**Project Title: Smart Parking**

**Phase 1: Project Definition and Design Thinking**

**Project Definition:**

The project involves integrating IoT sensors into public transportation vehicles to monitor ridership, track locations, and predict arrival times. The goal is to provide real-time transit information to the public through a public platform, enhancing the efficiency and quality of public transportation services. This project includes defining objectives, designing the IoT sensor system, developing the real-time transit information platform, and integrating them using IoT technology and Python.

Design Thinking:

**1.Empathize:**

* Start by understanding the pain points of your users. Conduct interviews, surveys, and observations at parking lots to gather insights into their parking experiences.
* Identify the key challenges users face, such as finding available parking spaces, uncertainty about parking availability, and difficulty navigating parking lots.

**2.Define:**

* Clearly define the project objectives: real-time parking space monitoring, mobile app integration, and efficient parking guidance.
* Create user personas to represent the different types of users who will benefit from this solution, such as drivers, parking lot operators, and app developers.

**3.Ideate:**

* Organize brainstorming sessions with a diverse group of team members to generate creative ideas for solving the defined problems.
* Explore various IoT sensor technologies and placement strategies to detect parking space occupancy and availability.
* Brainstorm ways to provide real-time parking information to users through a mobile app.

**4.Prototype:**

* Develop a prototype IoT sensor design, considering factors like sensor type (e.g., ultrasonic, magnetic, infrared), power source (e.g., battery, solar), and communication method (e.g., Wi-Fi, LoRa).
* Create a mockup of the mobile app interface that displays real-time parking availability and provides navigation guidance to available spaces.

**5.Test:**

* Deploy a small-scale pilot of IoT sensors in a parking lot to test their effectiveness in real-world conditions.
* Share the mobile app prototype with a group of users and gather feedback on its usability, accuracy, and overall experience.

**6.Feedback and Iterate:**

* Incorporate feedback from users and data collected during testing to refine the IoT sensor design and mobile app interface.
* Iterate on the design and functionality to address any identified issues or shortcomings.

**7.Implement:**

* Based on the refined designs, proceed with the full-scale deployment of IoT sensors in parking spaces.
* Develop the mobile app with real-time parking availability information and navigation features.

**8.Integration:**

* Determine the integration approach between the IoT sensors and the mobile app using Raspberry Pi or other suitable hardware.
* Develop the necessary software and communication protocols to collect data from the sensors and update the mobile app in real-time.

**9.Launch and Scale:**

* Launch the complete solution in a select group of parking lots or areas.
* Monitor the system's performance, gather user feedback, and make continuous improvements.
* Plan for scaling the solution to more locations based on the success of the initial deployment.

**10.Evaluate and Iterate:**

* Continuously gather data and feedback to evaluate the impact of the solution on parking efficiency and user satisfaction.
* Use this information to make further iterations and enhancements to the system as needed.