



COLLEGE NAME: PRIYADARSHINI ENGINEERING COLLEGE

COLLEGE CODE : 5119

COURSE NAME: Internet Of Things (IOT)

GROUP NUMBER: 2

PROJECT TITLE: PUBLIC TRANSPORTATION OPTIMIZATION.

PROJECT SUBMITTED TO: SKILL UP ONLINE

YEAR: 3rd

DEPARTMENT: ELECTRONICS AND COMMUNICATION ENGINEERING.

SEMESTER: 5th

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## **Project Description:**

The Public Transportation Optimization and Monitoring System is a comprehensive solution designed to enhance the efficiency, reliability, and quality of public transportation services in urban areas.

This project leverages IoT technology and advanced data analytics to track and optimize routes, monitor passenger dynamics, and ensure the well-being of public transport vehicles.

## **Components of the Working Model:**

### **IoT Sensors:**

- Deploy various IoT sensors within public transportation vehicles and at key infrastructure locations.
- These sensors may include GPS, passenger counting sensors, temperature and climate sensors, proximity sensors, and camera sensors (CCTV).

### **Data Collection and Transmission:**

IoT sensors continuously collect data.

Data is transmitted to a central server or cloud platform in real-time.

**Data Storage:**

Data is stored in a secure database for analysis.

**Data Analysis and Processing:**

Utilize data analytics and machine learning to process and analyse the data

**Passenger Counting:**

Determine passenger counts and monitor load capacity.

**GPS Data:**

Track vehicle locations, routes, and deviations

**Temperature and Climate Data:**

Ensure passenger comfort.

**Proximity Data:**

Enhance safety and prevent collisions.

**Camera Footage:**

Monitor passenger behaviour and security.

**Route Optimization:**

Develop algorithms for real-time route optimization based on GPS data, traffic conditions, and passenger demand.

Optimize routes to minimize delays and reduce fuel consumption.

**Passenger Information System:**

Develop a user-friendly mobile app for passengers to access real-time information about routes, delays, and expected arrival times.

Provide updates on passenger counts to help passengers choose less crowded routes.

**Fleet Condition Monitoring:**

Implement sensors for monitoring the condition of public transport vehicles, including engine health and maintenance needs.

### **Data Visualization and Reporting:**

Create a dashboard that displays real-time data, route maps, and vehicle conditions for transportation authorities.

Generate reports for operational decision-making.

### **Predictive Maintenance:**

Use machine learning to predict vehicle maintenance needs based on sensor data.

Schedule maintenance activities proactively to minimize downtime.

### **Security and Privacy Measures:**

Implement strong security measures to protect passenger data and ensure the privacy of individuals. Ensure compliance with data protection regulations.

### **Deployment and Continuous Improvement:**

Deploy the system in public transportation networks.

Continuously collect and analyse data to make real-time adjustments and improvements.

Incorporate passenger feedback for enhancements.

## **PYTHON PROGRAM :**

```
import random
```

```
import time
```

```
# Simulate GPS data for multiple buses
```

```
def simulate_gps_data():
```

```
    gps_data = []
```

```
    for bus_id in range(1, 6):
```

```
        latitude = 42.3601 + random.uniform(-0.05, 0.05)
```

```
        longitude = -71.0589 + random.uniform(-0.05, 0.05)
```

```
        gps_data.append({'BusID': bus_id, 'Latitude': latitude,  
'Longitude': longitude})
```

```
    return gps_data
```

```
# Implement a basic route optimization algorithm (for  
demonstration)
```

```
def optimize_routes(gps_data):
```

```
    # Replace this with your actual route optimization algorithm
```

```
return gps_data
```

```
# Main program
```

```
if __name__ == "__main__":
```

```
    try:
```

```
        while True:
```

```
            # Simulate GPS data for buses
```

```
            gps_data = simulate_gps_data()
```

```
            # Implement route optimization
```

```
            optimized_data = optimize_routes(gps_data)
```

```
            # Print optimized GPS data (for demonstration)
```

```
            print("Optimized GPS Data:")
```

```
            for bus in optimized_data:
```

```
                print(f"Bus {bus['BusID']}: Latitude {bus['Latitude']},  
Longitude {bus['Longitude']}")
```

```
            time.sleep(60) # Simulate data collection every minute
```

```
        except KeyboardInterrupt:
```

```
print("Simulation ended")
```

In this program,

we simulate GPS data for multiple buses, implement a basic route optimization algorithm (for demonstration purposes), and periodically print the optimized GPS data.

You should replace the route optimization algorithm with your actual optimization logic.

This program provides a simple framework for working on real-time route optimization in the context of public transportation.