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SMART COMPOST SYSTEM USING IOT

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Abstract : The "Smart Compose System" is an innovative project designed for real-time environmental monitoring and alerting. The system incorporates multiple sensors including MQ-6 gas sensor, CO sensor, DHT11 sensor for temperature and humidity, and a moisture sensor. These sensors are deployed to capture vital data related to air quality, temperature, and moisture levels. The collected data is then transmitted to a cloud-based platform using GSM and Wi-Fi modules for centralized storage and analysis. The primary objective of the Smart Compose System is to detect abnormal values in environmental parameters and promptly alert the concerned parties. An anomaly detection algorithm implemented in the cloud platform continuously analyses the incoming sensor data. If any abnormal values are detected, indicating potential environmental hazards such as gas leaks or unfavourable conditions, the system triggers immediate actions. The system utilizes two output modules for alerting purposes. Firstly, a buzzer is employed to provide audible alerts in the vicinity of the monitoring area, ensuring that individuals nearby are promptly informed of the detected anomaly. Secondly, a GSM module is utilized to send SMS alerts to predefined recipients, including relevant authorities or stakeholders. This dual alerting mechanism ensures that appropriate actions can be taken swiftly to address the detected environmental issues**.**

***IndexTerms*- Internet of Things, Arduino UNO, Thingspeak, DHT11 sensor, MQ-6 sensor, GSM module, CO2 Sensor, Relay.**

I.INTRODUCTION:

In today's era of rapid urbanization and industrialization, ensuring environmental safety and monitoring air quality has become a critical concern. The Smart Compose System is a cutting- edge project designed to address these challenges by employing advanced sensor technologies and cloud-based communication to monitor environmental parameters and provide real-time alerts in case of abnormal values. The primary aim of the Smart Compose System is to enhance environmental safety and awareness by continuously monitoring key parameters such as gas levels (using MQ-6 and CO sensors), temperature, humidity (via DHT11 sensor), and soil moisture levels. [1] These sensors are strategically deployed in areas prone to environmental risks or where precise monitoring is essential, such as industrial sites, agricultural fields, or indoor spaces. The project leverages the capabilities of modern IoT (Internet of Things) technology, integrating sensors with GSM and Wi-Fi modules to establish a seamless data communication network. This network enables the transmission of sensor data to a cloud-w1 platform in real time, where it is processed, analysed, and stored securely for further action. One of the key features of the Smart Compose System is its intelligent anomaly detection mechanism. An advanced algorithm implemented in the cloud platform continuously monitors the incoming sensor data for any deviations from normal values. These deviations, indicative of potential environmental hazards or unfavourable conditions, are promptly identified and trigger immediate alerts. The alerting mechanism of the Smart Compose System is twofold. Firstly, an audible alert is generated using a buzzer placed in the monitoring area, ensuring that individuals in the vicinity are alerted to the detected anomaly. Secondly, SMS notifications are sent via the GSM module to predefined recipients, which may include environmental authorities, facility managers, or stakeholders responsible for taking corrective actions. By combining state-of-the-art sensor technology, cloud-based communication, and intelligent algorithms, the Smart Compose System offers a comprehensive solution for environmental monitoring and alerting. It empowers organizations and individuals to proactively address environmental risks, promote safety, and contribute to sustainable practices in various sectors. [2]

II.EXISTING WORK:

The advanced waste management system is necessary to avoid the spread of some deadly diseases. It includes constant composter control, which helps to decompose the waste. But manual control of composters is difficult because of a lack of human resources. In the existing system, the waste is being managed intelligently by monitoring and controlling the composter, with the help of IoT. The

smart composter is connected to the internet to get the real-time information and its status to take the necessary phase of compositing. With the aid of IoT the multiple number of composters can be monitored [3].

To break down the compost, a moisture content of 60% is sufficient, for micro-organisms. Temperature sensor should control the temperature. Compost temperature is critical while biological activity occurs during the process of decomposition. These processes is slowed down by low outside temperature while warmer conditions speed up the process. [4] To start the composting cycle Mesophilic bacteria, work between 10 and 45 °C. Thermophilic bacteria assume control and thrive between 45 and 70 °C.

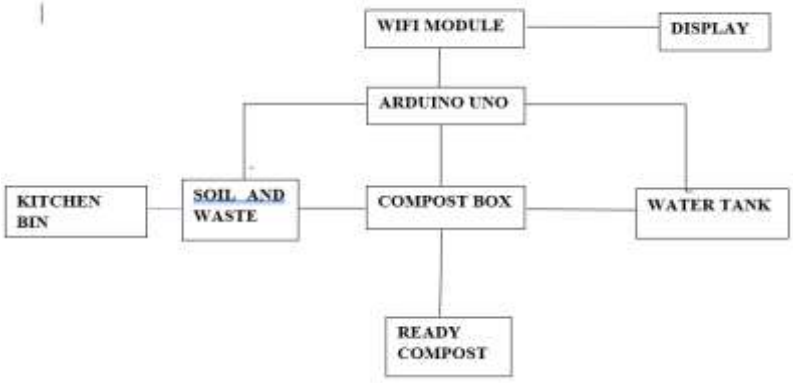

Fig 1: Block Diagram For Existing System

This is the existing work we have seen in the project to overcome and we have proposed some of the sensors which are used in the real life for the agriculture fields.

