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Iot Based Air Pollution Monitoring System

Uddesh U Naik, Shreyash R Salgaokar, Shreeyank Jambhale,
Department of Electronics and
Telecommunication
Shree Rayeshwar Institute of Engineering and
Information Technology
Shiroda-Goa, India
uddeshnaik564@gmail.com,shrshsalgaonkar@gmail.com, shreeyank.jambhale@ritgoa.ac.in

Abstract-Humans can be adversely affected by exposure to air pollutants in ambient air. Hence, health-based standards and objectives for some pollutants in the air are set by each country detection and measurement of contents of the atmosphere are becoming increasingly important. Careful planning of measurements is essential. One of the major factors that influencethe representativeness of data collected is the location of monitoring stations the planning and setting up of monitoring stations are complex and incurs a huge expenditure. Air pollution affects our day-to-day activities and quality of life. It poses a threat to the ecosystem and the quality of life on the planet. The dire need to monitor air quality is very glaring, owing to increased industrial activities over the past years. People need to know the extent to which their activities affect air quality. This project proposes an air pollution monitoring system. An IoT-based air pollution monitoring system is proposed to monitor the pollution levels of various pollutants. The geographical area is classified as industrial, Residential, and traffic zones theproposes an IoT system that could be deployed at any location and store the measured values in a cloud database, performpollution analysis, and display the pollution level at any given location.

Keywords – Sensor Array, ESP32, Blynk 2.0.

I. INTRODUCTION

Air pollution has grown so prevalent that nearly everyone accepts the fact that it is increasing exponentially and continuously due to rapid growth in industrialization and vehicles. Air pollutants such as ground–level ozone, nitrogen dioxide, and Sulphur dioxide are harmful for nature. Chemical pollutants, including suspended particulate matter, carbon monoxide, oxides of nitrogen, oxides of Sulphur, lead aerosol, volatile organic compounds are harmful for health.

Due to these pollutants the occurrence of diseases has increased. Advanced studies in the technology of sensor network and wireless communications have contributed a wide range of applications of wireless sensor network in environmental monitoring and pollution control. We discuss here a detailed study on ambient air pollution monitoring and air quality control using sensor nodes in a wireless sensor network. Substances in the polluted air are very dangerous. For example, if the carbon monoxide is above 100ppm, it makes humans feel dizzy, nauseous, and within minutes they could die. This research makes humans find out which content of the air is polluted. With module node MCU ESP32, we can monitor the air pollution remotely, because there is a Wi-Fi module in node MCU ESP32. This makes the air condition can be monitored every time.

II. OBJECTIVE

The primary objective of this project is to create a system when the industry does lot of pollution which is to be monitored by IoT system over web. To record the concentration levels of atmospheric pollutants in order to define air quality levels and establish actionplans if high levels of contamination are detected. Also, to monitors the air quality levels at certain cities where there is more traffic.

III. PROBLEM DEFINITION

Air pollutants such as ground–level ozone, nitrogen dioxide, and Sulphur dioxide are harmful for nature. Chemical pollutants, including suspended particulate matter, carbon monoxide, oxides of nitrogen, oxides of Sulphur, volatile organic compounds are harmful for health. Due to these pollutants the occurrence of diseases has increased. There are not many devices which can measure air pollution and Environment Department will not able to know about this pollution. So that they are not able to control it.

IV. EXISTING SYSTEM

The existing systems which are there are costlier and many of them uses only one sensor. Therefore, not all the

pollutants which are present in the air can be measured nor can be monitored.

V. PROPOSED SYSTEM

In proposed system we use multiple sensor which can sense different types of pollutant or gases which are present in air. We can place the system in industries, road sides or signals, junctions and we can collect the data. By using multiple sensors in our project which can monitor different types of gases we can overcome this problem. This data can be further given to Pollution Control OR Environment Department as they can take action and try to control the pollution.

