CONSTRUCTION AND PERFORMANCE TEST OF AUTOMATIC RAILWAY LEVEL CROSSING SYSTEM

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"AUTHORS"

ABSTRACT

The main aim of our project is to operate and control the Railway level crossing proper manner to avoid accidents in the railway level crossing. In our country where there are many railway level crossings, Accidents are increasing day by day. The railway level crossing can be operated to prevent accidents at the level crossing in terms of the speed of the train. The automatic Railway level crossing control System is an innovative circuit that automatically controls the operation of Railway level crossing detecting the arrival and departure of trains at the level crossing. This system uses a microcontroller, Arduino Uno with the help of two IR sensors. RF transmitter and RF Receiver for the transmission of sensor output to a controller which is in a remote location. The first part is the concern with the hardware development where allElectronic components have been included. IR sensors are the input components while the buzzer, DC servo motor, and LED. These are controlled by the controller circuit. The microcontroller forms the main unit of the system. It receives the input signal from the sensors and sends information to the DC servo motor driver for opening and closing the gate. The output signal Arduino Uno will activate and Buzzer. The first IR sensor is fixed at a certain distance from the level crossing and the second IR sensor is fixed at the same certain distance after the level crossing and the third IR sensor is placed near the level crossing. The gate is closed when the train crosses the first and second sensors and the gate is opened when the train crosses the third IR sensor.

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INTRODUCTION

1.1 Introduction

The Railway is an important transportation medium in the world. People all over the world mostly prefer the railway for their transportation. Similarly, the people of Bangladesh like train journeys as their priority, since it is less costly and safer than other vehicles. Most countries of the world take the railway as their main transportation medium and it is also at the center of their communication system. Being a developing country Bangladesh has many obstacles in developing its communication system and one of the major issues is the financial problem. As the railway system requires a big initial and running cost, development in this sector is a real challenge for a developing country. The railway system of the country was established during the British colonial period. Since then many roads have been constructed throughout the country and in hundreds of places, these roads crossed the railway. In busy cities like Dhaka, Chattogram, etc. these crossings become a major source of congestion on road. On the other hand, in country sides where traffic congestion is not an issue reluctant attitude of the people becomes a major source of accidents on these level crossings. Thus one of the main problems of the Bangladesh railway is that the railway level crossing system is manual, not automatic like in many other developed countries. It creates many problems and also causes many accidents. Many people lost their life and wealth because of these accidents. In these circumstances, the automated railway system is very needed for our country. Though the automated level crossing system is running in most developed country it's very hard for a country like ours. If we compare the people of Bangladesh to the people of the developed countries, it can be seen that the people of our country are not well educated and well trained with the technologies. They are also not aware of the traffic rules. Such ignorance sometimes becomes fatal and causes damage to lives and properties. [1]

Nowadays the number of train accidents is increasing day by day. In recent times we can see that the bus crushing with train, the car crushing with train and many people are dying because of these accidents. We also see the gateman are not always efficient in maintaining the gates at the level

Crossings when a train passes through a busy road. The main problem occurs at night because the gateman may fall asleep and can't receive any signal so an accident may occur. A similar problem occurs in country sides where the gateman may think that it is not a major problem and do not carry out his duty properly.

Another reason for these kinds of issues is the lack of manpower in the railway system. Due to lack of manpower, it is seen that one person carries out many functions in the busiest moment. They have to engage in multitasking like doing routine works alongside following the orders of their superiors, dealing with the public, etc. Many a time there are not enough skilled and educated people to handle the situations. Moreover, in socioeconomic conditions like ours, these issues often get buried and don't get attention to be solved.

Based on the above understandings this project work has been set to meet the following bjectives;

1.2 Objectives

1. To prevent accidents where gateman is not available.
2. To avoid collision between a train and other vehicles.
3. To provide a better traffic management system at the level crossing.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

Many countries nowadays are used automated railway level crossing. Because this is an easy and simple way. No gateman is required for this automated system. Many writers wrote about automated railway level crossing systems and show their project. Now we discussed their project. The previous project is that [1].

The main purpose of this paper is that opening and closing railway gates to minimize accidents at unmanned railway gates. This automatic system also identifies the person who is unnecessarily pulling the chains and alerts the station master about the position of the train using the GSM technique. It also identifies unwanted obstruction in the track by the anti-collision technique and detects the breakage in the track. This automatic railway system reduces the waiting time of road passengers at the railway crossings since it will identify the arrival of the train and thereby closing the gate when needed. [2].

The objective of this paper is to manage the control system of the railway gate using the microcontroller. The proposed model has been designed using an 8052 microcontroller to avoid railway accidents occurring at unattended railway gates, if implemented detection of a train approaching the gate can be sensed using two sensors placed on either side of the gate. This work utilizes two powerful magnetic sensors; one of these magnetic sensors is fixed at the up side (from where the train comes) and similarly, the other magnetic sensor is fixed at the down side of the train direction. Sensors are fixed on both sides of the gate. We call the sensor along the train direction as foreside sensor' and the other as 'after side sensor'. When the foreside sensor gets activated, the sensed signal is sent to the microcontroller and the gate motor is turned on in one direction by the relay driver and the gate is closed and stays closed until the train crosses the gate and reaches after side sensors.

When after the side sensor gets activated and the signal about the departure is sent to the microcontroller, the motor turns in the opposite direction and gate opens and the motor stops. [3].

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. [4].

The proposed model has been designed using an 8051 microcontroller and GSM module to avoid railway accidents without manpower. When the train reaches the sensors, the sensors can send the signal to the microcontroller and it activates the GSM module, it sends the message to another GSM module which is at the reception part. After receiving the signal to the microcontroller it can activate the motors to close or open the gates. While designing the gates if there is any obstacle is obtain it can give the intimation, which we can be averaged the buzzer. Again it starts working when the train passes over the station automatically the gates will be opened. [5].

