DIGITAL TRAFFIC SIGNAL CONTROL AND VEHICLE OVERSPEED DETECTION

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

Bachelor of Science in Electrical and Electronic Engineering

by

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Certification

This is to certify that this project and thesis entitled "**DIGITAL TRAFFIC SIGNAL CONTROL AND VEHICLE OVERSPEED DETECTION**" 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 31 October 2019.

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The project and thesis entitled **" DIGITAL TRAFFIC SIGNAL CONTROL AND VEHICLE OVERSPEED DETECTION,"** submitted by **MD. Shahadat Hossain and Md.Ahaduzzaman Murad**, ID No: 162-33-303, 162-33-306, Session: Summer 2016 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical and Electronic Engineering** on 31 October 2019.

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Dedicated to

Our Parents

CONTENTS

LIST OF FIGURES

List of Abbreviations & Symbols

PIR	Proximity Infrared Sensors
LCD	Liquid Cristal Display
IR	Infrared
LDR	Light Dependent Resistor
LED	Light Emitting Diode
PVC	Poly Vinyl Chloride
PWM	Pulse Width Modulation
Hz	Hertz
USB	Universal Serial Bus
mA	Milliamperes
V	Voltage
μF	Microfarad
GPS	Global Positioning System
VIP	Very Important Person
OLED	Organic Light Emitting Diode
CRT	Cathode Ray Tube

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ABSTRACT

The venture is planned for structuring a thickness based unique traffic signal framework where the planning of sign will change naturally on detecting the traffic thickness at any intersection. Traffic blockage is a serious issue in many urban communities over the world and along these lines the time has come to move increasingly manual mode or fixed clock mode to a mechanized framework with basic leadership capacities. Present day traffic flagging framework is fixed time based which may render wasteful on the off chance that one path is operational than the others. To improve this issue, we have made a structure for a clever traffic control framework. Once in a while higher traffic thickness at one side of the intersection requests longer green time when contrasted with standard apportioned time We, subsequently propose here a component where the timespan of green light and red light is relegated based on the thickness of the traffic present around then. This is accomplished by utilizing PIR (proximity Infrared sensors). When the thickness is determined, the gleaming time of green light is relegated by the assistance of the microcontroller (Arduino). The sensors which are available on sides of the street will distinguish the nearness of the vehicles and sends the data to the microcontroller where it will choose to what extent a flank will be open or when to change over the sign lights. In resulting segments, we have explained the strategy of this structure.

These days individuals are driving exceptionally quick, mishaps are happening regularly, we lost our significant life by committing little error while driving (school zone, slopes zone, and thruways). So as to maintain a strategic distance from such sort of mishaps and to caution the drivers and to control their vehicle speed in such sort of spots the roadway division have set the billboards. Drivers drive enthusiastically without minding the traffic. Insinuation of driver about speed and clumsy zone is fundamental. It tends to be finished by utilizing programmed innovation with the assistance of inserted framework and sensors.

With this, the power will be wasted up to some extent. This paper gives the best solution for electrical power wastage. Also, the manual operation of the lighting system is completely eliminated.

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the present rapid life, traffic clog turns into a major issue in our everyday exercises. It cuts down the efficiency of individual and along these lines the general public as heaps of work hour is squandered in the sign. High volume of vehicles, the lacking foundation and the unreasonable dissemination of the flagging framework are fundamental purposes behind this turbulent blockage. It in a roundabout way likewise adds to the expansion in contamination level as motors stay on as a rule, a gigantic volume of normal assets in types of petroleum and diesel is expended with no productive result. Thusly, so as to dispose of these issues or possibly lessen them to huge level, more up to date plans should be actualized by getting sensor based.

Fig 1.1: Traffic signal controlling road.

Over speeding vehicles are major issues for road safety and needs proper addressing to minimize the accidents. Excessive Speed is a factor in one third of all fatal crashes. Vehicle speed detection is based on the use of Doppler Radar to find the speed of the moving vehicles. Doppler effect can be exploited to measure the speed of vehicles and identify those crossing speed limit. The shift in frequency between the transmitted and reflected high frequency wave is the key

factor used to calculate speed. The Doppler radar-based speed detector can be interfaced to a microprocessor-based system for measurement and comparison.

1.2 Problem Statement

The present arrangement of traffic light has been giving a fixed traffic control plan, which settings depend on earlier traffic tallies however might be physically changed. It is the most widely recognized type of sign control for the time being a days and result in improper conduct in rush hour gridlock which varies from that which the arrangement was based, for example, the utilization of superfluous stages when the traffic is light.

1.3 Objectives

The objective of our project is to address the issues discussed above. The objectives are as follows:

i. The proposed framework will lessen the car influx since we investigation the particular traffic signal different time in a day.
ii. To design an automatic traffic signal control in a busy road.
iii. To detect the speed of the over speeding vehicle in which road.
iv. To apply in a big city of a busy road.

1.4 Scopes

i. Road safety: The convenient checking of the over speeding vehicle will lessen high level of street mishaps.

ii. Automation in law enforcement:

The system being completely automatic, reduces the number of traffic police officers needed to deploy in the real field for checking speeding vehicles. With very few enhancements in the proposed system new features can be easily incorporated such as:

Vehicle security: Accident will decrease for traffic signal control and speed detection.

Visitor management: In The system can be effectively used to assist visitor management systems in recognizing guest vehicles.

Traffic Jam: For Digital traffic signal control system it will reduces.

1.5 Research Methodology

Road accidents have been very common in the present world with the prime cause being the careless driving. The necessity to check this has been very essential and different methods have been used so far. However, with the advancement in the technology, different governing bodies are demanding some sort of computerized technology to control this problem of over speed driving. At this scenario, we are proposing a system to detect the vehicle which are being driven above the given maximum speed limit that the respective roads or highway limits. The overall project is divided in three categories; speed detection, image acquisition and transfer and image processing. Speed detecting device works on the principle of Doppler Effect using microwave Doppler radar sensor. The speed is compared with the preset threshold and camera is triggered if the speed limit exceeds.

1.6 Project/Thesis Outline

This Project/thesis is organized as follows:

Chapter 1 introduces of our project.

Chapter 2 reviews the literature of our project, how is it work.

Chapter 3 analyzes and simulates the theoretical works to write our arduino codes.

Chapter 4 describes the hardware development part that used in our project.

Chapter 5 presents the result and its discussions.

Chapter 6 concludes with some main system of our project.

CHAPTER 2

LITERATURE REVIEWS

2.1 Introduction

Under present situation, traffic control is accomplished by the utilization of an arrangement of hand signs by traffic police staff, traffic sign, and markings. An equivalent and coordinating instruction program is required, through driver-authorizing specialists, to guarantee that the individuals who work engine vehicles comprehend the principles of the street and the activities that they are required or encouraged to take when a specific control gadget is available. Each traffic control gadget is represented by models of plan and use; for instance, stop signs consistently have a red foundation and are octagonal fit as a fiddle. Structure measures enable the driver to rapidly and reliably see the sign in the visual field along the street. Standard utilization of hues and shape helps in this recognizable proof and in settling on the suitable strategy.

