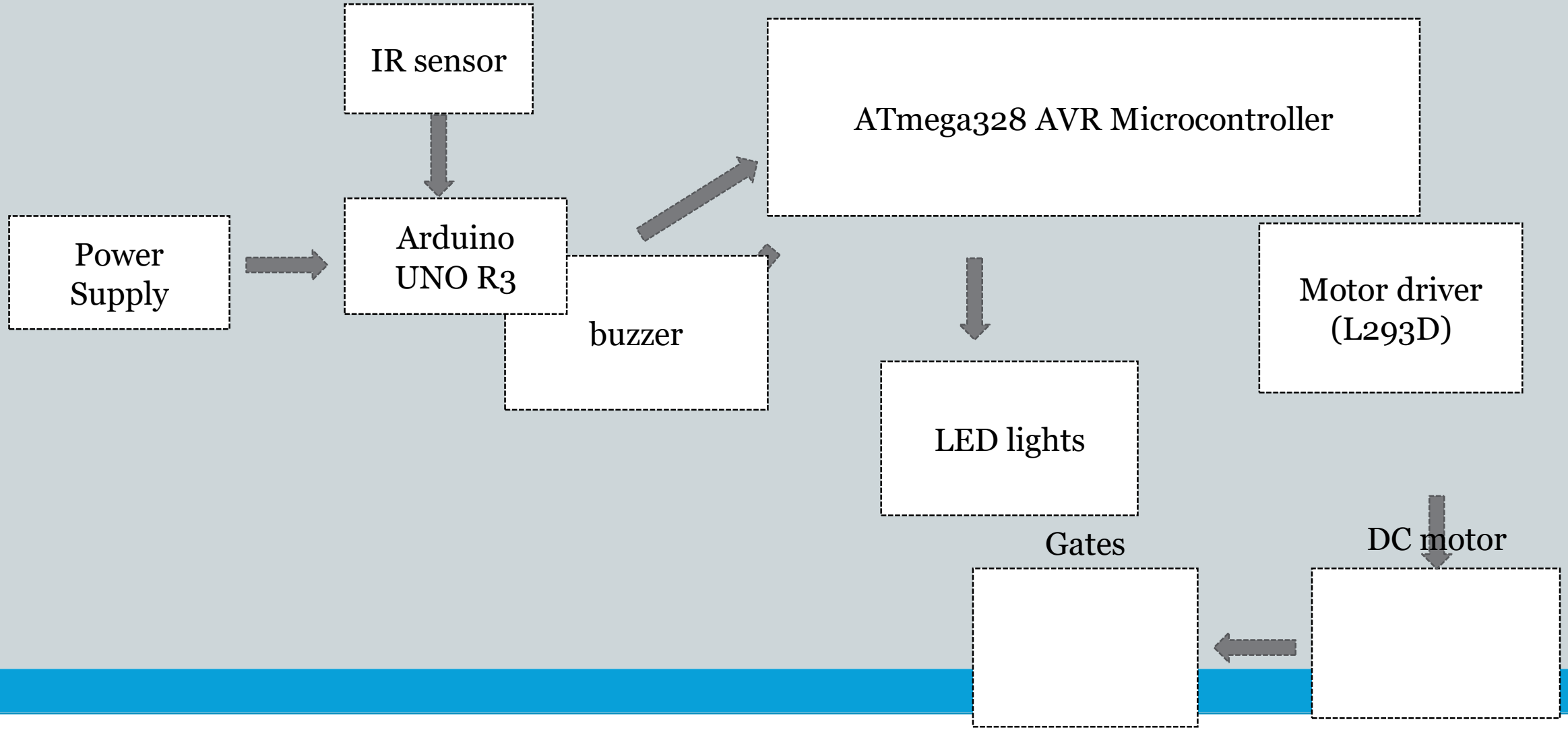
Motor driver act as bridge between the controller and the motor. It analyses the information from the controller and then commands the motor to function.

Continued.....

