AUTOMATION OF TRAFFIC

B. Tech AY-2021-22
GE-101 PROJECT REPORT
GROUP 7_D

GE101 Project

Automation of traffic

B. Tech 2021 /GROUP-7 / Group-D

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Objectives

- Signals currently in use have a fixed time for each route. Even if a road is empty, the signal will give green to the empty line. By automation, we can solve this problem.
- Sensors can be fitted on the road, which will detect the number of cars on each track, and the signal time will be decided for each way accordingly.

Methodology

- In urban areas, traffic is a nightmare. A significant proportion of time in a day is wasted due to traffic.
- Signals currently in use have constant timings, which loop without considering the number of vehicles or priority.
- Even if there is an uneven distribution of traffic, such as some track is empty, the time of the stop and go won't change. By automation, we can save this wasted time.
- We use a load sensor (pressure sensor) to get input (information of each lane). These inputs are processed in a processing unit, and it will give output to each traffic light, and the traffic light will work accordingly.
- The sensor will detect the presence of vehicles and prioritize the cars that come first. If there is no car in one lane, it will not turn green. So, it will save others time. The program will allow a particular time for each route according to the traffic. If the load sensor is not activated for an extended

interval, the program will understand it is out of traffic and give green to the next lane, which got priority.

Cost estimation

Amount spend=5672 Rs.

Sub-parts of our project

1. Software part (including coding and circuit designing)
2. Hardware (circuit components assemble and built)
3. Hardware (still model components)

Software part

- Coding part

```
float a,x,w,z,y,b,c,d,t1,t2,t3,t4;
int j=0;
void setup() {
 // put your setup code here, to run once:
pinMode(13,OUTPUT);
pinMode(12,OUTPUT);
```

```
pinMode(11,OUTPUT);
pinMode(10,OUTPUT);
pinMode(9,OUTPUT);
pinMode(8,OUTPUT);
pinMode(7,OUTPUT);
pinMode(6,OUTPUT);
pinMode(5,OUTPUT);
pinMode(4,OUTPUT);
pinMode(3,OUTPUT);
pinMode(2,OUTPUT);
pinMode(A1,INPUT);
pinMode(A0,INPUT);
pinMode(A2,INPUT);
pinMode(A3,INPUT);
Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedl
for(int i=13;i>1;i=i-3)
{
digitalWrite(i,HIGH);
}
x=analogRead(A0);
y=analogRead(A1);
z=analogRead(A2);
w=analogRead(A3);
//code for assaining time for green light
if(x<300)
{digitalWrite(13,HIGH);}
else if(x>=300 && x<600)
{t1=2500;
}
else if(x>=600 && x<780)
{t1=3500;
}
else if(x>=780 && x<890)
```

```
{t1=4500;
}
else if(x>=890 && x<=1023)
{t1=5500;
}
if(y<300)
{digitalWrite(10,HIGH);}
else if(y>=300 && y<600)
{t2=2500;
}
else if(y>=600 && y<780)
{t2=3500;
}
else if(y>=780 && y<890)
{t2=4500;
}
else if(y>=890 && y<=1023)
{t2=5500;
}
if(z<300)
{digitalWrite(7,HIGH);}
else if(z>=300 && z<600)
{t3=2500;
}
else if(z>=600 && z<780)
{t3=3500;
}
else if(z>=780 && z<890)
{t3=4500;
}
else if(z>=890 && z<=1023)
{t3=5500;
}
if(w<330)
{digitalWrite(4,HIGH);}
else if(w>=330 && w<630)
{t4=2500;
```

```
}
else if(w>=630 && w<780)
{t4=3500;
}
else if(w>=780 && w<890)
{t4=4500;
}
else if(w>=890 && w<=1023)
{t4=5500;
}
//code for printing initialy assained time
Serial.print("the time t1 is ");
Serial.print(t1/1000);
Serial.println(" seconds");

Serial.print("the time t2 is ");
Serial.print(t2/1000);
Serial.println(" seconds");

Serial.print("the time t3 is ");
Serial.print(t3/1000);
Serial.println(" seconds");

Serial.print("the time t4 is ");
Serial.print(t4/1000);
Serial.println(" seconds");

//codes which canges the light that is red,yellow and then
green,where green glows according to the assained time
if(x>=300 && x<=1023)
{if(y<300 || z<300 || w<300)
{delay(3000);}
digitalWrite(13,LOW);
digitalWrite(12,HIGH);
delay(3000);
digitalWrite(12,LOW);
digitalWrite(11,HIGH);
```

