

SMART TRAFFIC SYSTEM

BY

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APPROVAL

This Project/internship titled “**Smart Traffic System**”, submitted by Sree Shopon Kumer, ID No: 161-15-7598 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 7th December, 2019.

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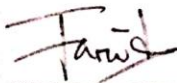
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I hereby declared that, This Project has been done by me under the supervision **Most. Hasna Hena, Senior lecturer, Department of CSE Daffodil International University.** I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

This paper describes a unique traffic system that can be control by a police man sitting in their police box. Where they easily control the light with a touch of their smart phone. They don't need to go in the middle of the road and stop the vehicle. In this system no vehicle passing when the red light is on even a single bike can't pass. For this, it need a app to build a wireless connection with Arduino through Bluetooth. It need to connect the Bluetooth Module with the app thus it can control the traffic through the app. This project is about a 4 lane traffic light control system. There is a big display so every lane driver can see that which lane is open and which one is closed. Also the RED, YELLOW, GREEN light give the signal. And there is some motor in the road side which make a little high barricade (turning on 90°) thus any vehicle couldn't pass. When the GREEN light is on the barricade is lying on the road (motor turn on 0°) thus the vehicles can pass easily. For implementation this project ARDUINO language and Board is used to control the system. A Bluetooth device connect with the ARDUINO board thus the board can connect with the Electronic device control app and the result can be display through the lights and display board. With this system the traffic controlling become more easy and strong. By changing the program of Arduino it can easy to update the system.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Today Traffic problem is serious problem like a developing country of Bangladesh. Every day many people suffer for traffic. Nowadays many road accidents happened in Bangladesh, this project make traffic control system more easy for the traffic police. They can control the traffic sitting in the police box. Now they need not to go the middle road to stop the vehicle. They can easily stop the vehicle, change light color, display the open and close lane and also the time.

1.2 Motivation

The motivation came for this project when I talked to a sergeant, he said we need to go to the middle of the road to stop the vehicle it's a risky work and there is no guaranty that always the vehicle break work. So, they need a system thus they can easily stop the vehicle and control the light smartly and digitally and also safely. So I think if I can develop a system for them thus they can control the traffic system with smart and digital way. And our population increase day by day and they come to city for education or livelihood, for this our busy city become busier, and our traffic system are become very poor day by day. Even I saw the traffic system very unorganized, though the RED light is on in the traffic lane, the vehicle is also running and crossing the road. So, more traffic jam is created because many of vehicle didn't follow the traffic rule. So, I want to build a system where they must be follow the traffic rule and unorganized jam become less and the traffic police doesn't need to stand under the hot sun all day long. And an easy, safely, strong, organized traffic system will be happening I think.

1.3 Objectives

- This project object is that to develop a technique to solve Traffic system digitally.
- To maintain Traffic light easily.
- Beside light the result shown in a big display.
- To stop the vehicle easily.
- To control traffic system with smart phone easily.

- No way to pass when the RED light is on.
- An organized traffic system will be happening.

1.4 Expected Outcome

We need an Arduino Bluetooth controller app where the user is traffic police, who can easily change light, stop car, bus, track, bike etc. easily. This app is so simple thus the user can use this easily and display the result sitting in the police box. And the police men need not to stand under the hot sun all day long. And they can handle the traffic digitally and smartly sitting in the traffic control box.

1.5 Report layout

Chapter 1: Introduction

Here introduction, motivation, objective & report outcome is being discussed.

Chapter 2: Background Study

Which tools, devices are used in this project are discussed here. Scope of the problem and the challenge of the system.

Chapter 3: Requirement specification

In this chapter I discuss about the circuit diagram, software and hardware requirement, components, components description for build the project.

Chapter 4: System design

Here I discuss about the design of the system like flow chart, Blocked Diagram, connection design etc.

Chapter 5: Implementation

Here I discuss about the result what I gain to use the system. And will see the project implementation and the results.

Chapter 6: Conclusion and in future

In his chapter I discuss about the conclusion about the project and the implication for the future scope.

CHAPTER 2

BACKGROUND STUDY

2.1 Introduction

In this section, I discussed what we need to build my project ‘Smart Traffic Control System’.

There is some device like Bluetooth module, servo motor, led, Arduino board, display and the coding language Arduino for build the project as design purpose.

2.2 Literature Review

Many Traffic systems were developed and many research and many techniques were done to develop Traffic system through Arduino. They were try to connect Arduino with traffic system and tried to build a smart system.

Dr.B.Prakash et al [1]. use the IR sensor, it can be monitoring the traffic signal and control them and also measure the density of traffic. It can count vehicles of a lane and by using provide button the green automatically will be signal for ambulance.

Mahesh Lakshminarasimhan et al [2]. Its discuss about population and its effect on traffic in cities. By using a RFID method used in the vehicle and analytics on big data support by Iot it manages parking space identification, controlling light and anti-theft mechanism.

Harshini Vijetha et al [3]. It is the combination of IR sensor, Pi-Camera, Raspberry Pi, RFID with IoT. Where Raspberry Pi mainly control the system, it can measure density, tell Zero Traffic, Stolen automobile with the help of RIFD and when a lost vehicle found a mail will drop.

2.3 Project Reviews

Balasaheb Nawale et al [4]. In this project, a simple 4 lane traffic light system is developed use Arduino. And various time duration is set for green, yellow and red light.

Antony Jackson et al [5]. it’s a 3-way simple traffic light controller project in a particular side.

Mayoogh Girish et al [6]. It is the basic concept to control a single LED by a smart phone using a Bluetooth module for on/off a LED.

2.4 Comparative Studies

Many of common things are existing in my project but it is more user friendly. Thus the policeman can find the features and easily use them. And my system can easily maintain the traffic system more strong way. That's why it is useful and digital and unique.

2.5 Scope of the problem

This is an Arduino based project and there are many problems solved with it. Then why the police man control traffic manually. Nowadays the technology updated day by day. With this we fulfil the need of police men. It's true that difficulties in everywhere, but in my project I tried my best to fulfil their need. And I ensure that this project has the ability to solve the problem of traffic control system most probably.

2.6 Challenges

At the beginning of any kind of work everyone faces some kind of problem but they need to try more to overcome those problem. I also face some problem but trying again and again I overcome those problem.