VI. METHODOLOGY

The primary objective of this project is to create a system when the industry does lot of pollution which is to be monitored by IoT system over web. Also, to monitors the air quality levels at certain cities where there is more traffic. In this system we have Sensor Array which includes: MQ135 which measures CO2, SO2, CH4, NH3 MQ9 which measures CO and Propane (C3H8) and MQ2 which detects any Gas Leakage. In this system we have used ESP32 Microcontroller (Node MCU), which will read all sensor data. Node MCU ESP32 will send this sensed data to Blynk 2.0 Cloud using Wi-Fi connectivity. We have used Blynk 2.0 Cloud for our system. • We can see the real time data on Cell Phones using Blynk Application and also on Blynk Web Dashboard in Graph form. If MQ 2 sensor detects any Gas Leakage then the system will send Notification on your Cell Phone.This system just requires a Wi-Fi Access Point for connectivity and it is very easy to maintain. If the system is not showing any readings OR if system is showing Offline on Blynk App on Cell Phone, then only we have to check connectivity to system OR Power Supply of system.

IV. FIGURES AND TABLES

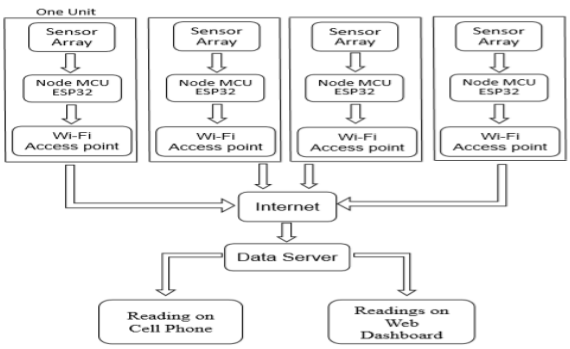

Fig 1: Total IOT Block Diagram

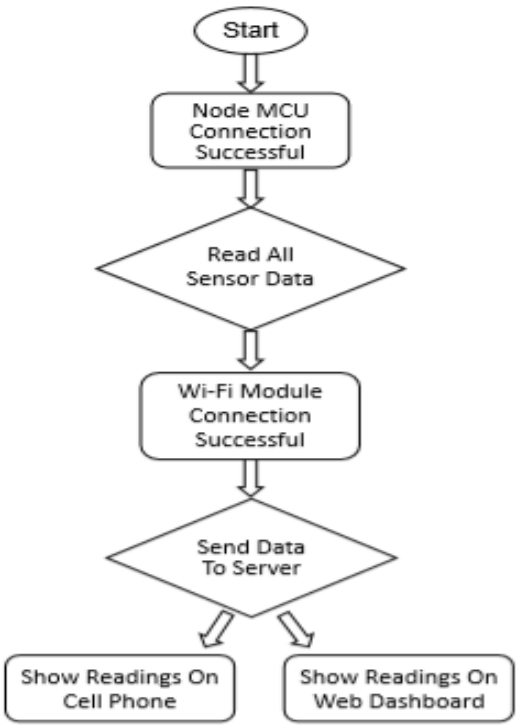

Fig 2: Flowchart of The Proposed System

Table 1

Sr. No	Components Required	Quantity
1	Node MCU ESP32	1
2	MQ 135 Gas Sensor	1
3	MQ 2 Gas Sensor	1
4	MQ 9 Gas Sensor	1
5	PCB/Bread Board	1
6	Connecting Wires	As per requirements

Table 2: Pollutant Specifications

Pollutants	Time	Concentration In Air	
		Industrial Area	Residential Area
Carbon Dioxide (CO2)	Average 24 Hour	Below 5000 ppm	Below 1000 ppm
Sulphur Dioxide (SO2)	Average 24 Hour	Below 45 ppm	Below 30 ppm
Ammonia (NH3)	Average 24 Hour	Below 0.56 ppm	Below 0.56 ppm
Methane (CH4)	Average 24 Hour	Below 1.7 ppm	Below 1.7 ppm
Carbon Monoxide (CO)	Average 24 Hour	Below 8.44 ppm	Below 3.38 ppm
Propane (C3H8)	Average 24 Hour	Below 15 ppm	Below 15 ppm

