IOT- Environmental Monitoring

NAME:Sinthuja.V

ID:aut962921104710

EMAIL:sinthujasinthuja120@gmail.com

TABLE OF CONTENTS

INTRODUCTION

We will learn 4 important applications of IoT Environmental Monitoring, which are beneficial for the environment.

IoT Environmental Monitoring

First, let's talk about an environmental monitoring system definition and how IoT supports these processes. *IoT-based environmental monitoring* is the consistent collection of measurements and data from our physical environment, using sensors and connected devices. Sensors embedded in irrigation systems, pipelines, tanks, weather stations, oceanic applications, and industrial equipment — anywhere on the planet — can detect temperature, moisture, water levels, leaks, and other physical properties.

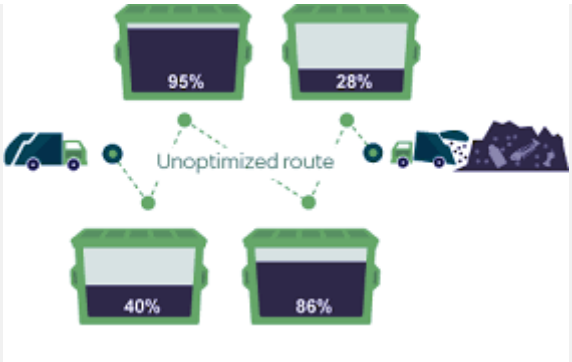
What is IOT Environmental Monitoring?

IoT environmental monitoring is a process that uses Internet of Things (IoT) technology to collect data about the environment, such as air quality, temperature, and humidity levels.

PROBLEM DEFINITION:

a. Waste Management

The problem of waste management is very crucial issue in big cities, due to two reasons; first the cost of service and second the problem of storage of accumulating garbage.
In order to save and make use of inexpensive environmental advantages, a deeper penetration of information and communications technologies solutions in this field will be required.
For example, intelligent waste containers help identify the level of load the trucks carry and allow for an optimization of the collector trucks route, which in turn can reduce the cost of waste collection and improve the quality of recycling.
To incorporate and make effective use of such smart waste management services, the IoT will connect these intelligent waste containers, to a control center where an optimization software will process the data and determine the optimal management and route the collector truck should follow.