III.PROBLEM STATEMENT:

The system should provide insights into temperature, humidity, soil moisture, and air quality within the compost bin, and it should be capable of sending notifications via GSM module to alert users of any significant changes or issues detected. [7]

IV. PROPOSED WORK:

The proposed methods for environmental monitoring systems typically involve a combination of sensors, data communication technologies, and alerting mechanisms. Here an overview of the proposed methods that are commonly used in projects similar to the Smart Compost System.

Gas Sensor: MQ-6 gas sensor and CO sensors are commonly used to detect gases such as LPG, propane, and carbon monoxide.

Fig2: Gas Sensor

Environmental Sensors: Sensors like the DHT11 measure temperature and humidity, providing essential data for environmental monitoring.

Fig3: DHT 11

Moisture Sensors: Used in agriculture and soil monitoring applications to measure soil moisture levels, aiding in irrigation management. If the moisture content goes more than 70%, it causes slow process and creates unpleasant smells that produces anaerobic conditions.

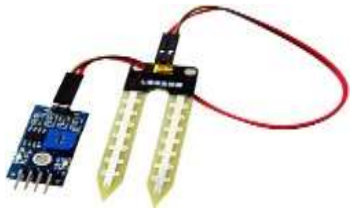

Fig4: Moisture Sensor

GSM Module: Enables communication via SMS messages, allowing for remote alerting and notifications.

Fig5: GSM Module

Wi-Fi Module: Facilitates data transmission to cloud-based platforms for real-time monitoring and analysis.

Fig6: Wi-Fi Module

IoT Protocols: MQTT, HTTP, or other IoT protocols are utilized for data transmission between sensors, microcontrollers, and cloud servers.

Data Storage: Cloud platforms like AWS IoT, Google Cloud IoT, or Azure IoT Hub are used to store sensor data securely.

Data Processing: Implementing cloud-based analytics and machine learning algorithms for data processing, anomaly detection, and predictive modelling**.**

Alerting Systems: Configuring alerting mechanisms within the cloud platform to trigger notifications based on predefined thresholds or anomaly detection.

Arduino IDE: Commonly used for programming microcontrollers like Arduino boards, ESP32, or ESP8266 to read sensor data, control actuators, and manage data transmission.

Buzzer/Sounder: Audible alerts generated by buzzers or sounders placed in monitoring areas to notify individuals of detected anomalies.

Fig7: Buzzer

V.BLOCK DIAGRAM:

This Block diagram shows that what are the Inputs and Output sensors we have taken for the smart compost system using IOT And outcomes that are present in this project by alerting mgs through the GSM module Through cloud.

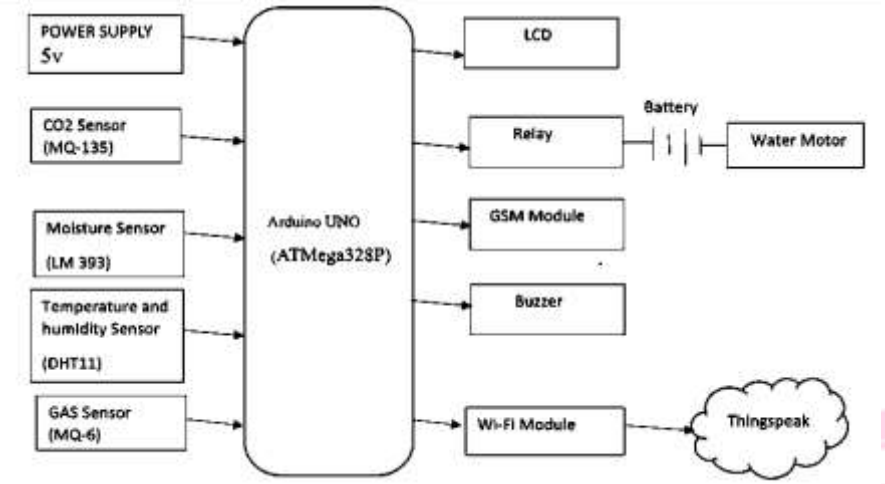

Fig8: Block Diagram for proposed system

VI.METHODOLOGY:

STEP-1: Switch On the power supply and connect USB cable to Arduino UNO while dumping the code remove Tx, Rx pins from GSM module later dump the code

STEP-2: Check the values of Gas sensor and CO2 sensor in the range between 200V(volume) then it is in good condition or else it going to give alert SMS to mobile phone from cloud

STEP-3: Read the moisture values it should be in between 700ppm or else automatically water motor will on

STEP-4: If Temp and Humidity is above 45º then the buzzer will be on and the alert SMS will be sent to mobile phone

STEP-5: GAS, Moisture, CO2, Temp sensors values that are going to show in LCD display and thingspeak account.

