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WoT Based Contamination Monitoring System

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ABSTRACT- Modernization and industrial development are disrupting the contamination 's equilibrium by releasing untreated harmful toxic elements into the atmosphere, resulting in contamination of basic ecosystem elements such as water, air, and soil, which are necessary for humans to survive. The four major types of contamination caused by industries are air contamination, water contamination, and noise contamination. This causes infections to spread through the air and water, affecting both humans and animals. As a result, controlling these pollutant characteristics is a major undertaking. The major goal of this project is to design an efficient and cost-effective industrial air, water, and sound contamination monitoring system, and the main objective of this paper is to provide an WoT-based industrial air, water, and sound contamination monitoring system. comprehensive mechanism to track the variables that are causing the problem of contamination. This project's/working system's technique is to read and track pollutant indicators, as well as to inform when any of these substances are released, contamination control authorities are notified. Contamination levels are above industrial requirements. The system looks into PH levels in industrial effluents, CO levels, and other factors.CO2, combustible gases, air humidity, and temperature During the manufacturing process, minute optical dust particles are released. as well as the sound level produced by the industry, employing PH sensor, MQ6, MQ9, temperature sensor, and other sensors Humidity, and noise sensors are all included. This system is based on the Internet of Things (WoT), which is a rapidly growing technology that combines electronics and computer science. The Internet of Things (WoT) concept allows us to obtain data from faraway locations and preserve it in a database without having to physically be present in that region.

KEYWORDS- Air contamination, sound contamination, water contamination, WOT, sensors, monitoring system.

I. INTRODUCTION

Contamination is a significant issue that has a negative impact on the lives of millions of people. The majority of pollutants in the contamination are caused by untreated emissions and the discharge of industrial waste into the contamination. As the world's population and industry expand, contamination has become a major worry. Many processing and manufacturing businesses contribute significantly to four different forms of contamination.

- Air contamination
- Water contamination
- Noise contamination

Air contamination is caused by the release of a large amount of untreated industrial waste such as carbon dioxide, carbon monoxide, sulphurous oxides, nitrous oxides, minute particulate matter such as optical dust, and a significant amount of polymer vapours such as methanes and butanes as a by-product of coal, natural oils, fossil fuels, and petroleum. According to the Indian contamination control authority, almost 1.2 million Indians die each year as a result of airborne infections.

Similarly, the most common cause of industrial water contamination is the discharge of untreated industrial waste generated during various processing activities; industrial waste includes asbestos, lead, mercury, nitrates, phosphates, sulphur, and other petrochemicals, among others. Untreated acidic effluents released into natural reservoirs lower the pH of the water, reducing microbial activity and inhibiting the growth of algae and other aquatic plants, resulting in a drop in BOD (biological oxygen demand), or the amount of dissolved oxygen in the water, which affects aquatic animals' breathing.

Noise contamination is defined as an undesirable, loud, and unpleasant sound that causes annoyance, irritation, or adverse consequences for humans and animals. According to the World Health Organization, noise contamination occurs when the sound level surpasses 75 decibels. Noise levels should be kept below 65 decibels during the day and below 30 decibels at night, according to the WHO. Noise contamination can be created by a variety of factors, such as air traffic noise and road noise, but big industrial devices, such as a pneumatic drilling machine used on construction sites, can produce up to 110 decibels of noise. Noise contamination has devastating consequences for both humans and animals, such as hearing loss, respiratory agitation, high blood pressure, severe headaches, and a variety of psychiatric illnesses.

II. LITERATURE REVIEW

Prem Kumar S and Zumyla Shanaz looked at an ‘WoT-based Industrial Contamination Monitoring System.' The author advocated developing a comprehensive system that continuously monitors air quality surrounding the factory by measuring the levels of various pollutants generated during the manufacturing process with minimal human intervention, with the goal of creating a healthy atmosphere for industry workers. For this study, the authors employed MQ-6 and MQ2 sensors. CO, CO2, and smoke quality discharged into the atmosphere GSM technology was used to create an atmosphere for the

concert. data flow between sensors and monitoring authorities.

