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Wireless Air Quality Monitoring System

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Abstract: This project is to develop a low cost, mobile Air Pollutant Index (API) Monitoring System, which consists of Air Quality Sensor (MQ135 as a sensor detecting gas, Node MCU Esp8266, BME280 as a pressure humidity sensor and concentration sensor. Readings from the sensor has been compared with reference data from the Department of Environment, Malaysia to ensure the results validity of the developed system. The developed dust detector is expected to provide a relatively accurate API reading and suitable to be used for the detection and monitoring of dust concentrations for normal areas around Parit Samsu,Muar Johor.The final evaluation shows the result analysis is done and categorized respectively into two parts which is the graph simulated to the ThingSpeak websites and the serial monitor data from Arduino IDE software.

Keywords: Air Monitoring System, Sensor, Dust

1. Introduction

Air pollution is regarded as the pollution that has the greatest impact on the environment. Global warming phenomena that threaten our earth in recent years is closely related to the level of air pollution that caused by a huge amount of carbon emission from vehicle petron and diesel combustion, waste from ever-expanding production industry, uncontrolled combustion of fossil fuel and open-air burning in the waste management site [1]. Hence, air pollution gradually affected the world and earth conditions including the air quality of the surroundings. Air pollution basically causes by the man-made act but, natural phenomena also contribute to air pollution, such as forest fires caused by heat from the sun and bursting of the volcanic eruption that might spread out a huge amount smoke and dust which might affecting to human breathing difficulties [2].

2. Materials and Methods

The materials and methods used in this research paper is listed below respectively and explanation of the functions for every component.

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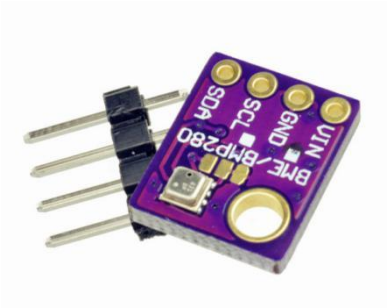
2.1 Materials

Table 1: List of components use in the project

Components	Function
● NodeMCU Esp8266 	● Act as a controller for the whole system of Iot project
● BME 280 	● Reads barometric pressure, temperature, and humidity
● MQ-135 	● Used to read and detecting the concentration of the air particles ● Ex : NH3, NOx, Alcohol, Benzene, Smoke, CO2
● JUMPER WIRE 	● Interconnect the components of a breadboard or other prototype or test circuit

All the required sensor listed in Table 1 such as MQ-135 and BME280 will connect to the nodeMCU to the respective pins before sending the data to the ThingSpeak server by using WiFi connection.

2.2 Methods

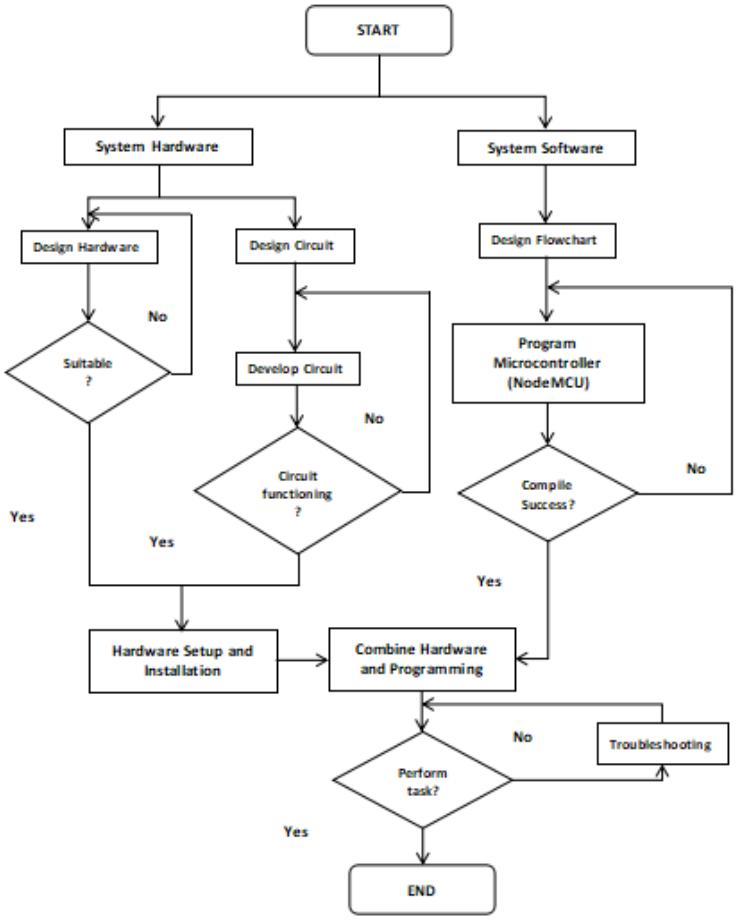


Figure 1: Flowchart of project development process

Based on the hardware development part, the process flow in Figure 1 is started by analyzing all the components needed and the suitable hardware setup for the project to understand on mechanism of the function of the hardware. Software development process is done simultaneously and combined after circuit functioning properly while programming code is compiled with success. If the combined process is not functioning properly, the troubleshooting stage should be done as it is a vital step to make sure both software and hardware is functioning according to the instructions implemented. The troubleshooting process will conduct repeatedly until a satisfactory result is achieved.