Under current conditions, traffic lights are determined to in the various ways with fixed time delay, following a specific cycle while changing from one sign to other making undesirable and inefficient blockage on one path while different paths stay empty.

The framework we propose recognize the thickness of traffic on individual paths and in this way manage the planning of the sign's planning. IR trans collectors check the blocks and give a thought regarding the traffic thickness on a specific path and feed this reaction to a controller unit which will settle on the important choices as and when required.

Observing street traffic especially vehicle rates is a most extreme need in the present society as the quantity of vehicles on the roadways is developing and the traffic is winding up exceptionally clogged. On a normal, one individual passes on by vehicle crash in consistently. About 10 million individuals are harmed every year by vehicle mishaps. The medical clinic bill, harmed property and different expenses are signifying 1%-3% of the world total national output. Over

speed of a vehicle is one of the most significant explanations behind expanding auto collisions. Late insights demonstrate that 25.1% mishaps are brought about by vehicular over speed. Traffic organizers and law requirement offices are giving a lot of consideration out and about traffic observing frameworks and techniques for an expanded wellbeing arrangement, occurrence the executives and street traffic detailing. All in all, these observing frameworks are included for checking, ordering or potentially evaluating paces of the moving vehicles out and about. Along these lines, there is a need to give a simple to-utilize and increasingly adaptable street traffic the board framework for checking the speed of moving vehicle on the roadways.

2.2 Background of the Project

This traffic management system will control the traffic signal automatically followed by time base (scheduling) system as well imaging. Help the people to traveling or moving one place to another without traffic jam over road. The system included online traffic signal monitoring, vehicle tracking system and all of the information store into a central database for that any time tracing any one of vehicle. The traffic police or any police officer traces the vehicle which is involved into different types of crime. It is also helpful to our crime branch and they can also help to the general people frequently.

2.3 Automatic Traffic Signal Light Control

The plan of Digital traffic control framework is a functioning examination subject. Analysts around the globe are developing more up to date draws near and inventive frameworks to take care of this unpleasant issue. Models dependent on scientific conditions are applied to assess the vehicle holding up time at an intersection, the quantity of autos in the holding up line, the augmentation of the holding up vehicles along the path, the ideal planning spaces for green, yellow, and red lights that best fit the genuine and veritable circumstance and the productive mix of steering. Truth be told, the common conditions between close by convergences lead to a muddled detailing with lumbering parameters. These parameters are accidental, hazardous, dependent, and the worse point is the variance of these parameters with time. Thus, finding a dynamic, consistent, and convenient solution

is quite the plan of clever traffic control framework is a functioning exploration point. Specialists around the globe are designing more current approaches and imaginative frameworks to tackle this distressing issue. Models dependent on scientific conditions are applied to assess the vehicle holding up time at an intersection, the quantity of autos in the holding up line, the augmentation of the holding up vehicles along the path, the ideal planning spaces for green, and red lights that best fit the genuine and veritable circumstance and the effective mix of directing. Truth be told, the common conditions between close by crossing points lead to an entangled detailing with lumbering parameters. These parameters are coincidental, risky, subordinate, and the more awful point is the fluctuation of these parameters with time. Hence, finding a dynamic, steady, and helpful arrangement is very inconceivable. Scientists from various orders are teaming up to investigate achievable arrangements that decrease traffic clog. Along these lines, different approaches are continually proposed in the writing and numerous procedures are executed benefitting from the mechanical advances of microcomputers, later fabricated gadgets and sensors, and creative calculations displaying, however much as could reasonably be expected, the difficulty of traffic lights.

2.4 Vehicle Over Speed Detection

Numerous sensors nowadays are accessible in the market for the deterrent identification. A portion of the sensors are PIR sensor, Ultrasonic sensor, IR sensor, photoelectric sensor and so forth. These have focal points and inconveniences too. There are executions of these sensors for the recognition reason in couple of strategies as pursues.

2.4.1 Detection of Obstacles Using IR Sensor

In a task on smart programmed road light control framework is tested and structured. This venture is predominantly planned and executed for sparing of vitality in the road light field and vehicle over speed finder. This framework is planned so as to not require any human help to ON and OFF the light. This task gives great answer for wastage of electric power in which human association is diminished. Road lighting is one of the most power expending segment in the

general public. Worldwide patterns have appeared in an exploration that 18-38% of the entire vitality is devoured by road lights and this is one of the significant issues which are to be considered. In this article, there are two kinds of sensors are utilized so as to make less power utilization. They are IR (Infrared sensor) and LDR (Light ward resistor).

LDR is utilized essentially to check whether it is day or night so as to ON or OFF the light in like manner. IR sensor is utilized to watch if there is any development around here with the goal that it checks the condition whether to ON or OFF the light. In the event that any impediment draws close or passes by IR sensor, at that point the light will be ON and when the obstruction moves away then the light will be OFF. To work this entire framework, Raspberry PI goes about as mind, which is the primary controller which controls entire framework. Raspberry PI takes the directions or information from LDR whether it is day or night and from IR sensor whether there is any impediment present to ON and OFF the light in like manner. For the road light, LED light is utilized.

