ARDUINO IDE PROJECT REPORT

Traffic Lights using Proximity Sensor

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INTRODUCTION

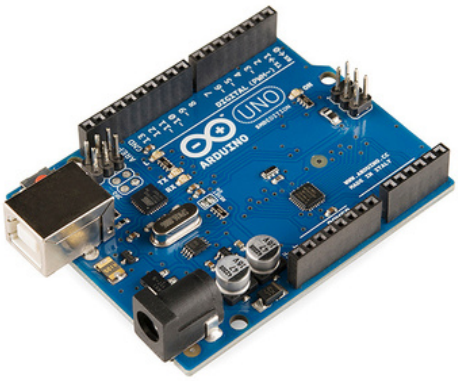
In our project, we have made a model to combat traffic congestion with a :Density-Based Traffic Signal".

Using Arduino Uno and basic components, we've created a prototype that adjusts traffic lights based on real-time vehicle density.

By using proximity sensor to monitor the density of vehicles are on the road, our system keeps traffic flowing smoothly and reduces jams.

COMPONENTS

- Arduino Uno



- Proximity Sensor

- Red LED
- Yellow LED
- Green LED

- Jumper Wires

CONNECTIONS

we will be using two ultrasonic sensors for two ways and 6 LEDs, 3 for each side.

Ultrasonic Sensor 1:

trigger >>>>> Arduino pin D10

Echo >>>>>> Arduino pin D9

GND >>>>>> GND

VCC >>>>>> 5V

Ultrasonic Sensor 2:

trigger >>>>> Arduino pin D12

Echo >>>>>> Arduino pin D11

GND>>>>>>> GND

VCC>>>>>>> 5V

LEDs:

All the cathodes of the LEDs must go to GND and all of the GND must be common.

Red1 Anode>>>>>>Arduino D8

Yellow1 Anode>>>>>Arduino D7

Green1 Anode>>>>>Arduino D6

Green2 Anode>>>>>Arduino D5

Yellow2 Anode >>>>Arduino D4

Red2 Anode >>>>>Arduino D3

CODE

```
int red = 8;
int green = 6;
int yellow = 7;
const int pingPin = 10;  // Trigger Pin of Ultrasonic Sensor
const int echoPin = 9;  // Echo Pin of Ultrasonic Sensor

void setup() {
 pinMode(red, OUTPUT);
 pinMode(yellow, OUTPUT);
 pinMode(green, OUTPUT);
}

void loop() {
 int distance = calculatedistance(pingPin, echoPin);

 if (distance >= 100) {  // Change threshold as needed
  digitalWrite(red, LOW);
  digitalWrite(green, HIGH);
  digitalWrite(yellow, LOW);
 } else if (distance >= 50 && distance < 100) {
// Change threshold as needed

  digitalWrite(red, LOW);
  digitalWrite(green, LOW);
  digitalWrite(yellow, HIGH);
 }
```

CODE

```
else {
 digitalWrite(red, HIGH);
 digitalWrite(green, LOW);
 digitalWrite(yellow, LOW);
 }
}

long microsecondsToCentimeters(long microseconds) {
 return microseconds / 29 / 2;
}

int calculatedistance(int pingPin, int echoPin) {
 long duration, cm;
 pinMode(pingPin, OUTPUT);
 digitalWrite(pingPin, LOW);
 delayMicroseconds(2);
 digitalWrite(pingPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(pingPin, LOW);

 pinMode(echoPin, INPUT);
 duration = pulseIn(echoPin, HIGH);

 cm = microsecondsToCentimeters(duration);
 return cm;
}
```

CONCLUSION

1. Traffic Management: By employing a proximity sensor, the system can detect vehicles in close proximity to the intersection. This information is crucial for determining when to change traffic light signals, ensuring optimal traffic flow and minimizing congestion.
2. Safety Enhancement: The system enhances safety by providing real-time monitoring of vehicle presence at the intersection. This allows for timely adjustments to traffic light timings, reducing the risk of accidents and improving overall road safety.
3. Efficiency: With the ability to dynamically adjust traffic light timings based on detected vehicle presence, the system optimizes traffic flow and reduces waiting times for vehicles at the intersection. This leads to improved efficiency in transportation and reduces fuel consumption and emissions associated with idling vehicles.
4. Flexibility: The Arduino platform offers flexibility in terms of customization and scalability. Additional features such as pedestrian crossing signals, emergency vehicle prioritization, or integration with centralized traffic management systems can be implemented easily to enhance the functionality of the system.
5. Cost-effectiveness: Arduino-based solutions are cost-effective compared to proprietary traffic control systems. The use of open-source hardware and software components makes it affordable for implementation in various traffic scenarios, especially in developing regions with limited budgets for traffic management infrastructure.
6. Educational Value: Developing and implementing the traffic light control system using Arduino provides valuable hands-on experience in electronics, programming, and real-world problem-solving. It serves as an educational tool for students and enthusiasts interested in learning about traffic engineering and smart city technologies.