AUTOMATIC RAILWAY CROSSING

A Project submitted in partial fulfillment of the requirements for the Award of Degree of

Bachelor of Science in Electrical and Electronic Engineering

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December 2018

CERTIFICATION

This is to certify that this project entitled "**Automatic Railway Crossing**" is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on December 2018.

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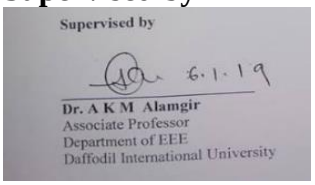

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DECLARATION

The project and thesis entitled **" Automatic Railway Crossing"** submitted by Name: Md Hafijul Islam, ID: 0151-33-2559, Name: Md. Mahabubur Rahman Chowdhury, ID: 0151-33-2558 Session: Spring 2015 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical and Electronic Engineering** on December 2018.

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LIST OF ABBREVIATIONS

CD	Chromatic Dispersion
EMI	Immune to Electromagnetic Interference
FBG	Fiber Bragg Gratings
FWHM	Full Width at Half Maximum
GVD	Group Velocity Dispersion
LED	Light Emitting Diodes
MD	Material Dispersion
NLSE	Nonlinear Schrödinger Equation
PMD	Polarization Mode Dispersion
PUA	Piecewise Uniform Approach
RMS	Root Mean Square
SSMF	Standard Single Mode Fiber
TFBG	Tilted Fiber Bragg Gratings
UV	Ultraviolet
WD	Wave-guide Dispersion
WDM	Wavelength Division Multiplexed

ACKNOWLEDGEMENT

First of all, we give thanks to Allah or God. Then we would like to take this opportunity to express our appreciation and gratitude to our project and thesis supervisor **Dr. A.K.M. Alamgir, Associate Professor of** the Department of Electrical and Electronic Engineering Faculty of Engineering of the Daffodil International University**,** for being dedicated in supporting, motivating and guiding us through this project. This project can't be done without his useful advice and helps. Also thank you very much for giving us opportunity to choose this project.

We also want to convey our thankfulness to **Dr. Md. Samsul Alam, Professor & Dean** of the **Department of EEE** for his help, support and constant encouragement.

Apart from that, we would like to thank our entire friends for sharing knowledge; information and helping us in making this project a success. Also thanks for lending us some tools and equipment.

To our beloved family, we want to give them our deepest love and gratitude for being very supportive and also for their inspiration and encouragement during our studies in this University.

ABSTRACT

In this project the railway signaling includes the gate control is done using microcontroller. The automatic opening and closing of the gate and also the signaling which depending on the gate position that will be controlled by the microcontroller. The railway gate is to be controlled so that the road traffic is to be predicted .The railway gate is to be closed when a train is passing by the way. The opening and closing of the gate is to be done using stepper motors and this stepper motor is controlled by micro controller. The signaling of the train is also controlled depending upon the gate position. Only when gate is closed the green signal is otherwise red signal.

CHAPTER-1

INTRODUCTION

Introduction

The project is a digital railway crossing system made with an Arduino pro mini and IR sensor and a few other components. The main aim of the project is to detect the presence of a train on the rail line and control the crossbar.

The working of the project starts with the IR sensor that senses the coming up train on the rail line near the rail crossing and uses that sensing signal the Arduino produce a voltage signal which controls the crossbar for open and close.

Project Objectives

To accomplish a project, the objective of the project must be clear and can be understood to achieve. So, the objectives of this project are:

i. To develop a program that can detect the coming up rail and can communicate between the sensor and microcontroller.

ii. To create a program that can control the railway crossbar efficiently.

iv. To explore how the Arduino mini will operate.

Scope of Project

The purpose of the project is to build or design a system that can identify the train and then give a warning using the alarm. The data will be sent in the analog signal and then will convert into a digital signal using analog to digital converter (ADC). The developed program will process all data in order to control the crossbar. All the process will execute in the microcontroller. If the crossbar is being closed firstly it can be resolved. This project helps to control the gate without any operator and cost-free.

Maintaining cost is also very low. The bar will slowly low or up, for this reason, it will not hurt anything and it also alarm before up or down. The system is totally safe and secure.

1.5 Report Outline

Chapter 1 introduction: The project is a digital railway crossing system made with an Arduino pro mini and IR sensor and a few other components. The main aim of the project is to detect the presence of a train on the rail line and control the crossbar.

Chapter 2 literature reviews: To complete this project, many types of research and analyze the digital railway crossing system and their theories had been done. Several of sources were being the reference for this research such as texts book.

Chapter 3 Theoretical Model: In this Arduino IR sensor and Servo Motor interfacing, Arduino ace smaller than expected is utilized to. Control the entire procedure. A RI sensor is utilized for detecting condition which gives a flag on each 10mV change at its yield stick.

Chapter 4 hardware development: There are a few C compilers available for the Atmega328 microcontroller. These compilers have many similar features and they can all be used to develop C based high-level programs

Chapter 5 results and discussions: After connecting all equipment according to the circuit we had created the body structure following to the other experimental example from the internet.

CHAPTER 2

LITERATURE REVIEWS

Introduction

To complete this project, many types of research and analyze the digital railway crossing system and their theories had been done. Several of sources were being the reference for this research such as texts book, journals and internet source. From the past research, many methods were achieved to solve the problem of this project and related to the theory.

