IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ATMOSPHERE MONITORING SYSTEM USING IOT

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Abstract: In this paper, carbon monoxide (CO) and air quality (Qa) were measured using MQ135 and MQ7 sensors, respectively. Measuring air quality is a crucial step in raising awareness among the public about the need to ensure the health of future generations. An Atmosphere Quality Monitoring Station (AQMS) is a system that measures metrological parameters like Temperature, Humidity, atmospheric pressure, and Air quality. User can monitor system from remote locations, also system creates database automatically on google sheet so user can see past information from that database and that data can used to make prediction system in machine learning. The current study develops an Internet of Things (IoT) that enables a mobile air quality monitoring system to assess real-time data including carbon monoxide, smoke, and particulate matter levels. By monitoring the atmosphere and understanding its patterns system can helpful to make predictions regarding atmosphere.

Index Terms **- IoT, MQTT, Pollution management System, ESP8266, BMP180, Blynk**

I. INTRODUCTION

Controlling atmospheric emissions, as well as understanding pollutant dispersion and monitoring emission levels, i.e., concentration in ambient air, are all important aspects of protecting the environment. To keep an eye on these numbers, Air Quality Monitoring Networks exist. The fundamental goal of these networks is to keep track of the concentration levels of various substances. pollutant levels in the atmosphere in order to establish air quality standards If large amounts of contamination are discovered, action plans must be put in place. citizen-facing environmental information systems (web, smartphone apps, variable message signs, etc.) using data from monitoring stations. These data are also provided to Prediction Systems in order to provide information on changes in air pollution over time. Knowing ahead of time that an incident may occur is an important tool for protecting people and the environment since it allows for the implementation of preventative measures.

Measurement, operation, and predictive analysis of the evolution of air pollution in various locations (urban areas, industrial areas, special nature protection zones, and so on) are all possible using Air Quality Monitoring Networks.

Monitoring stations have the equipment to measure thefollowing parameters:

- NOx, SO2, CO, O3, BTX, etc.
- Particulate matter (PM10 and PM2.5)

II. Literature Survey

[1] They present an extensive review of prospective enabling technology for IoT-based AQMS architecture in this article. Infrastructure and application layer protocols to support IoT-based architecture for AQMS are also needed. This paper addresses the requirements by analyzing previous research on air quality monitoring using IoT, with an emphasis on recent developments and problems.[2] The current research creates an Internet of Things (IoT) that allows an air quality monitoring system to be mobile while evaluating real-time data such as carbon monoxide, smoke, and particulate matter levels. [3]They present a real-time standalone air quality monitoring system in this study, which includes PM 2.5, carbon monoxide, carbon dioxide, temperature, humidity, and air pressure, among other characteristics.

