

Map Dashboard for Local Pollution and Weather Monitoring using Internet of Things

K. Sripath Roy, K. Harish, G. Chethan Sai, D. Indu, G. V. S. Ajith Kumar

Abstract: Pollution, a most significant issue that concerns the health of environment. This scenario differs from place to place where we have lot of trees and parks. Temperature, humidity and pollution are changing at a dangerous phenomenon which is detrimental to human life. It is becoming a global phenomenon not confined to towns and cities alone. The data available for evaluation of pollution is centralized now. Centralized data cannot give true and correct picture of situation. Hence, accurate conclusions cannot be drawn. To obtain decentralized data, a local solution we had proposed a local monitoring system which can give unambiguous renderings of temperature, humidity and pollution. This type of communication in between devices can be done with the help of IoT. This data can be stored for analytics which can be viewed using dashboards. Here, we are interfacing a temperature, humidity sensor and pollution sensor with NodeMCU to extract the decentralized data. This data is used to perform analytics in dashboards of an open-source platform Thing board and visualize using maps.

Index Terms: IoT, centralized, decentralized, open-source, dashboard, temperature, humidity, pollution, NodeMCU, Things board.

I. INTRODUCTION

The Internet of Things is a worldwide view which depends on insightful and self-arranging hubs that are interconnected in a universal system framework. This is a common platform to create communication between devices and conceptualize the data. IoT is not just about communicating, whereas it's all about the services and devices all talking to one another.

Nowadays Temperature is varying from place to place and everything is getting centralized and we can not depend on a centralized data so we create a decentralized weather monitoring system which can read temperature and humidity and Carbon Dioxide at that location by using this there's no need to depend on the centralized data and Things board is an Open source IOT platform which is used to device management, data collection, processing and visualize the that is gathered from any geographical location. There are so many maps on things board but we preferred using open

street maps as we are designing a decentralized system and chart are used to store data.

II. THEORETICAL ANALYSES

Here, we altogether have 2 phases in implementing this project:

(i) Phase 1: We implement a hardware using NodeMCU, MQ135 and DHT11 to collect the data from the atmosphere. We run this whole setup on ARDUINO IDE.

(ii) Phase 2: Visualization of data on Things board. The devices are interfaced to Things board to visualize the data on a map where the board is placed.

And therefore, we use these readings to visualize the swings taken in the weather.

Connecting a temperature sensor, analog values from the atmosphere can be received. Based upon Arduino's voltage, there are some formulae to convert the obtained 10-digit analog number to millivolts.

For 5Volts Arduino:

$$\text{Voltage in mV} = (\text{reading from ADC}) * (5000/1024).$$

For 3.3Volts Arduino:

$$\text{Voltage in mV} = (\text{reading from ADC}) * (3300/1024).$$

To convert the obtained millivolts into temperature, use this formula:

$$\text{Centigrade} = [(\text{voltage in mV}) - 500] / 10.$$

To monitor the air quality, we use MQ135. This will help us in triggering automatically if the air quality is poor. MQ sensor should burn to get more accurate readings. It should at least be burned for a period of 24 hours in fresh air.

III. IMPLEMENTATION

NodeMCU is an advanced board, which is an adorable module with an ESP8266EX microcontroller, assimilated Wi-Fi recipient, and transmitter. NodeMCU bolsters a few programming dialects; subsequently, it supports to transfer programs from any PC over a miniaturized scale USB port.

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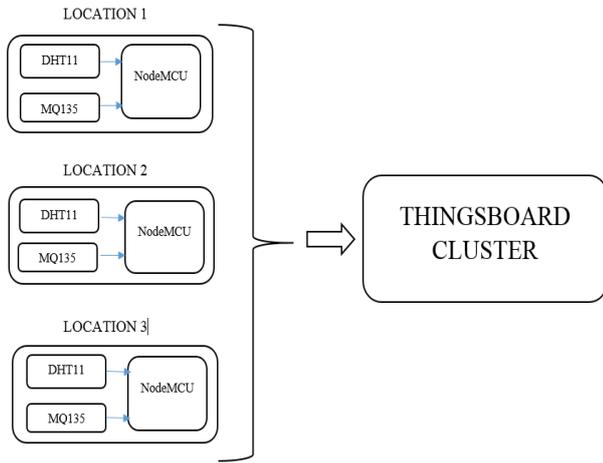
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MQ135 Semiconductor Sensor is an enduring, electrochemical gas sensor sensible for perceiving a broad assortment of VOCs and gases. It is incredibly sensitive to Ammonia, Sulphide and Benzene, moreover unstable to smoke and other dangerous gases. MQ135 uses both AC and DC voltages.

This DHT11 Temperature and Humidity Sensor includes an aligned advanced flag yield with the temperature and mugginess sensor ability. It is incorporated with a superior 8-bit microcontroller. Its innovation guarantees the high unwavering quality and brilliant long-haul solidness.

Things board is an Open Source IoT platform that helps us in empowering quick development and scaling of IoT ventures. It also helps us in collection and visualization of data which is taken from devices and assets and defines relations between them. Here, adding new functionality can be performed easily with the help of customized widgets.