Component List

1. Arduino pro mini
2. Microcontroller (Atmega328
3. Servo Motor
4. Buzzers
5. LED
6. Connector
7. Vero board
8. Soldering Wires

Arduino Pro Mini

In this project, we have used a microcontroller to control whole the process of a system that is Arduino por mini board. Actually, Arduino is not a mere controller as it has an operating system or boot-loader which runs on. [1]

Figure 2.1 Arduino Pro mini

Microcontroller

A microcontroller is a single chip micro-computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Basically, microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys, and other embedded systems. A microcontroller is available in different word lengths like microprocessors (4bit,8bit,16bit,32bit,64bit, and 128-bit microcontrollers are available today). Here we use Atmega328 microcontrollers.

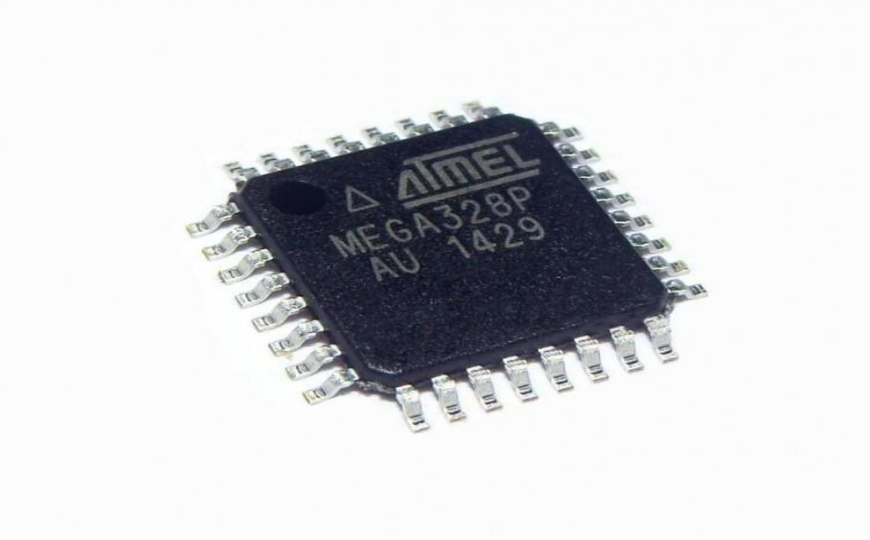

Fig. 2.2 Atmega328 Microcontroller

The Atmega328 is one of microcontroller chips that are used with the popular Arduino pro mini Duemila nove boards. The is Arduino Duemila nove board comes with either 1 or 2 microcontroller chips, the Atmega168 or the Atmega328. Of these 2, the Atmega328 the upgraded, more advanced chip. In this article we will go over the pinout of the Atmega328 chip. The Atmega328 is a very popular microcontroller

Servo Motor

Servo motors are also used in the industrial applications, robotics, in-line manufacturing, pharmaceutics, and food services. Servo engines have been around for quite a while and are used in numerous applications. They are little in size however pack a major punch and are exceptionally vitality effective. These highlights enable them to be utilized to work remote-controlled or radio-controlled toy vehicles, robots, and planes. [2]

Figure: 2.3 Servo Motor.

Buzzers

Piezoelectric Sounders are sound segments which create sound appropriate for use as info signals without implicit wavering circuits. This trademark enables them to be utilized in an extensive variety of utilizations. They come as the SMD type, which is ideal for little, high-thickness mounting and the stick type, which can be utilized for general purposes. Piezoelectric signals are sound parts which produce a monotone utilizing an inherent wavering circuit. [3]

Figure: 2.4 Buzzers

LED

The LED is a light source which utilizes semiconductors and electroluminescence to make light. There are two noteworthy sorts of light radiating diodes: LED and OLED. The LED is unique in relation to EL light in that it utilizes a little semiconductor precious stone with reflectors and different parts to make the light more splendid and centered into a solitary point. The OLED is fundamentally the same as the EL light in configuration, utilizing a level sandwich of materials. It is unique in relation to the LED and EL light in that it utilizes natural particles in the layer that radiates light. [4]

Figure: 2.5 LED

Connector

- An electrical connector, a gadget for combining electrical circuits

- Audio and video connector, electrical connectors (or optical connectors) for conveying sound flag and video motion, of either simple or advanced arrangement

- Gender of connectors and clasp

- Power connector, gadgets that enable electrically worked gear to be associated with the essential rotating flow (AC) control supply in a building
- RF connector, an electrical connector intended to work at radio frequencies in the multi-megahertz go

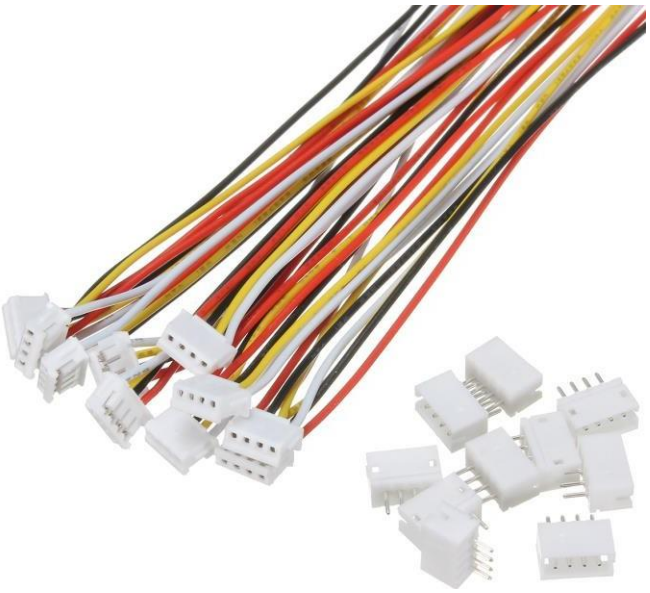

Fig: 2.6 Connector

- Circular connector
- Cigar lighter repository
- Blind mate connector, one in which the mating activity happens where you can't see or feel it guarantee that it is effectively adjusted. They make them adjust highlights which permit a little misalignment when m [6]