The purpose of the research is to replace the manual system which is currently used. The ABB PLC is used to mechanize the system. Sensors such as Proximity are used to provide input to the system. And motor such as servo and DC motor serves as an output. A ladder diagram as a programming language is used to control the whole system between the input and output. With the help of an Ultrasonic sensor, the Proximity sensor the arrival and leaving of the system is Monitored and the bridge is operated accordingly. [6].

Automatic Railway Gate Control (ARGC) is managed and controlled by microcontroller 8051 and is more reliable since there is no human intervention in the process. This model, most primarily, is different from others in terms of the programming method and considering various possibilities that the actual railroad crossing system encounters. We have programmed 8051 using an Assembly Language Program (ASM). Infrared (IR) sensors are used which senses the presence of the train and conveys the information to 8051. 8051 is programmed accordingly to open or close the gate whenever required. Also, the steps for creating a hex file from the program are elaborated. Keil uvision-3 is being used to create the hex file.

Pressure Sensed Fast Response Anti-Collision System for Automated Railway Gate Control published by Engineering. [7].

This paper presents an innovative project design of a pressure sensor-based swift response anti-collision system for an automatic railway gate control. By replacing the manual system of railway

gate control at the level crossing it has been developing an automatic system in which the arrival and departure of the train will be sensed automatically to control the gate. The novelty of this project-based paper is the use of a pressure switch that has been integrated into this anti-collision system for the railway. By chance, if a vehicle gets stuck at the level crossing of the rail line, the pressure sensor will detect the object and will take the necessary action by following the developed algorithm. The whole operation of this project has been controlled by a Microcontroller PIC16F84A. Two IR sensors have been used to detect the arrival and departure of the train. IR sensor will give the signal to the Microcontroller and the Microcontroller will pass this signal to the DC motor and it will rotate as its requirement. This noble project is very much reliable, safe, and cost-effective. [8].

It uses IR (infrared sensor) for detecting the coming as well as going off a train. This automatic gate can be controlled using Microcontroller. It uses the first sensor to detect the coming of the train and a second one is used to detect the exit of the train. As the sensor detects the train then the gate is closed using a motor. The gate is closed until the train completelymoves away from the barrier. When the leaving of train motor operates to open the gate. Hence, automatic gate operations at the train barrier are achieved using IR sensors. [9].

The gate opening and closing are to be done using servo motors which are controlled by Arduino Uno. Besides, with this, the status of the gate will be given to the motorman well in advance which ensures more safety from the accident. Buzzers are used to indicate the closing of the gate for the people who are trying to cross the gate. This system helps in avoiding the increased number of accidents at the level crossing in India. The hardware is supported by the Arduino C programming. The proposed system is more reliable and cost-efficient. [10].

This paper presents a concept of **"CONSTRUCTION AND PERFORMACE TEST OF automatic railway level crossing system"** The main objective of this paper is to install the system in unmanned level crossing. It will make the road users aware of the train approaching the level crossing and reduce the risk exposure. Day-by-day accidents in the unmanned level crossing are increasing and no steps have been taken so far in these areas. By employing the automatic railway siren at the level crossing the arrival of the train is detected by the IR detector which is placed below the rails at about 3KM from the level crossing. Subsequently, the siren started to alarm. This system provides safety to road users by avoiding accidents and useful to the public.

Chapter 3

METHODOLOGY

3.1 Introduction

This project aims to make a project to automatic railway level crossing. In this project are used various instruments such as PLC, Arduino Uno, Microcontroller, Servo motor, IR sensors, Buzzer, and so on. These are discussed below.

3.2 Microcontroller

Microcontrollers are embedded inside devices to control the actions and features of a product. Hence, they can also be referred to as embedded controllers. They run one specific program and are dedicated to a single task. They are low-power devices with dedicated input devices and small LED or LCD outputs. Microcontrollers can take inputs from the device they control and retain control by sending the device signals to different parts of the device. A good example is a TV's microcontroller. It takes input from the remote control and delivers its output on the TV screen.

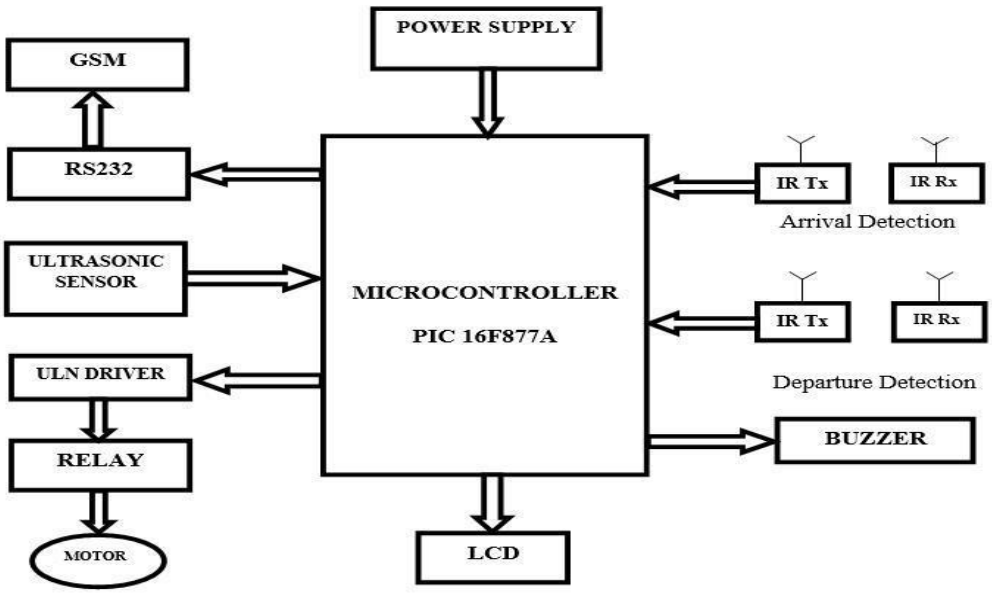


Figure 3.1: Block diagram of microcontroller system

3.2.1 Arduino Uno

It is a micro-controller based on an open-source electronic prototyping board that can be easily programmed with user-friendly software like Arduino IDE Arduino consists of both Hardware and Software where hardware is a physical circuit board available for connection of devices and software as IDE used for coding or programming of the system. The Arduino IDE uses embedded C as the basic coding language making the learning easy and process user-friendly. UNO is a popular board among beginners as easy learning and programming can be done here. Arduino board consists of the USB connection port used for proving a connection to the computer, a port for power supply, microcontroller for programming-based analysis of the system, analog as well as digital pins for connection as per requirement which can be done by using male to male or male to female connecting wires, ground, Rx/Tx which is receiver and transmitter LEDs are also available within the Arduino board. In addition to the hardware features, the Arduino IDE uses a simplified language for programming that is basic embedded C language which makes it easier to use and learn. Finally, Arduino provides a standard form factor that can break out the functions of the microcontroller into an easily accessible package.

