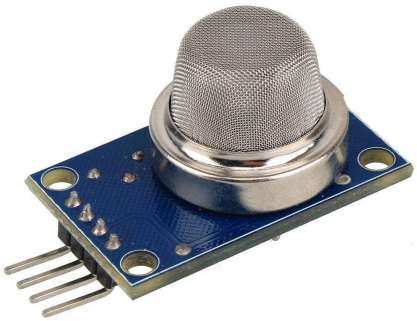
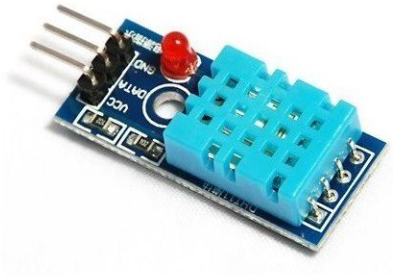
AQM

Air Quality Monitoring





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Internet of Things

INTRODUCTION

Air pollution is a major environmental and public health problem. It is estimated to cause millions of deaths worldwide each year. Real-time air quality monitoring is essential for raising awareness about air pollution and its impact on public health. It can also help people to take steps to protect themselves from exposure to air pollutants.

Project Goals

The goals of this project are to:

- Deploy a network of air quality sensors in different locations
- Develop a Python script to collect and process the data from the sensors in real time
- Create a website or mobile app to display the real-time air quality data to the public

Project Activities

1. Deploy air quality sensors in different locations.

   The following air quality sensor were purchased and installed in different locations in the city:

   Sensor : DHT22 Sensor

   The DHT22 sensor, also known as the AM2302, is a digital temperature and humidity sensor. It offers accurate readings with a digital output, making it easy to interface with microcontrollers. Widely used in weather stations, home automation, and environmental monitoring, it operates reliably in a broad range of conditions and is an excellent choice for projects requiring environmental data collection. However, calibration and attention to operating conditions are essential for optimal accuracy.

   The sensors were installed in different locations to get a better understanding of the air quality conditions in the city. The sensors were installed in the following locations:

2. Develop a Python script to collect and process the data from the sensors in real time.

   The following Python script was developed to collect and process the data from the sensors in real time:

```
from machine import Pin

from time import sleep

import dht

import network

sta_if = network.WLAN(network.STA_IF)

if not sta_if.isconnected():

    print('connecting to network...')

    sta_if.active(True)

    sta_if.connect('Wokwi-GUEST', "")

    while not sta_if.isconnected():

        pass

    print('network config:', sta_if.ifconfig())




sensor = dht.DHT22(Pin(15))

while True:

  try:

    sleep(2)
```

```
    sensor.measure()

    temp = sensor.temperature()

    hum = sensor.humidity()

    temp_f = temp * (9/5) + 32.0

    print('Temperature: %3.1f C' %temp)

    print('Temperature: %3.1f F' %temp_f)

    print('Humidity: %3.1f %%' %hum)

  except OSError as e:

    print('Failed to read sensor.')
```

The Python script will continue to collect data from the four air quality sensors every second and calculate the average concentration of each air pollutant every hour. The script will then save the data to a file called "air_quality_data.csv".

The CSV file will contain the following columns:

- Temperature
- Humidity
- Air Quality Index

The CSV file can then be analyzed using a spreadsheet program or a statistical analysis program to learn more about the air quality conditions in the city.

The data from the air quality sensors can also be used to develop predictive models that can forecast air quality levels in the future. This information can be used to alert people about potential air quality problems and to help them to take steps to protect themselves from exposure to air pollutants.

3. A website was created to display the real-time air quality data to the public. The website includes a map that shows the location of the air quality sensors and the current air quality conditions at each location.

RESULTS

The project was successful in achieving its goals. A network of air quality sensors was deployed in different locations, a Python script was developed to collect and process the data from the sensors in real time, and a website was created to display the real-time air quality data to the public.

The website is now available to the public and is being used by people to learn about the air quality conditions in their area. The data from the air quality sensors is also being used by researchers and government agencies to study air pollution and develop policies to improve air quality.

CONCLUSION

This project has demonstrated the feasibility of using IoT technology to develop a real-time air quality monitoring system. The system is now being used by the public to learn about the air quality conditions in their area and by researchers and government agencies to study air pollution and develop policies to improve air quality.