CHAPTER 3

ANALYSIS AND SIMULATION

3.1 Arduino Simulation Code

```
#include <LiquidCrystal_I2C.h>
#include <Wire.h>
LiquidCrystal_I2C lcd(0x27, 20, 4);

#include <Servo.h>
Servo myservo1;
Servo myservo2;
Servo myservo3;
Servo myservo4;

unsigned int flag_road11 = 0, flag_road22 = 0, flag_road33 = 0, flag_road44 = 0;

int mode   = 7;
int road1on = 8;
int road2on = 9;
int road3on = 10;
int road4on = 11;

int road1red = 22;
int road2red = 28;
int road3red = 34;
int road4red = 40;

int road1green = 23;
int road2green = 29;
int road3green = 35;
int road4green = 41;
```

```
int road1sensor1 = 24;
int road1sensor2 = 25;
double calibrate = 0;
float time_for_speed = 0, velocity = 0 ;

int road2sensor1 = 30;
int road2sensor2 = 31;
double calibrate2 = 0;
float time_for_speed2 = 0, velocity2 = 0 ;

int road3sensor1 = 36;
int road3sensor2 = 37;
double calibrate3 = 0;
float time_for_speed3 = 0, velocity3 = 0 ;

int road4sensor1 = 42;
int road4sensor2 = 43;
double calibrate4 = 0;
float time_for_speed4 = 0, velocity4 = 0 ;

void setup()
{
  Serial.begin(9600);
  pinMode(road1sensor1, INPUT);
  pinMode(road1sensor2, INPUT);
  pinMode(road2sensor1, INPUT);
  pinMode(road2sensor2, INPUT);
  pinMode(road3sensor1, INPUT);
  pinMode(road3sensor2, INPUT);
  pinMode(road4sensor1, INPUT);
  pinMode(road4sensor2, INPUT);

  pinMode(mode, INPUT_PULLUP);
  pinMode(road1on, INPUT_PULLUP);
  pinMode(road2on, INPUT_PULLUP);
  pinMode(road3on, INPUT_PULLUP);
  pinMode(road4on, INPUT_PULLUP);
```

```
pinMode(road1red, OUTPUT);
pinMode(road2red, OUTPUT);
pinMode(road3red, OUTPUT);
pinMode(road4red, OUTPUT);

pinMode(road1green, OUTPUT);
pinMode(road2green, OUTPUT);
pinMode(road3green, OUTPUT);
pinMode(road4green, OUTPUT);

myservo1.attach(26);
myservo2.attach(32);
myservo3.attach(38);
myservo4.attach(44);
myservo1.write(180);
myservo2.write(180);
myservo3.write(180);
myservo4.write(180);

lcd.begin(20,4);
lcd.init();
lcd.backlight();
lcd.clear();
lcd.setCursor(5,1);
lcd.print(" WELCOME ");
delay(2000);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("Digital Traffic ");
lcd.setCursor(2,1);
lcd.print("Signal Control");
lcd.setCursor(1,2);
lcd.print("& Vehicle Over ");
lcd.setCursor(0,2);
lcd.print("  Speed Detection ");
delay(5000);
```

```
 lcd.clear();
 lcd.setCursor(1,0);
 lcd.print("Project & Circuit");
 lcd.setCursor(3,1);
 lcd.print(" Design By ");
 lcd.setCursor(0,2);
 lcd.print("MD Shahadat Hossain");
 lcd.setCursor(0,3);
 lcd.print("MD Ahaduzzaman Murad");
 delay(5000);
 lcd.clear();
}

void loop ()
{
 int modestate = digitalRead(mode);
 if (modestate == LOW)
 {

  lcd.setCursor(3,0);
  lcd.print("Manual mode");
  manualy();
 }
 else
 {
  automatic();
 }

 delay(10);
}

void automatic()
{
 road1();
 road2();
 road3();
 road4();
```

```
}

void manualy()
{
  int road1state = digitalRead(road1on);
  int road2state = digitalRead(road2on);
  int road3state = digitalRead(road3on);
  int road4state = digitalRead(road4on);

if ((road1state == HIGH) && (road2state == HIGH) && (road3state == HIGH) && (road4state == HIGH))
{
   lcd.setCursor(0,1);
   lcd.print("All road is off now");
   lcd.setCursor(0,2);
   lcd.print("                    ");
   lcd.setCursor(0,3);
   lcd.print("                    ");
   digitalWrite(road1red, HIGH);
   digitalWrite(road1green, LOW);
   digitalWrite(road2red, HIGH);
   digitalWrite(road2green, LOW);
   digitalWrite(road3red, HIGH);
   digitalWrite(road3green, LOW);
   digitalWrite(road4red, HIGH);
   digitalWrite(road4green, LOW);
}

  if (road1state == LOW)
  {
    road11();
    flag_road11 = 1;
  }
  else
  {
    if(flag_road11==1)
    {
     flag_road11 = 0;
```

```
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  delay(2000);
  myservo1.write(120);
  delay(700);
  myservo1.write(140);
  delay(700);
   myservo1.write(160);
  delay(700);
  myservo1.write(180);
 }
}

 if (road2state == LOW)
{
 road22();
 flag_road22 = 1;
}
else
{
 if(flag_road22==1)
 {
  flag_road22 = 0;
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  delay(2000);
  myservo2.write(120);
  delay(700);
  myservo2.write(140);
  delay(700);
  myservo2.write(160);
  delay(700);
  myservo2.write(180);
 }
}

if (road3state == LOW)
```

```
 {
  road33();
  flag_road33 = 1;
 }

else
 {
  if(flag_road33==1)
  {
   flag_road33 = 0;
   digitalWrite(road3red, HIGH);
   digitalWrite(road3green, LOW);
   delay(2000);
   myservo3.write(120);
   delay(700);
   myservo3.write(140);
   delay(700);
   myservo3.write(160);
   delay(700);
   myservo3.write(180);
  }
 }

 if (road4state == LOW)
 {
  road44();
  flag_road44 = 1;
 }
 else
 {
  if(flag_road44==1)
  {
   flag_road44 = 0;
   digitalWrite(road4red, HIGH);
   digitalWrite(road4green, LOW);
   delay(2000);
   myservo4.write(120);
```

```
    delay(700);
    myservo4.write(140);
    delay(700);
    myservo4.write(160);
    delay(700);
    myservo4.write(180);
   }
  }
}

void Road1Speed()
{
  S1go();
}

void Road2Speed()
{
  S2go();
}

void Road3Speed()
{
  S3go();
}

void Road4Speed()
{
  S4go();
}

void S1go()
{
  calibrate = millis();

   if( digitalRead(road1sensor1) == 0)
   {
      while(digitalRead(road1sensor2) != 0);
```

```
    time_for_speed = (millis()- calibrate);
    while(digitalRead(road1sensor2) != 1);
    velocity = (216/time_for_speed);   // check note 1 comments below to see how 216 came here

  }

  if (velocity >= 1)
  {
   lcd.setCursor(0,2);
   lcd.print("Road1 Over Speed");
  }
  else
  {
   lcd.setCursor(0,2);
   lcd.print("Normal Speed        ");
  }

}

void S2go()
{
 calibrate2 = millis();

  if( digitalRead(road2sensor1) == 0)
  {
    while(digitalRead(road2sensor2) != 0);
    time_for_speed2 = (millis()- calibrate2);
    while(digitalRead(road2sensor2) != 1);
    velocity2 = (216/time_for_speed2);   // check note 1 comments below to see how 216 came here
  }

  if (velocity2 >= 1)
  {
   lcd.setCursor(0,2);
   lcd.print("Road2 Over Speed");
  }
  else
```

```
    {
     lcd.setCursor(0,2);
     lcd.print("Normal Speed       ");
    }

}

void S3go()
{
  calibrate3 = millis();

    if( digitalRead(road3sensor1) == 0)
    {
       while(digitalRead(road3sensor2) != 0);
       time_for_speed3 = (millis()- calibrate3);
       while(digitalRead(road3sensor2) != 1);
       velocity3 = (216/time_for_speed3);
    }

    if (velocity3 >= 1)
    {
     lcd.setCursor(0,2);
     lcd.print("Road3 Over Speed");
    }
    else
