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Water and Air Pollution Monitoring System

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Abstract: The developed system is a device that measures and displays air and water pollution. Nowadays, water and air pollution is increasing day by day. The factors responsible for this pollution are industrialization, growing population, urbanization and so on. This has become a big problem that needs to be worked on. The air quality sensor is used to detect the pollution level in ppm with the help of Arduino. The water sensors are used to detect the water quality and indicate whether the water is harmful due to physical and chemical factors. This will help people to monitor the level of pollution anywhere and anytime.

Keywords: Arduino UNO, LCD, Industrialization, Turbidity, TDS sensor.

I. INTRODUCTION

Pollution of the air and water resources happens as society's development and a variety of human activities progress more quickly. Therefore, to provide real-time safety, it is important to periodically monitor changes in these parameters. Low-cost air and water quality monitoring systems with simplified installation and quick and simple configuration can be created using sensor technology.

The suggested system is accurate, low-cost, and labor- intensive. It uses a number of sensors to measure the quality of the air and water in real-time so that appropriate action can be taken. The Arduino platform serves as the project's foundation. The values from the sensors are taken by the Arduino Ide software scripts and shown on LCDs. Every person in the community will be able to determine.

II. LITERATURE SURVEY

[1]A.B.Chounde Ms. Kshitija Tanaji Kamble, Ms.Arpita Vijaykumar Khatake, Ms.Aishwarya ,Chandrakant Ghandyalji,Prof

The operation of the IOT-based air pollution monitoring system using Raspberry Pi . TheMQ2 and MQ7 gas sensors are used in this project. These sensors are used as analog sensors that are connected to an adc. The adc is also connected to the Raspberry Pi. The Raspberry Pi is supplied with a power supply. The output from the Raspberry Pi is sent to the thing speak IOT platform for graphical monitoring. We can use thing speak in cell phones, laptops as well as in computer systems via an internet application that can be operated from anywhere.

[2] Anumandla Kiran Kumar, A. Sri Lakshmi, P. Janaki Nivas Roa

According to measurements of the ambient air quality, a gas monitoring aids in determining the pollution level. This work uses the Raspberry Pi Internet of Things (IOT) platform to create an IOT-based air quality monitoring system. To detect gases like CO, ammonia, smoke, alcohol, etc., a MQ135 sensor is employed. To minimise using duplicated data samples, the associated data will be processed using the moving average approach and saved in a database for later study and air pollution prediction. This will make it easier for future generations to practise safety practises.

[3] Komang Try Wiguna ,Adhitya Primantara, Putu Wira Bhuana, Kyle Doran

Three primary pollutants—carbon monoxide (CO), nitrogen dioxide (NO2), and dust particles (PM10)—are used to calculate the ISPU value. PH, temperature, turbidity, and total dissolved solids (TDS) are the factors used to assess the quality of water. a TDS sensor to measure total dissolved solids, a PH sensor to detect acidity, and a DS18B20 sensor to measure water temperature. A DHT11 sensor for temperature and humidity, a MQ-7 sensor for carbon monoxide concentration, and a MQ-135 sensor for nitrogen dioxide content make up the sensor nodes used to measure air quality.

[4] Zaky Wahyu Oktavianto , Anton Breva Yunanda.

Air is a mixture of gasses found in the layers surrounding the earth. The gas mixture's composition is not always constant. The element whose concentration varies the greatest is water, specifically in the form of water vapour (H2O) and carbon dioxide (CO2). Pollutants are always discharged into the air asbyproducts in the production of various air pollutants, such as gaseous sulphur dioxide (SO2), hydrogen sulphide (H2S), and carbon dioxide (CO). Examples of natural processes include the eruption of volcanoes, the decay of plant waste, and forest fires, among others.