I faced some challenges like,

- I have a little knowledge about Arduino.
- I faced some problems when I wanted to collaborate the Bluetooth module, Servo motor, LED light with the Arduino. Then control them by a smart phone.
- At the time of implementation, I wanted to add some more feature but I couldn't do it.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Software requirement

To control the lights and servo motor I need a Bluetooth controller app who control the electronics components through Arduino.

3.2 Hardware requirements

Components:

1. Arduino Mega 2560
2. Red LEDs *4
3. Yellow LEDs *4
4. Green LEDs *4
5. Servo motor *4
6. LCD display 16*2
7. Bluetooth Module
8. Connecting wires
9. Prototyping board
10. Power adapter.
11. A smart phone and Bluetooth controller app.

Components Description:

Arduino Mega 2560:

‘Smart Traffic System’ main part is Arduino mega 2560 which control all the thing. Which is ATmega2560 AVR microcontroller and has 70 I/O digital pins.



Figure 3.1: Arduino Mega 2560

LEDs:

5mm LEDs of Green, Yellow & Red colors are used in this project and their max current is 20mA.



Figure 3.2: LED Lights

Servo Motor:

Here in this project I use SG90 micro Servo motor to control the barricade.



Figure 3.3: Servo Motor

LCD Display 16*2:

LCD Display is an electronic display module which produced visual image by using liquid crystal. 16*2 LCD Display is commonly used in DIYs and circuits. Its display 16 characters per line & Such lines in 2. Those Displayed characters is 5*7-pixel matrix.

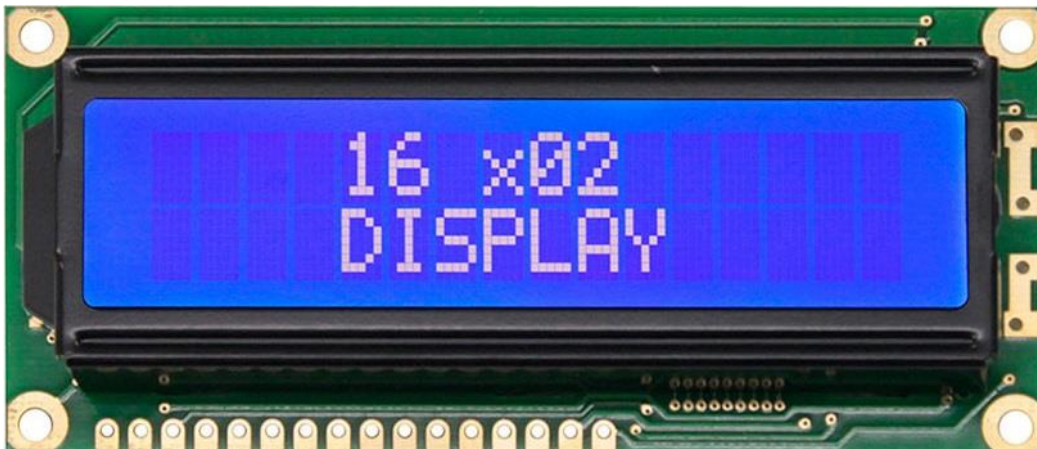


Figure 3.4: 16*2 LCD Display

Bluetooth Module:

HC 05 Bluetooth module are used in Arduino microcontroller, which has operating voltage 5v, operating current 30mA and <100m range working area. It's works with TTL compatible and Serial communication.

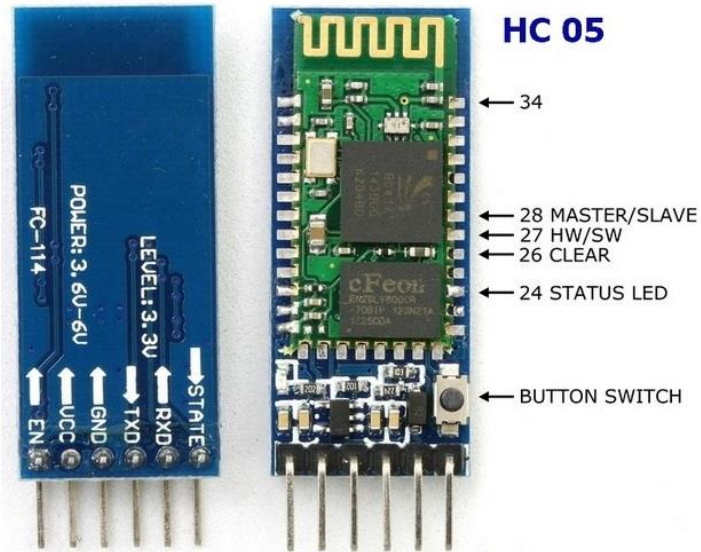


Figure 3.5: Bluetooth Module

Breadboard: A prototype solderless devise.



Figure 3.6: Breadboard

Connecting wires:

Those wire are used for connecting the devices.

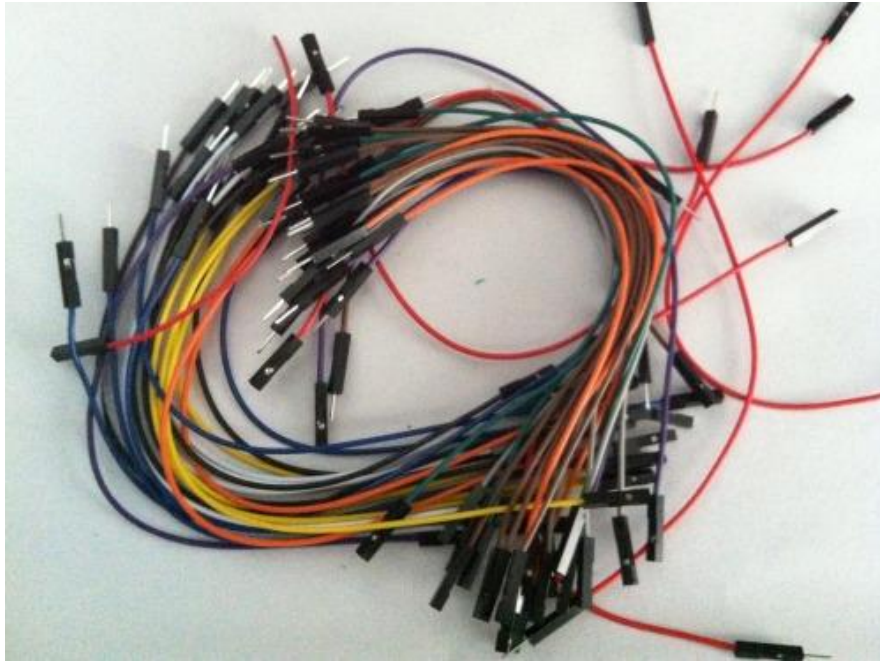


Figure 3.7: Connecting Wires.