Vero board

Vero board is a brand of stripboard, a pre-shaped circuit board material of copper strips on a protecting board. Which is the conventional name for a broadly utilized sort of hardware prototyping board described by a 0.1 inch regular network of gaps, with wide parallel strips in copper cladding running one way the distance crosswise over one side of the board? It is ordinarily additionally known by the name of the first item Vero board, which is a trademark, of British organization Vero Technologies Ltd and Canadian organization Pixel Print Ltd. In utilizing the board, breaks are made in the tracks, for the most part around gaps, to isolate the strips into

different electrical hubs. With consideration, it is conceivable to break between gaps to take into consideration segments that have two stick pushes just a single position separated, for example, twin column headers for IDCs.

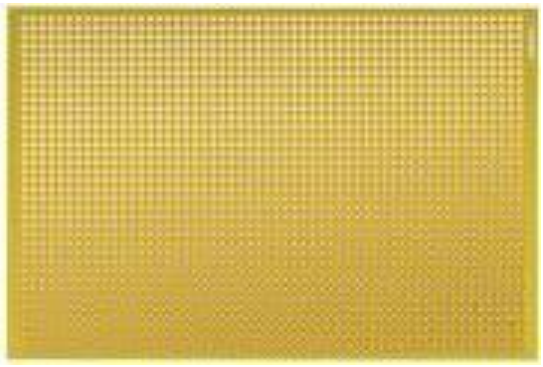

Figure: 2.7 Vero Board

2.4.8 Soldering Wires

Weld is fundamentally a metal wire with a "low" softening point, where low for our motivations implies low enough to be dissolved with a binding iron. For gadgets, it is customarily a blend of tin and lead. At the point when the fastening wire chilled an electrical association will lead. This is getting a decent mechanical association between the wires. The fibers of each wire ought to be turned together, carry on more like a solitary element. The initial step is to set up the wires at that point tinning the wears, by join the wires and weld graft together.

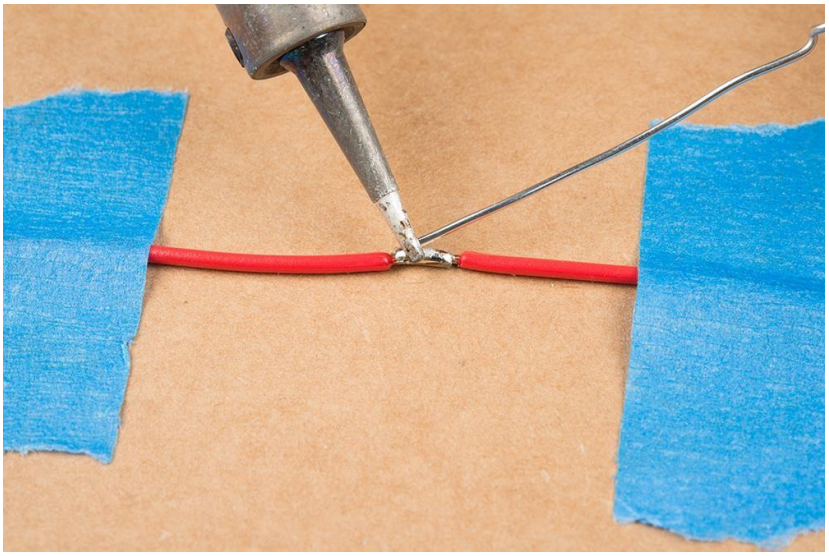

Figure: 2.8 Soldering Wires

2.3 Summary

The chapter describes some important equipment that related to the project. Describes of all equipment like Arduino, Microcontroller (Atmega328), Servo Motor, , Buzzer, LED, Connector, Vero board, that works properly use for show data read related this project.

CHAPTER 3

THEORETICAL MODEL

Basic Block Diagram

In this Arduino IR sensor and Servo motor interfacing, Arduino pro mini is used to

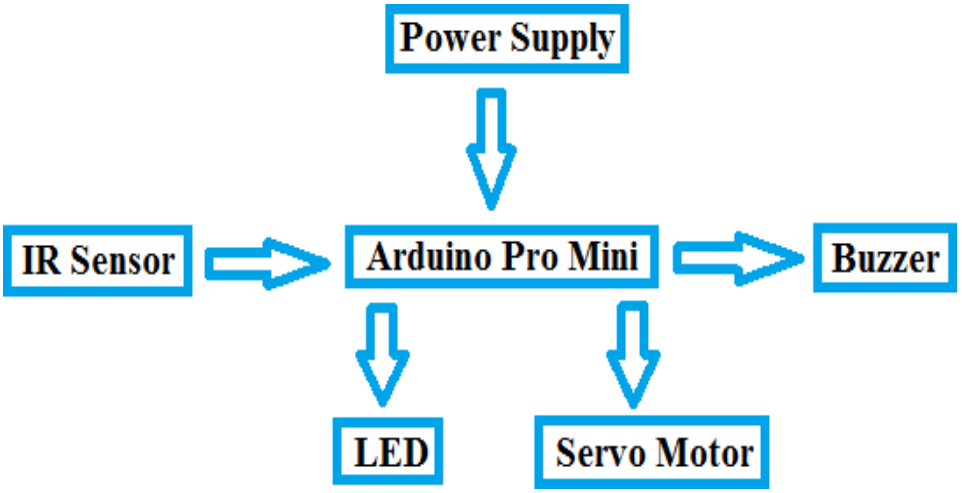

Figure: 3.1 Basic Block Diagram

Control the entire procedure. A RI sensor is utilized for detecting condition which gives a flag on each 10mV change at its yield stick. You can without much of a stretch check it with a voltmeter by interfacing Vcc at stick 1 and Ground at stick 3 and yield voltage at stick 2 of the IR sensor. For a precedent, if the yield voltage of the IR sensor is 250m volt that implies the Servo Motor is run a LED on. Arduino peruses yield voltage of IR sensor by utilizing Digital stick 3 and stick 3 plays out a

computerized estimation of run servo engine. After Arduino sends these flag to the servo engine.