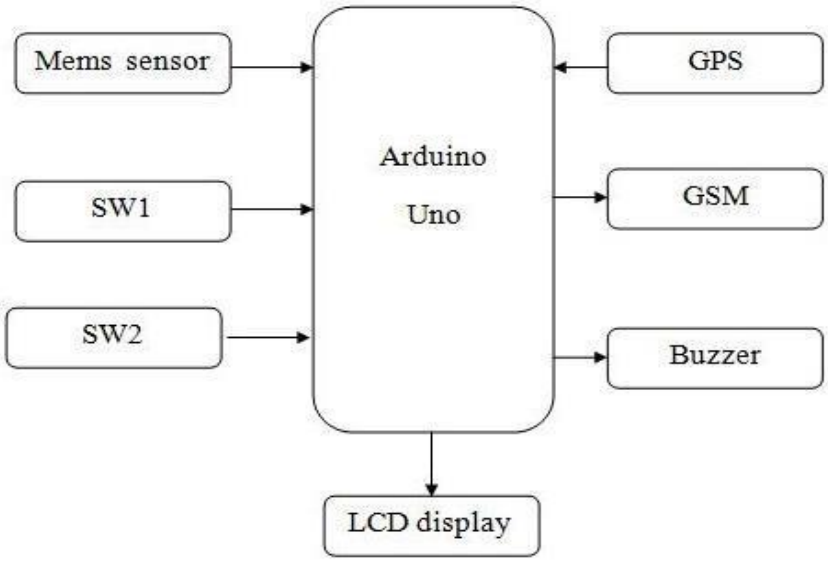


Figure 3.2: Block diagram of Arduino Uno

3.3 Servo motor

A servo motor has the capability of rotating the parts of machines with high efficiency and Precision on its own that's why it is a self-contained electrical device. The output the shaft has the capability of moving at a particular angle, position, and velocity which differs it from other motors. The controller is the most important part of the servo motor designed and used specially for this purpose. The servo motor is a closed-loop mechanism that incorporates position at feedback to control the rotational or linear speed and position.

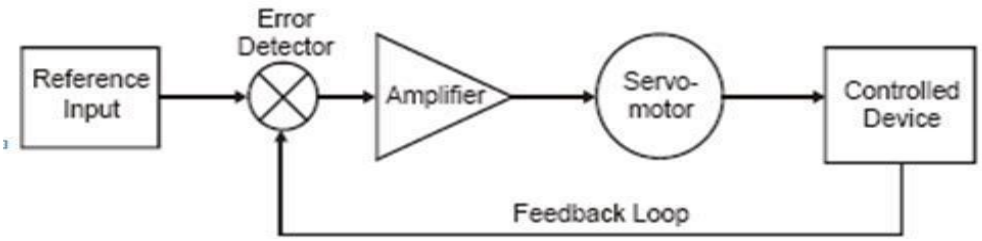


Figure 3.3: Block diagram of servo motor

3.4 Buzzer

A buzzer is a device that is used to make a beeping noise. The most commonly used buzzer is a piezoelectric buzzer. A piezoelectric buzzer is just made up of a flat piece of piezoelectric material which is having two electrodes. These type of buzzers requires an oscillator or something else like microcontroller to derive. If D. C supply is given, it will give a click. The buzzers are used where we want something which gives an audible noise. The buzzer in this proposed model is used for providing an alert warning about the arrival or departure of the train which is tuned with the Arduino. As the IR sensors detect the arrival or departure of the train, Arduino orders the buzzer to give a sound that denotes the alert of arrival/departure of the train

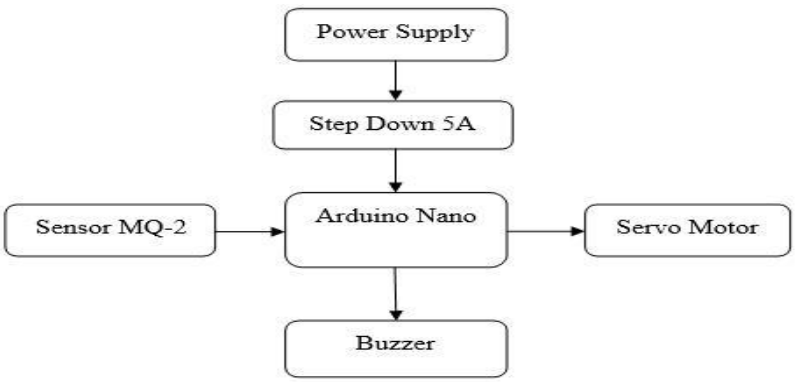


Figure 3.4: Block diagram of Buzzer

3.5 IR Sensor

In Today's world which is full of nanotechnologies, sensors play a very vital role, especially in robotics and Automations. Sensors make our life easy by automatically sense and control the devices. One of which is the IR sensor. IR sensor is a very popular sensor, which is used in Remote control systems, Line follower robots, and in our proposed system too i.e, Automatic Railway Gate control system. The working principle of the IR sensor is based on the IR LED which emits IR radiation falling on a photodiode which is used to sense that radiation. The resistance within the photodiode changes with a change in the number of radiations. The key benefits of infrared sensors include their low power requirements, their simple circuitry, and their portable features.