IV. RESULTS AND DISCUSSION

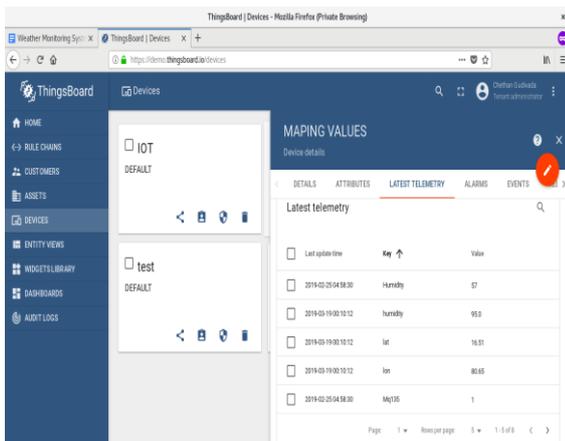


Figure 1. Visualization of data at each location using Things board

In the above result we can observe the values getting updates which are obtained from the sensors from time to time.

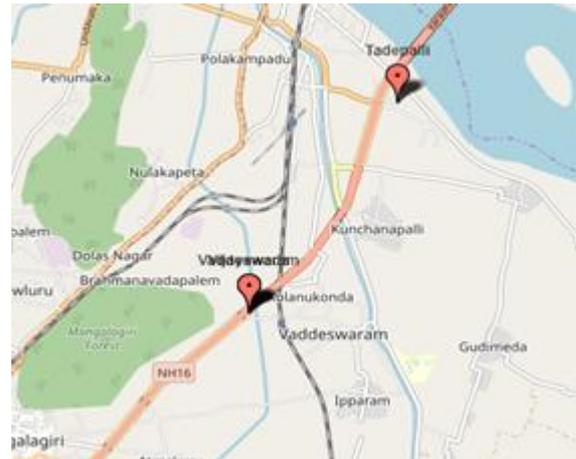


Fig 2 Markings on the Open Street Maps in Things Board

In the above figure you can see a landmarking's based on the latitude and longitude values you give in the code. In our code we gave the values of Vijayawada and Tadepalli.



Fig 3 Displaying the Temperature and Humidity and a latitude and longitude in Things Board.

In the above diagram we can see the Temperature and Humidity at a latitude and longitude by placing your device at that point we can get the Realtime temperature and humidity of the area.

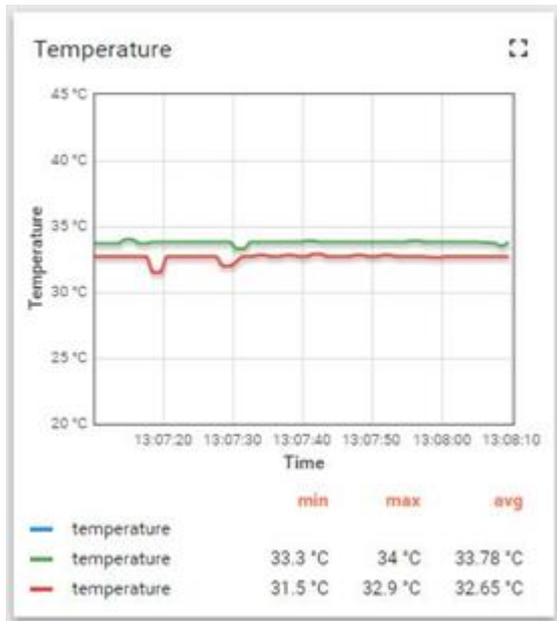


Fig 4 Perpetual Temperature renderings in Things Board Using DHT – 11

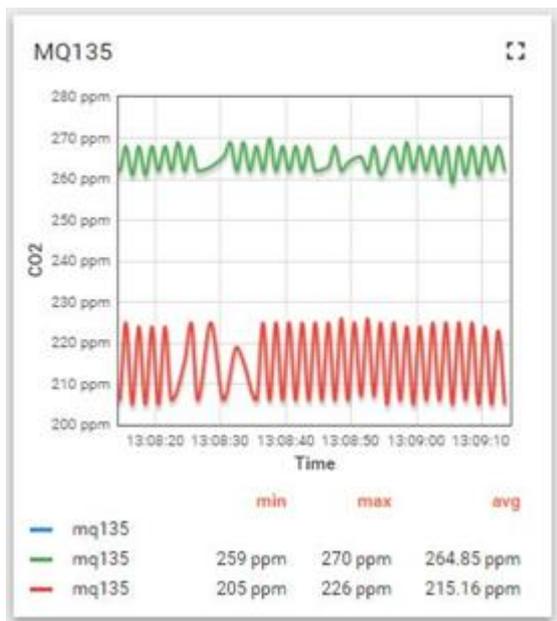


Fig 6 Perpetual ppm renderings of MQ135 sensor.

V. CONCLUSION

In this paper we had Studied the working of MQ135 sensor and DHT11 sensor and by using this knowledge we are reading the Realtime temperature and humidity at a geographical location anywhere across the globe and by interfacing ESP8266 we will send this data to Things board so that we can visualize the data and help the mankind.

FUTURE SCOPE

The readings obtained from the sensors using Things Board can store and frame up the data in a single graph, In order to increase the efficiency this objective can be implemented using local host and store the data in our

personal server to and display the data in an efficient manner.

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