TRAFFIC MANAGEMENT SYSTEM

PHASE-3 Project using **WOKWI** simulator.

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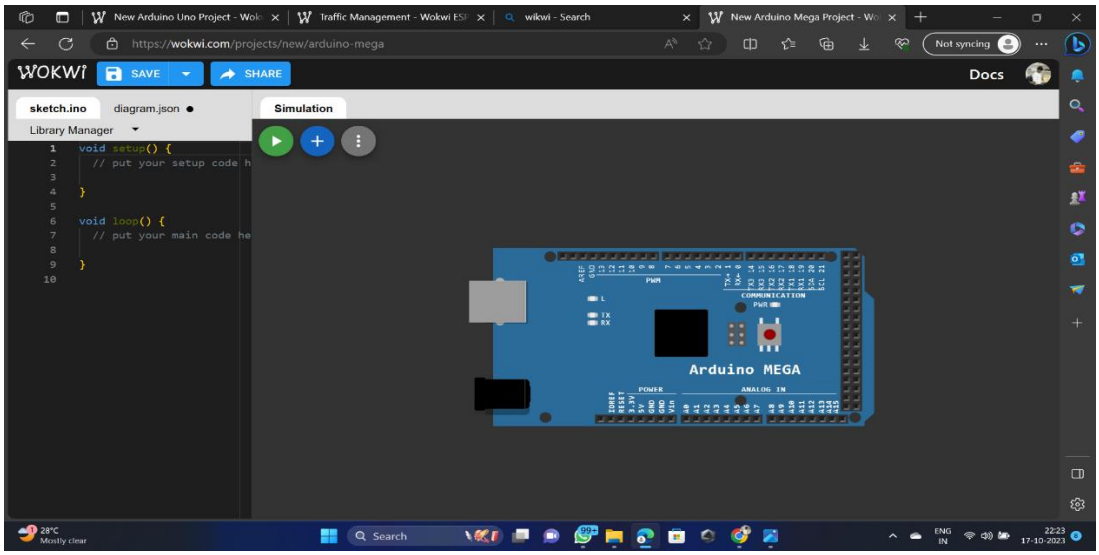
The smart Traffic management system is implemented by using the simulator WOKWI simulator.

This simulation is designed for a two-sides traffic road.

Step1:

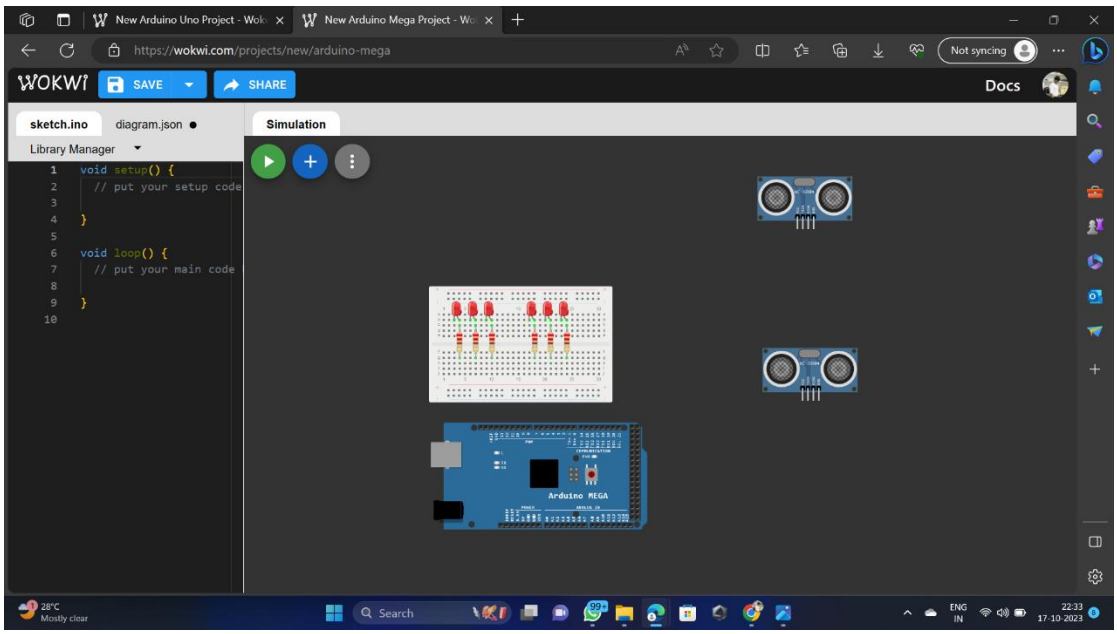
- Start the WOKWI simulator. (https://wokwi.com/).
- Log in to the side to create a new project, by clicking the “Create a New Project”.

