ENVIRONMENTAL MONITORING:

Project Objectives:

The objectives of environmental monitoring are simple: minimize the impact an our activities have on an environment. Real-time environmental monitoring systems are helping humans develop a proactive relationship with the Earth. Continuous environmental monitoring with real-time technologies helps provide data that is used to identify trends, make predictions, and establish parameters and trigger levels, which is essential for early warning strategies. Real-time monitoring helps agencies and enterprises set environmental performance goals and emission reduction targets, and create environmental monitoring reports to track their progress.

Another major benefit is the improvement of disaster response and preparedness. Disaster management data collection and emergency management software facilitate innovative emergency management endeavors such as crisis mapping, social media mining, and event simulations, which use enormous volumes of real-time and historical data to assist emergency management directors and their teams in developing proactive, protective strategies, such as flood warning systems.

Iot Devices Design:

DHT11 sensor:

In this project, we are using the **DHT11 sensor for sending Temperature and Humidity data to Thingspeak using Arduino and ESP8266**. By this method, we can monitor our DHT11 sensor's temperature and humidity data over the internet using the ThingSpeak IoT server. And we can view the logged data and graph overtime on the Thingspeak website. Here Arduino Uno reads the current temperature and humidity data from DHT11 and sends it to the ThingSpeak server for live monitoring from anywhere in the world. We previously used ThingSpeak with Raspberry Pi and ESP32 to upload the data on the cloud. **ThingSpeak** is an open data platform for monitoring your data online where you can set the data as private or public according to your choice. ThingSpeak takes a minimum of 15 seconds to update your readings. It's a great and very easy-to-use platform for building IoT projects.

Solar Power Iot:

After working closely with the Umstead State Park staff, Chip's solar-powered tracker was ready to deploy at the park gates. The Photon-based units use sensors, including an accelerometer, to keep track of any walkers, joggers, bikers, or cars accessing the park. And the solar power battery ensure reliable, independent power to the unit. In an early design, retrieving data from the counter required manually removing memory cards from each location and needed human interaction. Chip's next iteration added Bluetooth allowing for drive-by data downloads, but a person still had to be near the counters to retrieve data.

Today, the counters are built with Particle Electron and take advantage of its cellular connectivity to send data remotely. For the last six months, these Electron-based units have run with little maintenance and shuttle attendance data from the counters to the Particle Cloud. Park management can observe real-time information on a dashboard Chip built using Ubidots webhooks. Now there's no more need to leave the office to check attendance numbers.

Environmental Monitoring Platform:

Using data gathered from across an entire industrial deployment, it's possible to study **water treatment readings**, **air quality measurements**, **water and fuel flows**, and other data in real time. Users typically utilize an analysis dashboard that aggregates that data, shows trends, spikes, and abnormalities, which in many cases eliminates the need to schedule costly truck rolls, which also burn fuel, out to every remote installation. The data-driven approach provides the critical insights needed for predictive and preventative maintenance and resource management.

Integration Approach:

Smart parks, according to surveys by Hassell Studio, benefit from technology that enhances the green space's sustainability. By integrating technology throughout the park, it can collect more climate-relevant data, predict usage frequency, and provide solutions for climate adaptation based on the data collected. In addition, smarter and more attractive parks are often cleaner and better maintained, which can impact rents and increase housing prices in surrounding areas.

People tend to favour physically interactive technologies that can also increase the sustainability of the park, such as energy-generating paving and exercise equipment, smart lighting, smart bins, smart benches, and water fountains. This combination of smart technologies could lead to improved social connections via the technology and the overall quality of the park as a social space.