3.3 Use Case Model

Here, I use an electronic device control app thus I can connect to the Arduino with my smart phone through Bluetooth. Here is the app use case model. Here, the traffic police are the user, he can connect to the app, run the app and control the traffic by pressing the button through the app. Here, a developer can edit the app like add button, set button value if any update required. The traffic police can manage/control the traffic by connecting and running the app through Bluetooth.

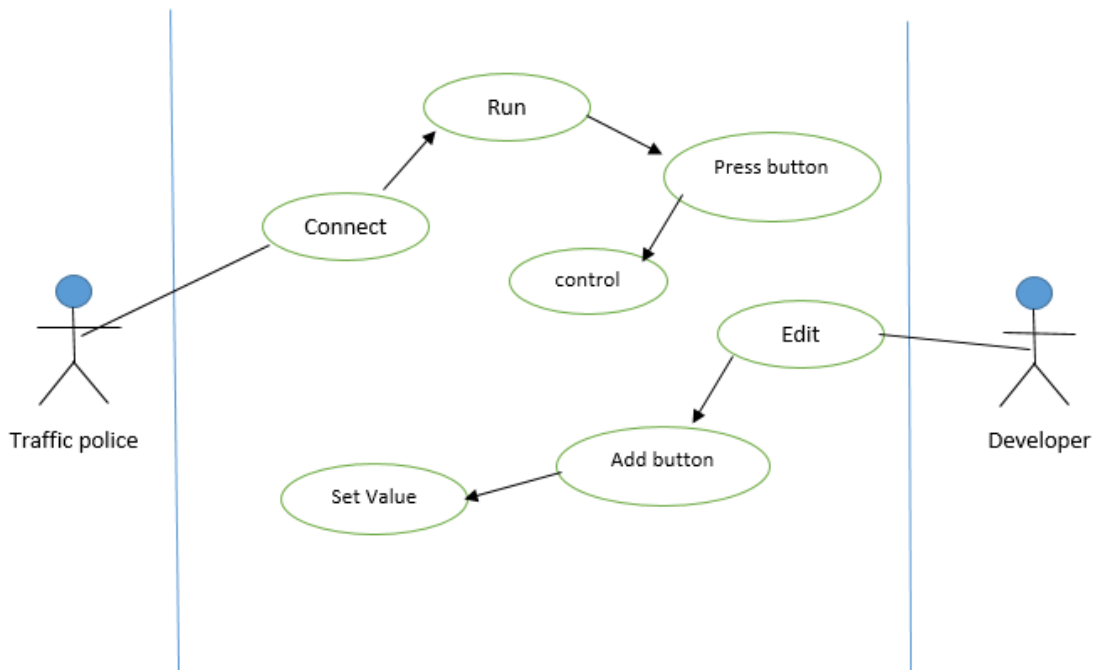


Figure 3.8: App Use case model

3.4 Blocked Diagram

There are many parts in this project like Android device, Bluetooth Transceiver, Servo Motor, Arduino, LED lights, LCD display. Though this is a 4-way Traffic system, I need 12 LEDs (4 green LED, 4 yellow LED, 4 red LED) and all those LEDs are connected with the Arduino digital I/O pins. Thus they can be displayed the result by turning on/off and the vehicle can be stop and start in 4-way traffic road. Here serial communication is done by Bluetooth module HC 05. When pressing the button on the app the serial data send to Arduino Bluetooth module through the designed Android app. Then Bluetooth module receives the data to the Arduino through the TX pin of Bluetooth Module (which connected to Rx pin in Arduino). Uploaded code to the Arduino checks the data and compare the data. If the receives data match, then servo motors and LEDs work. While connecting I can saw the receive data in serial monitor.

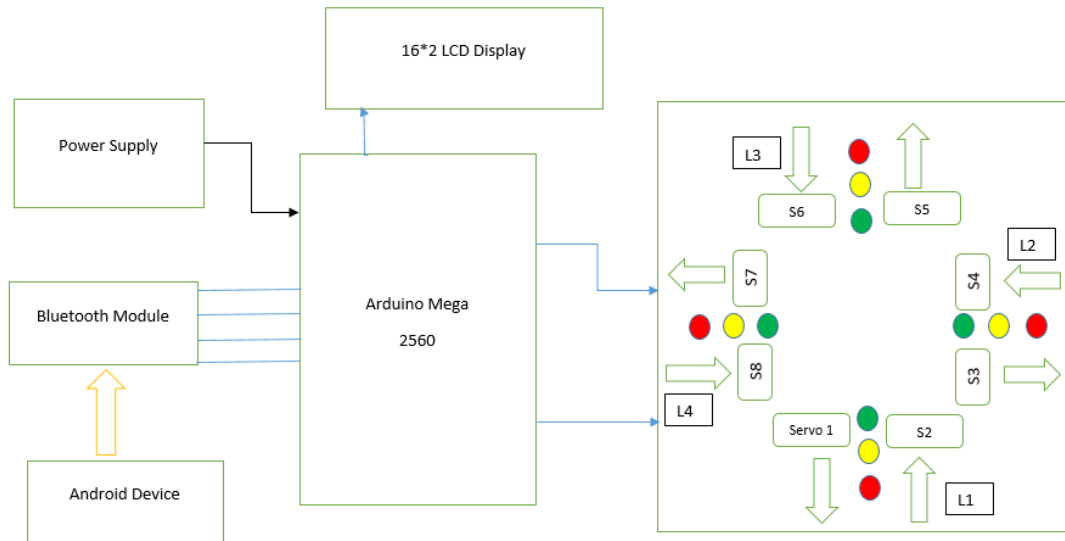


Figure 3.9: Circuit Design of the system

CHAPTER 4

SYSTEM DESIGN

4.1 Front-End Design

Android App & Connecting with Bluetooth Module

First I need to download a app name “Bluetooth Electronics” from Google Play Store. To continue this app, I need to turn on the Bluetooth at first.