Step2:



On the simulation area place an “ARDUINO MEGA” as controller of our system

Step3:

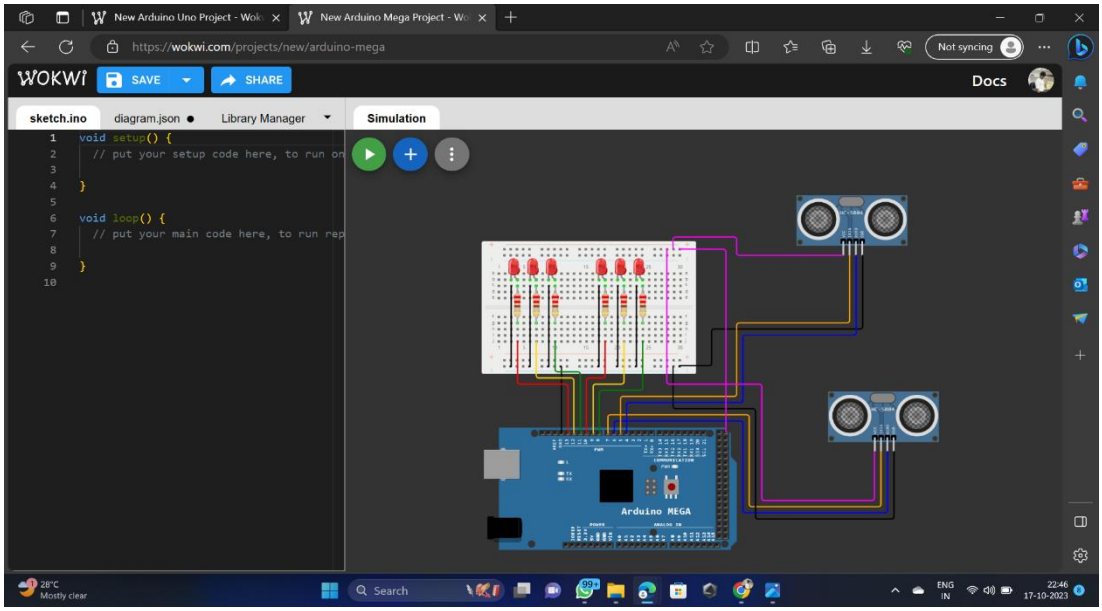


In step3 place the components required for the system from the component provider.

The required components are used in this system are:

- Bread board
- Ultra sonic sensors (HC-SR04)
- Resistors
- LED’s

Step4:



In step4, connections are completed according to the components requirements and our convinences.

Aurdunio mega pin connections:

- The LED to digital pin 2 and 3 will be the traffic lights of main road.
- The LED to digital pin 4 and 5 will be the traffic lights of side road.
- The uktra sonic sensor s connected to the pins of 5.2 v input terminal, ground pins to GND, the trx and rx are connected to the pins of 4,5,6,7 pins.
- The resistors are connected to the LED's positive terminal and the negative terminalas are connected to the GND pin with help of bread board.

Step5:

In this step the coading is created according to the connections given to the aurduino mega with the pin configurations.