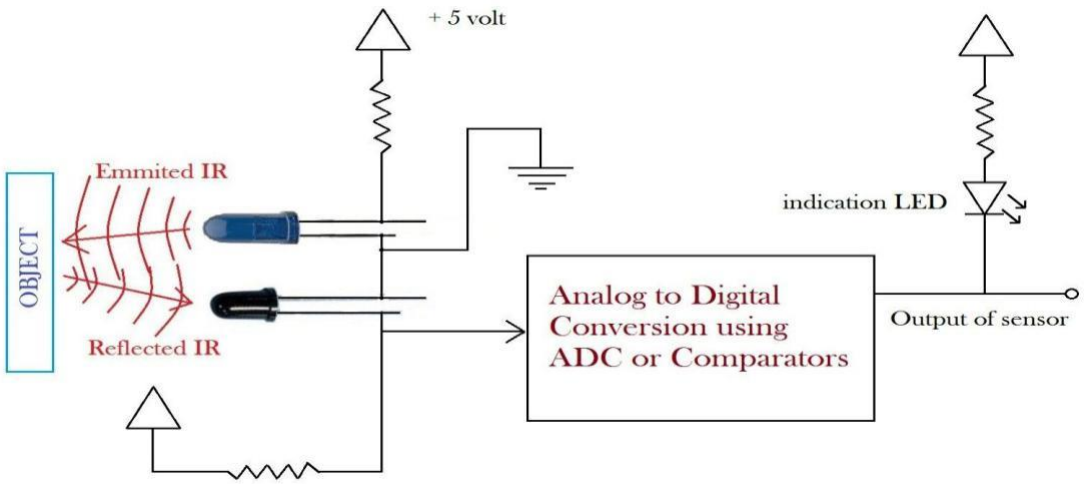


Figure 3.5: Block diagram of IR sensor

Chapter 4

PROJECT SET UP

4.1 Introduction

The whole project consists of several sensors and actuators as mentioned earlier. As the project is to design an automatic system for security at the level crossing of a railway the persons needed to Carry out the tasks at the crossing should be replaced by some controllers, sensors, and actuators. The main components of this project are as follows;

1. Arduino Uno
2. IR sensor
3. Servo motor
4. Buzzer
5. LED
6. Ultrasonic sensor
7. Breadboard
8. Connecting wire

4.2 Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the Microchip 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. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable It can be powered by the USB cable or by an external, though it accepts voltages between 7 and 20.

The word "UNO" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards it and version 1. 0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer

releases. The ATmega328 on the board comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

While the Uno communicates using the original STK500 protocol, [1]it differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

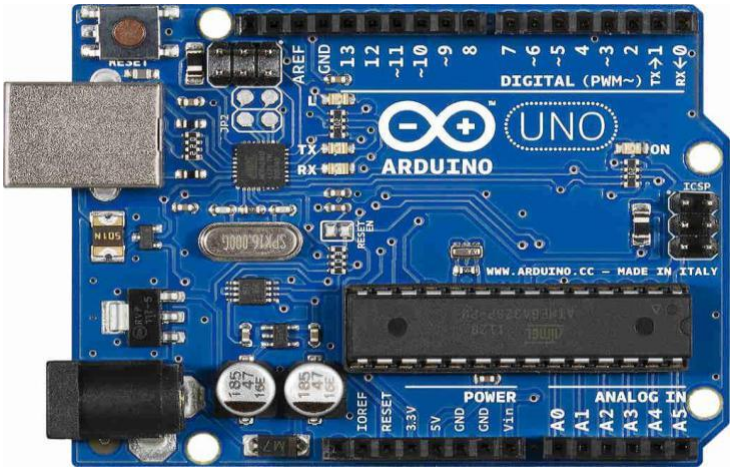


Figure 4.1: Arduino Board

4.2.1 Arduino UNO Pin diagram

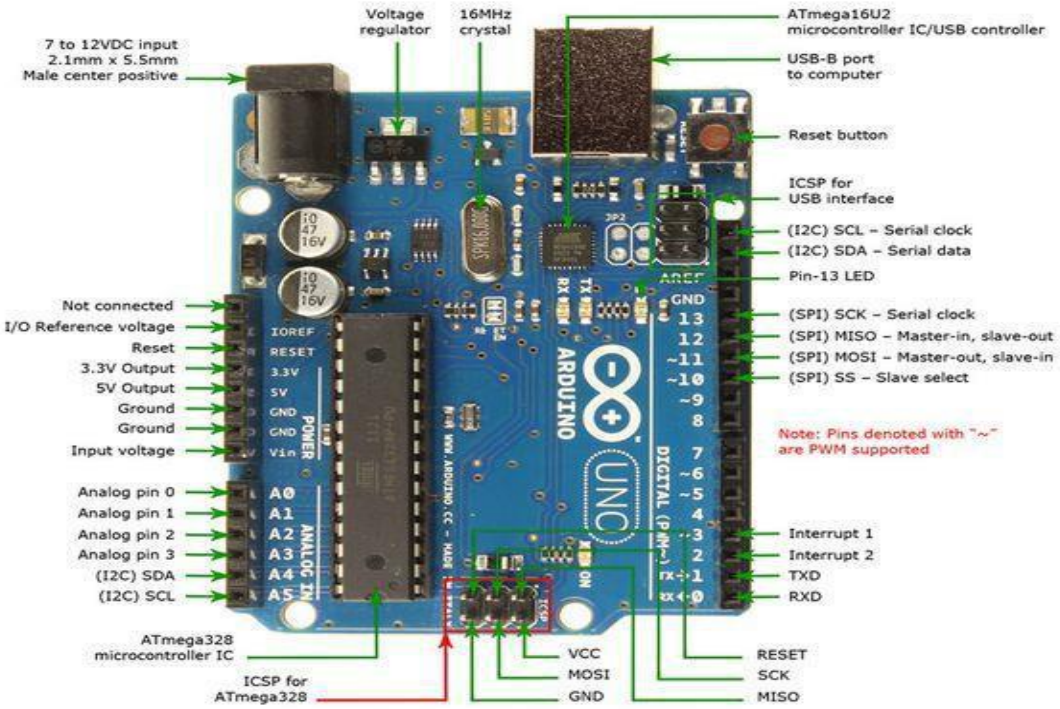


Figure 4.2: Arduino UNO pin diagram

Arduino Uno is a microcontroller board based on an 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists of other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header, and a reset button. The pin diagram of the Arduino UNO is given below

4.3 IR sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of the light (separated by a prism), he noticed thatthe temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light-emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors. And they are commonly used in obstacle detection systems (such as in robots).

