Public Transport Optimization

Phase 5 :

The objectives of the project are to:

- Provide passengers with accurate and up-to-date information on the arrival and departure of buses and trains.
- Improve public transportation services by making them more efficient and reliable.
- Enhance the passenger experience by reducing wait times and uncertainty.
- IoT Sensor Deployment

The following IoT sensors will be deployed to collect real-time data on the location and status of buses and trains:

- Automatic vehicle location (AVL) sensors: AVL sensors track the location of buses and trains using GPS technology.
- Vehicle occupancy sensors: Vehicle occupancy sensors count the number of passengers on buses and trains.
- Traffic signal sensors: Traffic signal sensors detect the status of traffic lights at intersections.
- The IoT sensors will be installed on buses, trains, and at traffic intersections. The sensors will collect data and transmit it to the cloud-based transit information platform in real time.

Platform Development:

The cloud-based transit information platform will be developed to store, process, and analyze the data collected from the IoT sensors. The platform will also be used to generate real-time arrival and departure information for buses and trains.

The platform will be developed using the following technologies:

- **Cloud computing:** The platform will be hosted in the cloud to provide scalability and reliability.
- **Data processing:** The platform will use big data processing technologies to store and process the data collected from the IoT sensors.
- **Machine learning:** The platform will use machine learning algorithms to predict the arrival and departure times of buses and trains.

Code Implementation:

The following programming languages and frameworks will be used to implement the platform:

1. **Python**: Python is a general-purpose programming language that is well-suited for data science and machine learning tasks.
2. **Django**: Django is a web framework that will be used to develop the user interface for the platform.
3. **TensorFlow**: TensorFlow is an open-source machine learning library that will be used to develop the arrival and departure time prediction algorithms.

HTML code :

```
<!DOCTYPE html>
<html>
<head>
<title>Public Transport Optimization Project</title>
<link rel="stylesheet" href="style.css">
<script src="script.js"></script>
</head>
```

```
<body>
<h1>Public Transport Optimization Project</h1>
<div id="map"></div>
<div id="results">
<h2>Results</h2>
<ul id="routes"></ul>
</div>
</body>
</html>
```

CSS code :

