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IOT BASED POLLUTION MONITORING AND CONTROLLING

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Abstract- In this paper monitoring of air, noise and water pollution and control of water pollution has been done. Every parameter measure in this paper can be monitor through any PC having internet connection by using IOT app made. The MQ7 Gas sensor will measure amount of CO2 gas present in air around industry. Microphone is used as an audio sensor, it will measure amount of noise present in the industry. For water pollution various parameters are measured that are pH level, Temperature, Turbidity and also sense level of water present in reservoir in industry. When turbidity of water present in reservoir reaches the given threshold then it can be decrease by heating of water by using heater and when level of water exceeds the capacity of reservoir then automatically solenoid valve get open.

Keywords-*Internet of things (IOT), MQ7 Gas Sensor*

I INTRODUCTION

Now a day's Environment monitoring is very important. As from this we can get an idea about pollution which is happening due to various resources like Industries, automobiles, thermal power plants. By detecting the weather conditions we can find out the solutions for controlling of pollution. The main sources of air pollution in India and in other countries are from mineral dust and gases, automobiles, thermal power plants and industries .Air pollution can also cause acid rain which damages soil, vegetation and aquatic life of the region. The main sources of noise pollution are harsh sounds of lightning and thunder, noise produced by machines, automobiles, railways, aero planes and the blaring sound of loudspeakers and some musical instruments .The main sources of water pollution are domestic effluents, agricultural effluents, sewage disposal, industrial wastes, radioactive wastes and oil leakages, etc. It causes many water-borne diseases, such as diarrhea, trachoma, intestinal norms, hepatitis, jaundice, etc.Objective of this project is monitoring of air, water and noise pollution of industrial area through Internet and controlling of water pollution. Due to the IOT technology using cloud service it is possible to monitor the weather conditions from any remote device having internet connection.

II.PROPOSED WORK

A. Block Diagram

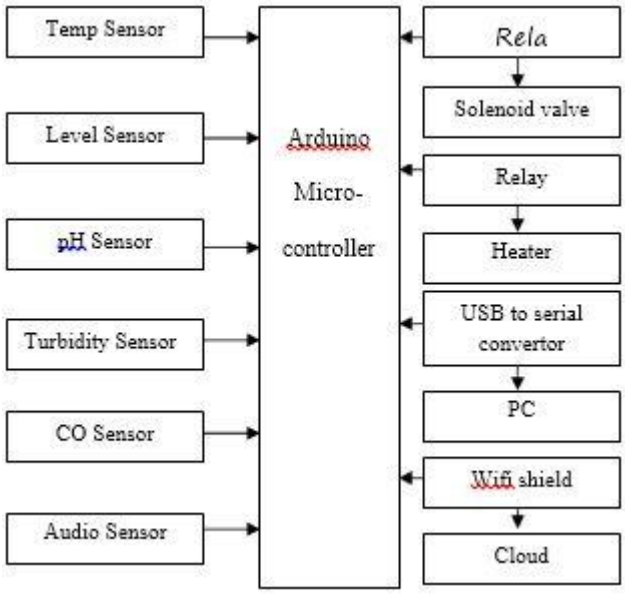


Fig 1-Block Diagram of Proposed System

B.Block Diagram Description

Temperature Sensor-It used to sense temperature of water. Level Sensor- It is a magnetic float sensor which acts as an ON / OFF switch and helps to sense the level of water present in the water tank. pH Sensor-It is used to measure the pH of water. Turbidity Sensor-It (TSD-10 Module) is used to detect turbidity of water. MQ7 Gas Sensor- It is an instrument for the measurement of Carbon dioxide present in air. Audio Sensor-A microphone is used as audio sensor. Relay-A relay is an electrically operated switch. It is used for controlling of solenoid valve and heater. Arduino Microcontroller-All Sensors are connected to Arduino microcontroller. By using USB to Serial Converter we can send data to be monitored to server PC. USB to Serial Converter-By using this cable we connect Arduino microcontroller to Server PC. Solenoid valve-It will act as a switch in our project. Heater-It is used for providing heat to water so as to reduce turbidity of water. Cloud- Cloud concept is used for storing and retrieving of the data. Monitoring Device-Any device having the IOT App can monitor the all air, water, noise pollution.

C. Hardware Description

1) Temperature Sensor

The integrated-circuit temperature devices consist of LM35 series which has output voltage linearly-proportional to the Centigrade temperature. To provide typical accuracies of ±¼°C at room temperature, the LM35 device do not require any external check circuitry. In linear temperature sensors (in Kelvin), the users required to subtract large constant voltage value from output value to obtain proper centigrade scaling but in LM35 this is not required. The LM35 gives low output impedance, precise inherent calibration and linear output which make interfacing to control circuitry very easy.

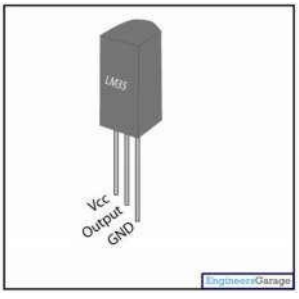


Fig 2.Pin Diagram

2) Level Sensor

In level sensor consist of a magnetic float sensor with two core cables and one on / off switch which helps to sense or determine the level of water present in the water tank. The magnet present in the float which is in the tank will activate the switch. The signals have a permanent magnet in the floats which are obtained from source. As the float arises or falls, the water level indicator will detect the level of water therein.

pH Sensor

pH is an important to limit chemical resources for aquatic life. If the water in a stream is contains more H+ ions (acidic water) or OH- ions (basic water) then it may affect the aquatic life either by harming or killing them. pH value ranges from 1 to 14 according to H+ and OH- ions present in water. The water is said to be acidic when its pH is less than 7 values. The pH can be measured in two ways either by non-invasive or non-destructive manner from outside which continuously monitors the pH there is no need for at-line sampling.