    {
     lcd.setCursor(0,2);
     lcd.print("Normal Speed       ");
    }

}

void S4go()
{
  calibrate4 = millis();

    if( digitalRead(road4sensor1) == 0)
```

```
    {
       while(digitalRead(road4sensor2) != 0);
       time_for_speed4 = (millis()- calibrate4);
       while(digitalRead(road4sensor2) != 1);
       velocity4 = (216/time_for_speed4);
    }

     if (velocity4 >= 1)
    {
      lcd.setCursor(0,2);
      lcd.print("Road4 Over Speed");
    }
    else
    {
      lcd.setCursor(0,2);
      lcd.print("Normal Speed       ");
    }

}

void road1()
{
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("   Automatic mode   ");
   lcd.setCursor(3,1);
   lcd.print("Road1 Open Now");
   digitalWrite(road1red, LOW);
   digitalWrite(road1green, HIGH);
   myservo1.write(90);
   digitalWrite(road2red, HIGH);
   digitalWrite(road2green, LOW);
   myservo2.write(180);
   digitalWrite(road3red, HIGH);
   digitalWrite(road3green, LOW);
   myservo3.write(180);
   digitalWrite(road4red, HIGH);
```

```
  digitalWrite(road4green, LOW);
  myservo4.write(180);
  delay(5000);
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  lcd.setCursor(3,1);
  lcd.print("Road1 Closing  ");
  delay(3000);
  myservo1.write(120);
  delay(700);
  myservo1.write(140);
  delay(700);
  myservo1.write(160);
  delay(700);
  myservo1.write(180);
}

void road2()
{
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("   Automatic mode   ");
  lcd.setCursor(3,1);
  lcd.print("Road2 Open Now");
  delay(1000);
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  myservo1.write(180);
  digitalWrite(road2red, LOW);
  digitalWrite(road2green, HIGH);
  myservo2.write(90);
  digitalWrite(road3red, HIGH);
  digitalWrite(road3green, LOW);
  myservo3.write(180);
  digitalWrite(road4red, HIGH);
  digitalWrite(road4green, LOW);
  myservo4.write(180);
```

```
  delay(5000);
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  lcd.setCursor(3,1);
  lcd.print("Road2 Closing  ");
  delay(3000);
  myservo2.write(120);
  delay(700);
  myservo2.write(140);
  delay(700);
  myservo2.write(160);
  delay(700);
  myservo2.write(180);
}

void road3()
{
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("   Automatic mode   ");
  lcd.setCursor(3,1);
  lcd.print("Road3 Open Now");
  delay(1000);
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  myservo1.write(180);
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  myservo2.write(180);
  digitalWrite(road3red, LOW);
  digitalWrite(road3green, HIGH);
  myservo3.write(90);
  digitalWrite(road4red, HIGH);
  digitalWrite(road4green, LOW);
  myservo4.write(180);
  delay(5000);
  digitalWrite(road3red, HIGH);
```

```
  digitalWrite(road3green, LOW);
  lcd.setCursor(3,1);
  lcd.print("Road3 Closing  ");
  delay(3000);
  myservo3.write(120);
  delay(700);
  myservo3.write(140);
  delay(700);
  myservo3.write(160);
  delay(700);
  myservo3.write(180);
}

void road4()
{
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("   Automatic mode   ");
  lcd.setCursor(3,1);
  lcd.print("Road4 Open Now");
  delay(1000);
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  myservo1.write(180);
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  myservo2.write(180);
  digitalWrite(road3red, HIGH);
  digitalWrite(road3green, LOW);
  myservo3.write(180);
  digitalWrite(road4red, LOW);
  digitalWrite(road4green, HIGH);
  myservo4.write(90);
  delay(5000);
  digitalWrite(road4red, HIGH);
  digitalWrite(road4green, LOW);
  lcd.setCursor(3,1);
```

```
  lcd.print("Road4 Closing  ");
  delay(3000);
  myservo4.write(120);
  delay(700);
  myservo4.write(140);
  delay(700);
  myservo4.write(160);
  delay(700);
  myservo4.write(180);
}

void road11()
{
  lcd.setCursor(0,1);
  lcd.print("Road1 Open Now      ");
  digitalWrite(road1red, LOW);
  digitalWrite(road1green, HIGH);
  myservo1.write(90);
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  myservo2.write(180);
  digitalWrite(road3red, HIGH);
  digitalWrite(road3green, LOW);
  myservo3.write(180);
  digitalWrite(road4red, HIGH);
  digitalWrite(road4green, LOW);
  myservo4.write(180);
  Road1Speed();
}

void road22()
{
  lcd.setCursor(0,1);
  lcd.print("Road2 Open Now      ");
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  myservo1.write(180);
```

```
  digitalWrite(road2red, LOW);
  digitalWrite(road2green, HIGH);
  myservo2.write(90);
  digitalWrite(road3red, HIGH);
  digitalWrite(road3green, LOW);
  myservo3.write(180);
  digitalWrite(road4red, HIGH);
  digitalWrite(road4green, LOW);
  myservo4.write(180);
  Road2Speed();
}

void road33()
{
  lcd.setCursor(0,1);
  lcd.print("Road3 Open Now      ");
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
  myservo1.write(180);
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  myservo2.write(180);
  digitalWrite(road3red, LOW);
  digitalWrite(road3green, HIGH);
  myservo3.write(90);
  digitalWrite(road4red, HIGH);
  digitalWrite(road4green, LOW);
  myservo4.write(180);
  Road3Speed();
}

void road44()
{
  lcd.setCursor(0,1);
  lcd.print("Road4 Open Now      ");
  digitalWrite(road1red, HIGH);
  digitalWrite(road1green, LOW);
```

```
  myservo1.write(180);
  digitalWrite(road2red, HIGH);
  digitalWrite(road2green, LOW);
  myservo2.write(180);
  digitalWrite(road3red, HIGH);
  digitalWrite(road3green, LOW);
  myservo3.write(180);
  digitalWrite(road4red, LOW);
  digitalWrite(road4green, HIGH);
  myservo4.write(90);
  Road4Speed();
}

// Note 1
/* distance between two ir sensors 6cm= 0.06m (1m= 100cm)
 * since time is in millisecond. So to change it to m per second we will have to multiply the whole thing with 1000
 * (0.06/time_for_speed)*1000
 * Now this speed is m/s which we will convert in km/h and for that multiply it by 18/5 or 3.6 (both are same)
 * ((0.06/time_for_speed)*1000)*18/5
 * after solving it, we will get 216/time_for_speed ..... finish
 * If you placing two ir at 5cm apart then you would choose 0.05 instead of 0.06
 * Do the same for other distance between two ir sensors
 *
 */
// Note 2
/* Variable active is used so that detected speed would be print on the screen only for one time because printing the same detected speed is illogical
 * active becomes 1 whilte calculation of speed or velocity but once printed on screen it goes to low which makes the execution of printing commands to execute
 * only one time for one detection
 */
```