VII. RESULTS:

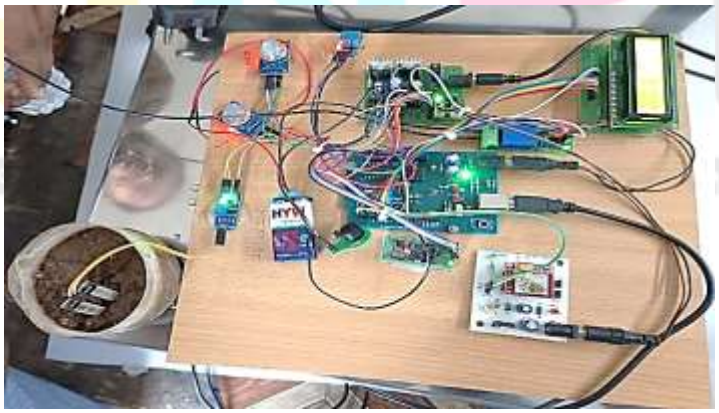

Fig 9: Project prototype

8A. TEMPARATURE AND HUMIDITY VALUES

Code is dumped into Arduino to checks the values of Temperature and it is in normal condition below 45^0 so it is displayed in LCD with the accurate values.

Fig 10: Temp & Humidity values

8B. CO_2, SOIL, GAS VALUES

Smart compost system will show the gases levels, co2 and soil levels and they are in the normal condition there will be no alert msg from GSM.

Fig11: Gas, CO2, Moisture Values

8C. WATER MOTOR

The soil is not containing any type of moisture value and it is above 700ppm so the water motor is automatically on through relay and buzzer is giving sound.

Fig 12: Working of Moisture sensor

8D. ALERT SMS FROM GSM

If the values are above the expected values weather the gases, CO2, temp are been released in agriculture fields the alert message is send to mobile phone.

Fig13: Alert SMS FROM GSM

8E. THINGSPEAK DATA

The status will be going to update on thingSpeak with time and date

Fig14: Gas ranges in Thingspeak view

Fig15: CO2 ranges in Thingspeak view

Fig16: Moisture ranges in Thingspeak view

Fig17: Temperature ranges in Thingspeak view

8F. Table

S. No	Name of Sensor	Output values
1	MQ6 Sensor (Gas)	200 ppm
2	MQ 135 Sensor (CO_2)	200ppm
3	LM 393 Sensor (Moisture)	700
4	DHT 11 (Temperature & humidity)	45^0

IX.CONCLUSION:

It concludes that the Smart Compost Monitoring System should provide users with real-time insights into the composting process, helping them maintain optimal conditions for efficient decomposition and minimize the risk of gas emissions. The GSM notification feature ensures timely alerts in case of any deviations from the desired composting parameters, enabling proactive intervention and management of composting operations and it going to show the values of the for expected ranges without any man power needed and finally, it giving the perfect outcome of the fields with the comparison values of the taken gas and co2 and moisture sensors values with the perfect alerting SMS from the GSM and cloud.

X. REFERENCES:

[1] Shetty, S., & Jain, P. (2019). " Internet of Things based Environmental Monitoring System." International Journal of Engineering and Advanced Technology (IJEAT), 9(1), 480-484.

[2] Kumar, A., & Singh, S. (2020). " Design and Implementation of Smart Environmental Monitoring System using IoT." International Journal of Innovative Technology and Exploring Engineering (IJITEE), 9(2S), 258-261.

[3] Ravi, K., Kumar, V., & Choudhary, R. (2018). " An Overview of Environmental Monitoring Systems using Internet of Things (IoT) and Big Data Analytics." Procedia Computer Science, 132,532-539.

[4] Kadam, P., & Patil, S. (2017). " Smart Environment Monitoring and Controlling System using IoT." International Journal of Engineering Research & Technology (IJERT), 6(4), 707-711.

[5] Sharma, A., Sharma, M., & Gupta, R. (2021). " IoT-based Environmental Monitoring and Alerting System." Proceedings of the International Conference on Computing, Communication & Automation (ICCCA), 1-6.

[6] Patel, K., & Choudhary, S. (2019). " Smart Environmental Monitoring System using IoT and Cloud Computing." International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET), 8(2), 2551-2555.

[7] Singh, S., & Jain, N. (2020). " Wireless Sensor Network Based Environmental Monitoring System for Smart Agriculture." International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE), 10(3), 122-126.

[8].Mark Risse ,Britt Faucette,(2020) “FOOD WASTE COMPOSTING: Institutional and Industrial Applications”

[9] A review paper on “compost site management monitoring piles: why and how”, Vermont Agency Of Natural Resources, Department of Environmental Conservation

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