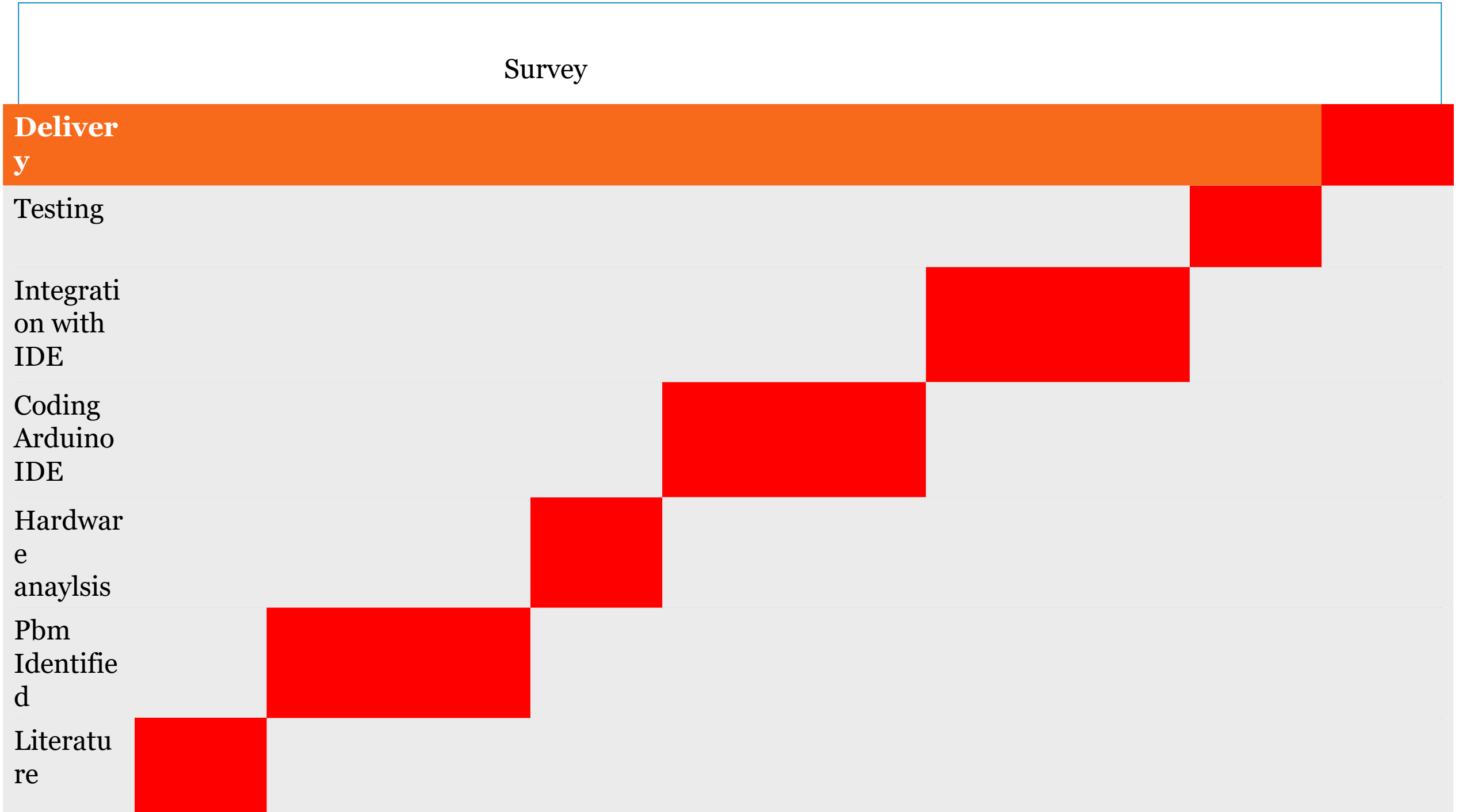
Buzzer:

A piezo buzzer is basically a tiny speaker that can be connected directly to the arduino board(one to the 8th pin and the other to the ground). From an arduino , you can make sounds with a buzzer by using a tone.

3. Architecture Diagram



4. Eqipment Identified


Survey
Deliver y
Testing
Integrati on with IDE
Coding Arduino IDE
Hardwar e anaylsis
Pbm Identifie d
Literatu re

5. Timeline Chart

6. References

1. http://www.arduino.cc/en/Guide/ArduinoUNOR3
2. http://playground.arduino.cc
3. http://learn.adafruit.com/category/learn-arduino
4. Sams Teach Yourself “Arduino Programming” by Richard Blum , Pearson Education 2015.

AUTOMATED SIGNALLING FOR RAILWAY CROSSING

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ABSTRACT

From this project we'll know how to implement the automation in railway gate control using Audrino. Application of this project is the direct implementation in

real world. Some components will be required more but the main working principle will be same. Now, other alerting systems can also be developed by using Audrino. The main aim of this project is to reduce train accidents at railway level crossings to the minimum.

1. INTRODUCTION:

1.1. Auromatic Railway Gate Control using Audrino Level crossing is that area where the rail line intersects with the road which is used by transportation or other vehicles.To prevent accidents a system named “Level Crossing” has been developed.But in early days all the level crossings are operated by humans.So human interference was mandatory.But,manual control is not erros free.The railway gate or level crossing is opened or closed by a gateman who was informed from the nearest railway station about the arrival of a train. There’re also many level crossings in India which are unmanned.So they are potentially dangerous for road users. In India we must develop a prototype to be implemented to automatically control railway gate upon arrival as well as departure of train.The project should not be too much expensive but must be reliable.So we used Audrino uno R3 which is quite reliable as well as affordable. We started to develop our project based upon 8051 microcontroller which is also cheaper than Audrino.But in terms of of reliability and implementation of future featured we upgraded to audrino uno.