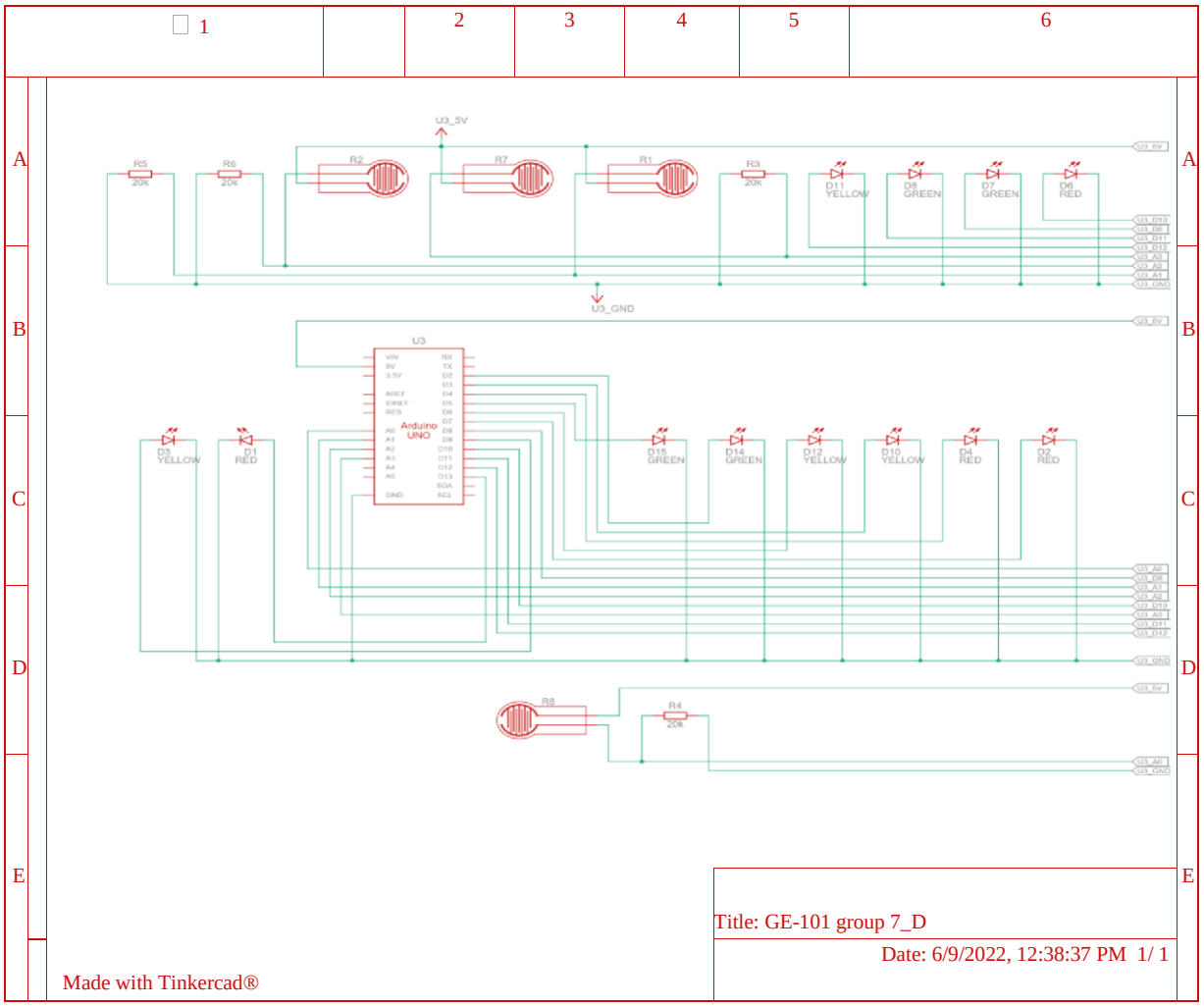
```
delay(t1);
digitalWrite(11,LOW);
digitalWrite(13,HIGH);
}

x=analogRead(A0);
y=analogRead(A1);
z=analogRead(A2);
w=analogRead(A3);

if(y>300)
{
if(y>=300 && y<600)
t2=2500;
else if(y>=600 && y<780)
t2=3500;
else if(y>=780 && y<890)
t2=4500;
else if(y>=890 && y<=1023)
t2=5500;
}

if(y>=300 && y<=1023)
{if(x<300 || z<300 || w<300)
{delay(3000);}
digitalWrite(10,LOW);
digitalWrite(9,HIGH);
delay(3000);
digitalWrite(9,LOW);
digitalWrite(8,HIGH);
delay(t2);
digitalWrite(8,LOW);
digitalWrite(10,HIGH);
}

x=analogRead(A0);
y=analogRead(A1);
```

```
z=analogRead(A2);
w=analogRead(A3);

if(z>300)
{
if(z>=300 && z<600)
t3=2500;
else if(z>=600 && z<780)
t3=3500;
else if(z>=780 && z<890)
t3=4500;
else if(z>=890 && z<=1023)
t3=5500;
}

if(z>=300 && z<=1023)
{if(x<300 || y<300 || w<300)
{delay(3000);}
digitalWrite(7,LOW);
digitalWrite(6,HIGH);
delay(3000);
digitalWrite(6,LOW);
digitalWrite(5,HIGH);
delay(t3);
digitalWrite(5,LOW);
digitalWrite(7,HIGH);
}

x=analogRead(A0);
y=analogRead(A1);
z=analogRead(A2);
w=analogRead(A3);

if(w>330)
{
if(w>=330 && w<630)
t4=2500;
```

```
else if(w>=630 && w<780)
t4=3500;
else if(w>=780 && w<890)
t4=4500;
else if(w>=890 && w<=1023)
t4=5500;
}

if(w>=330 && w<=1023)
{if(x<300 || y<300 || z<300)
{delay(3000);}
digitalWrite(4,LOW);
digitalWrite(3,HIGH);
delay(3000);
digitalWrite(3,LOW);
digitalWrite(2,HIGH);
delay(t4);
digitalWrite(2,LOW);
digitalWrite(4,HIGH);
}
//code for the printing of  updated time
Serial.println("UPDATED TIME");
Serial.print("the time t1 is ");
Serial.print(t1/1000);
Serial.println(" seconds");

Serial.print("the time t2 is ");
Serial.print(t2/1000);
Serial.println(" seconds");

Serial.print("the time t3 is ");
Serial.print(t3/1000);
Serial.println(" seconds");

Serial.print("the time t4 is ");
Serial.print(t4/1000);
Serial.println(" seconds");
```

```
x=analogRead(A0);
y=analogRead(A1);
z=analogRead(A2);
w=analogRead(A3);

//this will show the aurduino value of force
Serial.println("FINAL AURDUINO VALUE OF FORCE");
Serial.println(x);
Serial.println(y);
Serial.println(z);
Serial.println(w);
}
```