Circuit Diagram and Explanation

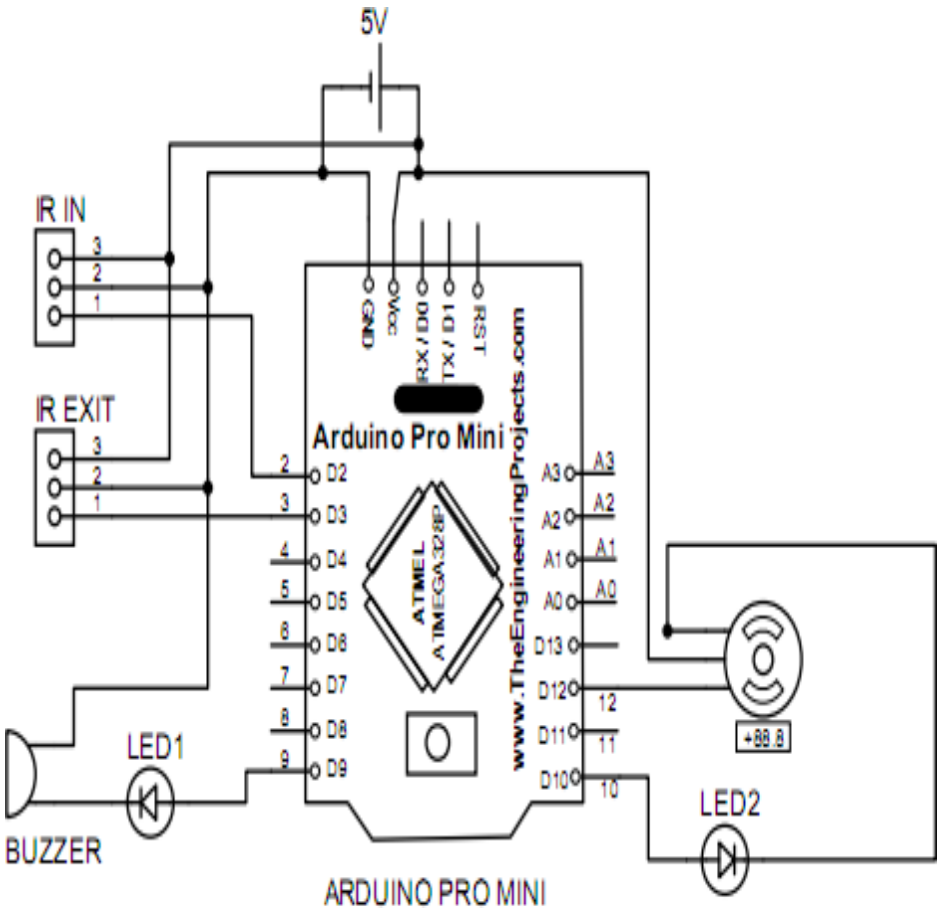

Figure: 3.2 Arduino Circuit Unit.

Circuit diagram for Automatic Railway Crossing using Arduino, IR sensor, is shown in the above figure. Make the connections carefully as shown in the schematic. Data pins of LED are connected to Arduino digital pin number 3, 5. An RI sensor is also connected to Digital Pin 3 and 5 of Arduino. Servo motor is connected to Arduino digital pin number 8.

Arduino Circuit

Arduino Pro Mini circuit was build and the main components for the main circuit for this Arduino are required in order to operate the Arduino Pro mini. In this circuit, the Arduino is connected to the LM35, LCD and power supply for a wake up the Arduino.

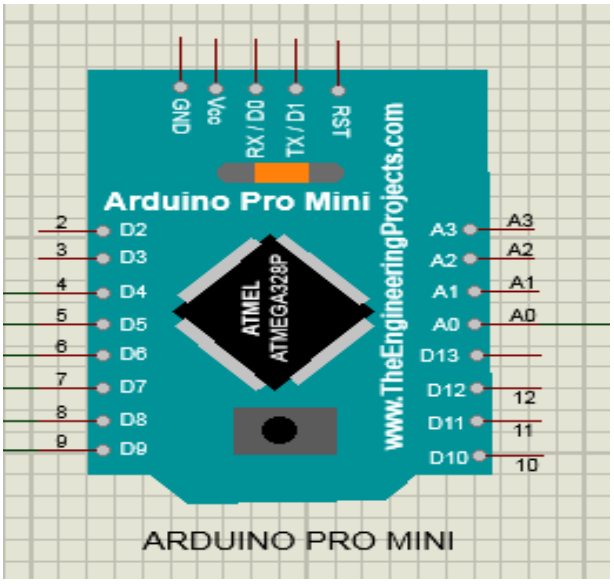

Figure 3.3 Arduino Pro mini Circuit Atmega328

Advantage and Disadvantage

Advantage

- The revolution point of the engine is corresponding to the info beat.
- The engine has full torque at standstill(if the windings are invigorated)
- Precise situating and repeatability of development since great stepper engines have a precision of 3-5% of a stage and this mistake are non-aggregate starting with one stage then onto the next.
- Excellent reaction to beginning/halting/switching.
- Very solid since they are no contact brushes in the engine. Thusly the life of the engine is essentially subject to the life of the bearing.