3.2 OPERATIONAL MODEL

The model chips away at the guideline of changing postponement of Traffic sign dependent on the quantity of vehicles going through a doled-out area of the street. There are four sensors set at

four sides of a four-way street which tallies the quantity of autos passing by the zone secured by the sensors.

Here we are utilizing IR sensors supplanting traffic control framework to plan a canny traffic control framework. IR sensor contains IR transmitter IR beneficiary (photodiode) in itself. These IR transmitter and IR beneficiary will be mounted on same sides of the street at a specific separation. As the vehicle goes through these IR sensors, the IR sensor will identify the vehicle and will send the data to the microcontroller. The microcontroller will check the quantity of vehicles, and give the gleaming time to LED by the nook sit of vehicles. On the off chance that the thickness is higher, LED will sparkle for higher time than normal or the other way around. The traffic lights are at first running at a fixed postponement of 5 seconds, which thusly delivers a deferral of 20 seconds in the whole procedure. This whole implanted framework is set at that intersection. Microcontroller is interfaced with driver's and IR sensors. The complete no of IR sensors required are 4 and Led's 12. Along these lines these are associated with any two ports of microcontroller.

IR transmitter and recipient sets, which work as closeness sensor is utilized. The yield voltage that changes as per good ways from an article is nourished to the comparator with a reference set. The reference is set by a variable obstruction as per required r ange of detecting.

At the point when the sensor finds any item, comparator yield goes low else it gives + 5 V (HIGH). The controller programs check this difference in occasions from LOW to HIGH demonstrating going of a vehicle.

The goal of the IR sensor is to recognize snags. It contains a producer (IR LE D), indicator (IR photodiode) and subordinate hardware. The more grounded the gathering of IR radiation source, more prominent is the yield voltage.

CHAPTER 4

HARDWARE DEVELOPMENT

4.1 Component and Accessories

- **Arduino Mega**
- **IR Sensor Module**
- **Servo Motor**
- **Diode**
- **Capacitor (1000µF)**
- **Resistor**
- **Display (20,4)**
- **Display Driver**
- **Controlling Switch**
- **LED**
- **PVC Board**
- **Varo Board**
- **Connecting Wire**

4.2 Arduino Mega

4.2.1 Introduction

- Arduino Mega 2560 is a Microcontroller board dependent on Atmega2560. It accompanies more memory space and I/O sticks when contrasted with different sheets accessible in the market.
- There are 54 advanced I/O pins and 16 simple pins fused on the board that make this gadget exceptional and stand apart from others.
- Out of 54 advanced I/O, 15 are utilized for PWM (beat width regulation).
- A precious stone oscillator of 16MHz recurrence is included the board.
- This board accompanies USB link port that is utilized to interface and move code from PC to the board.
- DC power jack is combined with the board that is utilized to control the board. Some adaptation of Arduino board comes up short on this component like Arduino Pro Mini doesn't accompany DC power jack.
- ICSP header is a noteworthy expansion to Arduino Mega which is utilized for programming the Arduino and transferring the code from the PC.

Fig 4.1: Arduino Mega 2560

Microcontroller	Atmega2560
Operating Voltage	5V
Input Voltage	7V – 12V
USB Port	Yes
DC Power Jack	Yes
Current Rating Per I/O Pin	20mA
Current Drawn from Chip	50mA
Digital I/O Pins	54
PWM	15
Analog Pins (Can be used as Digital Pins)	16 (Out of Digital I/O Pins)
Flash Memory	256KB
SRAM	8KB
EEPROM	4KB
Crystal Oscillator	16 MHz
LED	Yes/Attached with Digital Pin 13
Wi-Fi	No
Shield Compatibility	Yes

Fig 4.2: Arduino Mega 2560 specifications

4.2.2 Arduino Mega 2560 Pinout

Following figure shows the pinout of Arduino Mega 2560.

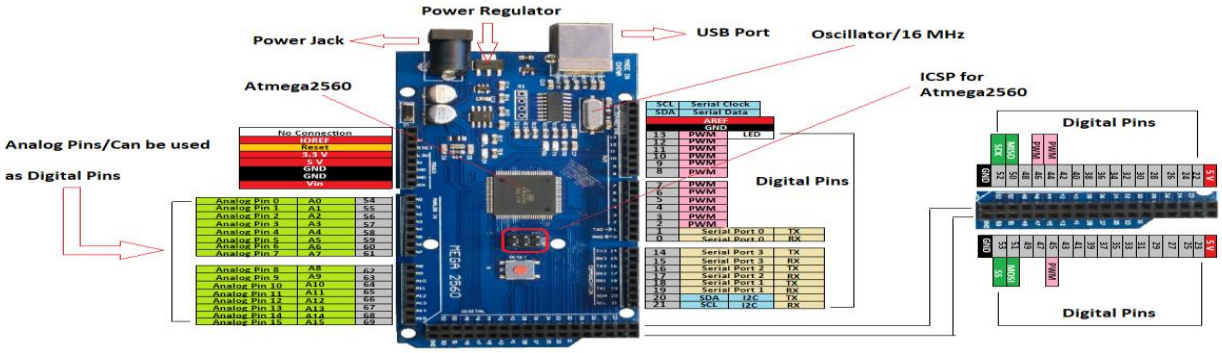

Fig 4.3: Arduino Mega 2560 Pinout

Each stick accompanies a particular capacity related with it. Every single simple stick can be utilized as computerized I/O pins.

4.2.3 Dimensions

Following figure demonstrates the components of the Arduino Mega 2560.

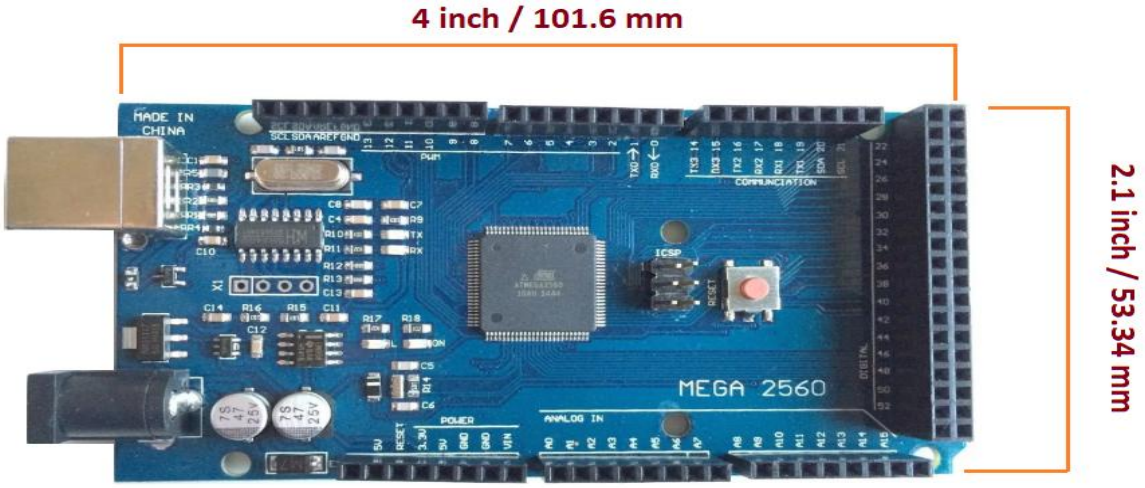

Fig 4.4: Arduino Mega 2560 Dimensions

Arduino Mega is relatively bigger than different sheets accessible in the market. It comes 4-inch length and 2.1-inch width. Be that as it may, USB port and power jack are somewhat reached out from the given measurements.

4.3 IR Sensor Module

Infrared Obstacle Sensor Module has built in IR transmitter and IR recipient that conveys IR vitality and searches for reflected IR vitality to identify nearness of any impediment before the sensor module. The module has on board potentiometer that gives client a chance to modify location run. The sensor has awesome and stable reaction even in encompassing light or in complete dimness.