Karan Kapoor spoke about 'Air and Sound Contamination Monitoring System Using WoT' with Ms.Aarthi. In this study, the author created a monitoring system. both the quality of the air and the volume of noise produced during The industrial technique of detecting CO2 levels in the atmosphere with various sensors, such as the MQ135 Temperature and humidity are both monitored via the DHT11 sensor. Sound intensity is monitored using an LM393 sensor. The Raspberry Pi 3B is used to integrate the system. The Raspberry Pi 3B is an ARM-based credit card module. A small SBC (Single Board Computer) with an integrated Wi-Fi and Bluetooth module. GPRS technology was utilized by the author to send data from the sensors to the specified places via WoT.

Mahammad D.V. presented the development and implementation of a moveable outdoor dust density tracking system based on the Internet of Things. The author uses an optical dust density sensor that is interfaced with an Arduino microcontroller to monitor the amount of minute optical pollutants inside the type of micro particles. The data is transferred via the web of things, which uses a Wi-Fi module to deliver the data to the Blink app, a mobile application.

Deepa Jose, Kavitha.B.C. B.C., and Kavitha.B.C. B.C. presented an 'WoT-based contamination monitoring system using the Raspberry Pi'. The author created a system that includes MQ-6, MQ-7, MQ-135, LDR, and DHT11 sensors to monitor the presence of various contamination -causing parameters such as carbon monoxide, carbon dioxide, smoke, and butane, as well as the increase in atmospheric temperature and humidity as a result of pollutants released. The deep learning and machine learning algorithms give best performances [5-9].

The technology continuously monitors data on the amount of pollutants in the atmosphere and delivers warning messages to the authorities when contamination emissions surpass the contamination board's pre-set limits.

III. PROBLEM STATEMENT

Because of the advancement of urbanization, there has been a dramatic increase in industries in recent decades. These industries have resulted in an increase in contamination al contamination by releasing harmful untreated toxic elements into the atmosphere, resulting in contamination of basic ecosystem elements such as water, air, and soil. The biological species that inhabit this filthy contamination are susceptible to a variety of air and waterborne diseases. Lack of contamination -control policies, uncontrolled industrial growth, outmoded methods for handling toxic effluents, and industrial carelessness are the main causes of industrial contamination . Despite the fact that many laws have been enacted by contamination control authorities imposing limits on industries relating to the release of pollutants into the contamination in any form, such as air, water, soil, and even unwanted noise, which causes serious health-related problems in both humans and animals, these laws are not effectively enforced by industries.

The authorities are also failing to manage industrial contamination due to a lack of technical support required to monitor and provide an exact record of pollutants generated by industries, especially in remote regions, where essential actions can be taken. Despite the fact that many studies have been conducted in this area, many of them have concentrated on detecting only one or two types of contamination , such as evaluating air or water quality.

As a result, a strong industrial contamination monitoring system is required, one that monitors all sorts of contamination and records the values of all types of pollutants discharged on a certain day and time. When there is an increase in the release, the system must be able to transmit warning notifications to the contamination al contamination monitoring authorities, so that required actions can be taken to control the release of pollutants.

IV. PROPOSED MODEL

An 'WoT-based industrial air, water, and noise contamination monitoring system' is presented in this research as shown in figure.1. The suggested system aids in the monitoring of all four forms of contamination created by industries, which are monitored using the methods listed below.

- The level of carbon-dioxide, carbon monoxide, combustible gases such as Butane and LPG, humidity in the contamination , and the presence of minute particulate matter such as optical dust released during the industrial process are all monitored using MQ-6, MQ-9, humidity sensor, and dust density sensor.
- Similarly, before releasing industrial waste effluents into natural reservoirs, water contamination is monitored using a pH sensor by examining the pH of the effluents.
- Similarly, the system uses an LM35 temperature sensor to analyze the degree of temperature of heat-treated water that is emitted by companies in order to avoid thermal contamination .
- Similarly, the LM393 sound sensor is used to analyze the intensity of noise produced by various heavy equipment utilized in the industrial process.
- The Arduino mega 2560 microcontroller is used to connect all seven sensors. The analogue data collected by the sensors is transformed into digital data, which is then transmitted via the internet using a GSM modem and an Android mobile application. The suggested system additionally saves sensor data for a certain day and time and delivers alerts and warnings to the user's SIM and email as shown in figure.2.

