INTRODUCTION:-

PROJECT OVERVIEW:

Sensor based railway gate automation system is developed to automate the process of opening and closing of gate at the railway level crosses. The system detects the arrival and the departure of train for the gate operation using different types of sensors. The proposed system uses three infrared sensors to identify the arrival and departure of trains. The system also implements obstacle sensor which detects any obstacle on the track and controls the operation of the train. Sensors and servo motors are programmed using Arduino micro-controller.The major components used in the automation of railway gate at the level gates are sensors. Sensors that detects the train can be classified into different types such as: Wheel detecting sensor: Wheel sensors works on magnetic inductive principle. The DC current is generated as the output signal from the wheel detectors are used for the detection of train arrival. Vibration sensor: Vibration sensors uses piezoelectric effect to detect the vibration in the track which detects the arrival and departure of the train. The output signal from the vibration sensor is fed into the micro-controller and it automates the gate operations. The major application of the vibration sensor is collision detection. IR sensor: IR sensors detect the train using infra-red receiver and transmitter. Infra-red sensors are capable of detecting the presence of an object by sensing the heat being emitted by the object. It emits or detects the radiations to detect the motion of an object surrounding it. The most commonly used sensors for the automatic railway gate system is vibration sensors and IR sensors

PURPOSE:

The present work attempts to automate the opening and closing of gates at a railway level crossing. In general, level crossing gates are operated manually by a gate keeper. The gate keeper receives the information about the train arrival from a near station. When the train starts to leave the station, the station in-charge delivers this information to the closest gatekeeper to get ready. This human intervention can be avoided by automating the process. In situations where the train is late due to some reason, the gates remain closed for long durations causing dense traffic jam near the gates. This too can be prevented by automation. The proposed system uses infrared sensors to detect the arrival and departure of trains at the railway level crossing and Arduino to control the opening/closing of gates. The system uses two IR sensors to detect the arrival of the train and a third IR sensor to detect the departure of the train. When the arrival of the train is sensed, signals are provided to the traffic indicating the arrival of the train on the track. When the second sensor detects the train then the signal

turns red and the motor operates to close the gate. The gate remains closed until the train completely moves away from the level cross. When the departure of the train is detected by the third sensor, the traffic signal turns green and the motor operates to open the gate. Thus automation of the gate operations at the railway level cross is achieved using sensors**.**

LITERATION SURVEY:-

REFERENCES:

1.Mr. Hasib Md. Abid Bin Farid, Assistant Professor, Dept. of EEE, AUST

2.www. automatic railway gate control system project .com

PROBLEM STATEMENT DEFINITION:

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.

IDEATION & PROPOSED SOLUTION:

PROPOSED SOLUTION:

Our Proposed System is a practically working system. Our idea is very simple and effective. The idea is to close the railway level crossing gates automatically and to open them automatically, during the time of train's arrival and departure respectively. Automated concept is to reduce the number of accidents with less manpower. In our system, we are placing ultrasonic sensors near the railway tracks. Ultrasonic sensors are

used in this system, because it has a very high range of 4 meters (which is better than other sensors). At a certain distance before the level crossing and after the level crossing, these ultrasonic sensors are placed. The reason for sensor placement is to sense, both the train's arrival and departure correctly and effectively. As soon as the train reaches the 1st sensor which is been placed before the level crossing, senses or detects the train, it sends a message to the Arduino connected, and then the buzzer will be turned on automatically so that the road users will be able to know that the train is nearer to the crossing and they can wait till the train passes by. As soon as the buzzer sound starts, the servo motor connected with the level crossing gates will close them automatically. The reason to use servo motor in our system is that it is working is based on Angular Rotation which means that at first the gates will be at 90° which is open, at then during the time of train's arrival the gates will be at 0° (closed), and after the train passes by it will return its original position which is 90°(opened). The proper working of the level crossing gates are because of the attached servo motor (with angular rotation). In case if we have used other motors there would have been a problem in opening and closing of gates because they lack angular rotation. This servo motor helps the gates to come back to normal position(90°) from closed position(0°) instead of going into the ground (270°). As soon as the train passes the second sensor, placed at a certain distance after the level crossing gates, buzzer sound will be turned off itself and the gates will open automatically, and then the road users can use the level crossing road safely. The second Ultrasonic sensor is placed a little far, comparatively higher distance than the distance between 1st Ultrasonic sensor and the level crossing gates(because of the train's length). This whole design is connected with the Arduino Nano ATMEGA 328p, which has a code uploaded in it before the whole process. Code is the main key to work the whole system. Though the idea and working of our system is simple, it's usage will be more effective. It will definitely reduce the railway level crossing accidents and will ensure people's safety

PROPOSED SOLUTION FIT:

Working in this project ,some problems have been faced by us .The problems aregiven below:

First of all, the value of resistances should be changed as the voltagechanges with the change of light .It is very difficult to vary the resistance for the perfect operation

Another problem is IR sensor easily damages so that the operationhampers.