2. OBJECTIVE:

A level crossing is an intersection where a railway line crosses a road or path at the same level, as opposed to the railway line crossing over or under using a bridge or tunnel. The term also applies when a light rail line with separate right-of-way or reserved track crosses a road in the same fashion. Other names include railway level crossing, grade crossing, road through railroad, railroad crossing, train crossing, and RXR.

3. PROBLEM DEFINING:

The history of level crossings depends on the location, but often early level crossings had a flagman in a nearby booth who would, on the approach of a train, wave a red flag or lantern to stop all traffic and clear the tracks. Gated crossings became commonplace in many areas, as they protected the railway from people trespassing and livestock, and they protected the users of the crossing when closed by the signalman/gateman. In the second quarter of the 20th century, manual or electrical closable gates that barricaded the roadway started to be introduced, intended to be a complete barrier against intrusion of any road traffic onto the railway. Automatic crossings are now commonplace in some countries as motor vehicles replaced horse-drawn vehicles and the need for animal protection diminished with time. Full, half or no barrier crossings superseded gated crossings, although crossings of older types can still be found in places. New technology is advancing to create new ways of protecting the railway from users of a level crossing, with one of the most recent being obstacle detection scanners fitted to some crossings in Europe. In rural regions with sparse traffic, the least expensive type of level crossing to

operate is one without flagmen or gates, with only a warning sign posted. This type has been common across North America and in many developing countries. Some international rules have helped to harmonize level crossing. For instance, Article 23b stand that one or two blinking red fire indicates a car should stop, when if they are yellow the car can pass with caution. This has been implemented in many countries, including countries not being part of the Vienna Convention. • in its article 27, a stop line is suggested at grade crossing • article 33, 34, 35 and 36 are specific to level crossing, because level crossing are recognized as dangerous • article 35 indicates a cross should exist when there is no barrier 12 A majority of the level crossings in India were manually regulated. Signals and barriers are installed at all crossings while manual crossings are additionally required to have the hand red and green signal flags. But Indian Railways aims at elimination of all unmanned crossings and replacing it with manned crossings.

4. BACKGROUND:

Railway accidents may be classified by their effects, e.g.: head-on collisions, rear-end collisions, side collisions, derailments, fires, explosions, etc. They may alternatively be classified by cause, e.g.: driver and signalman error; mechanical failure of rolling stock, tracks and bridges; vandalism, sabotage and terrorism; level crossing misuse and trespassing; natural causes such as flooding and

fog; hazards of dangerous goods carried; effectiveness of brakes; and adequacy of operating rules.

India's deadliest rail accidents were the Bihar train disaster (500–800 killed), the Firozabad rail disaster (358 killed), the Gaisal train disaster (285 killed) and the Khanna rail disaster (212 killed).

Though this prototype is simple to build and highly reliable but there're some obstacles too. Rather than a train if an animal or other object is placed in front of the IR sensor the alarm will and the gate will be closed which is not desirable at all.Also other natural obstacles like fog may arise problems. 28 There're also a scope of alerting the nearest railway station about arrival and departure of the train.

5. METHODOLOGY/PROCEDURE

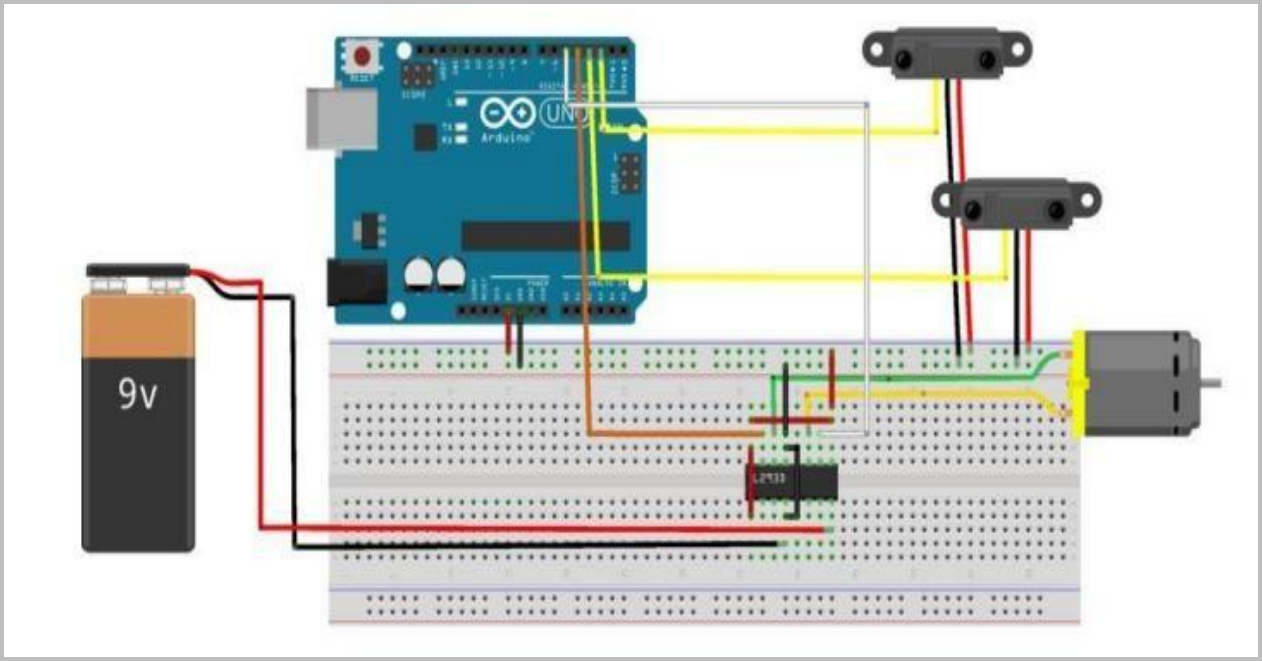
The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc.The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE(Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the

Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.[3] The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

THINGS USED IN THIS PROJECT:

1. Audrino Uno R3
2. L293D motor drvier
3. Lm 358 IC
4. IR sensor Pairs
5. Stepper Motor
6. Buzzer
7. LEDs
8. Jumper Wires

BASIC CIRCUIT DIAGRAM:


9v
L293D

6. CONCLUSION AND IMPROVEMENTS:

The problems indicated above can be overcome by adding some extra modules. Like we left the GSM module for future scope.After adding this module,upon arrival and departure of train,the GSM module will send an SMS to registered phone number for acknowledgement and safety. Also adding a pair of pressure sensor increases the chance of fault triggering of gate as well as alarm. After adding the pressure sensor , the audrino closes the gate after reciving both signal from IR sensor as well as pressure sensor.

7. REFERENCE:

1. http://www.arduino.cc/en/Guide/ArduinoUNO R3
2. http://playground.arduino.cc
3. http://learn.adafruit.com/category/learn-arduino
4. Sams Teach Yourself “Arduino Programming” by Richard Blum , Pearson Education 2015.

9. APPENDIX:

Code used is:

```
int   mpin1;

int   mpin2;

int mdelay;


void setup() {


  pinMode(13,OUTPUT); // Green LED pin

  pinMode(7,OUTPUT); //Buzzer & Red Light pin


  //IR sensors pins

  pinMode(8,INPUT);

  pinMode(9,INPUT);


  //Initially turning on the Green LED.

  digitalWrite(13,HIGH);


  //motor pins

  mpin1 = 2;

  mpin2 = 4;
```

```
  pinMode(mpin1, OUTPUT);
  pinMode(mpin2, OUTPUT);

  mdelay = 200;

  Serial.begin(9600);
}

void loop()
{

  //IF IR sensors sense the train, then it will give LOW signal.
  if(digitalRead(8)==LOW){

    //Turning off the GREEN LED
    digitalWrite(7, HIGH);

    //Turning on the Buzzer & RED LED
    digitalWrite(13, LOW);

    Serial.println("buzzer on");
```

```
//Shutting down the gate
digitalWrite(mpin1, HIGH);
digitalWrite(mpin2, LOW);

delay(mdelay);
//the gate has been shut down, stop motor
digitalWrite(mpin1, LOW);

//wait for the other IR on the opposite side to give signal
while(digitalRead(9)==HIGH){
}


digitalWrite(7, LOW);
digitalWrite(13, HIGH);

Serial.println("buzzer off");

delay(500);
```

```
  //The train has passed, open the gate, rotate the motor opposite direction
  digitalWrite(mpin2, HIGH);
  delay(mdelay);

  //the gate has been opened, stop the motor
  digitalWrite(mpin1, HIGH);
  delay(500);

} else if(digitalRead(9)== LOW){
  digitalWrite(7, HIGH);
  digitalWrite(13, LOW);
  Serial.println("Buzzer on");

  digitalWrite(mpin1, HIGH);
  digitalWrite(mpin2, LOW);

  delay(mdelay);

  digitalWrite(mpin2, HIGH);

  while(digitalRead(8)==HIGH){
  }
```

```
    digitalWrite(7, LOW);
    digitalWrite(13, HIGH);

    Serial.println("Buzzer off");

    delay(500);

    digitalWrite(mpin1, LOW);

    delay(mdelay);

    digitalWrite(mpin1, HIGH);

    delay(500);
  }

}
```

THANK YOU