The code:

```
#include<TimerOne.h>

int signal1[] = {23, 25, 27};

int signal2[] = {46, 48, 50};

int signal3[] = {13, 12, 11};

int signal4[] = {10, 9, 8};

int redDelay = 5000;

int yellowDelay = 2000;

volatile int triggerpin1 = 31;

volatile int echopin1 = 29;

volatile int triggerpin2 = 44;
```

```
volatile int echopin2 = 42;
volatile int triggerpin3 = 7;
volatile int echopin3 = 6;
volatile int triggerpin4 = 5;
volatile int echopin4 = 4;
volatile long time;                  // Variable for storing the time traveled
volatile int S1, S2, S3, S4;         // Variables for storing the distance covered
int t = 5;  // distance under which it will look for vehicles.
void setup(){
  Serial.begin(115200);
  Timer1.initialize(100000);  //Begin using the timer. This function must be called first. "microseconds" is the period of time the timer takes.
  Timer1.attachInterrupt(softInterr); //Run a function each time the timer period finishes.
  // Declaring LED pins as output
  for(int i=0; i<3; i++){
    pinMode(signal1[i], OUTPUT);
    pinMode(signal2[i], OUTPUT);
    pinMode(signal3[i], OUTPUT);
    pinMode(signal4[i], OUTPUT);
  }
  // Declaring ultrasonic sensor pins as output
  pinMode(triggerpin1, OUTPUT);
  pinMode(echopin1, INPUT);
  pinMode(triggerpin2, OUTPUT);
  pinMode(echopin2, INPUT);
  pinMode(triggerpin3, OUTPUT);
```

```
  pinMode(echopin3, INPUT);
  pinMode(triggerpin4, OUTPUT);
  pinMode(echopin4, INPUT);
}




void loop()
{
  // If there are vehicles at signal 1
  if(S1<t)
  {
    signal1Function();
  }
  // If there are vehicles at signal 2
  if(S2<t)
  {
    signal2Function();
  }
  // If there are vehicles at signal 3
  if(S3<t)
  {
    signal3Function();
  }
  // If there are vehicles at signal 4
```

```
  if(S4<t)
  {
    signal4Function();
  }
}
```

```
// This is interrupt function and it will run each time the timer period finishes. The timer period is set at 100 milli seconds.
void softInterr()
{
  // Reading from first ultrasonic sensor
  digitalWrite(triggerpin1, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerpin1, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerpin1, LOW);
  time = pulseIn(echopin1, HIGH);
  S1= time*0.034/2;
  // Reading from second ultrasonic sensor
  digitalWrite(triggerpin2, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerpin2, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerpin2, LOW);
  time = pulseIn(echopin2, HIGH);
```

```
  S2= time*0.034/2;
  // Reading from third ultrasonic sensor
  digitalWrite(triggerpin3, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerpin3, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerpin3, LOW);
  time = pulseIn(echopin3, HIGH);
  S3= time*0.034/2;
  // Reading from fourth ultrasonic sensor
  digitalWrite(triggerpin4, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerpin4, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerpin4, LOW);
  time = pulseIn(echopin4, HIGH);
  S4= time*0.034/2;
  // Print distance values on serial monitor for debugging
  Serial.print("S1: ");
  Serial.print(S1);
  Serial.print("  S2: ");
  Serial.print(S2);
  Serial.print("  S3: ");
  Serial.print(S3);
  Serial.print("  S4: ");
  Serial.println(S4);
}
```

```
void signal1Function()
{
  Serial.println("1");
  low();
  // Make RED LED LOW and make Green HIGH for 5 seconds
  digitalWrite(signal1[0], LOW);
  digitalWrite(signal1[2], HIGH);
  delay(redDelay);
  // if there are vehicels at other signals
  if(S2<t || S3<t || S4<t)
  {
    // Make Green LED LOW and make yellow LED HIGH for 2 seconds
    digitalWrite(signal1[2], LOW);
    digitalWrite(signal1[1], HIGH);
    delay(yellowDelay);
  }
}
void signal2Function()
{
  Serial.println("2");
  low();
  digitalWrite(signal2[0], LOW);
  digitalWrite(signal2[2], HIGH);
  delay(redDelay);

  if(S1<t || S3<t || S4<t)
  {
```

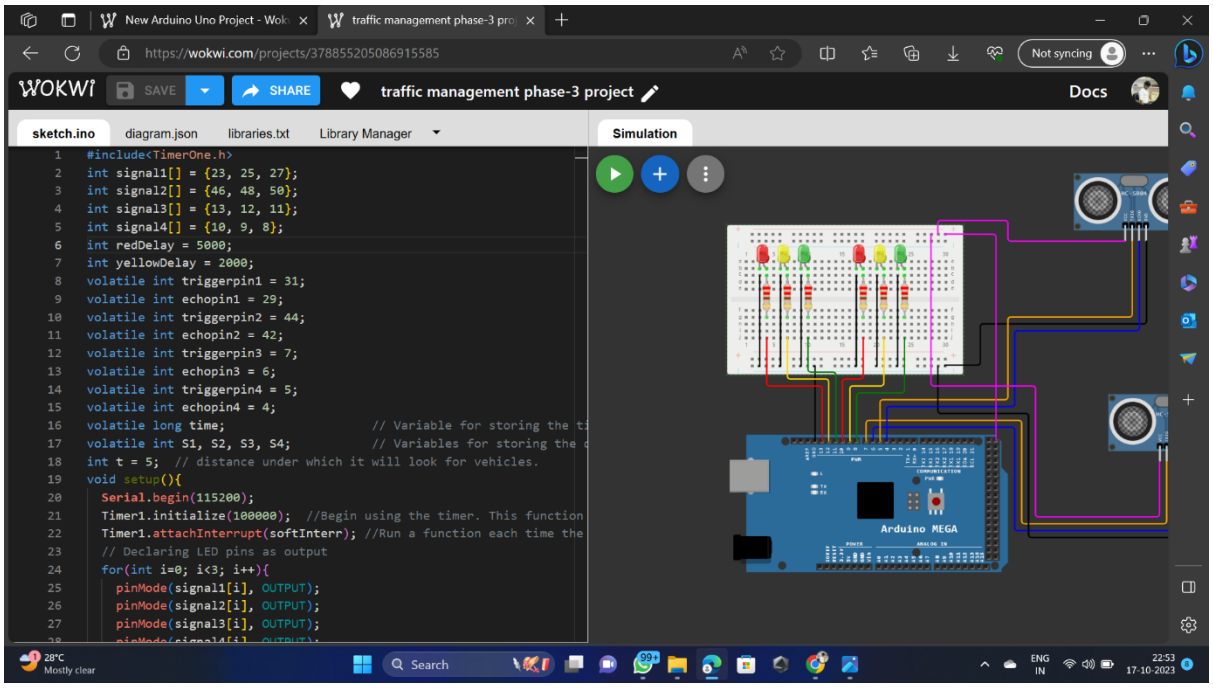
```
    digitalWrite(signal2[2], LOW);
    digitalWrite(signal2[1], HIGH);
    delay(yellowDelay);
  }
}
void signal3Function()
{
  Serial.println("3");
  low();
  digitalWrite(signal3[0], LOW);
  digitalWrite(signal3[2], HIGH);
  delay(redDelay);
  if(S1<t || S2<t || S4<t)
  {
    digitalWrite(signal3[2], LOW);
    digitalWrite(signal3[1], HIGH);
    delay(yellowDelay);
  }
}
void signal4Function()
{
  Serial.println("4");
  low();
  digitalWrite(signal4[0], LOW);
  digitalWrite(signal4[2], HIGH);
  delay(redDelay);
  if(S1<t || S2<t || S3<t)
```

```
  {
    digitalWrite(signal4[2], LOW);
    digitalWrite(signal4[1], HIGH);
    delay(yellowDelay);
  }
}
// Function to make all LED's LOW except RED one's.
void low()
{
  for(int i=1; i<3; i++)
  {
    digitalWrite(signal1[i], LOW);
    digitalWrite(signal2[i], LOW);
    digitalWrite(signal3[i], LOW);
    digitalWrite(signal4[i], LOW);
  }
  for(int i=0; i<1; i++)
  {
    digitalWrite(signal1[i], HIGH);
    digitalWrite(signal2[i], HIGH);
    digitalWrite(signal3[i], HIGH);
    digitalWrite(signal4[i], HIGH);
  }
}
```

