AIR QUALITY MONITOR IN HOSPITAL

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I. Abstract

Monitoring of air quality can help the community to prepare themselves if they have to move outside by wearing a mask or cancel plans to leave the house, especially for patients who are in hospital, because these patients are still in the healing phase. This is important considering the dangers of fine particles in the air, especially those whose size is 2.5 microns or known as PM 2.5 pollutants. Its small size makes pollutants with these standards can enter the lungs and cause problems in human health such as respiratory problems. In this research, a system will be created that can monitor air quality so that we can get an early warning. In this system using esp32 combined with several sensors. This research uses fog and cloud systems so that they are always under monitoring. The results obtained are that we can see and measure air quality, humidity, temperature and oxygen levels in real time and the results will be sent to us via the telegram application.

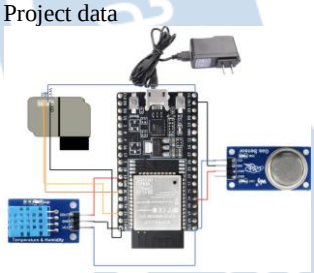
Keywords-IoT, ESP 32, Fog and Cloud Computing

II. Introduction

Indoor air quality in hospitals and other healthcare facilities has been a hot topic for decades. To monitor the air quality in a room is easy, but to monitor it in a large building with many rooms is quite complex. Negative health effects of waste hospital gases such as carbon dioxide, carbon monoxide, harmful gases and vaporized disinfectants (formaldehyde, ethylene oxide) are widely known. Hospitals and health care facilities have a unique collection of potentially risky compounds, which in turn increases the pressure to monitor and control air quality in these facilities. Each of the above contaminants can have a negative impact on health, depending on the length of exposure, the level of contaminants, and other factors. Indoor air quality monitoring can also reveal the presence of pollutants that you do not know, leading to new mitigation strategies. Temperature and humidity are two other characteristics of hospital indoor air quality that directly affect patient comfort and thus patient satisfaction.

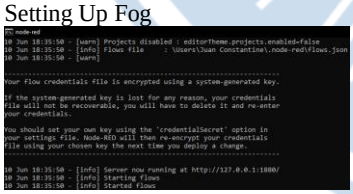
III. Data and Method

a. Project data



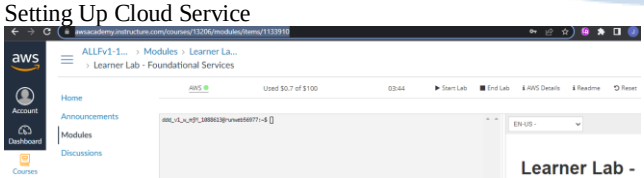
b. Project steps

1) Setting Up Fog



- Turn on node red through cmd by typing : Node-red
- Open node red server with browser at http://127.0.0.1:1880/
- Open XAMMP

2) Setting Up Cloud Service



- Open learner lab
- Choose EC2 Service
- Click instance, click instance name, connect
- Open the public IPv4 address
- The Cloud dashboard is shown below. The IP address is changing every time the EC2 instance is started.
- Then we can open the cloud database using : IPAdress/phpMyAdmin

IV. Project Result and Analysis

a. Project result

1.Sensor

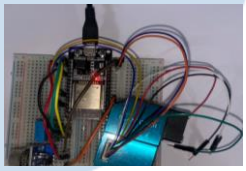
No	Sensor	Minimum limitation	Maximum limitation
1	Temperature (°C)	< 16	> 30
2	Humidity (°C)	< 50	> 100
3	PM 1	< 10	> 10
4	PM 2.5	< 35	> 35
5	PM 10	< 150	> 150

2. Harmful Gases

No	Harmful Gases	Minimum limitation	Maximum limitation
1	CO2	< 150	> 150
2	CO	< 10	> 10
3	Alcohol	< 400	> 400
4	Toluene	< 200	> 200
5	NH4	< 35	> 35
6	Acetone	< 250	> 250

b. Analysis

During the past semester, as has been written in the weekly activity progress table, this final project has gone through several stages of testing and installation. Starting from testing on each component and tool used in experiments such as testing on ESP32 components including temperature sensors, humidity sensor, PM 1, PM 2.5, PM 10 used and Amazon Web Services. After each component is declared to work, then the connection to the FOG is carried out. We use laptop as our FOG. And then connect to node-red server and XAMMP. After that we try to connect to cloud service, we use Amazon Web Service as our cloud. We use EC2 service. For IoT class, we get this service for free, with 100$US limit. This is the step to setting up cloud service for our project. If measurement value is out of range, notification will be sent to telegram by node-red (as fog). The obstacles we got when doing the experiment were incorrect sensor readings, components that didn't work anymore and when connecting to coding, there were several errors so we recoded.



V. Conclusion

1. After doing this experiment, we were able to know that the need for air quality in the hospital was very important. All aspects must be considered so that the environment remains comfortable and healthy. This tool is very sensitive so it can be used anywhere. We also managed to solve existing problems such as the process of testing the tools one by one, coding, using github to creating our own website during the tool creation process.
2. The IoT system worked. It can store data to database in fog and cloud. The fog can send notification to telegram and turn on buzzer if the reading is out of range.

VI. References

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