IR sensor is light dependent sensor. It varies with the change of light so it isnot applicable for all environment

IR sensor works at a certain distance .If the distance is increased the IR willnot work which is a drawback of this project..

REQUIEMENT ANLAYSIS:-

FUNTIONAL REQUIREMENT:

1. Audrino Uno
2. IR sensor Pairs
3. Servo Motor pairs
4. Buzzer
5. LEDs
6. connecting Wires

NON-FUNCTIONAL REQUIREMENTS:

1.TRAIN

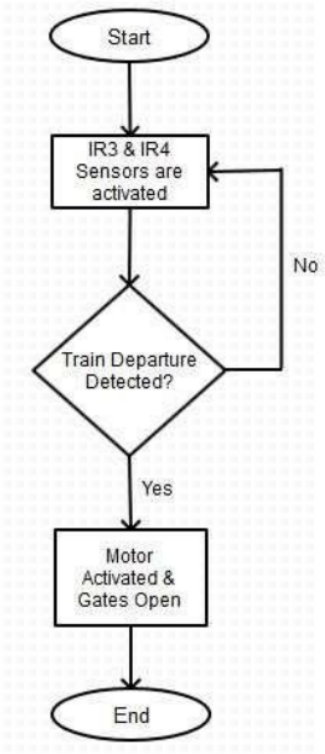
2.TRACK

3.GATE

PROJECT DESIGN:-

DATA FLOW DIAGRAM:

Architecture diagram



USER STORIES:-

When we turn ON the circuit there is no IR radiation towards photodiode and the Output of the comparator is LOW. When we take some object (not black) in front of IR pair, then IR emitted by IR LED is reflected by the object and absorbed by the photodiode. Now when reflected IR Falls on Photodiode, the voltage across photodiode drops, and the voltage across series resistor R2 increases. When the voltage at Resistor R2 (which is connected to the non-inverting end of comparator) gets higher than the voltage at inverting end, then the output becomes HIGH and LED turns ON.Voltage at inverting end, which is also called

Threshold Voltage, can be set by rotating the variable resistor's knob. Higher the voltage at inverting end (-), less sensitive the sensor and Lower the voltage at inverting end (-), more sensitive the sensor

CODING AND SOLUTION:-

```
#include<Servo.h>
int ir1=2;
int ir2=7;
Servo myservo1;
Servo myservo2;
void setup()
{
  pinMode(ir1, INPUT);
  pinMode(ir2, INPUT);
  pinMode(13,  OUTPUT);
  pinMode(12,  OUTPUT);
  pinMode(11,  OUTPUT);
  myservo1.attach(3);
  myservo2.attach(5);
}
void loop()
{
  if(ir1==LOW)
{
  myservo2.write(90);  //sets the servo at 90 degree position
  myservo1.write(90);  //sets the servo at 90 degree position
  digitalWrite(13, HIGH);//LED
```

```
  digitalWrite(12, HIGH);//BUZZER
  digitalWrite(11, LOW);//LED
}
else if(ir2==LOW)
{
  myservo2.write(0);   //sets the servo at 90 degree position
  myservo1.write(0);  //sets the servo at 90 degree postion
  digitalWrite(13, LOW);//LED
  digitalWrite(12, LOW);//BUZZER
  digitalWrite(11, HIGH);//LED
}
}
```

