

Project. : **Environment monitoring in park**

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

In this part you will need to understand the problem statement and create a document on what have you understood and how will you proceed ahead with solving the problem.

Please think on a design and present in form of a document.

Project definition:

Monitoring the environment in a park using IoT (Internet of Things) technology can provide real-time data and insights, making it more efficient and effective.

Air Quality Monitoring:

Deploy IoT sensors to measure air quality parameters such as particulate matter (PM2.5 and PM10), ozone (O3), nitrogen dioxide (NO2), and carbon monoxide (CO).

Transmit data from sensors to a central system via wireless networks.

Analyze the data in real-time and provide alerts or warnings to park authorities and visitors when air quality reaches unhealthy levels

Water Quality Testing:

Install IoT-enabled water quality sensors in various water bodies within the park.

These sensors can continuously measure parameters like pH, turbidity, dissolved oxygen, and temperature.

Transmit data wirelessly to a central monitoring station.

Set up automated alerts for deviations from acceptable water quality standards.

Temperature and Humidity Monitoring:

Deploy IoT temperature and humidity sensors at different locations in the park.

Collect and transmit data in real-time to monitor temperature variations and humidity levels.

Use this data to predict weather changes and assess their impact on the park environment.

Biodiversity Surveys:

Use IoT-enabled cameras and acoustic sensors to monitor wildlife and record sounds.

- Implement machine learning algorithms to identify and classify species based on images and audio data.

- Gather valuable information on the park's biodiversity and ecosystem health.

Noise Pollution Monitoring:

Place IoT noise sensors at strategic locations to continuously measure noise levels.

- Transmit data

wirelessly to a central database.

- Generate noise pollution reports and visualize trends over time.

Weather Monitoring:

Deploy IoT weather stations to measure parameters like precipitation, wind speed, and temperature.

- Transmit data to a central weather database for analysis.

- Provide real-time weather updates to park authorities and visitors.

Soil Health Assessment:

Install soil moisture and nutrient sensors in different areas of the park.

- Use IoT technology to collect and transmit soil data, including moisture levels and nutrient content.

- Monitor soil health and provide recommendations for park maintenance and conservation efforts.

Remote Sensing and GIS:

Combine IoT data with Geographic Information Systems (GIS) to create maps and visualizations of environmental conditions.

- Monitor changes in land use, vegetation, and ecological features over time.

Visitor Impact Studies:

Use IoT-connected trail counters, waste bins, and visitor counters to track visitor impact.

- Collect data on trail usage, waste generation, and visitor density.

- Optimize park management and develop strategies to minimize environmental impact.

Early Warning Systems:

Implement IoT-based early warning systems for natural disasters, such as wildfire detection sensors and flood level sensors.

- Send real-time alerts to park authorities and emergency services when potential threats are detected.

Energy Efficiency:

Implement IoT-based early warning systems for natural disasters, such as wildfire detection sensors and flood level sensors.

- IoT to optimize energy consumption in park facilities, such as lighting and HVAC systems, by adjusting them based on occupancy and weather conditions.

IoT-enabled environmental monitoring not only provides valuable data for park management but also enhances visitor safety and engagement by offering real-time information about park conditions. It can

play a significant role in preserving the natural beauty and ecological balance of the park while promoting sustainable practices.