Circuit drawing



Hardware circuit parts

- XCLUMA Led Traffic Light Module 5V

- Resistor 20K Ohms

- 22 Gauge Wire, Hook-up Wire

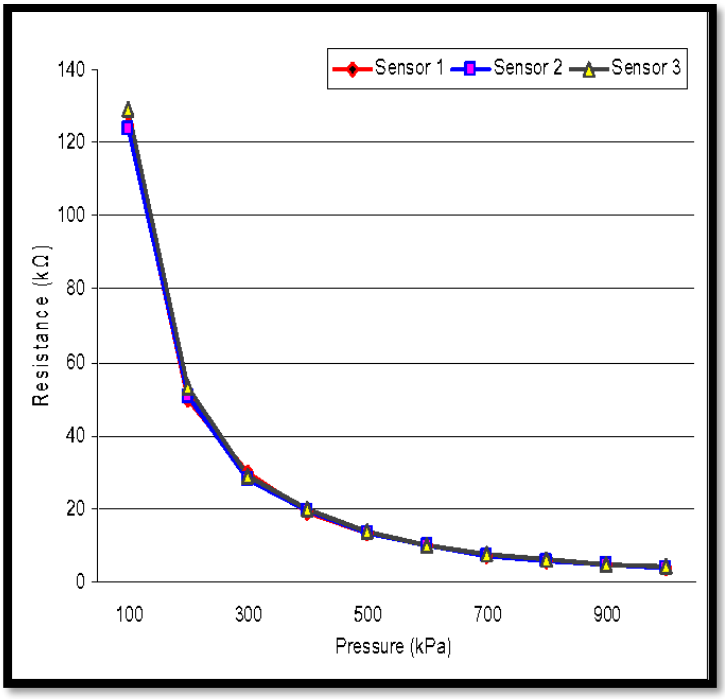
- ePro Labs KIT-0010 Breadboard + 60 Pieces Jumper Wires Set