- The proverbs reaction to the computerized information beats gives open-circle control, making the engine less complex and less expensive to control.
- it is conceivable to accomplish moderate speed synchronous pivot with a heap that is specifically coupled to the pole.
- a extensive variety of rotational paces can be acknowledged as the speed is corresponding to the recurrence of the information beats

Disadvantage

- The framework can be actualized all the more effectively by joining more proficient sensor arranges.
- A blend of manual remote control and sensors based control can be utilized for the better activity.

3.4 Summary

In this chapter has discussed block diagram, circuit diagram, Advantage and Disadvantage of this project. It has also explained the operating system of the project.

CHAPTER 4

HARDWARE DEVELOPMENT

Writing and Burning Programming into the Arduino

Writing Programming

There are several C compilers on the market for the Atmega328 microcontroller. These compilers have many similar features and they can all be used to develop C based high-level programs for Atmega328 microcontroller some of the C compilers used most often in commercial, industrial and educational.

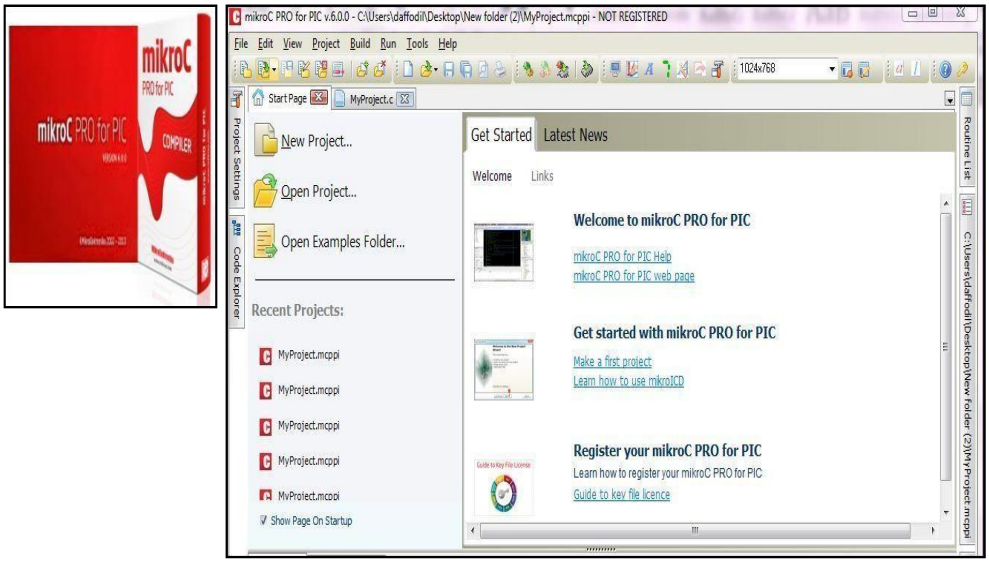

Figure 4.1: Mikro C software

Atmega328 microcontroller applications are – Mikro C, CCS, an Atmega328. This project is used by mikro C. The popular and powerful mikro C is easy to learn and comes with the high resources. Mikro C is a built-in simulator and an in-circuit

debugger. The program is compiled by a compiler Mikro C. After the conversion process, a hexadecimal code is generated. The mikro C for writing programming