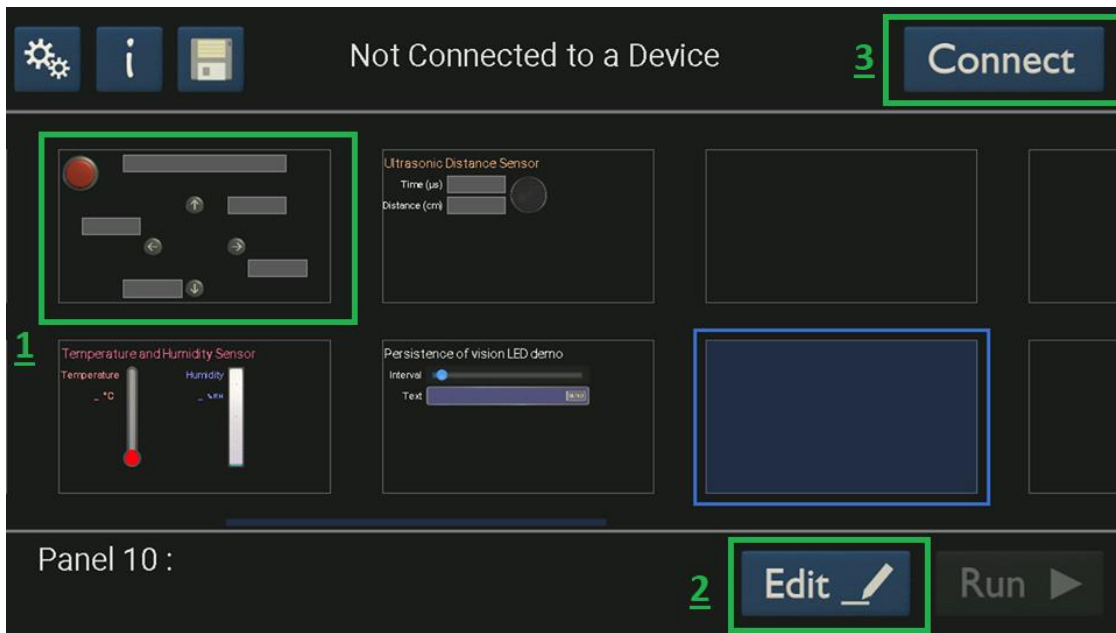


Figure 4.1: Android App panel

In Figure we see three number 1,2,3. In 1, it is my panel and I can add button text etc. what I need. In 2, this way I can make my unique own panel to control the Arduino via Bluetooth. Then in 3, I can connect the app with the Bluetooth module to send data in Arduino.

Edit My Panel:

From Figure 4.1, If I click edit which is mention in 2 in the figure, then I get a view like below, I can set button and button sending data, thus when I press the button the data sent to the Arduino and can compare and take decisions. But the set vale must be declared in Arduino sketch. I also decorate our panel by adding text etc.

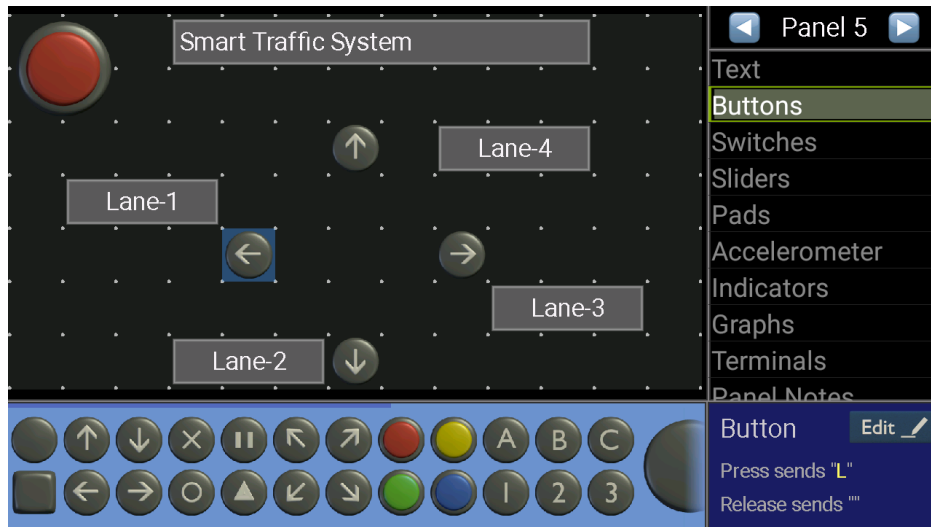


Figure 4.2: Designing panel

Connecting:

From figure 4.1, In 3 I see the connect button. For connecting at 1st I need to turn on the Bluetooth and then press the app connect app. Then I will see a view like that,

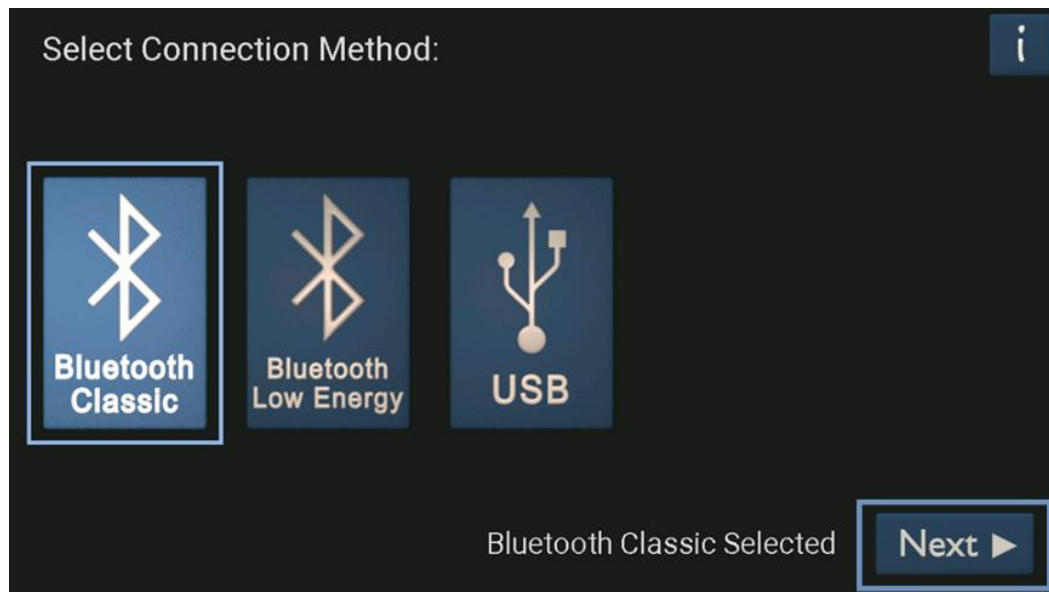


Figure 4.3: Connecting

Then I need to select “Bluetooth Classic” and press the “Next” Button.