3) Turbidity Sensor

TSD-10 Module is a turbidity sensor which detects and measures the suspended particles in water. Turbidity is a measure of the transparency in water. Transparency is caused mainly by soil particles and microscopic plants and animals that are suspended in the water. When the turbidity is more it can create problem to aquatic life. Turbidity blocks the sunlight that is needed by aquatic plants and animals. A surface water temperatures increase above normal as suspended particles absorbs the heat from sunlight.

Fig 3.TSD-10 MODULE

4)MQ-7 Gas Sensor

The MQ-7 sensor is used to sense CO gas level in the air. CO-gas concentrations from 20 to 2000 ppm can be detected by using this sensor. It detects CO at low temperature. Applications of CO sensors are CO gas leakage alarm, industrial CO gas alarm and portable CO gas detector.

5) Audio Sensor

A microphone convert sound signal into an electrical signal. Dynamic microphones, condenser microphones produce electrical signals from air pressure variations. A pre-amplifier is a device connected to microphone before signal is produces or reproduce.

6) Relay

A relay is an electrical switch. Magnetic field is formed when lever gets attracted when current flows through the coil of relay by which contacts of switch changes. Relays have two switch positions changeover switches. Relays allow one circuit to switch at a time. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. The relay consists of only magnetic and mechanical connections.

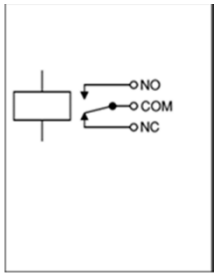


Fig 4.Circuit symbol for relay

7) Solenoid Valve

It will act as a switch .by using this we can Control the gate of reservoir will be done simply by ON/OFF of the gate by checking the water level.

8) Arduino Microcontroller

a) Arduino is an open-source platform used for building electronics projects.

b) Arduino consists of both microcontroller and software IDE (Integrated Development Environment).It is used to write and upload computer code to the Arduino board.

c) The Arduino IDE uses a simplified version of C++, Java.

Fig 5. Arduino kit diagram

9) USB To Serial Converter

A superior minimal effort USB to UART interface permitting you to speak with TTL serial gadgets, for example, microcontroller UART's utilizing your PC

Fig 6.USB to serial converter

10) Monitoring Device

Any PC having the IOT App can monitor the all air, water, noise pollution.

III IoT CONCEPT

A. Assigning IP Address To Device

1) Arduino board is connected to the PC.

2) Dynamic Host Configuration Protocol (DHCP) is a client/server protocol that automatically provides an Internet Protocol (IP) host with its IP address.

3) How the DHCP process works when you go online:

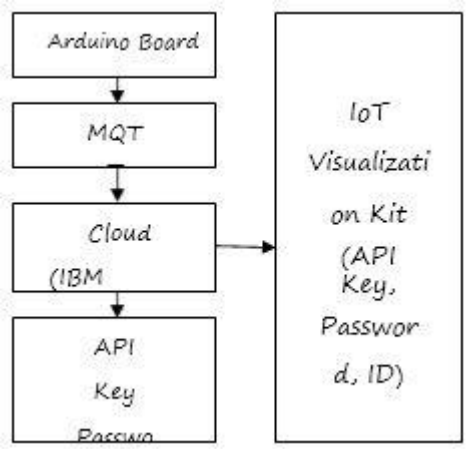
a) You go on your computer to connect to the Internet.

b) The network requests an IP address.

c) On behalf of your computer's request, the DHCP server allocates your computer with an IP address. It responds with a DHCP request message that verifies the IP address that's been offered and accepted.

d) DHCP then updates the correct network servers from them with the IP address and other configuration information needed for your computer.

Your computer accepts the IP address for the lease term.



1)MQTT (Message Queuing Telemetry Transport) is a light weight messaging protocol that provides resource- constrained network clients with a simple way to distribute telemetry information.

2)The protocol, which uses a publish/subscribe communication pattern, is used for machine-to-machine (M2M) communication and plays an important role in the Internet of Things (IoT).

3)By using IMB bluemix we get a required space on cloud for publishing our data.

4)After getting a space on cloud we are provided with an API key, password and Id.

5)To actually observe this stored data, IOT visualize kit is used.

IV ADVANTAGES

1)Water quality monitoring system is very effective and efficient way to avoid severe issue related to industrial waste water.
2)It achieves high speed and flexibility in the process of monitoring and reporting water, air, and noise parameters data without loss.
3)This protocol gives very high precision and high degree of automation.
4)It is Cost-effective solution.
5)It gives real time and continues observation.

V APPLICATIONS

1.For health department to identify the reason of water diseases.
2.Water supply agencies.
3.This system can use in commercial and domestic use.

VI DISCUSSION

In this paper environmental monitoring in industrial area has been developed. Due to its ability to automatically upload to the internet; one correctly placed system can provide easy accessible weather data for whole community.

Here all sense data is monitor through app so fluctuation of parameters like noise, water or air pollution levels from their normal levels can be detected so we can control it.

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