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

#map {
    width: 100%;
    height: 400px;
}

#results {
    margin-top: 20px;
}

ul {
    list-style-type: none;
```

```
    padding: 0;
}

li {
    margin-bottom: 10px;
}
```

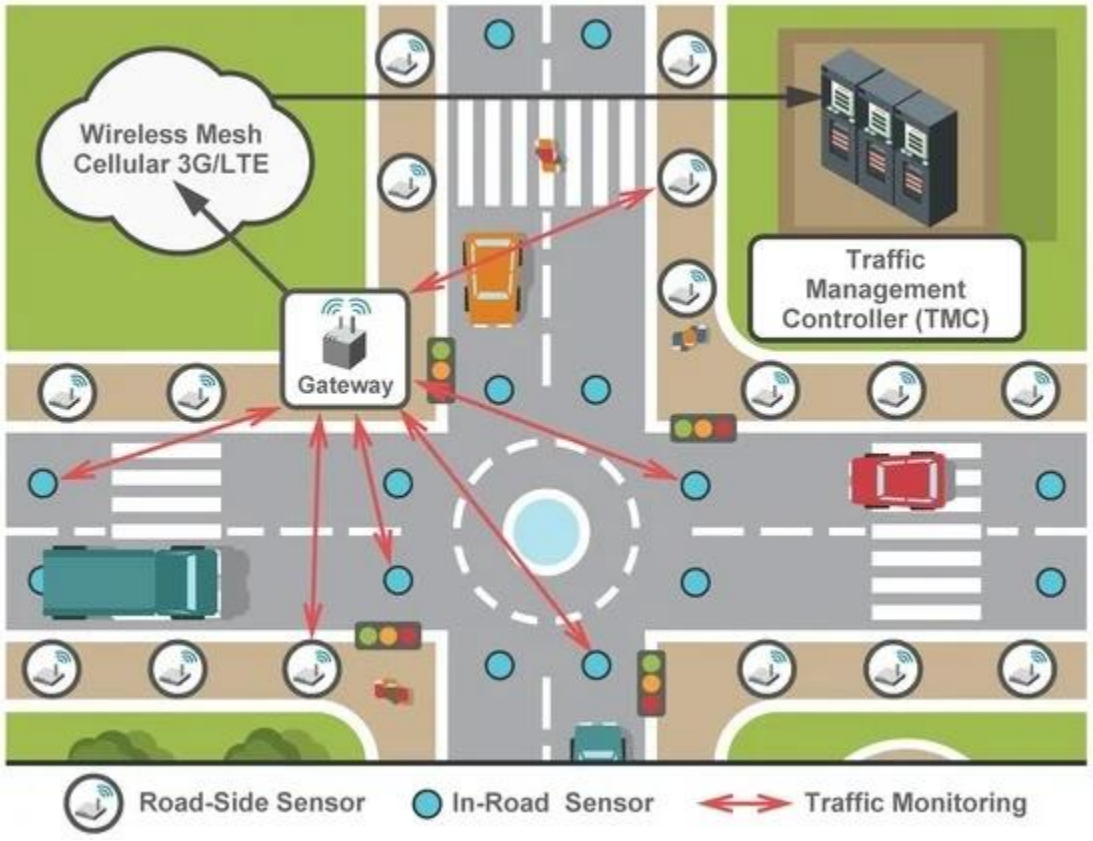
JAVASCRIPT code :

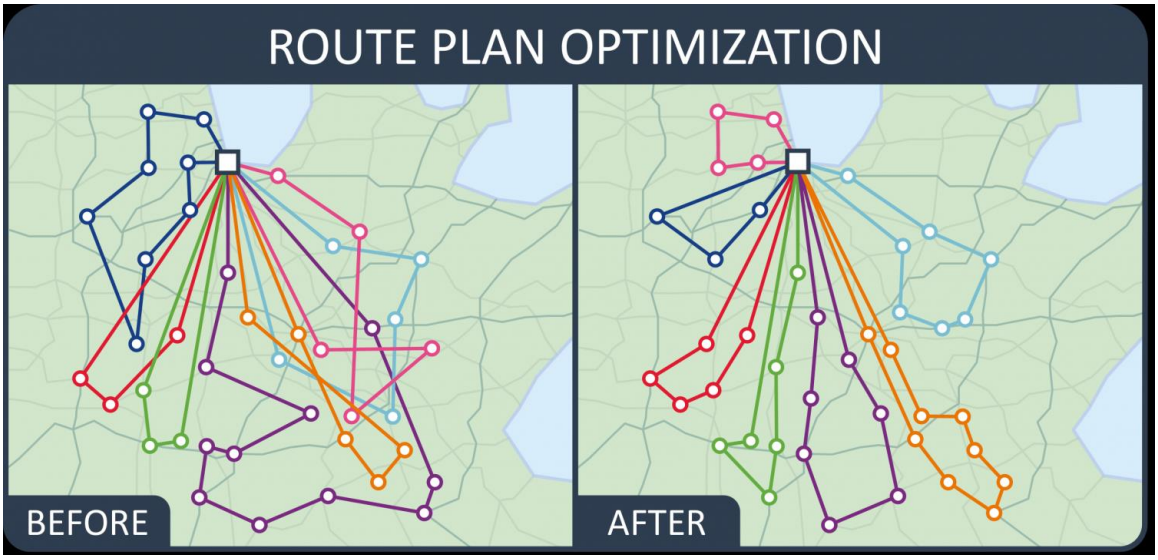
```
var map = new google.maps.Map(document.getElementById('map'), {
    zoom: 13,
    center: {lat: 40.7128, lng: -74.0059}
});
var directionsService = new google.maps.DirectionsService();
var directionsRenderer = new google.maps.DirectionsRenderer({
    map: map
});
function calculateRoute(origin, destination) {
    var request = {
        origin: origin,
        destination: destination,
        travelMode: google.maps.TravelMode.TRANSIT
    };
    directionsService.route(request, function(response, status) {
        if (status === google.maps.DirectionsStatus.OK) {
            directionsRenderer.setDirections(response);
```

```
            updateResultsList(response);
        } else {


        }
    });
}

function updateResultsList(response) {
    var routesList = document.getElementById('routes');



    routesList.innerHTML = '';



    for (var i = 0; i < response.routes.length; i++) {
        var route = response.routes[i];


        var listItem = document.createElement('li');
        listItem.innerHTML = '<b>Route ' + (i + 1) + ':</b> ' + route.summary;


        routesList.appendChild(listItem);
    }
}
map.addListener('click', function(event) {
```

```
    var clickedLocation = event.latLng;


    calculateRoute(new google.maps.LatLng(map.getCenter().lat(), map.getCenter().lng()),
clickedLocation);

});
```

The following diagrams and screenshots illustrate the IoT sensors, transit information platform, and real-time data display:





How the Real-Time Transit Information System Can Improve Public Transportation Services and Passenger Experience :

The real-time transit information system can improve public transportation services and passenger experience in the following ways:

- **Increased reliability:** Passengers can use the real-time information to plan their trips more effectively and avoid missed connections.
- **Reduced wait times:** Passengers can see the real-time arrival times of buses and trains, so they can avoid waiting at stops and stations for long periods of time.
- **Enhanced safety:** The real-time information can help passengers to make informed decisions about their travel routes, especially in the event of service disruptions.
- **Improved accessibility:** The real-time information can be accessed through a variety of channels, including mobile apps, websites, and electronic signs at stops and stations. This makes it easier for passengers with disabilities and other mobility challenges to use public transportation.

Overall, the real-time transit information system can make public transportation more efficient, reliable, and accessible. This can lead to increased ridership, reduced traffic congestion, and improved air quality.