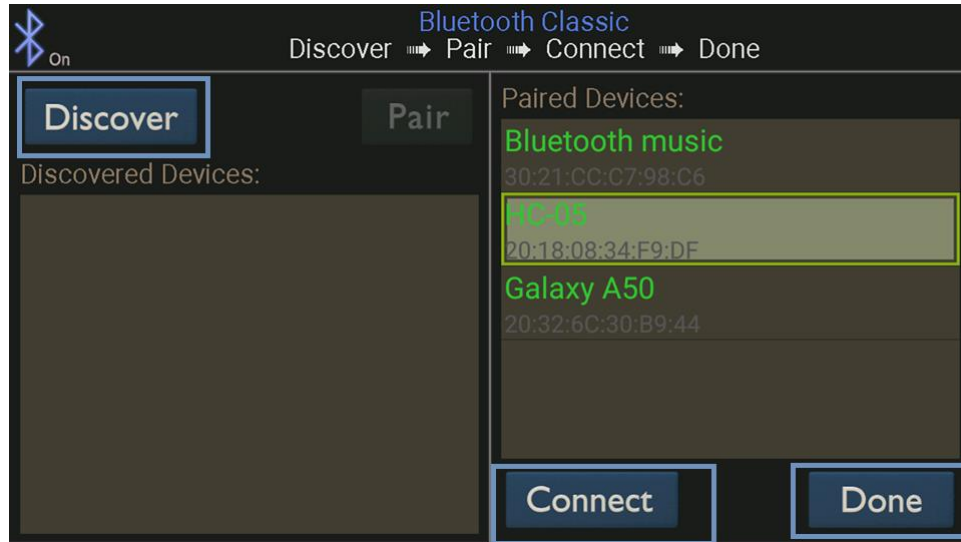


Figure 4.4: pair and connect

To complete the connection, I need to follow the below procedure:

Discover => Pair => Connect => Done

If I complete the procedure successfully then our app is ready to operate the Arduino through the Bluetooth module.

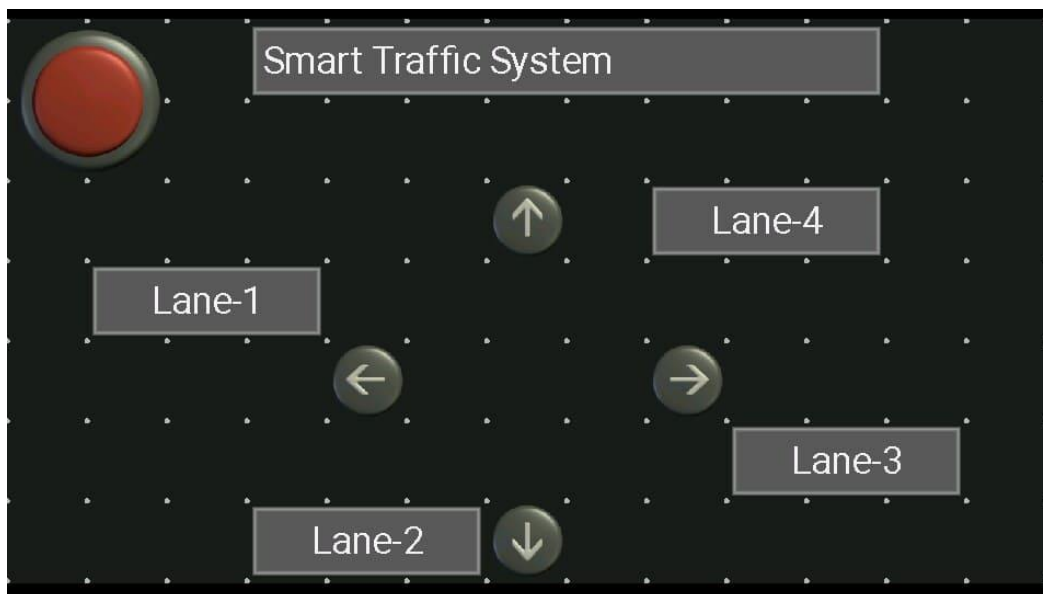


Figure 4.5: Final look of app

Then finally my app looks like the figure 4.5, and it ready to control.

4.2 Back-End Design

Making 4-way lane

To making 4-way lane I need 12 LED (4 green LED, 4 red LED, 4 yellow LED) and adjust them just like the pic which is represent the traffic light. And connecting them to the Arduino digital input/output pins.

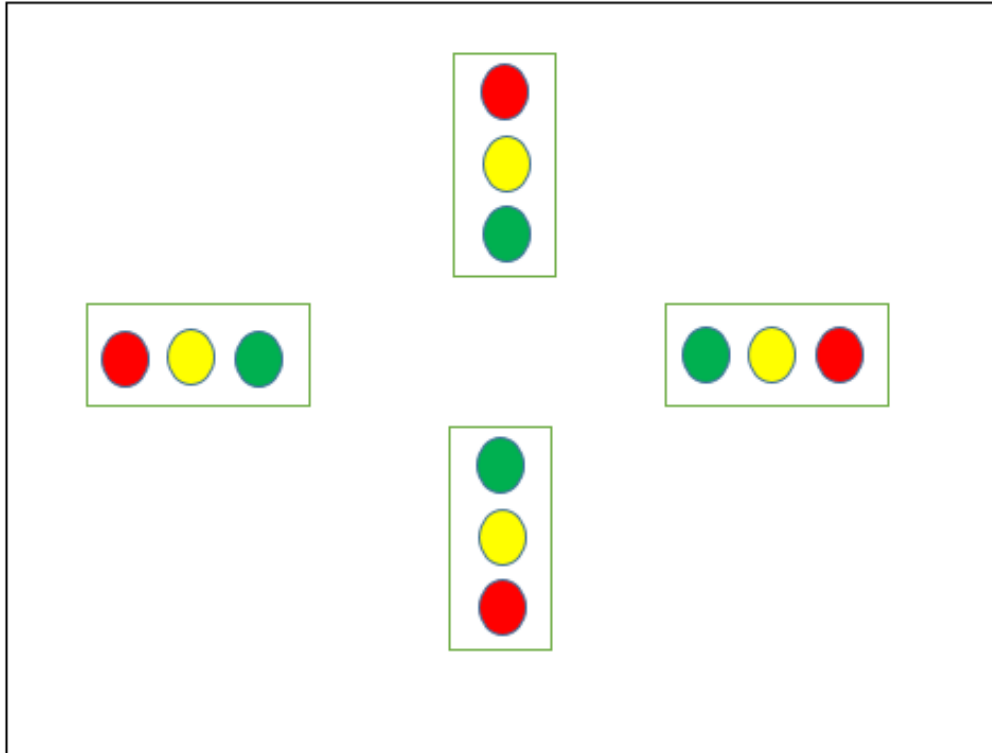


Figure 4.6: 4-way Traffic light

Connecting Servo Motor

Connecting the servo motor to the system thus I can make bridge and stop the vehicle. Every lane has two side, so every lane needs two servo motor for controlling those road side. And connect those motor with the Arduino pins. A single servo motor has 3 pin, 1 connect to the digital I/O pin and else 2 are connect to voltage pin and Ground pin. Like the figure shown in below,