Burning the Program

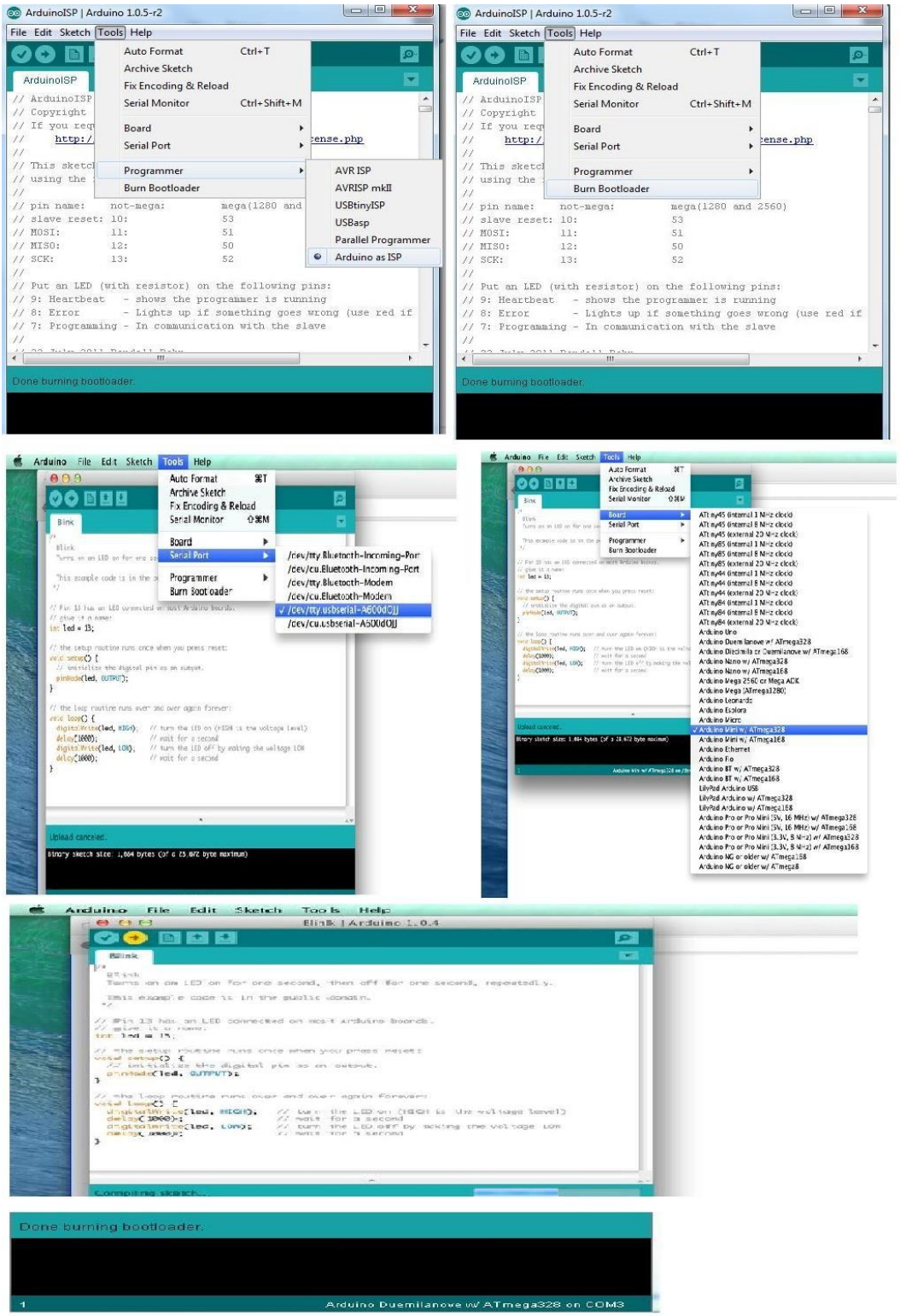

Figure 4.2: Burning Boot Loader Process

Connect the all circuit connection now open the Arduino software and select Tools->Board ->Ardunio Pro or Pro Mini (5V, 16MHZ) / ATmega328. If we select the Arduino pro we can see the selected board in the bottom of the software as shown in the above image.

And open the coding we want to program and click the upload button. Now we can see that program uploading into pro mini. We can see the Tx and Rx Led in Arduino Uno board blinking while program uploading. After uploading of the code. Now remove all connection and give power supply to the pro mini. Our code works perfectly on Arduino mini.

Power Supply

A battery holder is at least one compartments or chambers for holding a battery. For dry cells, the holder should likewise reach the battery terminals. For wet cells, links are regularly associated with the battery terminals, as is found in vehicles or crisis lighting hardware.

Figure: 4.3: Power Supply

A battery holder is either a plastic case with the state of the lodging shaped as a compartment or, or a different plastic holder that is mounted with screws, eyelets, stick, twofold sided tape, or different means. Battery holders may have a cover to hold and secure the batteries. Curled spring wire or level tabs that press against the battery terminals are the two most normal techniques for making the electrical association inside a holder. Outside associations on battery holders are generally made by contacts with pins, surface mount feet, bind drags, or wire leads. [7]

System of the Flowchart

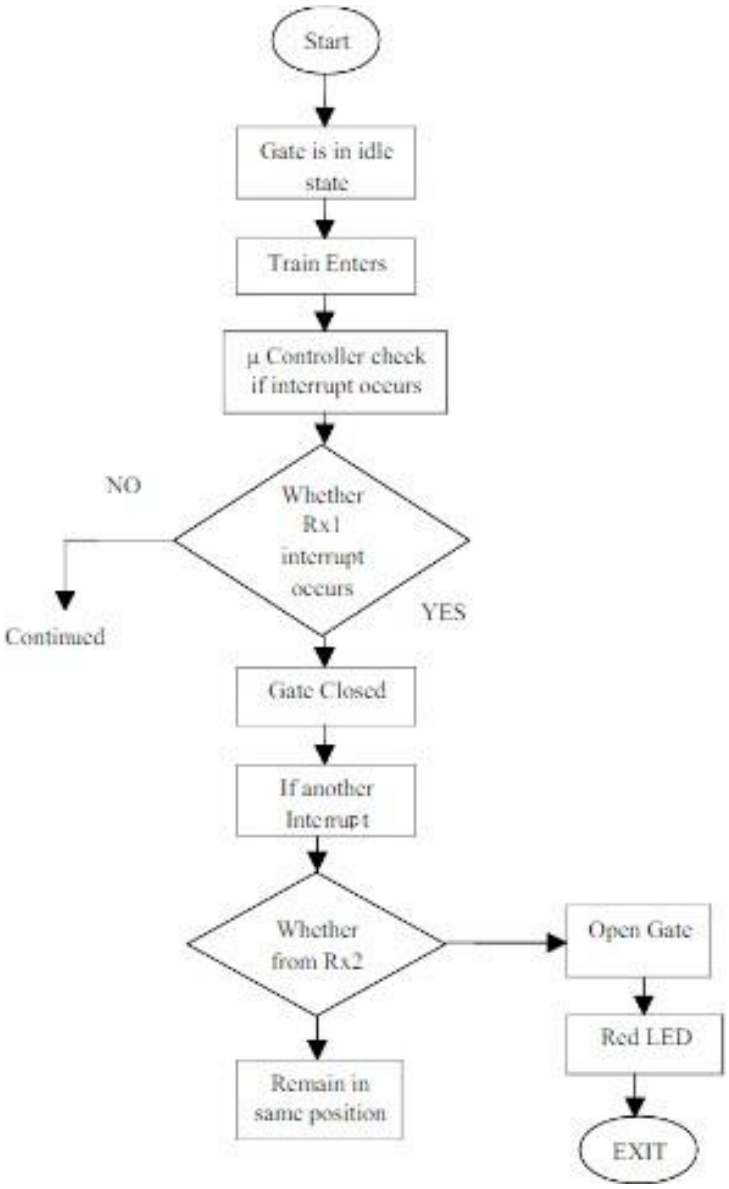

Figure: 4.4 System of the Flowchart

4.5 Summary

In this chapter has discussed Writing and burning program. Also discussed power supply and Flowchart system It has also explained about these topics of the project.