V. OBJECTIVES

The suggested system can track all four categories of contamination produced by industry: air, water, thermal, and noise contamination . Pollutants discharged are monitored in real time. A thorough record of sensor data obtained at a specific time and date .The data from the sensors is presented on the LCD screen as well as on the webpage portal. When contamination emissions from companies exceed the user's pre-set value, the system sends alerting or warning messages to both the user's SIM card and email on a regular basis.

VI. METHODOLOGY

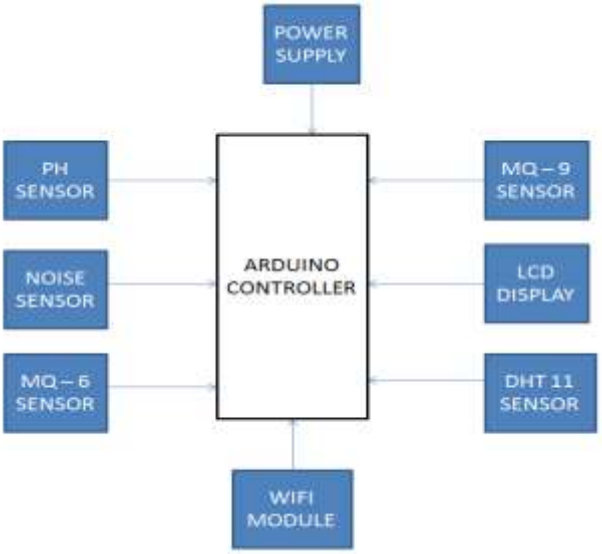

Figure 1: Transmitter section of this project

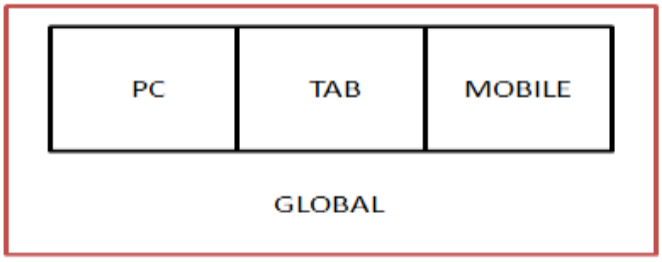

Figure 2: Receiver section of this project

The transmitter and receiver sections of the system make up the entire system. The transmitter part includes a power supply unit for the system as well as numerous analogue sensors, such as the PH sensor, MQ-6 sensor, MQ-9 sensor, temperature sensor, humidity sensor, dust density sensor, and noise sensor, all of which are connected to the Arduino Mega 2560 microprocessor. The data is sent to the receiver portion via the internet using the WIFI module. The receiver component is usually a smart phone on which the project's webpage application is built using the embedded C and Android programming. The data acquired from the transmitter section is displayed and recorded in the receiver section, as well as the SMS and email notifications delivered by the transmitter section. portion of the transmitter It's possible that the receiver section is the Whether you're the owner of a business or in charge of contamination management, authorities maintain a close check on industrial sector emissions in order to maintain contamination al management contamination .

The system's sensors have been set up. The sensors collect data from the industrial contamination , such as the analogue data of the MQ-6 sensor. The amount of flammable gases such as LPG and Butane Similarly, the MQ-9 sensor, which is a temperature sensor, a humidity sensor, a pH sensor, a dust density sensor, and a temperature sensor. The analogue data regarding the presence of noise is captured by the noise sensor. Carbon monoxide, carbon dioxide, and the temperature of the atmosphere are all examples of carbon monoxide. The water that has been heat-treated, the humidity in the contamination , pH of industrial effluents, optical dust level and last but not least, the sun. During the manufacturing process, there is a lot of noise respectively.