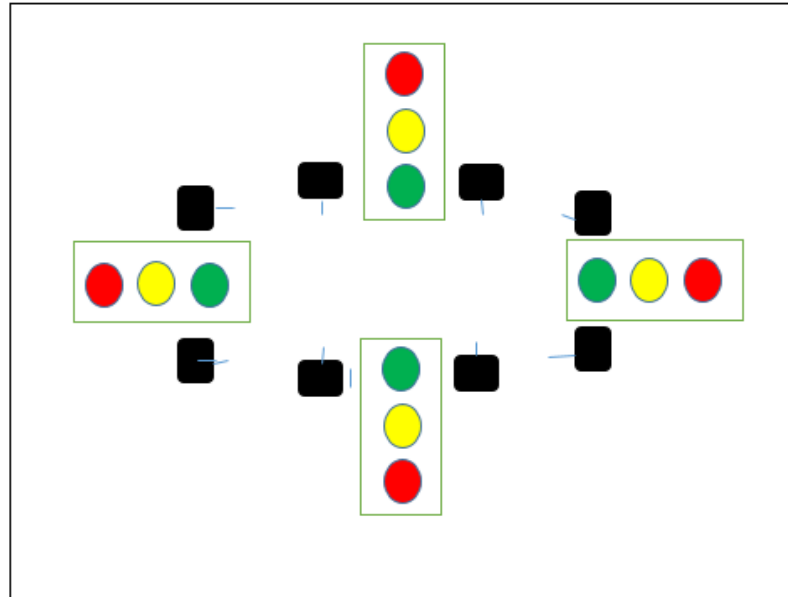


Figure 4.7: servo motor with those lanes

Bluetooth Module connecting

Bluetooth module has 4 pin RX, TX, VCC, GND. Those 4 pin connected to the Arduino for making connection with Android app. Bluetooth TX is connected with Arduino RX, and Bluetooth Rx is connected with Arduino TX. VCC & GND are connecting with Arduino in same pin.

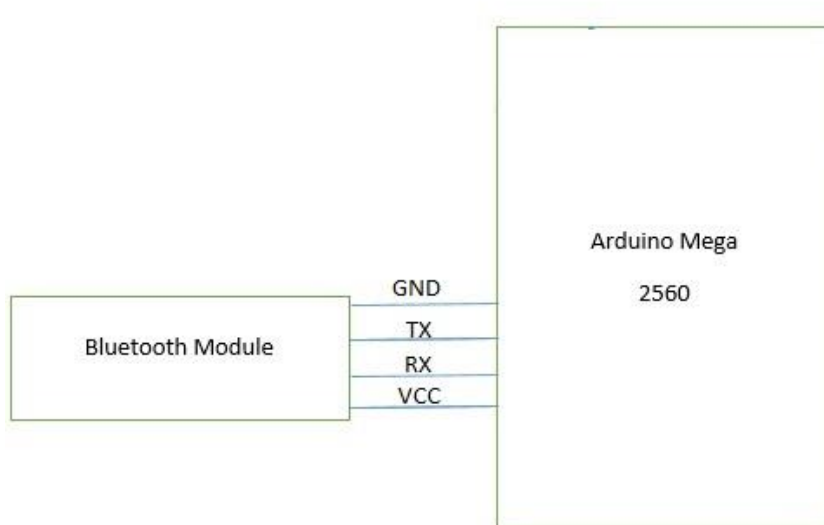


Figure 4.8: Bluetooth and Arduino connecting

Connecting Display

16*2 LCD Display used for this project thus everyone can see the live result that what is the lane condition now. The SDA and SCL is connected to the Arduino SDA &SCL pin and GND & VCC pin is also connected with the Arduino GND &VCC pin.

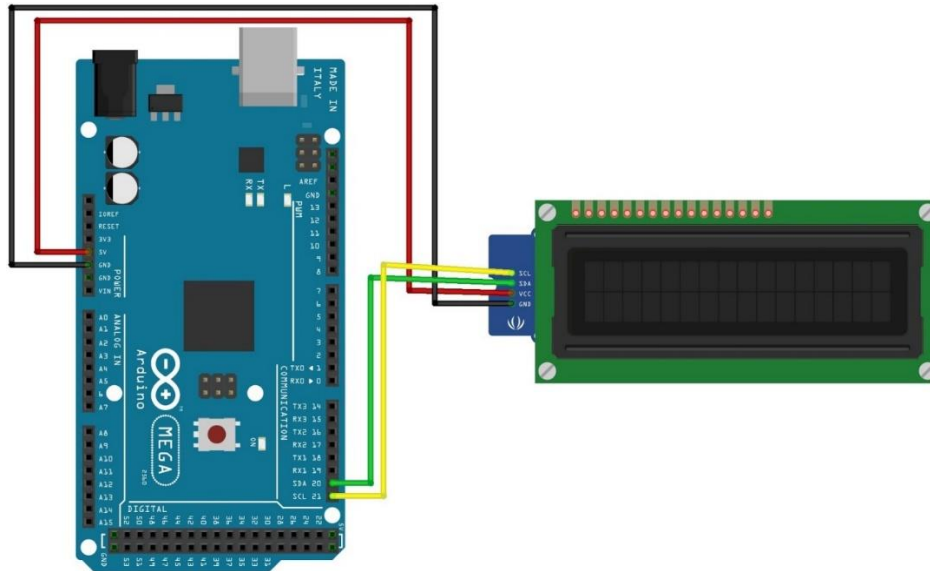


Figure 4.9: 16*2 LCD Display and Arduino Mega Connecting

Connecting Power Supply:

We can supply power in Arduino in many way:

- Powering an Arduino with external power bank.
- Powering an Arduino with Adapter.
- Powering an Arduino with external battery.
- Powering an Arduino through laptop.