Then the code is created the simulation is ready to perform.

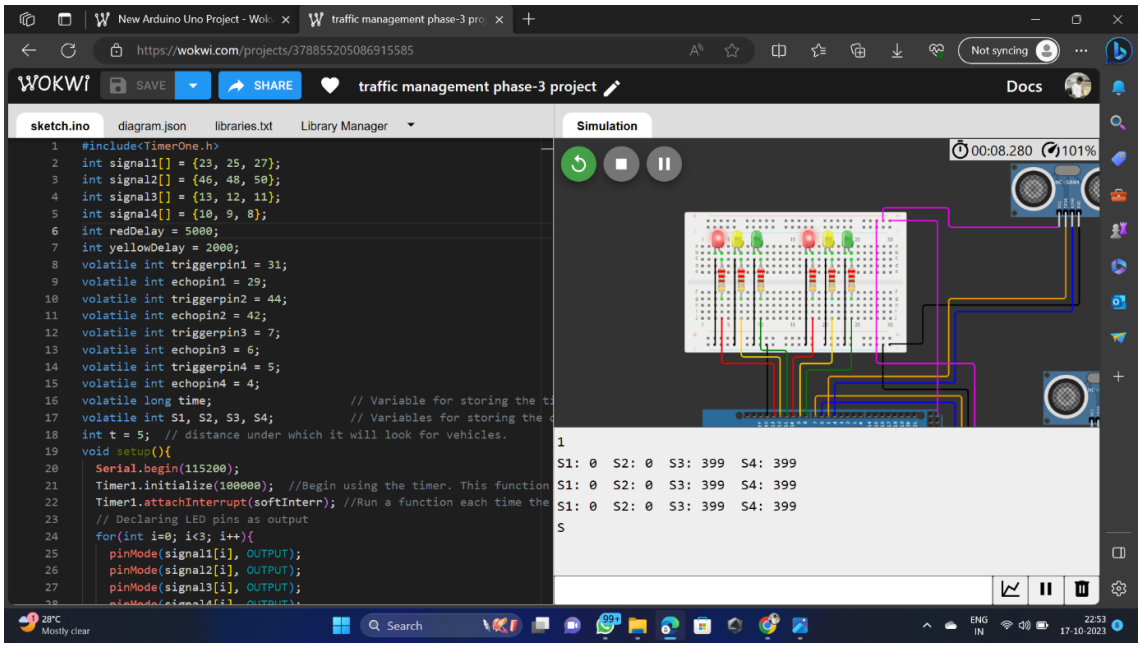
Step6:

In this step the simulaation is executed by cliking the run button



Then the last step is output progress for our system.

Step7:



Here the simulation is implemented successfully without any errors and simmulation issues.