AIR QUALITY MONITORING

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AIR QUALITY MONITORING

IOT_PHASE-2 PROJECT

INTRODUCTION

In this project, we see about innovations for solving problems in air quality monitoring and steps to design air quality monitoring system using arduino and esp8266.

INNOVATIONS IN AIR QUALITY MONITORING SYSTEM

Sensor Technology Advancements:

Develop more sensitive and accurate sensors to detect a wider range of pollutants. This could include miniaturized, low-cost sensors for widespread deployment.

D**ata Integration and Analysis**:

Implement advanced data analytics and machine learning algorithms to process and analyze the vast amount of data generated by monitoring systems. This can lead to more precise and timely insights.

Real-time Monitoring and Alerts:

Enable real-time monitoring and immediate alerts for high pollution events. This could be achieved through faster data transmission and processing capabilities.

Integration with IoT and Smart Cities:

Leverage the Internet of Things (IoT) and smart city technologies to create a networked system that can communicate and respond dynamically to changing air quality conditions.

Mobile Monitoring Platforms:

Develop portable and mobile monitoring platforms that can be easily deployed in different locations, especially in areas with transient pollution sources or variable weather conditions.

Crowdsourced Data Collection:

Engage communities and citizens in data collection efforts through mobile applications, citizen science initiatives, or community-driven monitoring stations.

Multi-pollutant Monitoring

Create systems that can measure multiple pollutants simultaneously, providing a comprehensive view of air quality rather than focusing on a single pollutant.

Autonomous Monitoring Stations:

Implement autonomous monitoring stations equipped with renewable energy sources and self-maintenance capabilities to ensure uninterrupted operation.

Public Engagement and Awareness:

Develop user-friendly interfaces and apps to provide accessible information to the public, empowering individuals to make informed decisions about outdoor activities.

Integration with Climate Models:

Link air quality monitoring data with climate models to better understand the interplay between air quality, weather patterns, and climate change.

Pollution Source Attribution:

Utilize advanced techniques like source apportionment to identify and quantify contributions from specific pollution sources, aiding in targeted interventions.

STEPS TO DESIGN AIR QUALITY MONITORING SYSTEM

Materials Required:

1. Arduino UNO
2. ESP8266 WiFi module
3. USB cable
4. Breadboard
5. Sensors(DHT11,MQ series)
6. LCD display

- Connect the Particulate Matter Sensor, the MQ-135 Air Quality Sensor, and the Pressure Sensor such as DHT11 to the Arduino board using the appropriate pins and wires.
- Connect the ESP8266 Wi-Fi module to the Arduino board using the serial communication pins (RX and TX) and a logic level converter.
- Install the Arduino IDE on our computer and download the necessary libraries for the sensors and the ESP8266 module.
- Create a Thingspeak account and create a new channel with four fields: PM2.5, AQI, Temperature, and Humidity. Note down the channel ID and the write API key for later use.
- Write a sketch in the Arduino IDE that reads the sensor data, calculates the air quality index (AQI), and sends it to the Thingspeak server using the ESP8266 module.
- Upload the sketch to our Arduino board and open the serial monitor to check if everything is working properly..
- Go to our Thingspeak channel and view the data on the graphs or widgets.

Steps for implementation:

STEP 1: Start the program.

STEP 2: Turn on the Gas, Temperature and Humidity sensors.

STEP 3: Collect the data:

i.Read gas concentration.

ii. Measure temperature and humidity level.

STEP 4: Analyze Data:

i.Check if gas concentration is within safe limits.

ii.Check if temperature and humidity is within comfort range.

STEP 4: Display results:

i.Show gas concentration on display.

ii.Show temperature value on display.

iii.Show humidity percentage.

STEP 5: Take action :

i.If gas concentration is high, activate alarm or ventilation.

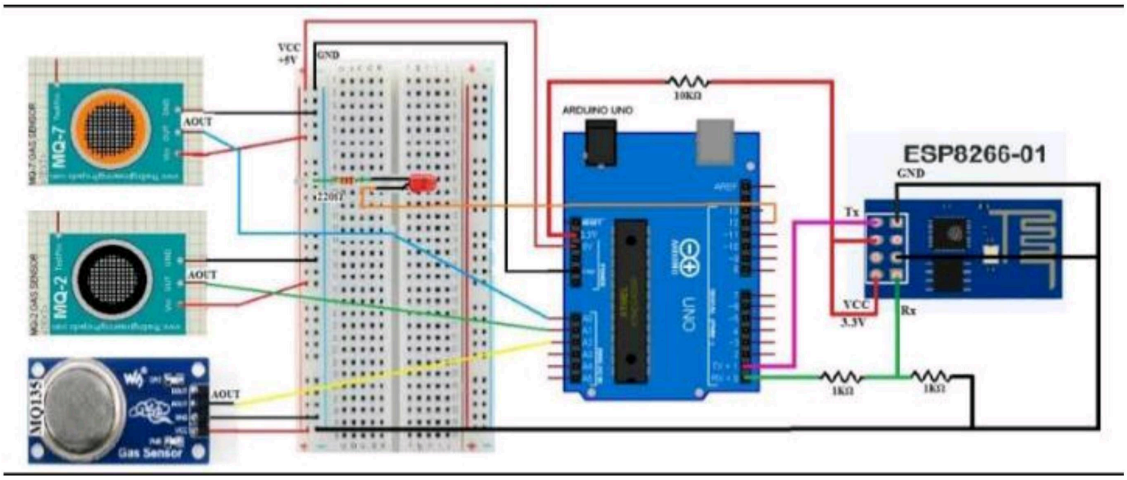
ii.If temperature is too high or low, adjust heating or cooling system.

iii.If humidity is too high or low, activate dehumidifier or humidifier.

STEP 6: Wait for a set time.

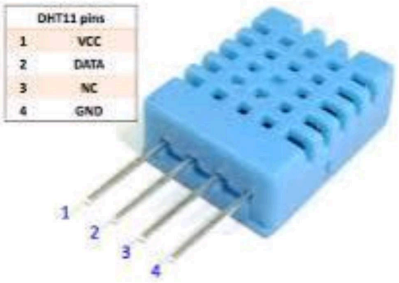
STEP 7: Repeat 3-7 continuously.

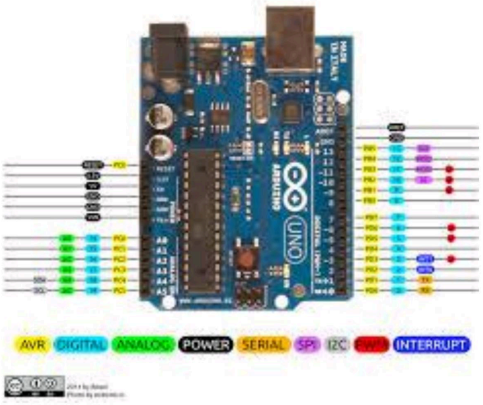
STEP 8: End the program.



DHT11 sensor

MQ135 sensor





CONCLUSION

In conclusion, air quality monitoring plays a critical role in safeguarding public health, preserving the environment, and promoting sustainable development. By continuously collecting and analyzing data on air pollutants, it enables informed decision-making, early warning systems, and regulatory compliance. Ultimately, the goal of air quality monitoring is to create healthier, cleaner, and more sustainable communities by addressing air pollution and its associated challenges. It is an essential tool in the ongoing effort to ensure breathable and safe air for all.