Here I use an external battery to supply power to the Arduino. I need 5v power supply and the battery can give us the power. So, it's safe and reasonable.



Figure 4.10: Power supply to the Arduino.

4.3 Flow Chart

Figure shows my project flow chart. This system when the red light is on servo motor rotated in 90° which stop the vehicles. If green light is on, then servo motor is in 0° and the vehicles are moving. If yellow light is on, then the servo motor is turn 90 to 0 that's why the vehicle need to wait for some moment.

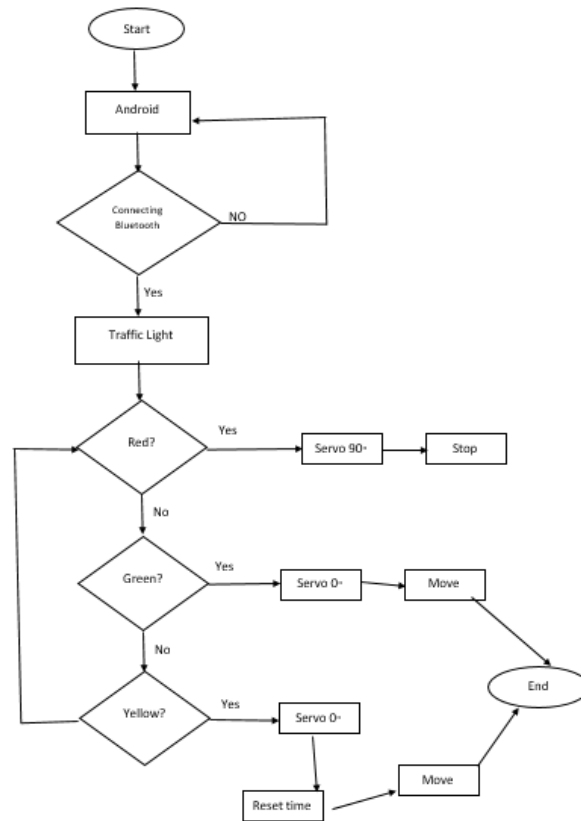


Figure 4.11: A flow chart that define the Smart Traffic Control System

CHAPTER 5

IMPLEMENTATION

5.1 Implementation The Lights:

Making 4 traffic lights like the figure with the LEDs.

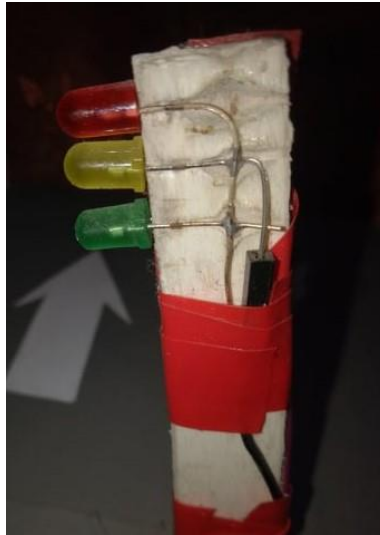


Figure 5.1: building light

Take a board and then design the board like 4-way traffic and attached the 4 traffic lights like the figure 5.2 and connect them to the Arduino thus the lights can be control as like as the traffic lights



Figure 5.2: Implementation of lights

5.2 Implementation of LCD display

Here a picture of LCD display implementation where the display shows the result. Which lane is busy and which one is free.

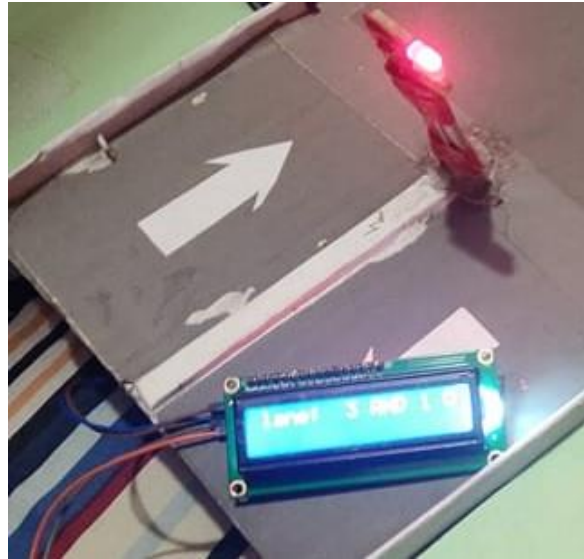


Figure 5.3: LCD implementation

5.3 Implementation of motors:

Here we see the 4 motors are in the road side which control the barricades in the Smart Traffic System. Their position set such a way thus the traffic police easily control the 4 lane traffic.

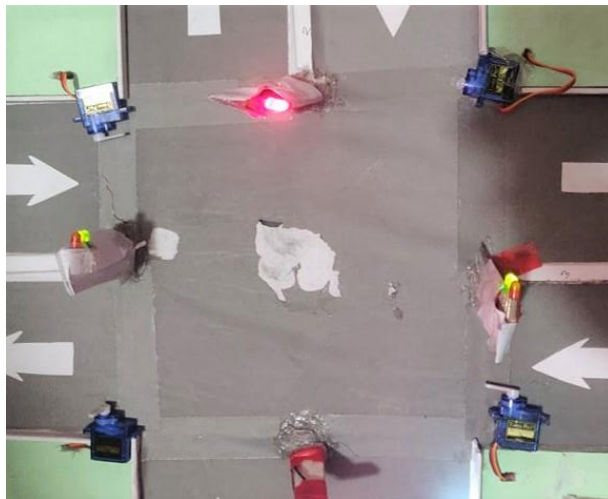


Figure 5.4: Motor implementation

5.4 Implementation of Bluetooth Module

At first the implementation of Bluetooth Module, it need a breadboard to fix the Bluetooth Module then connect in to the Arduino by connecting wires like the figure 5.5.

