**PROJECT 1: FLOOD MONITORING AND EARLY WARNING**

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

**PROJECT TITLE: IOT FLOOT MONITORING AND EARLY WARNING IN CITIES AND VILLAGES**

**PROJECT DEFINITION:**

Floods are a natural disaster that can cause significant damage to property and loss of life. Traditional flood monitoring systems are often limited in their effectiveness, relying on manual data collection and analysis. IoT technology offers the potential for more accurate and timely flood monitoring and early warning systems

1.**Project Objectives**:

* **Causes of Flooding and the Importance of Flood Monitoring:** A flood can be described as an overflow of water in an area considered to be relatively dry.

## Climate Change and Flood Monitoring: **Connecting climate change to flooding is challenging as a result of limited data on floods, making it difficult to measure or compare against climate-driven trends today.**

## Benefits of Flood Monitoring: **Because of the devastating effects that floods people and their environments, flood monitoring systems have been developed to help prepare and warn people of emanating danger.**

## Challenges Faced in Flood Monitoring: **Flood risk information can be acquired via past flood records that occurred in the area, surveying assets and people exposed to floods, and the use of predictive modeling.**

## New Developments and the Future of Flood Monitoring: **Many western European countries were recently subjected to severe flooding which resulted in huge economic losses and multiple deaths.**

2. **IoT Device Design**:

* Sensor Selection: Choose appropriate sensors to measure water levels, rainfall, and other relevant data.
* Data Collection and Transmission: Develop a system to collect and transmit data in real-time, using wireless or cellular networks.
* Data Analysis: Use machine learning algorithms to analyze data and identify patterns that indicate potential flooding.
* Early Warning System: Develop a system to alert authorities and residents of potential flooding, using mobile apps, text messages, or other means.

3. **floot Monitoring Platform**:

* Wireless sensor network**:** relevant variables about the flow of rivers and streams (level, flow, speed, water temperature, etc.).
* A smart computer system: for the exploitation of hydrometeorological and weather data captured to generate warnings and notifications for events that may involve a flood risk situation.
* Real-time monitoring: ENVIRA IoT’s system controls the flow and its behavior in real time, detects possible water courses and alerts about the flood risk with real and accurate data.
* Communication modules:The flexibility of the firmware displayed at Nanoenvi® stations can integrate the equipment directly with any kind of IoT platform or control center, both cloud-based and on-premise, by means of communication protocols (message format, communication and transport protocols, M2M networks) completely adapted to each case.
* Data display and analysis: IoT Envira DS platform enables the reception, organization and exploitation of data, reporting changes in levels, flows and speed.

4. **Integration Approach**:

* + **Data Transmission**: Determine the data transmission protocol and frequency from IoT devices to the floot 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 city and villages. 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 peoples.
* **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 floot 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 floot 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 floot monitoring system that not only enhances the villages and citys but also contributes to their safety and satisfaction