

**Task 1 : Research on Problem Statement**

**IoT Based Air Pollution Monitoring System**

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## • **Problem Statement :**

**Air pollution** is now considered to be the world's largest environmental health threat. Air pollution is basically the presence of substances in the atmosphere that are harmful to the health of humans and other living beings, or cause damage to the climate or to materials. There are many different types of air pollutants, such as gases, particulates, and biological molecules.

## ❖ **Causes Of Air Pollution :**

Air pollution is caused by the presence in the atmosphere of toxic substances, mainly produced by human activities, even though sometimes it can result from natural phenomena such as volcanic eruptions, dust storms and wildfires, also depleting the air quality.

**Anthropogenic air pollution sources are:**

- 1) Combustion of fossil fuels, like coal and oil for electricity and road transport, producing air pollutants like nitrogen and sulfur dioxide
- 2) Emissions from industries and factories, releasing large amount of carbon monoxide, hydrocarbon, chemicals and organic compounds into the air
- 3) Agricultural activities, due to the use of pesticides, insecticides, and fertilizers that emit harmful chemicals
- 4) Waste production, mostly because of methane generation in landfills.

## ❖ **Effects:**

**On the Environment :**

Air pollution has a major impact on the process of plant evolution by preventing photosynthesis in many cases, with serious consequences for the purification of the air we breathe. It also contributes to the formation of acid rain, atmospheric precipitations in the form of rain, frost, snow or fog, which are released during the combustion of fossil fuels and transformed by contact with water steam in the atmosphere.

**Global Warming :**

On top of that, air pollution is a major contributor to global warming and climate change. In fact, the abundance of carbon dioxide in the air is one of the causes of the greenhouse effect. Normally, the presence of greenhouse gases should be beneficial for the planet because they absorb the infra-red radiation produced by the surface of the earth. But the excessive concentration of these gases in the atmosphere is the cause of the recent climate change.

## **On Human Health :**

Our continual exposure to air pollutants is responsible for the deterioration of human health. Air pollution is indeed a significant risk factor for human health conditions, causing allergies, respiratory and cardiovascular diseases as well as lung damage. So Humans can be adversely affected by exposure to air pollutants in ambient air. Air Pollution causes and exacerbates a number of diseases, ranging from asthma to cancer, pulmonary illnesses and heart disease.

If **air pollution** is not controlled by 2030, air will become so poisonous that it will be necessary to use an oxygen kit to breathe easily. Rising air pollution will also lead to premature ageing.

As **air pollution** is becoming serious issue so there is need to build such a flourishing system which overcomes the problems and monitor the parameters. Health based standards and objectives for a number of pollutants in the air are set by each country.

In this project , we are going to develop an **IoT Based Air Pollution Monitoring System**. And this system monitors the Air Quality over a webserver using internet and will trigger an alarm when the air quality goes down beyond a certain level, means when there are amount of harmful gases present in the air like CO<sub>2</sub>, smoke, alcohol, benzene, NH<sub>3</sub>, NO<sub>x</sub> and LPG.

- **HARDWARE AND SOFTWARE REQUIREMENTS :**

- ❖ **Hardware Requirements :**

1. **MQ135 Gas sensor :**

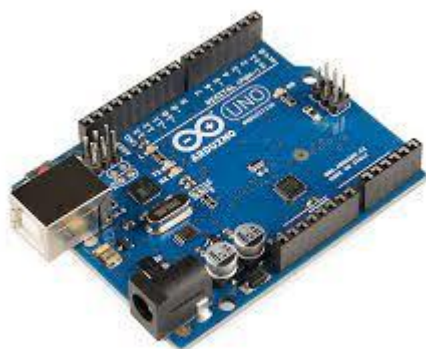
Air quality sensor for detecting a wide range of gases, including NH<sub>3</sub>, NO<sub>x</sub>, alcohol, benzene, smoke and CO<sub>2</sub>. Ideal for use in office or factory. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases.

Detection Range: 10 - 300 ppm NH<sub>3</sub>, 10 - 1000 ppm Benzene, 10 - 300 Alcohol



2. **Arduino Uno :**

It is a microcontroller board based on the ATmega328P. Arduino Uno is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards



### 3. Wi-Fi module ESP8266 :

ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all WiFi networking functions from another application processor.



### 4. 16X2 LCD

A 16x2 LCD, which display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix.



### 5. MQ-6 LPG gas sensor :

MQ-6 LPG gas sensor can be used in **gas** leakage detecting equipment in consumer and industry applications ,this **sensor** is suitable for detecting LPG, iso-butane, propane, LNG.

Detection range : 200 to 10000 ppm



## 6. LM35 :

LM35 is a precision Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ .

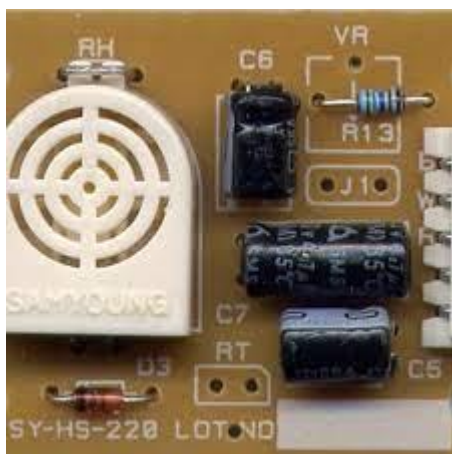


## 7. SY-H5220:

These modules convert the relative humidity to the proportional output voltage. Specifications:

Storable Humidity Range : within 95%RH.

Standard Output Range : DC 1.980 mV (at  $25^{\circ}\text{C}$ , 60%RH)



❖ **Software Requirement :**

1. **Arduino IDE**
2. **Proteous**



- **ADDITIONS AND UPDATES:**
- **APPLICATIONS , ADVANTAGES AND CHALLENGES:**

❖ **Applications :**

1. Industrial perimeter monitoring.
2. Indoor Air quality monitoring
3. Site selection for reference monitoring stations
4. Making data available to users

❖ **Advantages :**

1. Easy to install
2. Accurate pollution monitoring
3. Remote location monitoring

❖ **Challenges**

- **CONCLUSION:**

The system to monitor the air of environment using Arduino microcontroller, IOT Technology is proposed to improve quality of air . With the use of IOT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issue proposed in this project . Here using MQ135 and MQ6 gas sensor gives the sense of different type of dangerous gas .

And Arduino is the main which control the entire process. Wi-Fi module connects the whole process to internet and LCD is used for visual output.

- **REFERENCES :**

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