**PROJECT 2: ENVIRONMENTAL MONITORING**

**PHASE 1: PROBLEM DEFINITION AND DESIGN THINKING**

**PROJECT TITLE: IOT ENVIRONMENTAL MONITORING IN PUBLIC PARKS**

**PROJECT DEFINITION:**

The project’s primary goal is to establish an Internet of Things (IoT) infrastructure for monitoring environmental conditions, specifically temperature and humidity, in public parks. This endeavor seeks to deliver real-time environmental data to park visitors through a public platform, allowing them to make informed decisions regarding their outdoor activities. The project encompasses the following key components.

1.**Project Objectives**:

* + **Real-time Environmental Monitoring:** Implement a system that continuously monitors temperature and humidity in public parks.
  + **Aiding Park Visitors**: Furnish park visitors with access to real-time environmental data to facilitate planning and enhance their outdoor experience.
  + **Promoting Outdoor Experiences**: Encourage and enable park visitors to engage in outdoor activities by providing data-driven insights.
  + **Enhancing Visitor Satisfaction**: Improve visitor satisfaction by ensuring they are well-prepared for changing weather conditions.

2. **IoT Device Design**:

* + **Sensor Selection**: Identify appropriate temperature and humidity sensors that are reliable, accurate, and cost-effective.
  + **Development Strategy**: Develop a strategy for the optimal placement and distribution of IoT sensors within public parks to achieve comprehensive coverage while efficiently utilizing resources.
  + **Power Source**: Determine the power source for IoT devices, considering options such as battery power, solar panels, or a combination thereof.
  + **Connectivity**: Select suitable connectivity options (e.g., Wi-Fi, cellular, LPWAN) to ensure robust and reliable data transmission.

3. **Environmental Monitoring Platform**:

* + **Web-Based Interface**: Design a user-friendly web-based platform accessible via various devices (mobile phones, computers) for park visitors.
  + **Real-time Data Display**: Develop a dashboard that presents real-time temperature and humidity data in a comprehensible and visually appealing format.
  + **Historical Data Access**: Enable access to historical environmental data, allowing visitors to review past conditions.
  + **Weather Forecasts**: Integrate weather forecast data to enhance the platform's predictive capabilities and assist visitors in planning activities.

4. **Integration Approach**:

* + **Data Transmission**: Determine the data transmission protocol and frequency from IoT devices to the environmental monitoring platform.
  + **Data Security**: Implement robust data security measures to safeguard data integrity and user privacy.
  + **Scalability**: Consider the system's scalability to accommodate additional parks or sensors in the future.
  + **Development Technology**: Utilize Python for platform development and IoT technology for seamless sensor integration.

**DESIGN THINKING APPROACH:**

To effectively address the project's objectives and requirements, we will adopt a Design Thinking approach, comprising the following phases:

* **Empathize:** Gain a deep understanding of the needs and challenges faced by park visitors and park management. Conduct surveys, interviews, and on-site observations to empathize with their expectations and pain points.
* **Define**: Clearly articulate the project's objectives, requirements, and success criteria, informed by the insights gathered in the empathy phase. Create user personas to represent different categories of park visitors.
* **Ideate**: Brainstorm innovative ideas for sensor deployment, platform design, and integration strategies. Encourage collaborative cross-functional ideation sessions to generate creative solutions.
* **Prototype**: Develop prototypes of the IoT sensor system and the environmental monitoring platform. Conduct user testing to gather feedback and iterate on the prototypes.
* **Test**: Conduct usability tests with users and gather feedback from stakeholders. Use this feedback to refine the prototypes, ensuring they align with the defined project objectives.
* **Implemen**t: Develop the final IoT sensor system and environmental monitoring platform based on the refined prototypes. Ensure the solution aligns with the project's defined objectives and requirements.
* **Deliver**: Deploy IoT sensors in public parks according to the deployment plan. Launch the environmental monitoring platform for public access, and provide training for park administrators.
* **Evaluate**: Continuously monitor the performance of IoT devices and gather user feedback. Measure the impact of the project on visitor satisfaction and park utilization.
* **Iterate**: Make ongoing improvements and updates based on user feedback and data analysis. Consider the possibility of expanding the project to additional parks or enhancing the platform with additional features.
* **Sustain**: Develop a maintenance plan to ensure the long-term functionality of IoT devices and the platform. Stay updated with advancements in IoT and web technologies to ensure the project remains relevant.

By embracing this Design Thinking approach, we aim to create a robust and user-centric IoT environmental monitoring system that not only enhances the park experience for visitors but also contributes to their safety, satisfaction, and appreciation of outdoor activities.