Passive infrared (PIR) sensors only detect infrared radiation and do not emit it from an LED. PIR sensors are most commonly used in motion-based detection, such as in-home security systems. When reference in IR levels between the two pyroelectric elements is measured. The sensor then sends an electronic signal to an embedded computer, which in turn triggers an alarm.

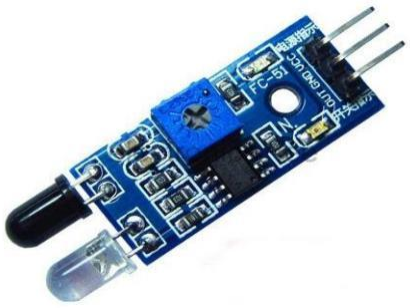


Figure 4.3: IR sensor

4.4 Servo Motor

A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system. Servomotors are used in applications such as robotics, CNG machinery, or automated manufacturing

4.4.1 Servo Mechanism

A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analog or digital) representing the position commanded for the output shaft.

The motor is paired with some type of position encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero, and the motor stops.

The very simplest servomotors use position-only sensing via a potentiometer and bang-bang control of their motor; the motor always rotates at full speed (or is stopped). This type of servomotor is not widely used in industrial motion control, but it forms the basis of the simple and cheap servos used for radio-controlled models.

Figure 4.4: Servo motor

4. 5 Buzzer

A buzze**r** or beeper is an audio signaling device that may be mechanical electromechanical or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers,and confirmation of user input such as a mouse click or keystroke.

There are five types of buzzer these are

1. Piezoelectric buzzers.
2. Magnetic buzzers.
3. Electromagnetic buzzers.
4. Mechanical buzzers.
5. Electromechanical buzzers.

Figure 4.5: Buzzer

4.6 Connecting Wire

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which to move. Most wires in computers and electronic components are made of copper or aluminum. Copper is cheap and electrically conductive. Silver has higher conductivity but is far more expensive

In a basic circuit, the wire comes from one terminal of a power source, such as a battery. It then connects to a switch that determines whether the circuit is open or closed. The wire then connects to the device that is drawing power, allowing it to draw electricity and perform its task. Finally, the wire connects the load back to the opposite terminal of the power source.

Before a current can travel through the wire, the circuit has to be closed; in other words, there cannot be any breaks in the path. Electricity cannot easily travel through the air, and if it does there is a risk of stray current leaking into the surroundings and causing damage or failing to power the appliance.

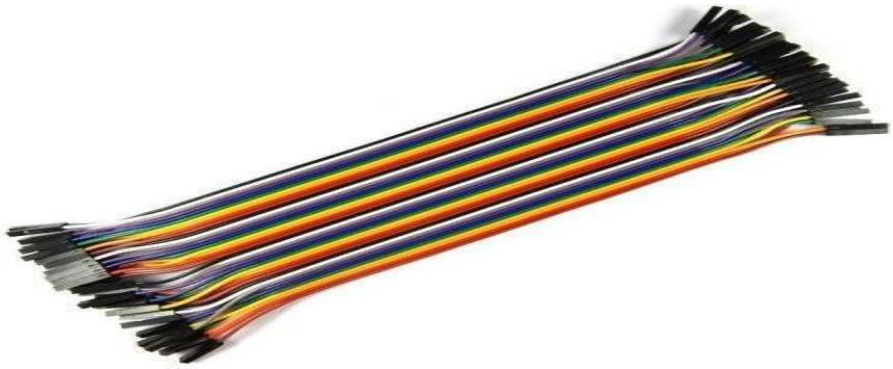


Figure 4.6: Connecting wire

4.7 LED

A **light-emitting diode** (**LED**) is a semiconductor light source that emits light when a current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the bandgap of the semiconductor

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. LEDs are used in applications as diverse as aviation lighting, fairy lights, automotive headlamps,

advertising, general lighting, traffic signals, camera flashes, lighted wallpaper, horticultural growlights, and medical devices.

Figure 4.7: LED

4.8 Breadboard

A breadboard, or protoboard, is a construction base for prototyping electronics. Originally the word referred to a literal breadboard, a polished piece of wood used for slicing bread.

Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education. Older breadboard types did not have this property. A stripboard (Veroboard) and similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes or one-offs,cannot easily be reused. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units (CPUs).

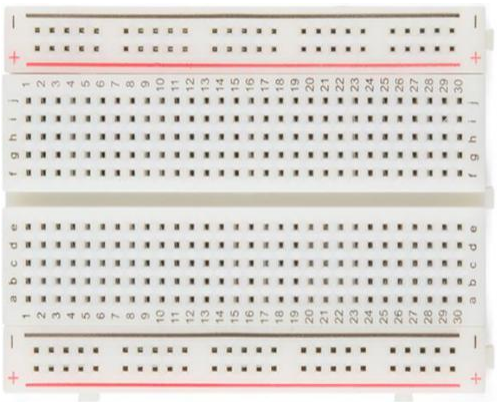


Figure 4.8: Breadboard

4.9 Ultrasonic Sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i. e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has traveled to and from the target).

To calculate the distance between the sensor and the object, the sensor measures the time it takes between the emissions of the sound by the transmitter to its contact with the receiver. The formulaFor this calculation is D = ½ T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0. 025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box.