The Arduino Mega 2560 microcontroller receives the analogue data. The analogue data from the sensor is converted to digital data by the Arduino Mega 2560 microprocessor, and the values are shown on the LCD panel. The data is transmitted over the internet via the WIFI module to the project homepage of the receiver section. On the web page of the receiver part, the series of data collected from the transmitter portion is displayed as a table. The data is recorded in great detail in the receiver section, including the exact date and time of acquisition.

When the values of any particular data obtained by the transmitter portion fall below a certain threshold, the transmitter section sends a warning message to the receiver's cell SIM or email address. When sensors exceed the pre-set value, it indicates that there is a problem. rise in the respective pollutant emissions by If there is a growth in industries, for example, The MQ-9 sensor detects CO emissions from industry. This analogue data is of high value. The information is transformed into high-value digital information. At the moment, the The data acquired is compared by the Arduino microcontroller. It delivers an alert when the sensor detects the predefined value. a warning concerning the rise in carbon dioxide emissions CO is produced by the industry.

VII. CONCLUSION

The "WoT-based industrial air, water, and noise contamination monitoring system" is intended to monitor and regulate contamination caused by the release of dangerous, untreated industrial pollutants in a cost-effective and secure manner. This system is more effective than the existing system because it assists contamination al contamination control authorities in monitoring industrial contamination al conditions with the help of 5 sensors interfaced to an advanced controller that collects and records real-time data of various pollutants released by industries through various means, allowing authorities to keep a tight grip on the situation. Furthermore, the project homepage continuously saves data in full, including data and time of capture, which cannot be wiped or destroyed, and may access sensor data at any time and date. Based on the collected data, appropriate action can be taken to limit contamination al contamination.

REFERENCES

[1] Zumyla Shanaz, Prem Kumar S, Rahul R, Rajesh Kumar,and Santhosh Kumar. "WoT based Industrial Contamination Monitoring System" (2019).

[2] Deshmukh, Sarika, Saurabh Surendran, and M. P. Sardey. "Air and Sound Contamination Monitoring System using WoT." International Journal on Recent and Innovation Trends in Computing and Communication 5.6 (2017).

[3] Mahammad, D. V. "Design and Implementation of WoT based Portable Outdoor Dust Density Monitoring System." (2019).

[4] BC, Kavitha, and Deepa Jose. "WoT Based Contamination Monitoring System using Raspberry-PI." International Journal of Pure and Applied Mathematics 118.24 (2018).

[5] S. Patibandla, M. Archana, and R. C. Tanguturi, "Object Tracking using Multi Adaptive Feature Extraction Technique," International Journal of Engineering Trends and Technology, vol. 70, no. 6, pp. 279–286, Jun. 2022, doi: 10.14445/22315381/ijett-v70i6p229.

[6] G. Sadineni, A. M, and R. C. Tanguturi, "Optimized Detector

Generation Procedure for Wireless Sensor Networks based Intrusion Detection System," International Journal of Engineering Trends and Technology, vol. 70, no. 6, pp. 63–72, Jun. 2022, doi: 10.14445/22315381/ijett-v70i6p208.

[7] S. Patibandla, Dr. M. Archana, and Dr. R. C. Tanguturi, "DATA AGGREGATION BASED HYBRID DEEP LEARNING TECHNIQUE FOR IDENTIFYING THE UNCERTAINTIES AND ACCURATE OBJECT DETECTION," Indian Journal of Computer Science and Engineering, vol. 13, no. 3, pp. 697–708, Jun. 2022, doi: 10.21817/indjcse/2022/v13i3/221303049.

[8] Dr. S. R. Anand, Dr. R. C. Tanguturi, and S. D S, "Blockchain Based Packet Delivery Mechanism for WSN," International Journal of Recent Technology and Engineering (IJRTE), vol. 8, no. 2, pp. 1112–1117, Jul. 2019, doi: 10.35940/ijrte.b1627.078219.

[9] M. V. Bharathi, R. C. Tanguturi, C. Jayakumar, and K. Selvamani, "Node capture attack in Wireless Sensor Network: A survey," 2012 IEEE International Conference on Computational Intelligence and Computing Research, Dec. 2012, doi: 10.1109/iccic.2012.6510237.