CHAPTER 5

RESULTS AND DISCUSSIONS

Introduction

This chapter will present all the results and calculations and relevant discussions.

Our Project

After connecting all equipment according to the circuit we had created the body structure following to the other experimental example from the internet. After preparing the body structure and connection of the circuit we prepared a logic program with the help of C++ program by Arduino. Our project picture is given below:

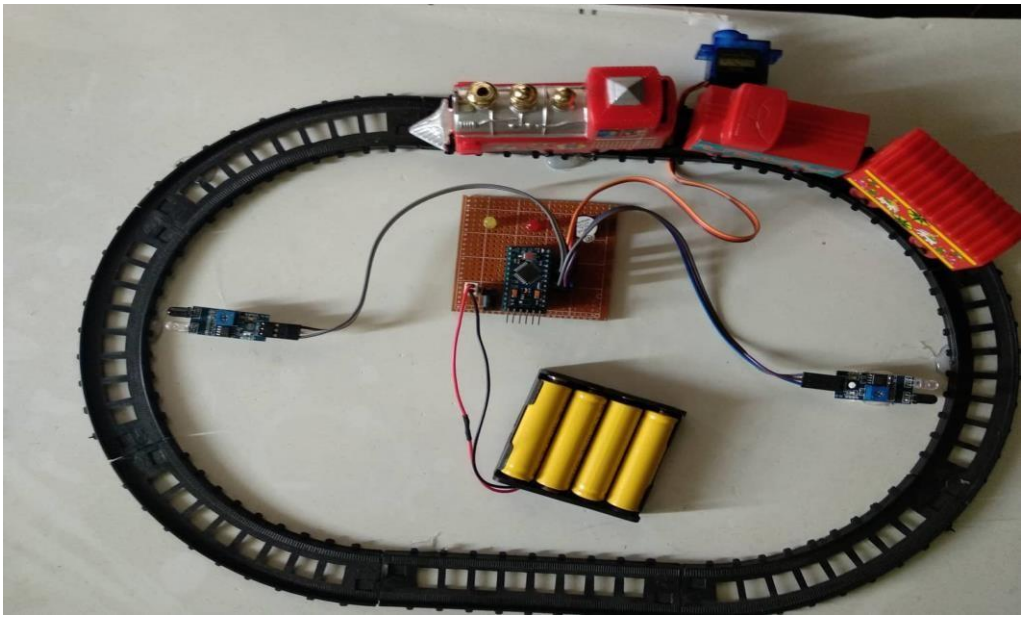

Fig. 5.1 Our Project Picture

After complete the program, we uploaded the program to the Microcontroller. Then we interface the software and hardware part. After completing the entire program and

body with the interface we had tried to experiment it is it work or not. We saw that our project working perfectly. [10]

