**Phase 1**

**PROBLEM, IDENTIFICATION AND DESIGN THINKING**

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| **Date** | 20-09-2023 |
| **Team Id** | **Proj\_223982\_team** |
| **Project Name** | Public Transport Optimization |
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**Introduction**

Public transport management involves the planning, operation and organization of various forms of public transport to ensure efficient, safe and convenient transport services for the public.

**Problem**

The major concern on Public transport has many challenges like seat managements, traffic accidents, lack of linking for transport between public vehicles, rush on public transport, etc. This project aims to solve these difficulties by using the IoT systems that develop a system to provide a platform that connects with passenger.

**Key Challenges**

* Data privacy and security
* Cyber security risks
* Data accuracy and Reliability
* Public acceptance and Trust
* Environment Factors and Durability
* Legacy Infrastructure Integration
* Power consumption and Battery Life

**Design Thinking**

1. **Project Objective** .
2. **Real-time Seat Management:**

**Solution:** Implement a real-time seat management system that allows passengers to view available seats on public transportation through a mobile app or a display at stations. Utilize sensors to track seat occupancy and update availability in real-time.

**Benefits:** Enhances passenger experience, minimizes discomfort, and optimizes seating capacity.

**b) Traffic Accidents Prevention:**

**Solution:** Utilize advanced driver assistance systems (ADAS) and collision detection technologies in public vehicles. Integrate vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication to alert drivers and prevent collisions.

**Benefits:** Improves safety for passengers and reduces traffic accidents.

**c) Lack of Linking for Transport:**

**Solution:** Develop a unified, integrated mobile application that provides comprehensive information on various public transportation options, schedules, routes, and seamless payment options for transfers between different modes of transportation.

**Benefits:** Enhances convenience for passengers, encourages the use of public transport, and facilitates easier transfers.

**d) Rush on Public Transport:**

**Solution:** Introduce dynamic pricing strategies to incentivize off-peak travel. Adjust fares based on demand to spread passenger load throughout the day.

**Benefits:** Reduces overcrowding during peak hours and promotes a more balanced utilization of public transport.

**e) Enhanced Passenger Experience:**

**Solution:** Upgrade vehicles for better comfort and accessibility, provide Wi-Fi, charging ports, and clean, well-maintained facilities. Implement improved signage and communication systems for clear announcements and directions.

**Benefits:** Enhances passenger satisfaction, encourages repeat usage, and attracts new users to public transport.

**f) Traffic Management and Infrastructure:**

**Solution:** Implement a smart traffic management system that uses real-time traffic data to optimize traffic flow, synchronize traffic signals, and adjust routes for public vehicles. Use AI algorithms to predict traffic patterns and plan routes accordingly.

**Benefits:** Reduces congestion, enhances efficiency, and ensures timely arrivals and departures.

1. **IoT sensors Network Design**

* The appropriate sensors involved in this project is about optimize the transport with respects to public safety and secure travel.
* The sensors involved in tracking the transport by the GPS sensors along with measuring the speed with the accelerometer and gyroscope..
* Infrared sensors are used for calculating the passenger counting and occupancy detection within vehicle.
* RFID sensors used for contactless ticketing and passenger tracking allowing for efficient fare collection and analysing passenger movement pattern.

1. **Integration Approach**

In this project to deploy the sensors that transmit the data to the platform about the details needed for passengers. The common protocols involved like MQTT, HTTP/HTTPS, CoAP and LoRaWAN.

**Conclusion**

It proposed Public Transport Improvement Program addresses challenges in management, enhancing passenger experience through real-time seat availability and control technology. It prioritizes safety, streamlines logistics, and promotes flexibility. The program also emphasizes sustainability and efficiency, reducing carbon emissions and creating an environmentally friendly system.