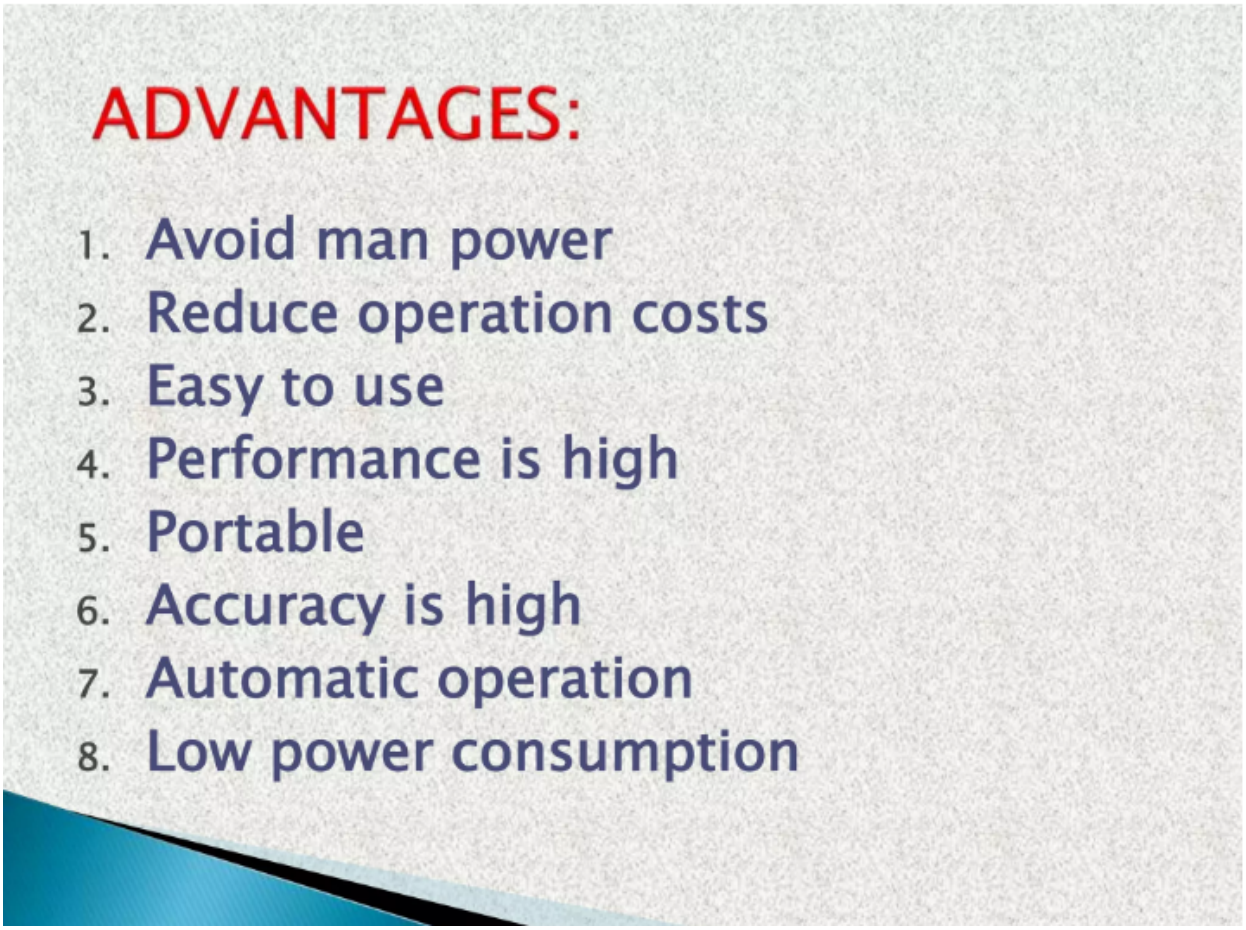
RESULT:-

PERFORMANCE MATRICES:

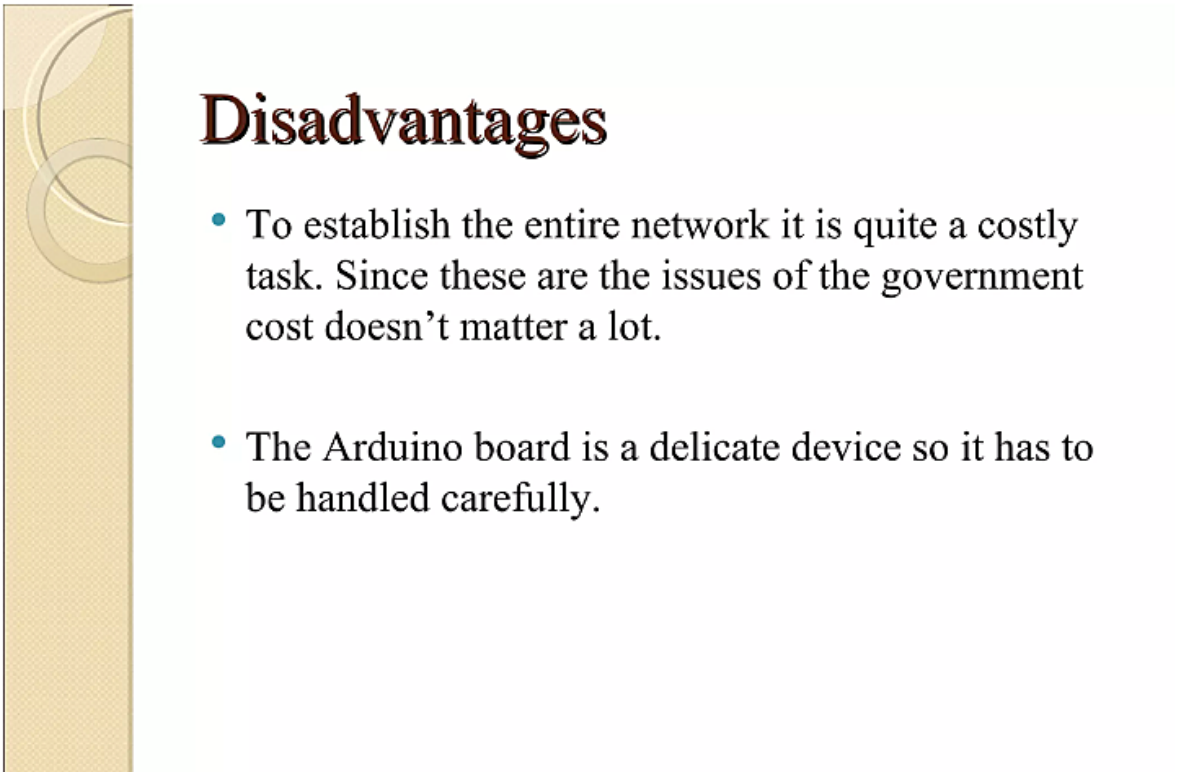
Our idea has been used and developed as a working model. A Railway track of diameter 60cm has been fixed. And the level crossing gate is setup containing two gates facing each other with a gap and the gates are fixed with LED lights and the servo motor has been fixed at the gates, an important point is that the tracks should be in between the level crossing setup. The distance between the level crossing gates is 20cm and the length of the road is 19cm. And the Ultrasonic sensors have been placed before and after the level crossing gates at a distance of about 20cm. And sensors are placed at a distance of about 6cm on each side of the track. The whole setup has been connected with the Arduino nano ATMEGA328p.
Buzzer is placed near the Arduino. The Arduino has been connected to the external power supply. After the whole setup is ready, a toy train is fixed on the track. Then the toy-train starts running with the help of batteries. To start the process, power supply is switched on. After that when we turn on the toy train, it starts running, and when the train comes nearer to the 1st

Ultrasonic Sensor, the crossing gates will be closed, and if it reaches the 2nd one the gates will open. The servo motor attached with the gates, which has Angular Rotation, helps the system with both the opening and closing of the gates. Like the gates, Buzzer will also be turned on automatically as soon as the train reaches 1st sensor and will be turned off when the train reaches 2nd one. During the whole process, the power supply should be turned on. And before all these operations the code for the whole process should be uploaded in the Arduino. The code can be transferred to Arduino with the help of Transmission cable, with the help of that the Arduino can be attached to the computer or Laptop easily. The code can be uploaded and reset easily. Arduino IDE software is used to upload the code in the computer to the Arduino

ADVANTAGES AND DISADVANTAGES:-



DISADVANTAGES:



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FUTURE SCOPE:-

FUTURE SCOPE OF THIS PROJECT

- By using this project, we can save man power.
- Here, there is no need of man. The circuit itself checks the presence of vehicle and automatically closes the gate by rising an alarm. Once we switch on the circuit, it automatically performs all these actions without man handling.
- It is the most advantage of this project. For this reason,in future, this project may be used in railways and also in apartments, military,etc.

APENDIX:-

Source code

GitHub & Project demo link