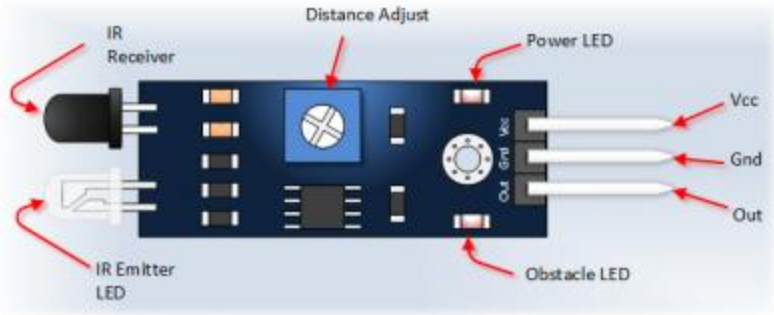

Fig 4.5: IR Sensor

Details

- Operating Voltage: 3.0V – 5.0V
- Detection go: 2cm – 30cm (Adjustable utilizing potentiometer)
- Current Consumption: at 3.3V: ~23 mA, at 5.0V: ~43 mA
- Active yield level: Outputs Low rationale level when impediment is distinguished
- On board Obstacle Detection LED marker

4.4 Servo Motor

Servo engine is utilized to pivot the board. To drive the servo engine, a PWM Signal must be given to its control stick and consequently Pin 17 (which has PWM) is associated with the control stick of the servo engine. A servo engine can typically just turn 90° in either heading for a sum of 180° development. The engine's impartial position is characterized as the position where the servo has a similar measure of potential turn in the both the clockwise or counter clock astute bearing.

Fig 4.6: Servo Motor

4.5 Diode

An electrical component which permits the progression of flow in just a single course. In circuit graphs, a diode is spoken to by a triangle with a line cross one pinnacle.

The most widely recognized kind of diode in wherever p-n intersection. In this sort of diode, one material (n) in which electrons have charge bearers adjoins a subsequent material (p) in which have openings (go about as charge transporters. At their interface, an exhaustion district is framed crosswise over which electrons diffuse to fill gaps in the p-side. This stops the further progression of electrons. At the point when this intersection is forward one-sided (that is, a positive voltage is applied to the p-side), electrons can without much of a stretch move over the intersection to fill the gaps, and a present course through the diode. At the point when the intersection is turn around one-sided (that is, a negative voltage is applied to the p-side), the exhaustion locale extends and electrons can only with significant effort move over. The present stays exceptionally little until a specific voltage (the breakdown voltage) is come to and the current all of a sudden increment.

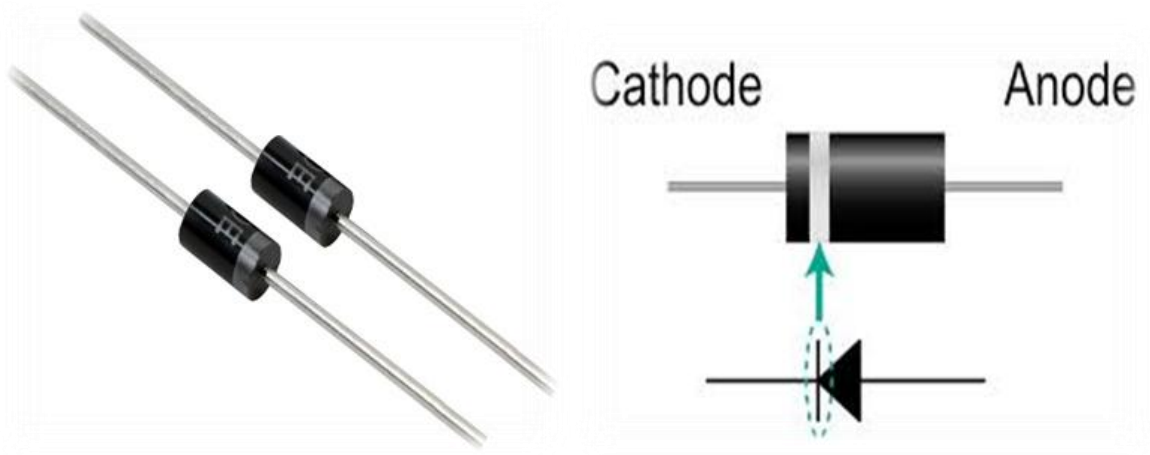

Fig 4.7: Diode

4.6 Capacitor (1000µF)

A condenser is partner degree idle two-terminal electrical stage that stores potential essentialness in an electrical field. The effect of a condenser is thought as capacitance. The condenser was toward the beginning called a condenser or buildup. The essential name remains regularly used in differed vernaculars, however not in English. The physical casing and advancement of suitable condensers vary regularly and different capacitor assortments are in like way use. Most capacitors contain something close to 2 electrical transports frequently as gold plates or surfaces separated by a stuff medium. A transmitter can be a defeat, slim streak, shape dab of metal, or partner degree arrangement. The non-leading stuff acts to make the capacitor's charge limit. Materials as often as possible used as dielectrics fuse glass, terminated, sheet, paper, mica, and synthetic compound levels. Capacitors are inexactly used as components of electrical circuits in fluctuated conventional electrical contraptions. In differentiation to an electrical gadget, a perfect condenser doesn't disperse imperativeness.

Fig 4.8: Capacitor

History:

In October 1745, Ewald Georg von Bernd Heinrich Wilhelm von Kleist of Pomerania, Germany, found that charge might be place away by interfacing a high-voltage Wilmshurst machine by a wire to a volume of water in a very hand-held glass instrumentality. Von Kleist's hand, and along

these lines, the water went worried as courses, and accordingly, the instrumentality as a cover (notwithstanding the way that refined pieces of the component was erroneously perceived at the time). Von Bernd Heinrich Wilhelm von Kleist found that reaching the wire prompted an incredible being, admirably harder than that got from Associate in Nursing electrical gadget. Progressive year, the Dutch man of science Pieter van Musschenbroek built up a near condenser, that was named the Leyden instrumentality, when the University of Urban Center any place he worked. He similarly was awed by the force of the shock he got, expressing, "I wouldn't take a second daze for the territory of France." Daniel Gralath was the essential to solidify a few compartments in parallel to grow the charge stockpiling limit. Man, of science examined Leyden instrumentality and fell upon the goals that the charge was place away on the glass, not inside the water as others had anticipated.

Types:

Ceramic capacitors:

Fig 4.9: Multi-tier ceramic capacitor

Fig 4.10: safety capacitor

Fig 4.11: High voltage ceramic power capacitor

Streak capacitors:

Power streak capacitors:

Fig.3.11: Power streak capacitor

4.7 Resistor

A resistor is a uninvolved two-terminal electrical part that actualizes electrical obstruction as a circuit component. In electronic circuits, resistors are utilized to lessen current flow, adjust sign levels, to partition voltages, predisposition dynamic components, and end transmission lines, among different employments.

