**IDEATHON PHASE**

**Defining the Problem Statement**

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| **Date** | **26-09-2023** |
| **Team ID** | **530** |
| **Project Name** | **Smart parking using IOT** |

**Smart parking using Internet of Things**

**Problem Definition and Design Thinking**

**Introduction:**

Our project idea is to implement a smart parking system in rural areas using Internet of Things (IoT) to overcome the time consumption and frustration. A using sensor, mobile application, cloud-based methodology. In this document, we will outline the problem statement, the steps involved in solving it, and the design thinking approach that will guide our project.

**Problem Statement:**

Objective: The current state of urban parking is inefficient, causing congestion, pollution, and driver frustration due to the lack of available parking spaces and ineffective management.

Data: We have a dataset containing various features of (e.g., size, location, number of parking slots, ownership, parking fare) of parking area by considering time consumption and traffic due to in search of available parking space.

**Key Challenge:**

1.Sensor Accuracy and Reliability:

Ensuring that sensors accurately detect parking space occupancy and vacancy is crucial for the success of the smart parking system. Factors like sensor calibration, environmental conditions, and sensor malfunctions can affect the accuracy and reliability of the data collected.

1. Data privacy and security:

Collecting and managing sensitive information about parking habits and user data raise concerns about privacy and security. Protecting this data from unauthorized access, hacking, or misuse is crucial to gain and maintain public trust.

1. Scalability:

Adapting the smart parking system to handle increasing numbers of parking spaces and users can be challenging. Scaling the infrastructure to accommodate a growing user base while maintaining system performance and reliability is a significant character.

1. Environmental Factors:

Environmental conditions such as extreme weather, debris, or vandalism can impact the performance and longevity of sensors and other IoT devices, affecting the overall reliability of the system.

1. Power Consumption and Energy Efficiency:

IoT devices like sensors and communication modules require power to operate. Balancing the need for accurate and real-time data collection with power consumption is a key challenge. Energy-efficient designs and sustainable power sources must be considered.

1. Parking congestion:

Traditional parking systems struggle to manage high-density parking areas efficiently, leading to congestion during peak hours.

**Design Thinking Approach**

**Empathize:**

Before diving into solving the problem, In this case, we need to understand the needs and pain points of both drivers and parking lot operators.

**Actions:**

- Conduct surveys, interviews, and observations to gain insights into their experiences and challenges.

- Seek feedback from the drivers about the parking lot operators.

**Define:**

Based on our understanding of the problem, we will define the problem by synthesizing the information gathered during the empathy stage.

**Objectives:**

- Identify specific pain points, such as difficulty finding parking, congestion, or payment issues.

- By using smart sensors in parking area.

- providing real time data accessing through application.

**Ideate:**

Brainstorm creative solutions to address the identified problems.

**Actions:**

-Encourage a diverse group of stakeholders to generate a wide range of ideas. Consider technologies like sensors, mobile apps, and data analytics.

-Implement a reliable communication network (e.g., LoRaWAN, NB-IoT) to connect sensors to a central server or cloud platform. Ensure consistent and real-time data transmission between sensors and the centralized system.

-Integrate navigation features into the mobile app that guide users to available parking spots using the shortest and most efficient routes.

**Prototype**

By creating a prototype of the “Smart Parking model” using IOT and to provide real time data transfer to the drivers on availability of parking lot.

**Actions:**

- Create a tangible representation such as a mock-up of a mobile app or a small-scale parking lot with sensor installations.

- Prototyping allows for early testing and refinement of ideas.

- By testing the prototype with a subset of the dataset to ensure it meets performance objectives.

**Test**

Evaluate the model's performance using appropriate metrics and gather feedback from users.

**Actions:**

- By gathering feedback from users and stakeholders by testing our prototype.

-Understand how well our solution addresses the defined problem and make adjustments based on user insights.

- Invite a small group of users to interact with the prototype. Ask them to use the app to reserve a parking spot and monitor the real-time availability data.

**Implement**

Once the prototype meets the defined objectives and receives positive feedback, proceed with full implementation.

**Actions:**

- Providing solution based on user feedback. Be open to making changes and improvements to ensure it meets user needs effectively.

-This may involve deploying sensors, developing a mobile app, or integrating existing infrastructure.

- Deploy the model as part of a production-ready web application.

- Conduct thorough testing to ensure the application is robust and user-friendly.

**Iterate**

Continuous improvement is essential. Gather user feedback and iterate on the model and interface to enhance accuracy and usability.

**Actions:**

- Continue to gather feedback and data, and make necessary adjustments to optimize the smart parking solution over time.

- Based on user feedback, make necessary adjustments to both the app's interface and the sensor system. Ensure that the app provides a seamless parking experience.

**Conclusion:**

**Summary:**

The implementation of a smart parking solution using IoT technology addresses the challenges in conventional parking systems, improving efficiency, user experience, and urban sustainability.

**Future Prospects:** The proposed solution provides a scalable foundation for further enhancements and integration with evolving smart city initiatives, ultimately contributing to a more connected and efficient urban infrastructure