- Force sensor

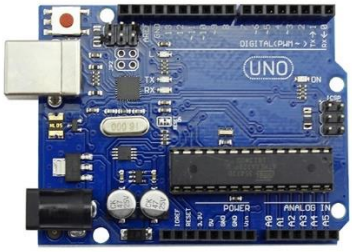
FORCE SENSOR WORKING PRINCIPLE

It responds to the applied force, as well as converts the value to a measurable quantity. Most force sensors are created with the use of force-sensing resistors. Such sensors consist of electrodes and sensing film. Force-sensing resistors are based on contact resistance.

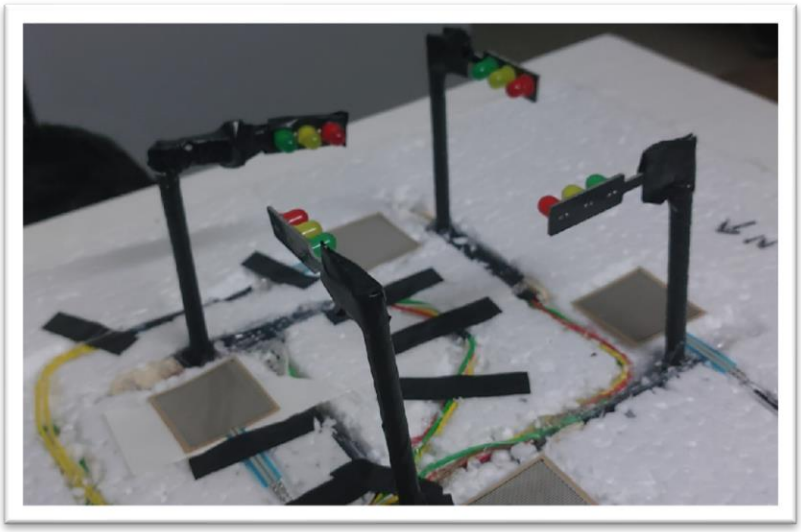
GRAPH **PRESSURE VS RESISTANCE**



- Programmable Microcontroller with a USB wire.

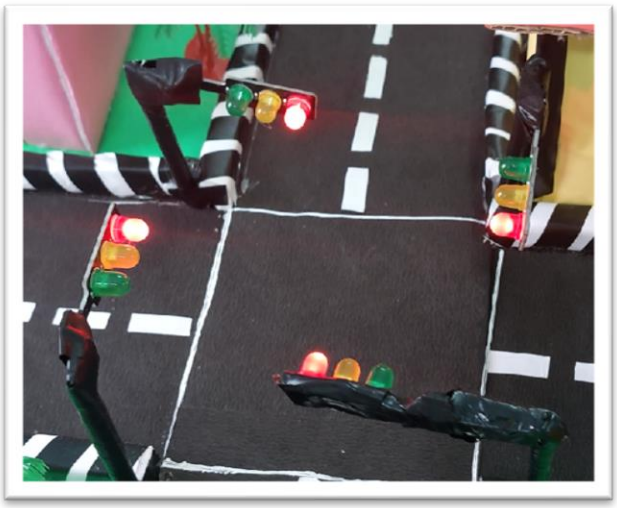


Model:

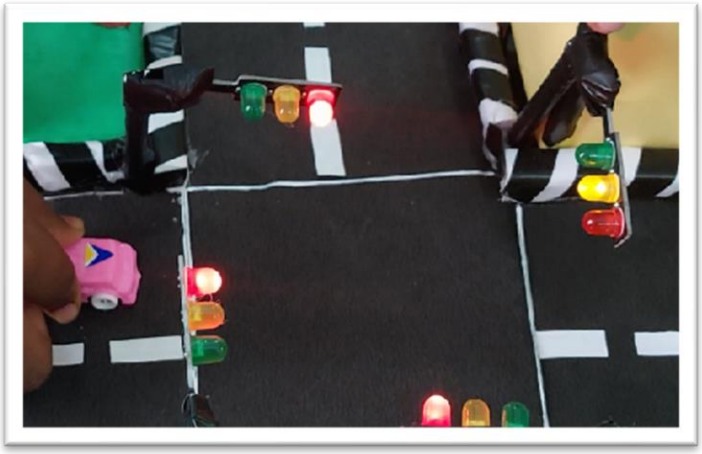


WORKING

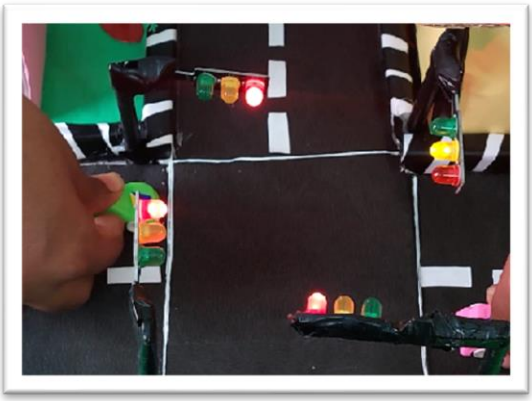
- NO VEHICLES
  ALL LIGHTS ARE RED



- ONE CAR
  GIVE GREEN TO THE CAR



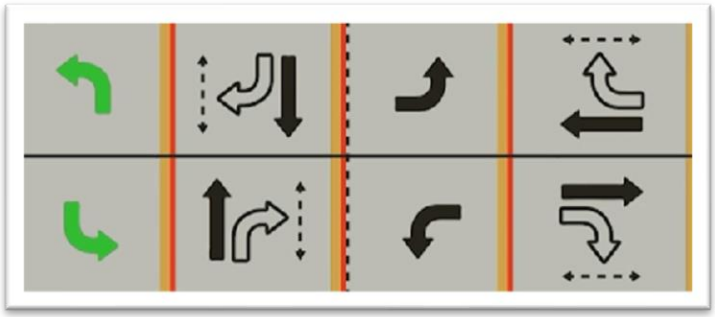
- MULTIPLE CARS
  GIVE GREEN TO THE CAR ACCORDING TO PRIORITY

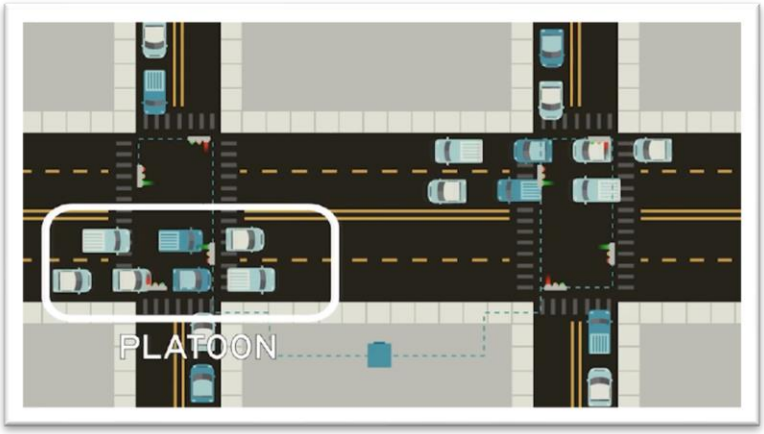


- HIGH TRAFFIC VOLUME
  GIVE MORE TIME FOR HIGH FORCE

Conclusion

To apply the idea of our model for practical purposes, we can install force sensors on the road, which will detect the force applied by the vehicle and assign the time according to the vehicle's weight. Also, we can combine opposite side signals, and it will assign the time according to the force sensor, which has more weight.





Reference

- https://www.brookings.edu/research/traffic-why-its-getting-worse-what-government-can-do/
- https://www.youtube.com/watch?v=DP62ogEZgkI&t=323s

Video

Explanation video: https://www.youtube.com/watch?v=sQJNWfojV0A