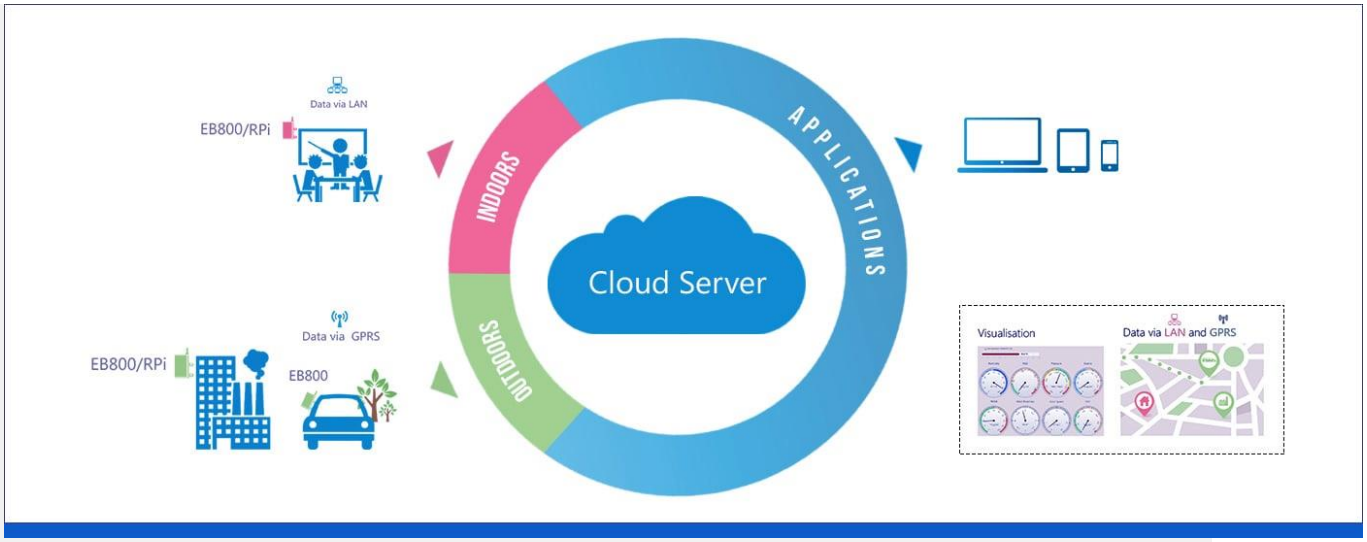
IoT Application – Waste Management

b. Vehicle Tracking

Internet of things IoT Environmental Monitoring – Vehicle Tracking

The vehicle tracking facility makes use of road sensors and intelligent display systems that help drivers to find the best path for parking in the city.
The benefits from this service are many such as faster the car takes to locate a parking slot means lesser CO emission from the car, lesser traffic problems, and ultimately happier citizens. The IoT infrastructure can directly integrate the vehicle parking facility.

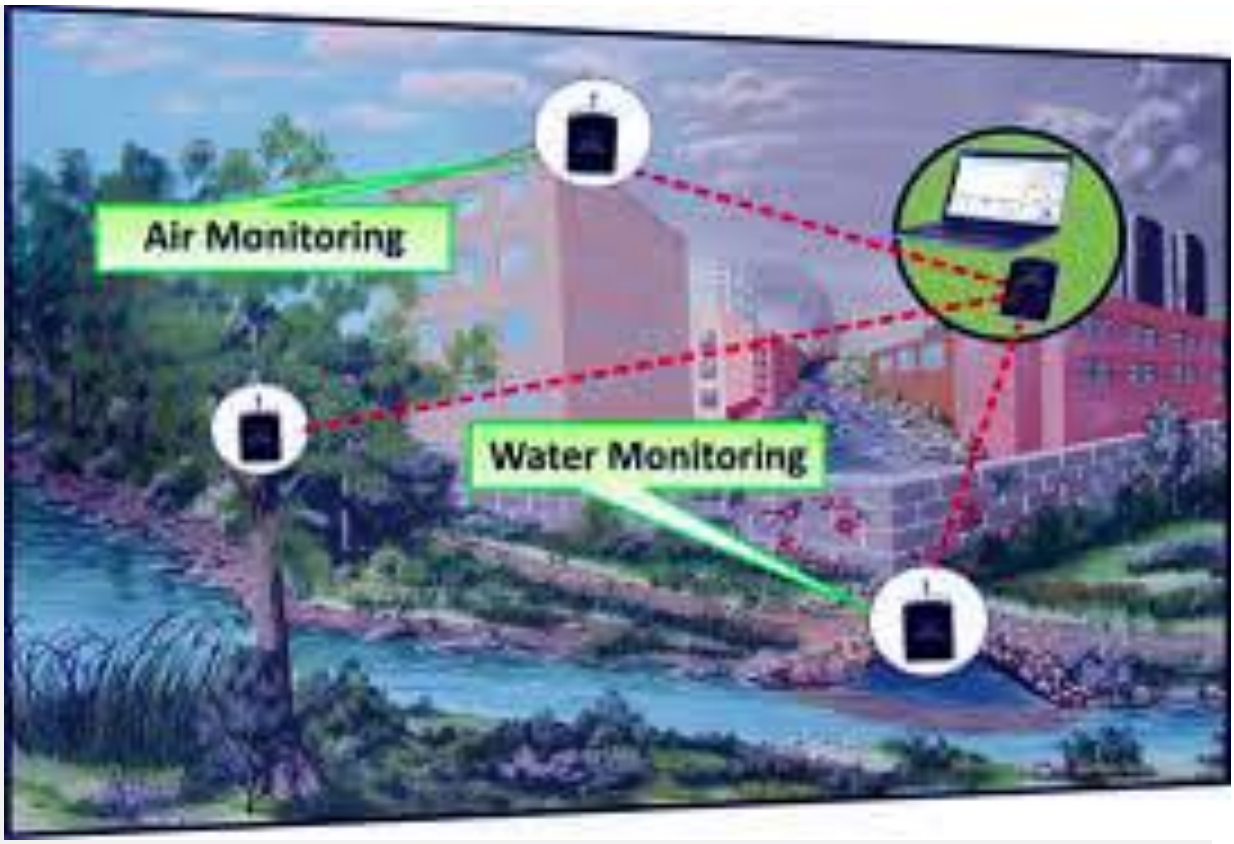
Furthermore, like we discussed earlier, by using communication technologies, such as *Near Field Communicatio*n (NFC) or *Radio Frequency Identifiers* (RFID), we can understand the electronic confirmation system of parking and locate slots reserved for residents or disabled persons, thus offering a better service to residents that can make use of those slots and also as an efficient tool to spot any violations quickly.