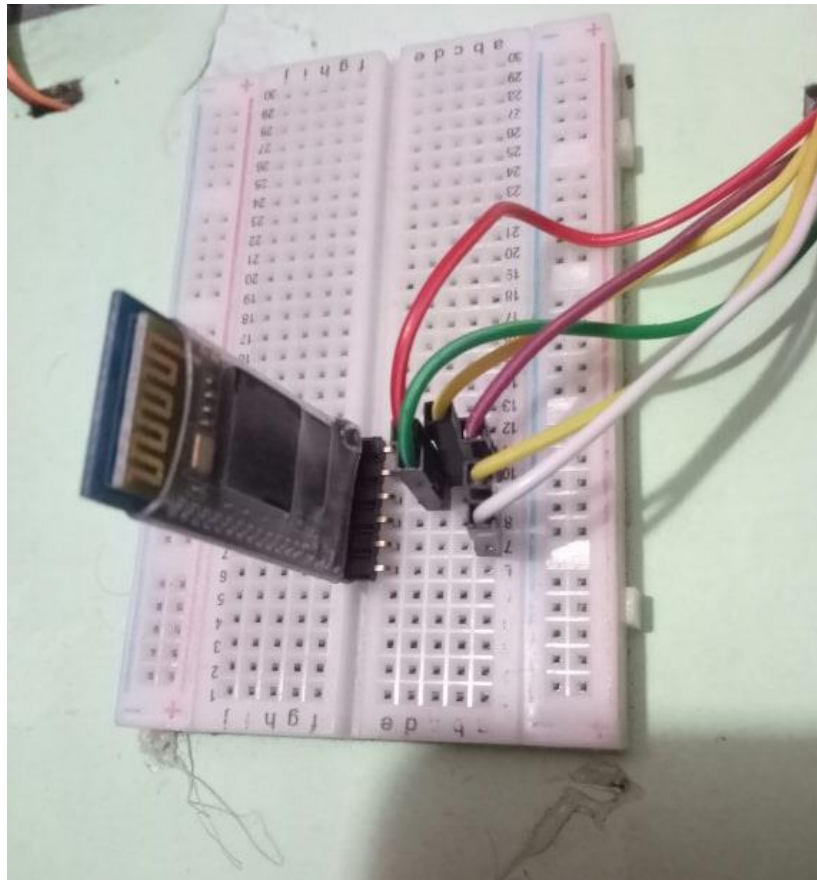


Figure 5.5: Bluetooth Module implementation

5.5 Testing Implementation and Results

This is the system, when press the app button the lights and motors are controlling the road.

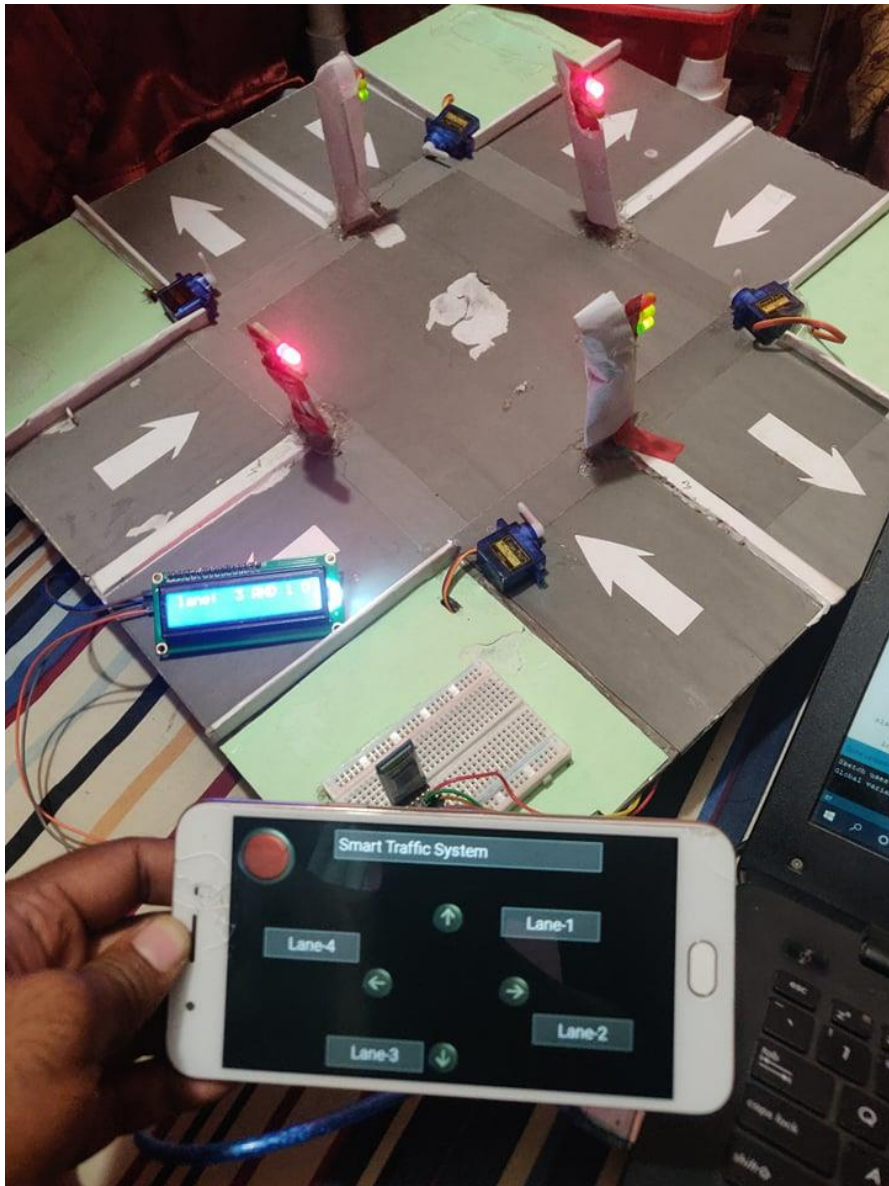


Figure 5.6: Testing Implementation

CHAPTER 6

CONCLUSION & FUTURE SCOPE

Conclusion

“**Smart Traffic System**” using this system traffic control is more efficiently and easily be handled.

This can make an exceptional alternative in the traffic control system. It's a system where every vehicle must be follow the roll and couldn't break the roll and move when a red light is on. This system make safety for the police man who stand on the road under the sun and stop the vehicles.

In this system they don't need to do that, they only sit in the police box and control all those thing by their smart phone through the Bluetooth controller app.

It's an Arduino based so by changing program It can easily be updated.

In future:

In future more feature can be adding like,

- Adding camera
- Adding scanner to scan the car number for tracking
- Access range
- Notification system
- Location update
- Adding sensors.

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