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[5] Mohammad Salah Uddin Chowdurya, Talha Bin Emranb , Subhasish Ghosha , Abhijit Pathaka , Manjur Alama, Nurul Absara , Karl Anderssonc , Mohammad Shahadat Hossain.
By examining variables like temperature, pH, and conductivity, among others, several writers have suggested various methods to evaluate the quality of water. A WQM system was created by Dong based on WSN. The remote sensor used a Zig-Bee network as its foundation. WSN used GPRS to send data to the Internet while testing WQP. It was created for the IOT at a reasonable cost and uses sensors to evaluate numerous significant physical and chemical characteristics of water. It is possible to monitor water characteristics like turbidity, temperature, pH, dissolved oxygen, and conductivity. In our proposal, we suggested an IOT-based system for monitoring water quality.

III. OBJECTIVES

- To measure the quality of air and water.
- To determine temperature, turbidity and quality ofwater.
- To detect carbon monoxide and LPG present in air.

IV. BLOCK DIAGRAM

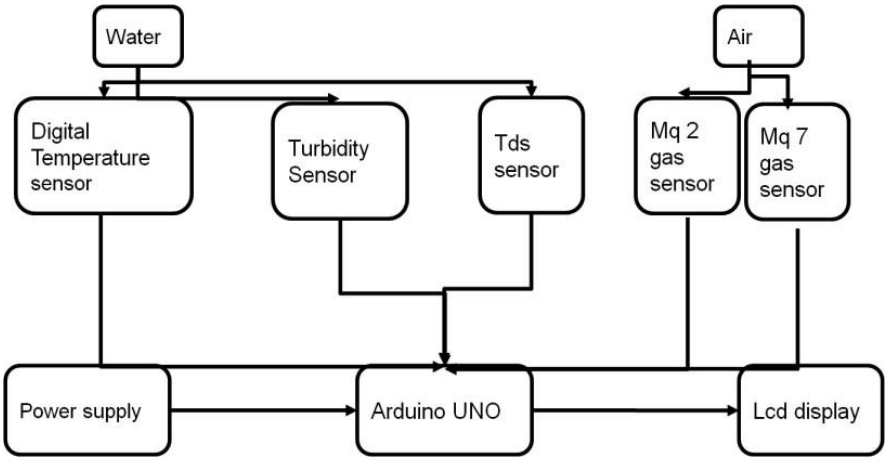

Fig 1. System block diagram

V. METHODOLOGY

The model tests a given sample of water and air in industrial areas, after the treatment the wastewater may still be hazardous or contain toxic waste which may be harmful. In scenarios where industrial equipment fails to process the wateror leakage of harmful gases can be identified so here the waterand air quality monitoring system comes in handy to check thequality of water being released out of the industry or factory. Here a sample of the waste water is taken into the monitor's body and is held within by the help of valves. As the sensors are present to monitor the body and display the impurities present.

Also the air quality check is used to measure the amount of impurities in the air in the surroundings of the industrial area or in the area within the factory. Inhalation of hazardous elements for longer durations can be dangerous or fatal. Hence the air quality monitoring system has a suction fan in it which sucks in the air and the body has sensors attached to it, the gasses present in it are displayed on the lcd display.

VI. HARDWARE IMPLEMENTATION

1. MQ-2 sensor

The MQ-2 is a gas sensor module that is commonly used to detect and measure gases like methane, LPG, propane, and alcohol. The module consists of a small heater element, a sensing element, and an electronic circuit.

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Fig .2.MQ-2

2. MQ-7 sensor

The MQ-7 sensor module is actually designed to detect and measure carbon monoxide (CO) in the air.This module is commonly used in gas detection systems, industrial safety applications, and home automation systems to detect the presence of carbon monoxide and flammable gases, providing an early warning in fire alarms or potential hazards.

Fig .3.MQ-7

3. DS18B20 Digital Temperature Sensor

Temperature sensor is an electronic device that isdesigned to measure and detect changes in temperature. They are widely used in various applications, including industrial control systems, HVAC (heating, ventilation, and air conditioning systems, weather monitoring, medical devices, and many more.