Internet of things IoT Environmental Monitoring – Vehicle Tracking

C.Air&Water Pollution

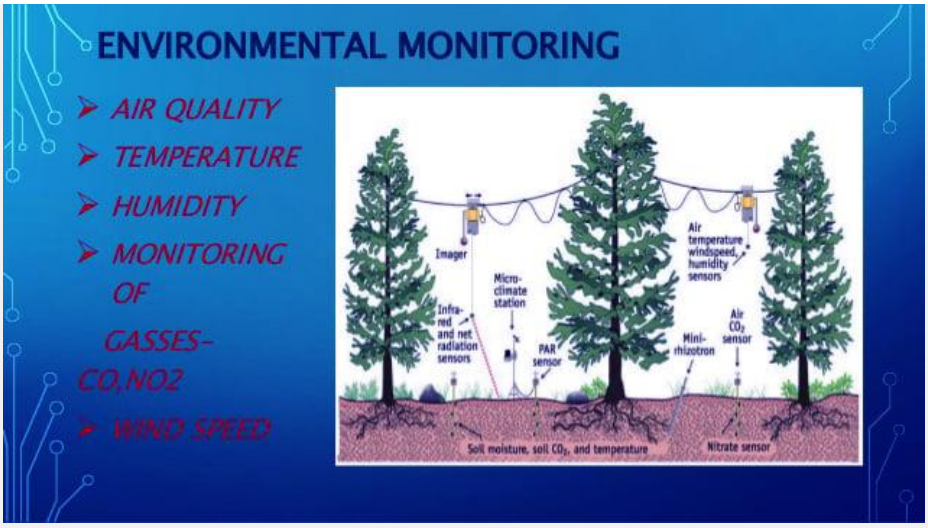
The monitoring technology currently in use for air and water safety mainly uses manual labor along with some advanced instruments, and lab processing techniques. Through IoT systems, the need for manual labor is reduced. As a result, frequent sampling is allowed, increasing the range of monitoring and sampling, allowing sophisticated on-site testing, and providing responses to detection systems. This prevents any further contamination of water bodies and other natural resources and related disasters.



IoT Application – Air & Water Pollution

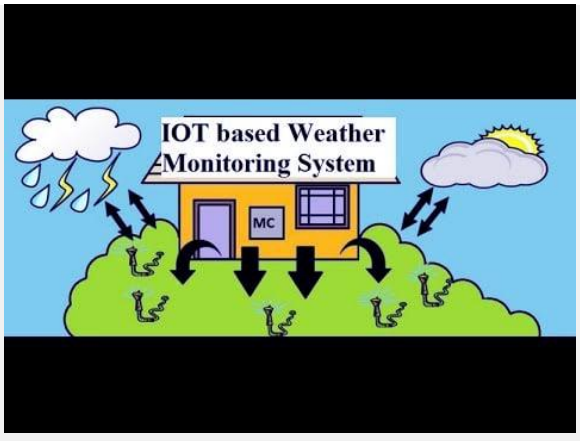
d. Extreme Weather

Powerful, advanced systems currently used for weather forecasting allow deep monitoring, but they suffer from using broad instruments, such as radar and satellites. These instruments that are used for small details lack the accurate targeting potential for smart technology.