3. Results and Discussion

The results and discussion of this project was the outcome of this project. The results is categorized into 2 different part which is visualized graph from Thingspeak websites, the serial monitor of the Arduino IDE. The results obtained were further observed, analyzed and compared so that improvement can be done to the prototype.

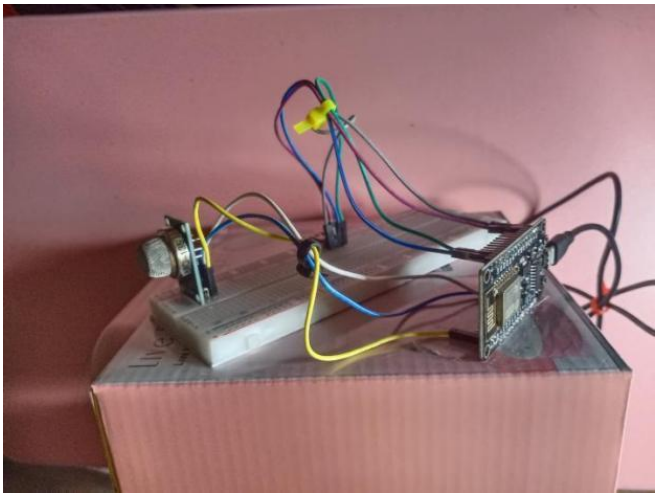


Figure 2: Final product

Figure 2 show the final completed product with completed connected hardware and implemented programs

3.1 Results

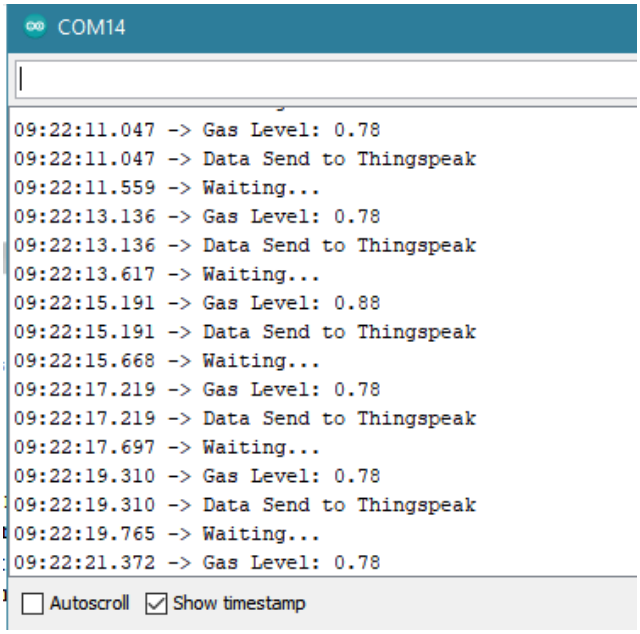


Figure 3: Arduino IDE serial monitor display

Figure 3 shows the result reads as gas level in the Arduino IDE serial monitor.

3.2 Discussions

Based on the result obtained, the gas level is constantly between 0 to 0.78. The analysis of the air quality above is taken for an hour of a normal air quality in a bedroom. From the graph obtained, it clearly indicates that the air monitoring prototype is working properly as the graph shows the constant gas level which is categorized as a good air quality.

Based on the observation , the IOT air monitoring prototype is worked properly but did not provide an accurate data result. More improvement need to be done so that more accuracy can be achieved from the result.

3.3 Tables

Table 2: Air Pollution Index Standard

API	Status
0-50	Good
51-100	Moderate
101-200	Unhealthy
201-300	Very Unhealthy
>301	Hazardous

Table 2 shows the API level for air quality and its shows for API 0 to 50 is categorized as a good and higher than 301 is considered hazardous [4].

4. Conclusion

As a conclusion, it is safe to say that the project is success but more improvement need to be done so that the more accuracy of the result can be achieved. The problem statement has been resolved to achieve objective of the project.

Recommendation to the prototype that can be used in the future improvement is we can use different type of sensor to compare the accuracy of the sensors and decide which sensor that should be use for the prototype. Next, put prototype on different several locations to get various of data and results. We can also add buzzer or any any sound device to alarm user on the air quality level.

5. Acknowledgement

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