Figure 4.9: Ultrasonic sensor

Ultrasonic sensors are used primarily as proximity sensors. They can be found in automobile self-parking technology and anti-collision safety systems. Ultrasonic sensors are also used in robotic obstacle detection systems, as well as manufacturing technology. In comparison to infrared (IR) sensors in proximity sensing applications, ultrasonic sensors are not as susceptible to interference of smoke, gas, and other airborne particles (though the physical components are still affected by variables such as heat). Ultrasonic sensors are also used as level sensors to detect, monitor, and regulate liquid levels in closed containers (such as vats in chemical factories). Most notably, ultrasonic technology has enabled the medical industry to produce images of internal organs, identify tumors, and ensure the health of babies in the womb.

Chapter 5

RESULT AND DISCUSSION

5.1 Result

The present existing system is manually and human controlled system, once the train leaves the station, the stationmaster informs the gateman about the arrival of the train through the telephone. The gateman receives the information from stationmaster. Hence, if the train is late due to certain reasons, then gate remain closed for a long time causing traffic. No centralized system is available, presently signals are control by mean of warning signs and signal device, which is totally automatic system.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on anLED.We can tell the Aduino Uno board what to do by sending a set of instructions to the microcontroller on the board. To do so we can use the Arduino programming language (based on Wiring), and theArduino Software (IDE), based on Processing.

Program Name: Automatic railway level crossing system.

```
#include <Servo.h>

Servo myservo;

int red = 9, green = 11, buzzer = 10;
int ir1 = 7, ir2 = 6;
intpos = 0 ;
void setup() {
  myservo.attach(5);
  pinMode(red, OUTPUT);
```

```
  pinMode(green, OUTPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(ir1, INPUT);
  pinMode(ir2, INPUT);

    tone(buzzer, 600, 50);

    delay(50);

  Serial.begin(9600);

}

void loop() {

  if (digitalRead(ir1) == LOW)
  {
    digitalWrite(red, HIGH);
    digitalWrite(green, LOW);
    digitalWrite(buzzer, HIGH);
    delay(10);
    for (pos = 0; pos<= 95; pos += 1) {
      myservo.write(pos);
      delay(20);
    }
    digitalWrite(buzzer, LOW);

    delay(1000);
  }
```

```
 if (digitalRead(ir2) == LOW)
 {
  digitalWrite(red, LOW);
  digitalWrite(green, HIGH);
  for (pos = 95; pos>= 0; pos -= 1) {
   myservo.write(pos);
   delay(20);
  }
  delay(100);
  digitalWrite(red, LOW);
  digitalWrite(green, HIGH);
  tone(buzzer, 600, 100);
  delay(1000);
 }
}
```

5.2 Discussion

This project helps us to know about the automatic railway level crossing system. Though the project has some limitations for using in practical purpose. It is very difficult to vary the resistance for the perfect operation. Another problem is IR sensor easily damages so that the operation hampers. This project can be improved by using LED and IR sensors for increasing the distance for real train. A buzzer can be added for safety.This project can be developed in future using the concept which will be preferable for practical use in Bangladesh.

Chapter 6

DESIGN IMPACT

The design impact of the system in various regards is discussed in the following subsections.

6.1 Economic Impact: The installation of automatic level crossing system would mean that the job of gatekeeping would decline. Even though a person at every crossing should have to be present for safety purposes but maintenance of the components would be a bigger requirement.

6.2 Environmental Impact: The main components used in the project are the ultrasound sensors and IR sensors. Both of these components are harmless to the environment. Infrared radiation sources are all around us all the time. Ultrasound also does not pose any threat to the environment.

6.3 Social Impact: The number of accidents in level crossings is likely to decrease by a huge margin with the employment of automatic level crossing system. As such people would be able to enjoy their train ride rather than be worried of accidents all the time.

6.4 Political Impact: Employing automatic systems would raise the standard of living in any country. Therefore our system would have a very positive impact on politics.

6.5 Ethical Impact: Automatic systems are much more reliable than manual ones. Lot of unnecessary accidents could be prevented by our system. So it's fair to say that our system would have a positive ethical impact as well.

6.6 Health and Safety Impact: The ultrasonic sensors used in the system are very low powered ones which poses no health hazards. It is even used for diagnostic purposes with no known side-effects. The laser used in the warning system is also harmless since they are very low power lasers. However, they can cause damage to the eye if the light falls directly to the eye from a very close distance.

6.7 Manufacturability: The components used in the system are all widely available. It's more a matter of proper assembling and integrating than availability.

6.8 Sustainability: All the components used in the system are low power consuming units and quite durable by nature. They are used extensively in different equipment. Although the components might need maintenance once in a while, it would be a long time before they have to be replaced.