IoT Environmental Monitoring Benefits – Extreme Weather

Now, through the new IoT advances, the IoT system promises more data that fine-grain, better flexibility, and accuracy.
Effective weather forecasting procedures require high detail as well as flexibility in instrument type, range, and deployment. This results in early responses to prevent loss of life and property through early detection.



IoT Environmental Monitoring Benefits – Extreme Weather

So, this was all about IoT Environmental Monitoring Application. Hope you like our explanation.

Design Thinking

1. **Empathize**:
   - **User Research**: Start by understanding the needs, goals, and pain points of all stakeholders, including scientists, environmentalists, policymakers, and the public. Conduct surveys, interviews, and observational research.
   - **Field Observations**: Visit environmental monitoring locations to gain firsthand insights into the environmental conditions and the challenges faced by monitoring teams.
   - **User Personas**: Create detailed user personas representing the various types of users, their roles, and their unique requirements. For example, a citizen volunteer, a climate researcher, or a government regulator.
   - **Define the Problem**: Synthesize research findings to define a clear and concise problem statement. For instance, "How can we create an IoT-based environmental monitoring system that provides real-time data on air quality, is accessible to the general public, and supports data-driven decision-making?"
2. **Define**:
   - **Point of View (POV)**: Develop a specific POV statement that frames the problem from the user's perspective. For example, "Citizens in urban areas need an intuitive IoT system that empowers them to actively monitor air quality and take steps to protect their health."
   - **User Journey Map**: Create a user journey map that illustrates the touchpoints and interactions users have with the IoT system, from data collection to taking action based on the data.
3. **Ideate**:
   - **Brainstorming**: Organize brainstorming sessions with a diverse team to generate a wide range of ideas for the IoT system. Encourage free-thinking and creativity. Use techniques like brainstorming, mind mapping, and brainstorming cards.
   - **Idea Selection**: After brainstorming, evaluate and prioritize the generated ideas based on their alignment with user needs, feasibility, and impact.
   - **Storyboarding**: Develop storyboards or user scenarios that visualize how users would interact with the IoT system in different situations. This helps to create a user-centric narrative.
4. **Prototype**:
   - **Low-Fidelity Prototypes**: Create low-fidelity prototypes of the IoT system, which can be sketches, paper models, or wireframes. Focus on the core features and user interface.

5. **Test**:
    - **Iterate and Refine**: Based on user feedback from testing, make iterative improvements to the prototypes. Address usability issues, refine features, and ensure that the IoT system aligns with user needs.
6. **Implement**:
    - **System Development**: Transition from prototyping to actual system development. Build the IoT environmental monitoring system, integrating sensors, data processing algorithms, and communication infrastructure.
    - **Data Collection**: Set up the physical or digital infrastructure for data collection, ensuring that sensors are accurately calibrated, data transmission is reliable, and data storage is secure.
    - **User Interface and Experience (UI/UX)**: Design and develop a user-friendly interface for accessing and interpreting environmental data collected by the IoT system.
7. **Evaluate and Iterate**:
    - **Usability Testing**: Conduct usability tests with the actual IoT system to identify and address any issues that may have emerged during development.
    - **Data Validation**: Continuously validate the accuracy and reliability of the environmental data collected by the IoT sensors.
    - **Performance Monitoring**: Monitor system performance, including response times, data refresh rates, and overall reliability, and make adjustments as necessary.
8. **Engage Stakeholders**:
    - Maintain open and regular communication with stakeholders, including users, environmental experts, policymakers, and regulatory agencies. Share progress, gather input, and involve them in decision-making.
9. **Sustainability and Scalability**:
    - Consider the long-term sustainability of the IoT environmental monitoring system. Plan for maintenance, updates, and scalability to accommodate future needs and technologies.
10. **Data Visualization and Communication**:
    - Develop clear and engaging data visualization tools and communication channels to effectively convey environmental information to users and the public. Ensure that the data is presented in an understandable and actionable manner.