Fig .4.DS18B20

4. Turbidity sensor

The cloudiness (whiteness) or turbidity of a liquid sample is measured with a turbidity sensor, commonly referred to as a turbid meter. In households or businesses, it is used to gauge the turbidity of water. Depending on the specific technology employed, a turbidity sensor's operating principle can change, however one frequent approach is based on light scattering.

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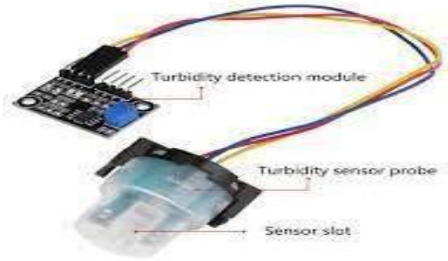

Fig .5.Turbidity sensor

5. TDS sensor

A TDS (Total Dissolved Solids) sensor, also known as a conductivity sensor, is used to measure the concentration of dissolved solids in a liquid sample. It is commonly used in water quality monitoring, hydroponics, aquariums, and industrial processes. The working principle of a TDS sensor is based on electrical conductivity.

Fig .6.TDS sensor

6. Arduino UNO

The Arduino UNO board has six analog input pins A0 throughA5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into adigital value that can be read by the microprocessor. This board includes digital I/O pins-14, a power jack, analog i/ps-6,ceramic resonator-A16 MHz, a USB connection, an RST button, and an ICSP header.

All these can support the microcontroller for further operation by connecting this board to the computer. The power supply ofthis board can be done with the help of an AC to DC adapter, aUSB cable, otherwise a battery.

- The operating voltage is 5V
- The recommended input voltage will range from 7v to 12V
- The input voltage ranges from 6v to 20V
- Digital input/output pins are 14
- Analog i/p pins are 6
- DC Current for each input/output pin is 40mA
- DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK Speed is 16 MHz

Arduino Uno can detect the surroundings from the input. Here the input is a variety of sensors and these can affect its surroundings through controlling motors, lights, other actuators,etc.

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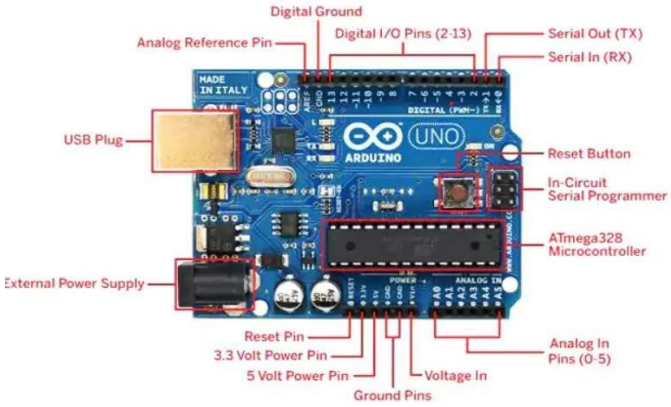

Fig .7. Arduino board

VII. RESULTS

Air pollutants have been identified by the sensors MQ-7, MQ-2.Identification of the pollutants in water using TDS, temperature and turbidity sensors and display whether water is safe for drinking and for daily purposes. The module is designed to be portable and accessible. The sensors in the pipe are designed to be integrated with industrial or other water pipelines.

Fig . 8. Demonstration model

VIII. CONCLUSION

The system has come a long way in providing accurate and timely data to help combat environmental degradation. Thereis a need to focus on developing countries where the resourcesare limited but pollution is a major problem, actions can be taken to protect their citizens' health and reduce pollution levels. Here is where the monitoring system comes in handy and plays a vital role in detecting and monitoring the quality of water and air.

IX. FUTURE SCOPE

This project can be integrated with new technologies such as artificial intelligence and machine learning to improve the accuracy of the data collected. With the advent of new technologies, it is possible to create a system that can filter the pollutants. There is a need to focus on developing countries where resources are limited but pollution is a major problem, actions can be taken to protect their citizens' health and reducepollution levels.

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