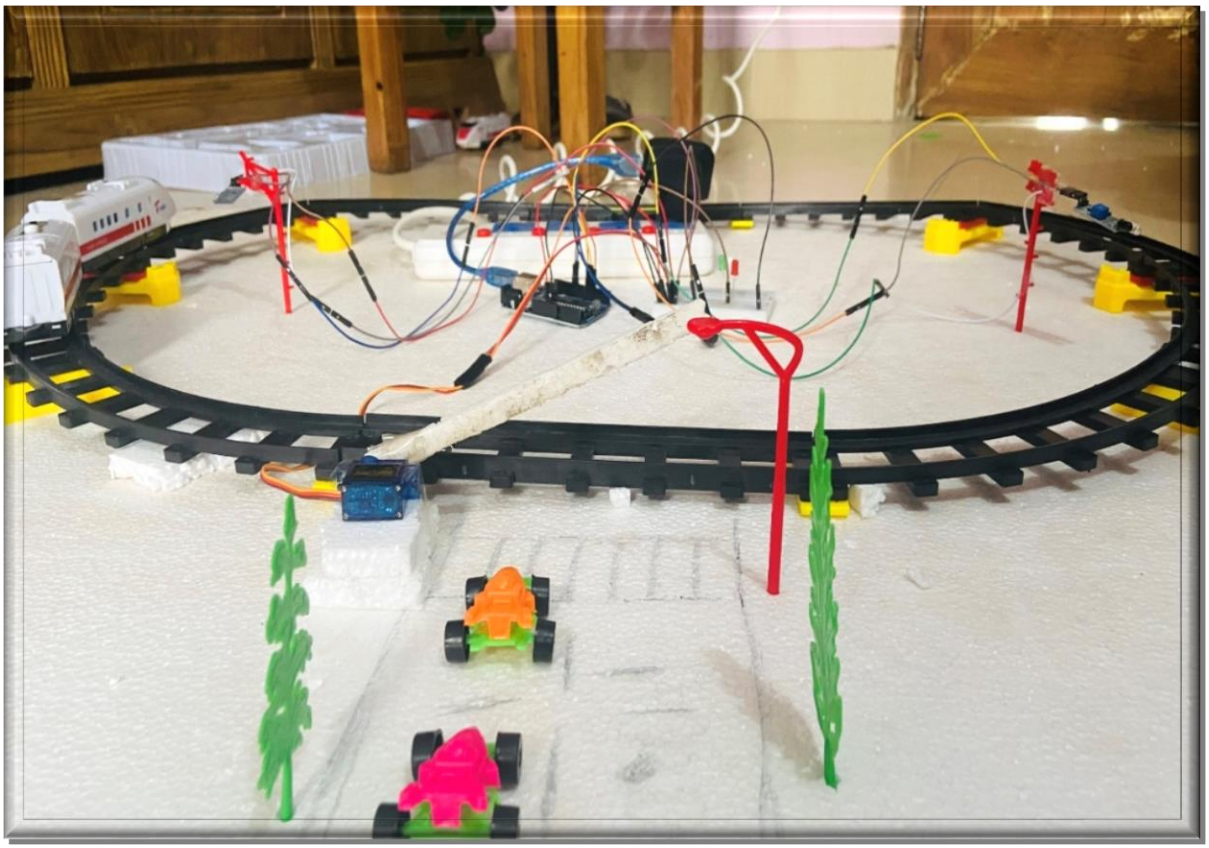
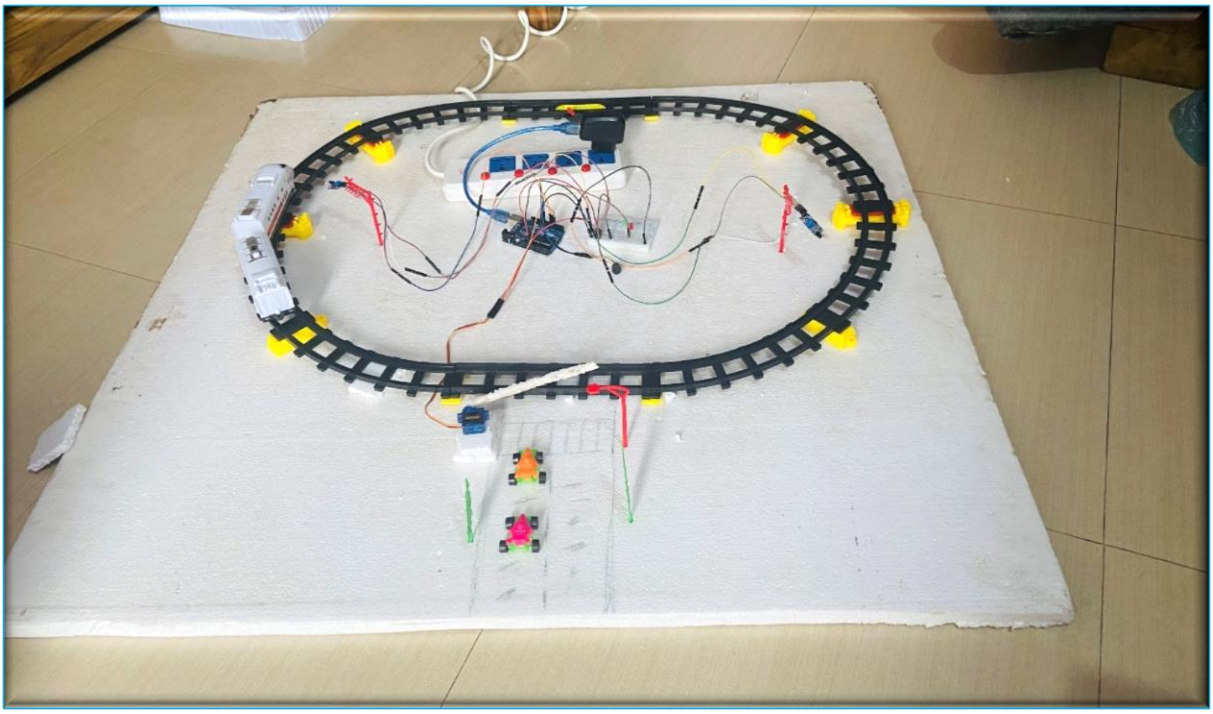