Result

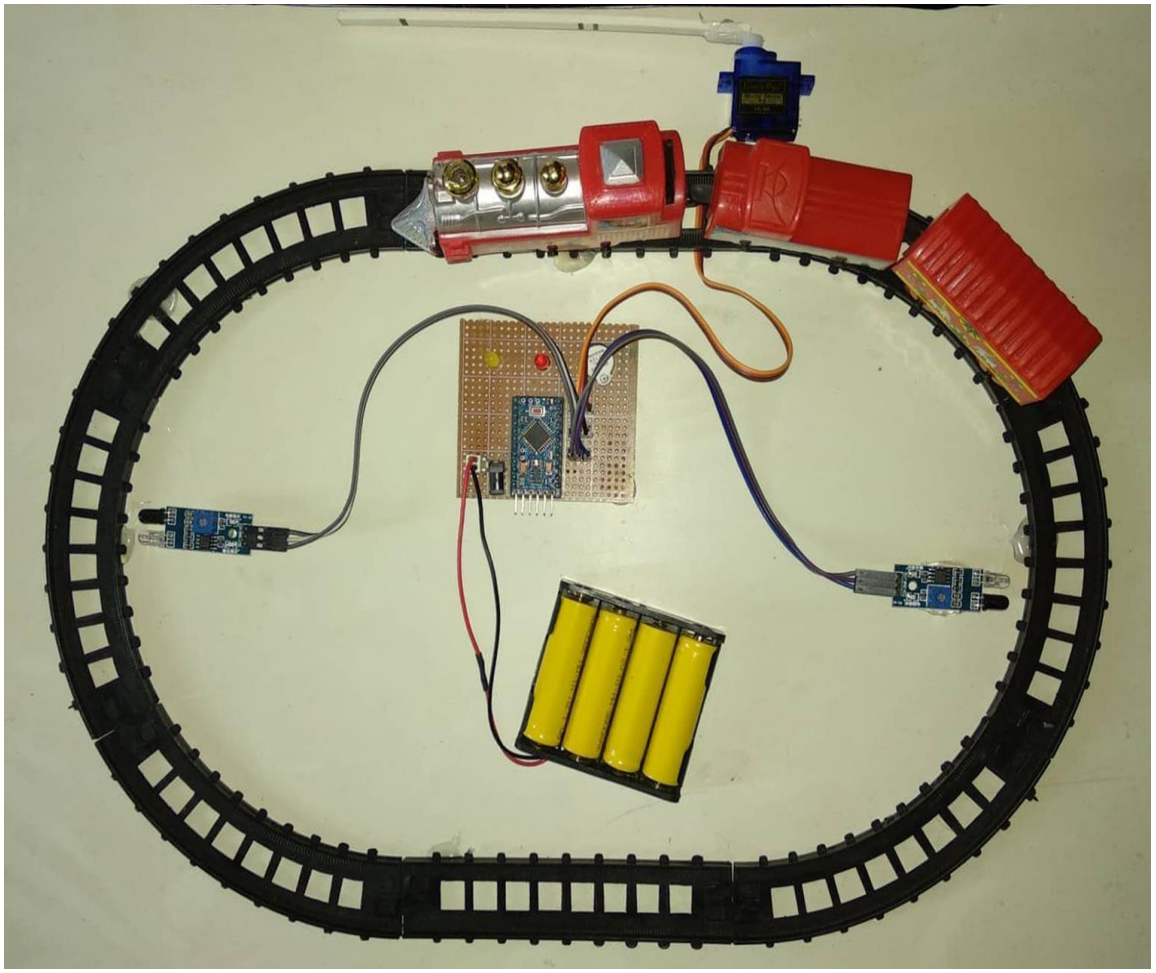

Figure: output displaying temperatures on the LCD screen.

This project name digital thermometer using Arduino mini, LM35, and LCD. The project measured temperature and give the output displaying the temperature on the LCD screen.

5.5 Cost Analysis

Table 5.1: Cost Analysis

Serial	Components	Price in (BDT)
01	Arduino Pro Mini	350/-
02	Servo Motor	500/-
03	Connecting wire	100/-
04	Power supply	150/-
05	Vero board	30/-
06	Wire connector	100/-
07	IR Sensor	300/-
08	LED	20/-
09	White Wood Board	250/-
10	Glue Gun Stick	50/-
11	Reel Connector	50/-
12	Charging Port	20/-
13	Buzzer	30/-
14	Others	200/-
Total Cost		= 2150/-

Discussion

We have built up an idea of programmed track exchanging. Considering a circumstance where in an express train and a neighborhood train are going inverse way on a similar track, the express train is permitted to go on a similar track and the nearby train needs to change on to the next track, pointer lights have been given to maintain a strategic distance from an impact.

Summary

In this chapter has discussed the result and discussion. With our project, we became successful to demonstrate with regarding the objectives of the project. At last, completing this chapter the project is ready to use.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The task work" Automatic Railway Gate Control", these days such a large number of mishaps occur at the railroad entryway on account of manual control. To maintain a strategic distance from these serious mischances we need to change manual work to this most recent innovation (Automatic Railway Gate Control), we can dodge the greatest number of mishaps.

Limitations of the Work

Mention few limitations or challenges faced in my work. In this project, we have faced few problems as like as

Advantages:

- The revolution point of the engine is corresponding to the info beat
- the engine has full torque at standstill(if the windings are empowered)
- Precise situating and repeatability of development since great stepper engines have an accuracy of 3-5% of a stage and this blunder is non-aggregate starting with one stage then onto the next. Magnificent reaction to beginning/ceasing/turning around.
- Excellent reaction to halting/turning around.

• Very solid since they are no contact brushes in the engine. In this manner the life of the motor is just reliant on the life of the bearing.

• The aphorisms reaction to the advanced information beats gives open-circle control, making themotor less complex and less exorbitant to control.

• A extensive variety of rotational rates can be acknowledged as the speed is corresponding to thefrequency of the information beats.

Disadvantages:

• Resonances can happen if not appropriately controlled

• Not simple to work at to a great degree high speeds.

• This engine can likewise be warmed at standing as a result of the torque required to hold it in position.

REFERENCES

[1] https://learn.sparkfun.com/tutorials/using-the-arduino-pro-mini-33v/all retrieved on 5/10/2018

[2] https://www.edgefx.in/servo-motor-types-and-working-principle/ retrieved on 8/10/2018

[3] https://www.collinsdictionary.com/dictionary/english/buzzer retrieved on 15/10/2018

[4] http://edisontechcenter.org/LED.html retrieved on 16/10/2018

[5] https://learn.adafruit.com/ir-sensor/overview retrieved on 16/10/2018

[6] http://katalog.we-online.de/en/em/browse/connectors retrieved on 16/10/2018

[7] https://www.batterymart.com/c-battery-boxes.html retrieved on 16/10/2018

[8] https://bangladesh.exportersindia.com/suppliers/pvc-sheets.htm retrieved on 17/10/2018

[9] https://www.crunchbase.com/organization/varo-money/advisors/current_advisors_image_list retrieved on 17/10/2018

[10] https://www.scribd.com/doc/54952160/Automatic-Railway-Gate-Control retrieved on 17/10/2018

APPENDIX

```
// Programa: Car Parking Lot (MMI)
#include <Servo.h>
Servo myservoA;
const int ProxSensorIn = 2;
const int ProxSensorExit = 3;
int LEDA = 10;
int LEDB = 11;
int ServoM = 12;
void setup(){
  pinMode(LEDA, OUTPUT);
  pinMode(Buzzer, OUTPUT);
  myservoA.attach(ServoM);
  pinMode(ProxSensorIn, INPUT);
  pinMode(ProxSensorExit, INPUT);
  }
void loop()
{
  if(digitalRead(ProxSensorIn) == LOW){
  digitalWrite(LEDA, HIGH);
  myservoA.write(0);
  if(digitalRead(ProxSensorIn) == LOW{
  digitalWrite(LEDA, LOW);
  myservoA.write(90);
    }
}
```