III. Methodology

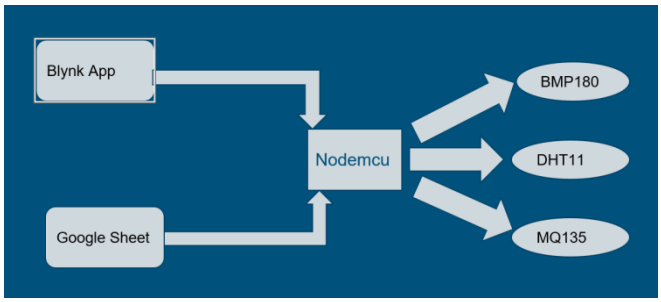


Figure 1

This project basically consists of three sensors BMP180 which is barometric pressure sensor to measure the atmospheric pressure and it connected to analog pin of Nodemcu. Due to the fact that temperature affects the density of gases like air, the BMP180 detects both pressure and temperature. Air is less thick and heavier and exerts less pressure on the sensor at higher temperatures. Because air is heavier and more dense at lower temperatures, it presses more forcefully against the sensor. Another sensor we used here is DHT11 which is temperature and Humidity sensor. A basic, extremely affordable digital temperature and humidity sensor is the DHT11. It measures the humidity in the air using a thermistor and a capacitive humidity sensor, and it outputs a digital signal on the data pin (no analogue input pins needed). Although reasonably easy to operate, data collection requires precise timing. We used here MQ135 gas sensor which is Air quality sensor The MQ-135 Gas Sensor can identify dangerous gases and smoke, including ammonia (NH3), sulphur (S), benzene (C6H6), and CO2. This sensor, like the others in the MQ series of gas sensors, has a pin for both digital and analogue output. The sensing element is encased behind a steel exoskeleton that makes up the gas sensor module. Through connecting leads, current is applied to this sensing element. The gases that are near the sensing element become ionised and are absorbed by the sensing element when this current, also known as heating current, passes across them. Nodemcu collects data from all three sensors and by using google scripts that data get upload on google sheet automatically. In another way data get upload on Blynk cloud, we can monitor our atmospheric parameters by using Blynk app.

IV. Components

1. MQ135 Sensor:- The MQ-135 Gas sensor can detect gases like Ammonia (NH3), sulfur (S), Benzene (C6H6), CO2, and other harmful gases and smoke. Similar to other MQ series gas sensor, this sensor also has a digital and analog output pin.
2. BMP 180:-low-cost sensing solution for measuring barometric pressure and temperature.
3. DHT11:-This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component.

V. Result and Discussion

Circuit of air quality monitoring system gives us the following results.

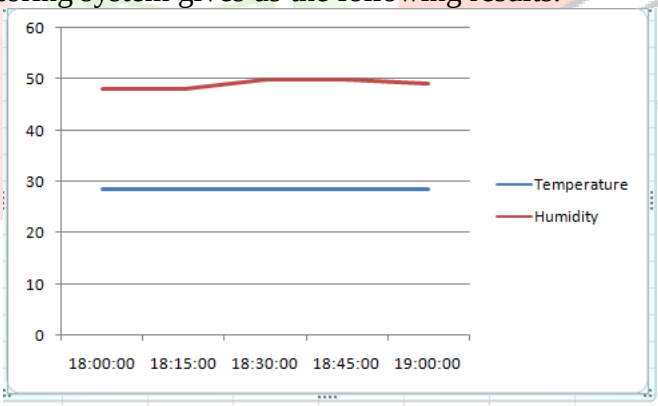
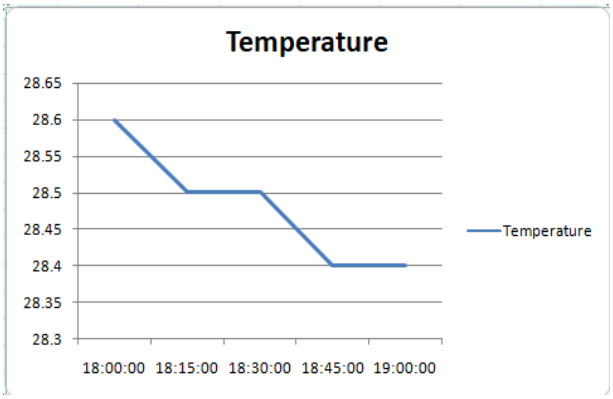


Figure 2



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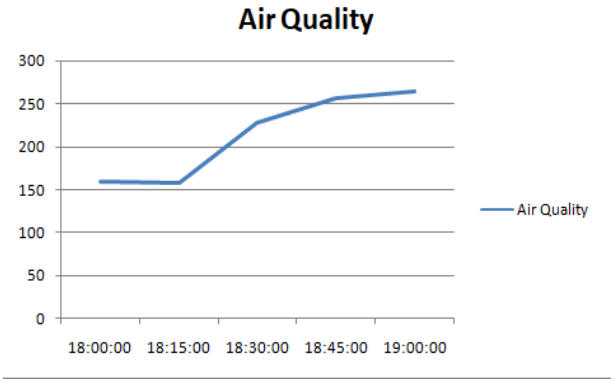