Figure 6.1: Model of Project



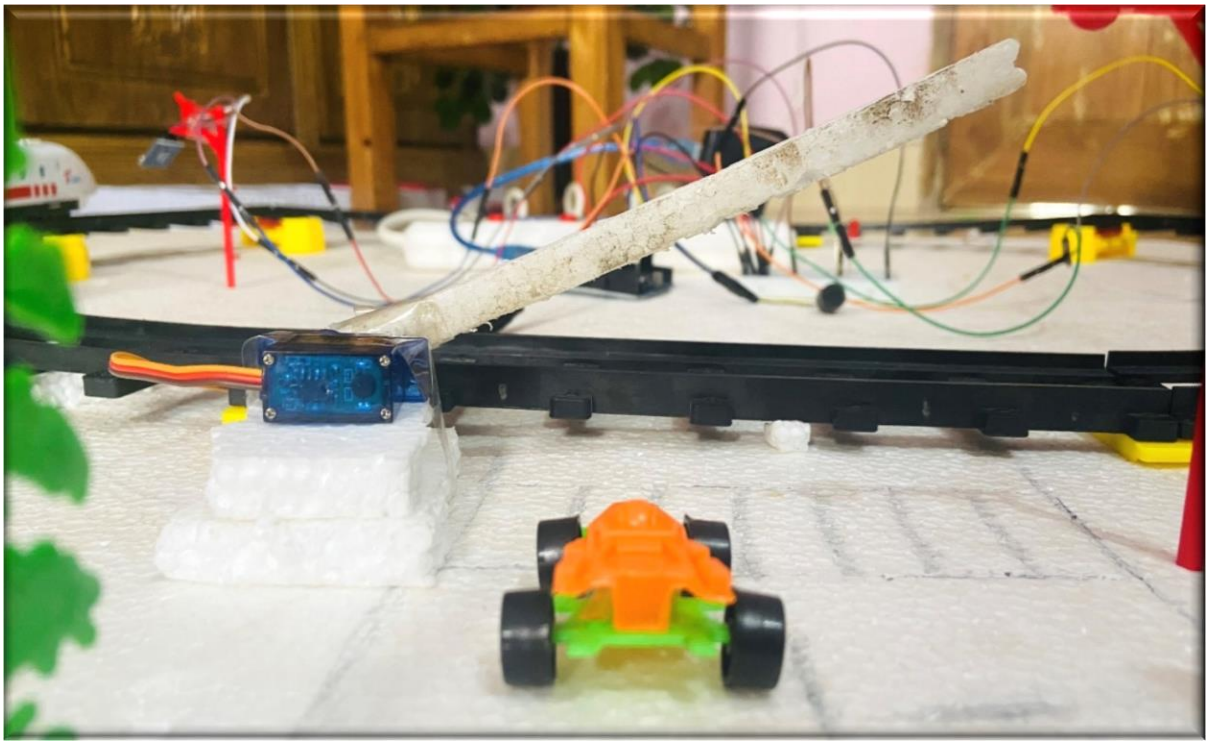


Figure 6.2: Model of our project

Chapter 7

CONCLUSION

The accidents are avoided at places where there is no person to manage the railway level crossing. Here we use the DC servo motor to open and close the gate automatically. When the train arrives in a particular direction the IR sensor senses and generates an appropriate signal, then at the same time the PLC provides a certain output signal to the DC servo motor to function. when the signal from PLC is sent to the DC servo motor rotates to function open/closes the gate according to the signal output from sensors

7.1 Limitations

Besides being ineffective in rough weather conditions the system also suffers from being insecure. Even though the IR transmission is encoded, it can be traced with the help of proper equipment and could be used to cause disturbance to the system.

7.2 Future scope

This system provides a basic platform in which much enhancement can be made. As discussed previously a host of different kind of sensors in a strategic set up would provide better results. Security issues would also have to be dealt with. For future work, this system could be integrated with other sensors and high-end security devices.

REFERENCES

[1] L. G. , C. Singh and N. Jha, "Automatic Railway System", *International Journal of Computer Applications*, vol. 159, no. 8, pp. 30-33, 2017. Available: 10.5120/ijca2017913018

[2] https://pt. scribd. com/document/100033800/IJERTV1IS3013. [Accessed: 07- Apr- 2021].

[3] R. Kushwaha and B. Chaubey, "Automatic Railway Gate Control System", *International Journal Of Engineering And Computer Science*, 2016. Available: 10. 18535/ijecs/v5i5. 45.

[4] "A GSM ENABLED REAL TIME SIMULATED HEART RATE MONITORING & CONTROL SYSTEM", *International Journal of Research in Engineering and Technology*, vol. 03, no. 15, pp. 6-10, 2014. Available: 10. 15623/ijret. 2014. 0315002.

[5] https://iarjset.com/upload/2017/may-17/IARJSET%2013.

[6] https://docplayer.net/48338796-Assembly-language-programmed-automatic-railway-gate-control.html.

[7] https://www.ajer.org/papers/v2(11)/R0211163173.

[8] Krishna, ShashiYadav and Nidhi, "Automatic Railway Gate Control Using Microcontroller",

Oriental Journal Of Computer Science & Technology, Vol.6, No.4, December 2013.

[9] KarthikKrishnamurthi, Monica Bobby, Vidya V, Edwin Baby, Sensor based automatic control of railway gates, International Journal of advanced Research in Computer Engineering and Technology, vol.4, issue 2 Feb2015, pp.539-543

[10]Atul Kumar Dewangan, Meenu Gupta, Pratibha Patel, Automation of Railway Gate Controller using Micro controller, International Journal of Engineering Research and Technology, 2012, pp1-8

[11] KarthikKrishnamurthi, Monica Bobby, Vidya V, Edwin Baby, Sensor based automatic

[12] S. Taghvaeeyan and R. Rajamani. "Use of vehicle magnetic signatures for position estimation." Applied Physics Letters 99, (2011) no.13, pp..13401-13401-3.

[11] Indian Railway develops warning system for unmanned level crossings, article in Times of India, 25th October 2015 by PTI.

[12] J. Banuchandar, V. Kaliraj, P. Balasubramanian, S. Deepa, N. Thamilarasi,"AutomatedUnmanned Railway Level Crossing System", in International Journal of ModernEngineering Research (IJMER)Volume.2, Issue.1, Jan-Feb 2012.

[13] M. Kottalil1 ,Abhijith S2, Ajmal M M3, Abhilash L J.4,Ajith Babu, "Automatic RailwayGate Control System", in International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE)- Vol. 3, Issue 2, February 2014

[14] M. Kottalil1 ,Abhijith S2, Ajmal M M3, Abhilash L J.4,Ajith Babu, "Automatic RailwayGate Control System", in International Journal of Advanced Research in Electrical, Electronic and Instrumentation Engineering (IJAREEIE)- Vol. 3, Issue 2, February 2014.