

ENVIRONMENTAL MONITORING SYSTEM

(Phase 1)

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ABSTRACT:

In recent time, there have been tremendous increase of human activities resulting from population growth and technological advancement. The operational activities resulting from usage of automobiles, industrialization and urbanization have been attributed to detrimental effect which is affecting the human health and other living beings. Industrialization operations and waste especially in urban and metropolitan cities have also been a major factor responsible for release of pollutants in our environment today. In this regard, there is need to develop a system for monitoring the high level of industrial pollution. This paper is therefore put together from a robust research that developed a system to not only monitor industrial pollution but in addition minimizes human intervention in monitoring industrial pollution and maintain a healthy environment. This system is designed to continuously access industrial pollution via the following devices; Microcontroller ATmega328, ESP8266 Wi-Fi Module and sensors like MQ-2 gas sensor, sound, temperature, turbidity, conductivity sensors and other associated devices. The system monitors the level of pollutants in the environment, cuts off the main power line to the polluting industries

whenever the level of acknowledged pollutants goes high. This can be useful for government departments like the federal and state Ministry of Environment, National Emergency Management Agency (NEMA) for monitoring the industries and take necessary actions

An environmental monitoring system using IoT (Internet of Things) involves deploying sensors and devices to collect data about various environmental parameters and transmitting that data to a central hub or cloud platform for analysis and control. Here's how it typically works:

MODULE:

1. Sensors and Devices:

Deploy a variety of sensors and devices to measure environmental parameters such as temperature, humidity, air quality, water quality, soil moisture, noise levels, and more. These sensors can be connected to microcontrollers or IoT modules.

2. Data Collection:

The sensors collect data continuously or at regular intervals. This data can include real-time measurements and historical data.

3. IoT Connectivity:

Use IoT communication protocols (e.g., Wi-Fi, cellular, LoRa, NB-IoT) to transmit the collected data to a central hub or cloud-based platform.

4. Cloud Platform:

The data is sent to a cloud-based platform where it is stored, processed, and analyzed. Popular cloud platforms for IoT include AWS IoT, Azure IoT, Google Cloud IoT, and others.

5. Data Analysis:

Perform real-time and historical data analysis to identify patterns, trends, and anomalies. Machine learning algorithms can be used for predictive analysis.

6. Alerts and Notifications:

Set up alerting systems to notify stakeholders or authorities when predefined thresholds or anomalies are detected. For example, if air quality deteriorates beyond a certain level, an alert can be sent.

7. Visualization:

Create dashboards and visualization tools to display environmental data in a user-friendly format. This can help stakeholders easily interpret the data.

8. Remote Control:

In some cases, IoT systems allow for remote control of environmental devices, such as adjusting heating or cooling systems based on temperature data.

9. Reporting:

Generate reports and share insights with relevant stakeholders, including government agencies, researchers, and the public.

10. Maintenance and Scalability:

Regularly maintain the sensors and devices to ensure accurate data collection. Scalability is essential as more sensors may need to be deployed over time to cover a larger area.

11.Air and water pollution

Current monitoring technology for air and water safety primarily uses manual labor along with advanced instruments, and lab processing. IoT improves on this technology by reducing the need for human labor, allowing frequent sampling, increasing the range of sampling and monitoring, allowing sophisticated testing on-site, and binding response efforts to detection systems. This allows us to prevent substantial contamination and related disasters.

12.Water Quality Monitoring:

Clean and fresh drinking water is an essential resource for survival, and IoT technology is efficiently used to measure water quality parameters. By using the environmental monitoring solution, it is possible to measure the quality of water in real-time . It significantly results in efficient operations and improved production rate. You can detect turbidity, pH level, temperature, dissolved oxygen, TDS, and salinity to improve water quality for several purposes. The solution helps in gaining water quality information through smart IoT techniques and perform advanced analytics to enhance the production rate.

13.Farming:

For decades, agriculture was among the most conservative industries. But times are a-changin'! Farmers have to carefully consider land use and the application of fertilizers and pesticides if they don't want to face fines. Of course, this doesn't make farming any easier. What's more, the human population is growing along with food consumption. To keep up, farmers need to boost crop yields and improve product quality.