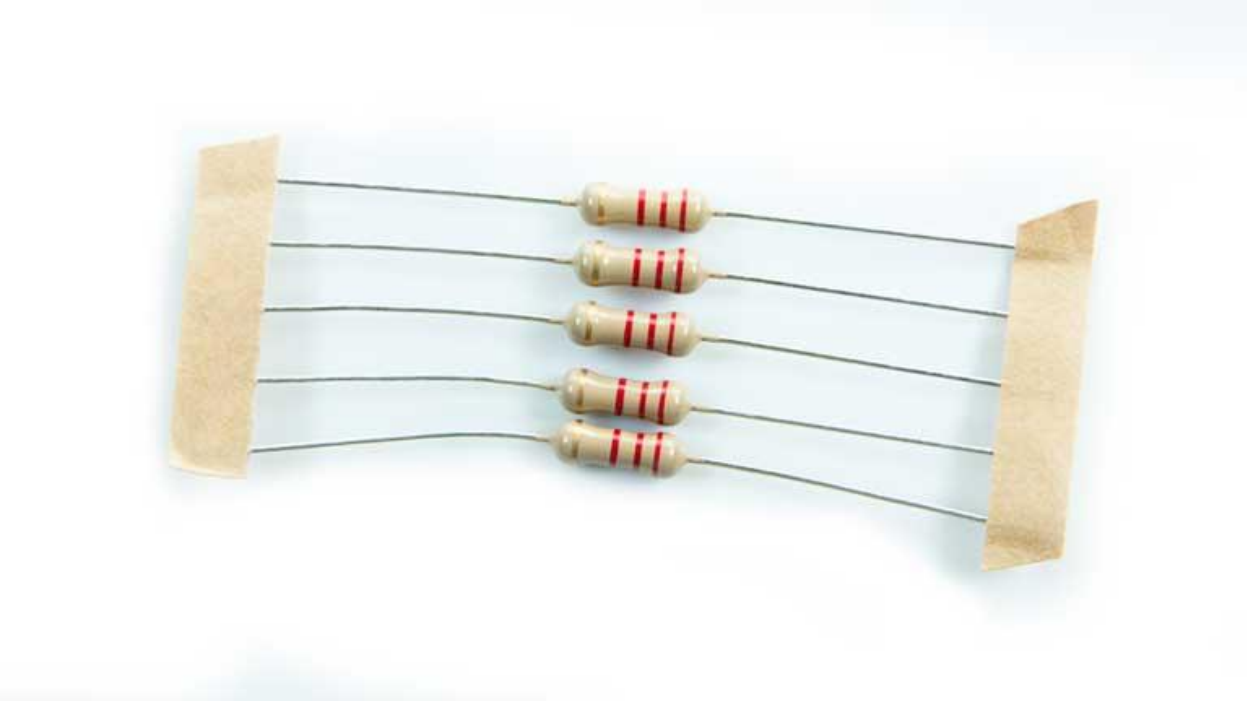

Fig 4.12: Resistors

High-control resistors that can scatter numerous watts of electrical power as warmth, might be utilized as a major aspect of engine controls, in power conveyance frameworks, or as test loads for generators. Fixed resistors have protections that lone change somewhat with temperature, time or working voltage. Variable resistors can be utilized to modify circuit components, (for example, a volume control or a light dimmer), or as detecting gadgets for warmth, light, moistness, power, or concoction action.

The electrical capacity of a resistor is determined by its opposition: regular business resistors are fabricated over a scope of in excess of nine sets of greatness. The ostensible estimation of the opposition falls inside the assembling resilience, demonstrated on the part.

4.8 LCD Display (20,4)

LCD full form is Liquid Crystal Display. LCD screen is an electronic showcase module and locate a wide scope of utilizations. A 20x4 LCD show is fundamental module and is ordinarily utilized in different gadgets and circuits. A 20x4 LCD implies it can show 20 characters for each line and there are 4 such lines.

Fig 4.13: LCD Display

4.9 Display Driver

In Electronics/PC equipment a showcase driver is normally a semiconductor incorporated circuit (yet may then again contain a state machine made of discrete rationale and different segments) which gives an interface work between a chip, microcontroller, ASIC or broadly useful fringe interface and a specific kind of presentation gadget, for example LCD, LED, OLED, ePaper, CRT, Vacuum fluorescent or Nixie.

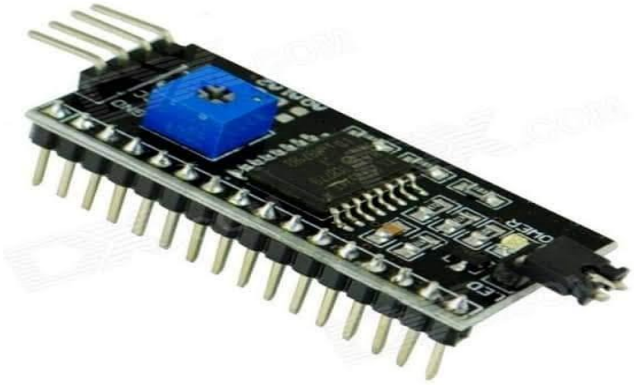

Fig 4.14: Display driver

The showcase driver will normally acknowledge directions and information utilizing an industry-standard universally useful sequential or parallel interface, for example, TTL, CMOS, RS232, SPI, I2C, and so forth and produce signals with reasonable voltage, momentum, timing and demultiplexing to make the presentation demonstrate the ideal content or picture.

The showcase driver may itself be an application-explicit microcontroller and may consolidate RAM, Flash memory, EEPROM and additionally ROM. Fixed ROM may contain firmware and show text styles.

4.10 Toggle Switch

A switch is an electrical component that can "make" or "break" an electrical circuit, interrupting the current or diverting it from one conductor to another.

Fig 4.15: Toggle Switch

A toggle switch or tumbler switch is a class of electrical switches that are manually actuated by a mechanical lever, handle, or rocking mechanism. Here we used this switch for control the traffic signal manually.

4.11 Push button Switch

A push-button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal.

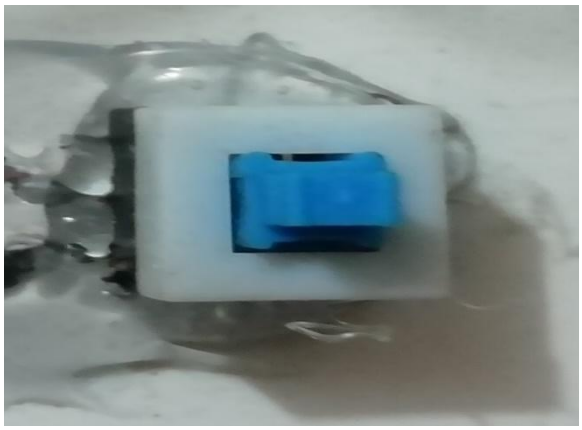

Fig 4.16: Push Button Switch

Here we used this switch for changing the traffic signal controlling system automatic to manually.

4.12 LED

LED lights square measure designed for emergency vehicle specifications and built to satisfy the strain of a spread of labor trucks, as well as construction, municipal, utility and tow and recovery. LED lights feature high-impact resistant poly carbonates housing and have LED technology to cut back maintenance prices.

Fig 4.17: LED light

4.13 PVC Board

The PVC froth board, also called Chevron board or Andy board is generally utilized for both indoor and outside applications. Made of lightweight and frothed PVC, this PVC froth board is dampness and erosion safe. It is completely lightweight.

Fig 4.18: PVC Board

4.14 Varo Board

Varo board is the conventional name for a generally utilized kind of hardware prototyping board portrayed by a 2.54 mm normal (rectangular) lattice of openings, with wide parallel pieces of copper cladding running one way right crosswise over one side of the board.

