Traffic management System
Using IOT

Objectives:

The objective of traffic management using IoT (Internet of Things) is to enhance the efficiency, safety, and sustainability of transportation systems through the integration of connected devices and data-driven technologies.

Iot set-up device:

1) Sensors
2) Microcontroller (such as Arduino And Raspberry Pi)
3) Communication module (Wifi)

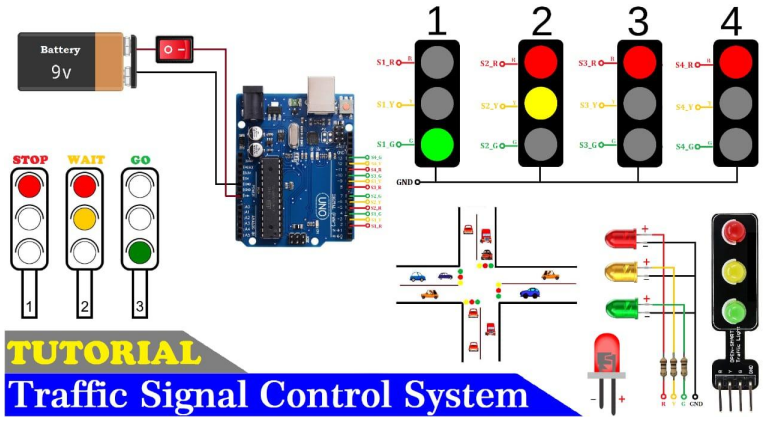
Hardware specifications:

1) Ultrasonic sensor
2) Magnetic sensor or LiDAR
3) Raspberry pi, Arduino
4) Solar panels or batteries
5) Display screen
6) Adequate frame
7) Wheather sensors
8) Passengers information display
9) Power supply
10) Cameras

Software specifications:

1) Define the communication protocols (e.g., MQTT, HTTP, CoAP) for transmitting data from the sensors to the central processing unit
2) Decide whether data processing will be performed at the edge (on local devices) or in the cloud (remote servers).
3) Specify the hardware requirements and capabilities for edge computing devices

Circuit diagram:



Working principle of traffic management:

1)Sensor Deployment:

IoT sensors are strategically deployed at various points in a traffic system. These sensors can include cameras, motion detectors, GPS devices, and other specialized sensors.

2)Data Collection:

The deployed sensors continuously collect data related to traffic conditions. This data can encompass vehicle counts, speed, congestion levels, weather conditions, and more**.**

3)Data Transmission:

The collected data is transmitted over a network, typically via wireless communication protocols like Wi-Fi, Bluetooth, or cellular networks, to a central data processing hub.

4)Data Processing and Analysis:

At the central hub, the received data is processed and analyzed in real-time. Advanced algorithms and machine learning models may be employed to extract meaningful insights from the raw data.

5)Traffic Monitoring and Control:

Based on the analyzed data, the system can make informed decisions for traffic management. For instance, it can adjust traffic signals, display variable message signs, and provide real-time information to drivers via electronic boards or mobile apps.

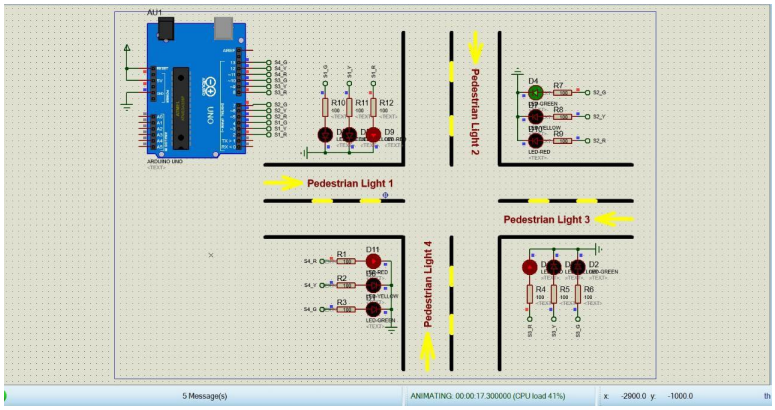
6)Traffic Optimization:

The system can also optimize traffic flow by dynamically adjusting traffic signals, rerouting vehicles, or suggesting alternative routes to alleviate congestion.

7)Emergency Response and Safety: IoT-enabled traffic management systems can also facilitate quick response in emergency situations. For example, they can detect accidents or road hazards and promptly alert relevant authorities.

8)Data Visualization and Reporting:

The processed data can be presented in a user-friendly format for traffic operators, city planners, and even the general public. This can be in the form of dashboards, reports, or visualizations.



Source code:

1)HTML(index.html)****

```
<!DOCTYPE html>
<html>
<head>
    <title>Traffic Management System</title>
</head>
<body>
    <h1>Traffic Management System</h1>

    <div id="trafficInfo">
        <h2>Traffic Information</h2>
        <p>Current Traffic Status: <span id="currentStatus">Loading...</span></p>
        <p>Number of Vehicles: <span id="vehicleCount">Loading...</span></p>
        <button onclick="requestTrafficData()">Refresh Data</button>
    </div>

    <script>
        function requestTrafficData() {
            // JavaScript code to request data from IoT devices and update the HTML elements
        }
    </script>
</body>
</html>
```

2) CSS (style.css)

```
body {
    font-family: Arial, sans-serif;
}
```

```
h1 {
    text-align: center;
}

#trafficInfo {
    border: 1px solid #ccc;
    padding: 20px;
    max-width: 400px;
    margin: 0 auto;
    background-color: #f9f9f9;
}

button {
    display: block;
    margin: 10px auto;
    padding: 10px 20px;
    background-color: #007bff;
    color: #fff;
    border: none;
    cursor: pointer;
    font-size: 16px;
}

button:hover {
    background-color: #0056b3;
}

#currentStatus, #vehicleCount {
    font-weight: bold;
    color: #007bff;
}
```

3) JavaScript

```
// HTML
<!DOCTYPE html>
<html>
<head>
  <style>
    .traffic-light {
      width: 50px;
      height: 150px;
      border: 2px solid black;
      border-radius: 10px;
    }
```

```
  </style>
</head>
<body>
  <div class="traffic-light">
    <div id="red" class="light red"></div>
    <div id="yellow" class="light yellow"></div>
    <div id="green" class="light green"></div>
  </div>
  <button id="startButton">Start</button>
  <button id="stopButton">Stop</button>

  <script>
    let lights = ["red", "yellow", "green"];
    let currentLight = 0;
    let intervalId;

    const toggleLight = () => {
      lights.forEach((light, index) => {
        const element = document.getElementById(light);
        if (index === currentLight) {
          element.style.backgroundColor = light;
        } else {
          element.style.backgroundColor = "gray";
        }
      });

      currentLight = (currentLight + 1) % 3;
    };

    const startTrafficLight = () => {
      intervalId = setInterval(toggleLight, 2000); // Change lights every 2 seconds
    };

    const stopTrafficLight = () => {
      clearInterval(intervalId);
    };

    document.getElementById("startButton").addEventListener("click", startTrafficLight);
    document.getElementById("stopButton").addEventListener("click", stopTrafficLight);
  </script>
</body>
</html>
```

Conclusion:

In conclusion, traffic management using IoT (Internet of Things) is a sophisticated approach that leverages interconnected devices and sensors to collect, monitor, and analyze data related to traffic conditions. This system enables dynamic decision-making and real-time adjustments to optimize traffic flow, enhance safety, and improve overall urban mobility.