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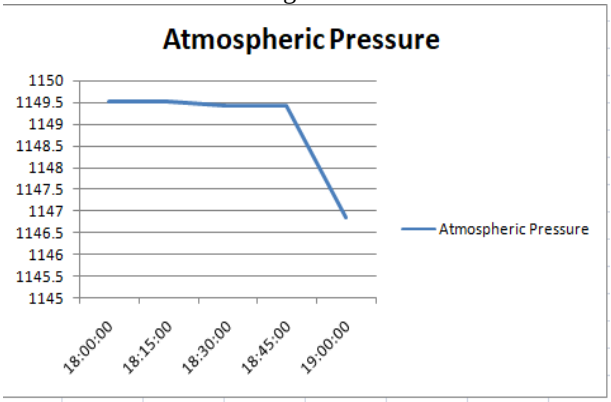

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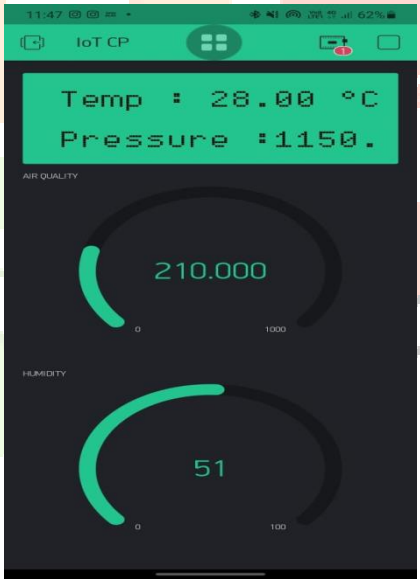

Figure 6

Helpful Hints

PORTABILITY

It is a compact device that consists of many sensors including the cloud which are all combined by using the internet of things (IOT)

SAFETY

One can avoid going to a particular location by redirecting themselves or by taking safety precautions such as wearing a mask and can reduce dumped wastages in a particular locality area

COST

Compared to others it's efficient and low cost because many sensors are clubbed by using IoT and Arduino microcontroller

SIMPLE MAINTENANCE

As the Project deals with the software embedded in C, maintenance will be easy and this can also be installed in GSM android mobiles.

VI. LIMITATIONS

Continuous efforts with the advancement of technology are ongoing in construction of IoT based AQMS, at the same time the field throws many challenges to the researchers. Major issues can be listed as below.

Sensing and calibration: Selection of low-cost sensor for particular air pollutant and maintenance of the sensor over longer period is one of the issues. Moreover, performance starts deteriorating with aging. Calibration model building and availing reference observation to match data from the deployed sensors is also challenging task.

Sampling: Sampling period affects the power consumption, so sampling frequency is tradeoff between accuracy and power usage.

Deployment of sensing unit: Selection of Deployment site with appropriate height to avail continuous concentration of pollutant for the sensors.

Energy optimization: In cases of resource constrained sites, sensing nodes are designed to be operated on batteries. Energy optimization is major challenge to keep the sensing node on for longer period.

VII. FUTURE SCOPE

The future scope is that the device that we currently have can be done in a compact manner by reducing the device's size. For further implementation or adjustments, detecting the quantity of pollution produced by a vehicle can be determined. In the future, the range for high-range frequencies can be enhanced based on bandwidth. More research can be done by directing people in the appropriate direction for their own benefit. As a result, another benefit of employing this device in an app is that it can all be utilized in GSM mobile phones for daily updates while also improving their range.

VIII. CONCLUSION

This project proposal focuses on the well-being of society, which will benefit all people by reducing pollution. There are several different sorts of sensors that are linked with this, such as gas sensors, humidity sensors, rain sensors, and temperature sensors. Given the enormous environmental consequences that are prevalent in our society, this could result in new aspects of prevention for people in this civilization. As a result, we conclude that the purpose of our project proposal is to benefit the people in our society by preventing them from being exposed to dangerous gases.

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