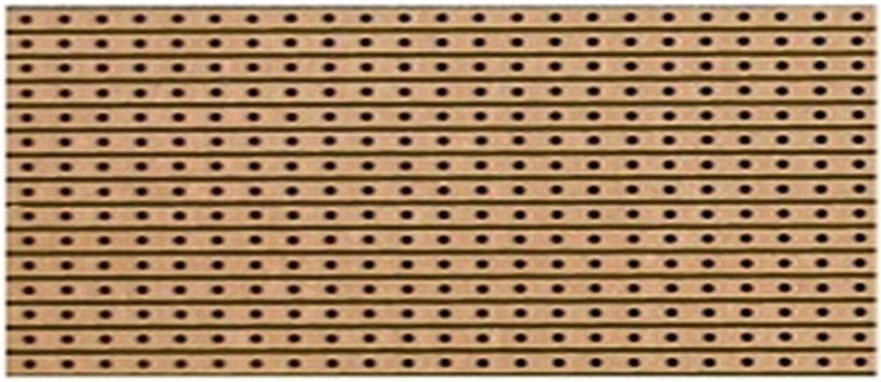

Fig 4.19: Varo Board

4.15 Connecting Wire

Connecting wires enables an electrical flow to go starting with one point on a circuit then onto the next in light of the fact that power needs a medium through which it can move. The greater part of the interfacing wires is comprised of copper or aluminum.

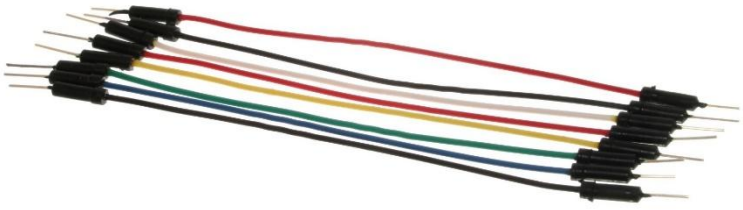

Fig 4.20: Connecting wire

4.16 Buzzer

A buzzer is an audio signaling device. We used it for when any car drive with over speed that time it will be beeping.

Fig 4.21: Buzzer

4.17 Circuit Diagram

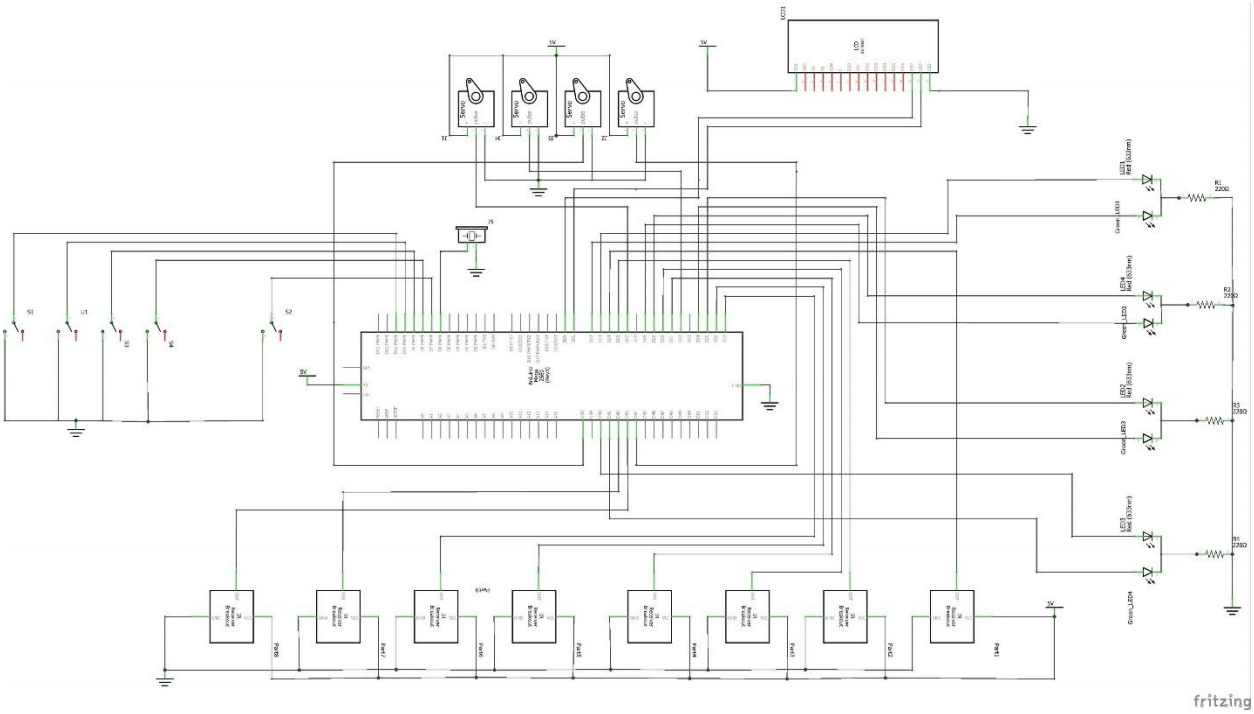

Fig 4.22: Circuit Diagram

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 Discussion

In this project work we have studied and implemented a complete working model using an Arduino Mega. The programming and interfering of Arduino Mega have been mastered during the implementation. This work includes the study of traffic and overspeed system in many applications.

Usually people drive very harshly in heavy traffic prone areas as they are in a hurry, but in that hurriedness, they often end in loosing either their life or someone other life on road.

Our project is based on **"Automatic Traffic Signal Control and Vehicle Overspeed Detection".** So, it has a great significance in termination and reduction of overall accidents and casualties in high traffic prone areas. For this system, traffic jam never created, if traffic jam creates it not for long time. And we can used it manually when any VIP arrive and Emergency.

5.2 Result.

This project has a system that automatic traffic signal control and vehicle overspeed detection using IR sensors and servo motor and arduino mega system. For this system, traffic jam never created, if traffic jam creates it not for long time. And we can used it manually when any VIP arrive and Emergency. We used this project real life than reduce our road accident and it will be decreasing the traffic jam. Traffic jam and overspeed is a main problem in our country.

CHAPTER 6

CONCLUSIONS

6.1 Conclusions

This project is agreed at lifesaving system in heavy traffic areas and reduce our electricity loss. For this system, traffic jam never created, if traffic jam creates it not for long time. And we can used it manually when any VIP arrive and Emergency.

When any car passes the IR sensor part with > 80km/hour speed, then the buzzer is on and the speed is show in the LCD display.

When the speed is <80km/hour then the buzzer is off or no response.

6.2 Limitations of the Work

The working procedure of this project is very easy but we are facing some limitation for doing this project. Such as coding problem, program writing, connecting to Arduino meag, commend following etc.

6.3 Future Scopes of the Work

Future scopes of this project can be

- A GPS based traffic light pre-emption control system for emergency car or Ambulances.
- Improving the speed control system.
- When a car overspeed by the specific road speed, that time the car driver can know that I am driving overspeed by see the speed meter. The speed meter or any system that seen him a signal or alarm.

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