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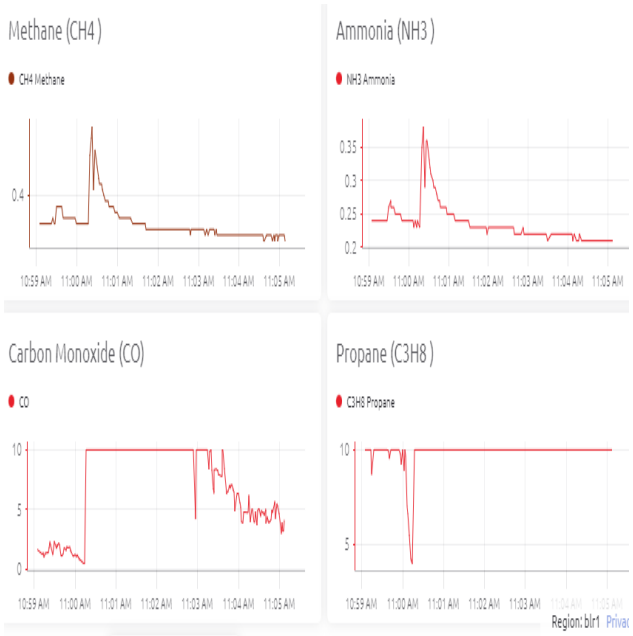
Fig3:Designed Model.

Readings on Blynk App on Smart Phone

Readings on Blynk Cloud Web Dashboard



V. COST AND SIZE ANALYSIS

Our overall system cost has come approximately 3000 rupees which comparatively less than those system available in market right now. The dimensions of the project are 15cm in length and 12cm width with 4cm height fairly making it a compact system. The weight of the project is below 300gm thus making it light weight comparatively and portable. Thus, our project is portable, low maintenance and cost efficient, thus can be made available in industries, households areas and any other areas where pollution has to be measured.

VI. FUTURE SCOPE

There is aalot of future scope in our project, we can add more multiple sensors so that we can measure different types of pollutants. IoT-based air pollution monitoring systems can be integrated with smart city initiatives. By deploying a network of sensors throughout a city, real-time data on air quality can be collected and analyzed. This information can then be used to make informed decisions and take appropriate actions to improve air quality and public health. By providing real-time data and personalized information to individuals, communities can actively participate in pollution reduction initiatives and make informed choices that contribute to cleaner air. These advancements have the potential to significantly improve air quality, protect public health, and create more sustainable and livable cities.

VI. CONCLUSION

Air pollution has grown so prevalent that nearly everyone accepts the fact that it is increasing exponentially and continuously due to rapid growth in industrialization and vehicles. Air pollutants such as Sulphur dioxide, carbon monoxide, suspended particulate matter, carbon dioxide are harmful for nature and harmful for health. Due to these pollutants the occurrence of diseases has increased. So, we need to measure the pollution that occurs in our surrounding areas. In proposed system we use multiple sensor which can sense different types of pollutant or gases which are present in air. We can monitor the sensed data from sensors on Blynk Application on our smart phones and also on the Web Dashboard.

REFERENCES

[1] "A Smart Air Pollution Monitoring System" Samuel John and Kennedy IJCIET Volume 9, Issue 9, September 2018, pp. 799–809, Article ID: IJCIET_09_09_077

[2] M. Lu, et al., "Novel customized manufacturable DFM solutions," Proc. SPIE Photo mask Technology 2012, vol. 8522, pp. 852223, December 2012.

[3] "Air Quality Monitoring System" Meghana P Gowda, Harshita G.Y, Jyoti K N and Padma R IJERT Volume 9, Issue 12 Special Issue – 2021 ISSN: 22780181 www.ijert.org

[4] "IOT Based Air and Sound Pollution Monitoring System" Pradyumna Bapat, Karthikeyan Sengunthar, Krishna Shenvi and AninditaKhade VOLUME 6 I ISSUE 2 I APRIL– JUNE 2019 IJRAR http://ijrar.com

[5] "Air Pollution Monitoring Using IOT" Pattar Sunil Mahesh, Patil Bhushan Rajendra, Bodke Akshay Dnyaneshwar and Mr. Ulhās. V. Patil Vol-4 Issue-6 IJARIIE 2018 www.ijariie.com

[6] "Prediction of Air Quality Index and Forecasting Ambient Air Pollutants using Machine Learning Algorithms" Radhika M.Patil, Dr. H. T. Dinde and Sonali. K. Powar Volume 5, Issue 8, August – 2020 www.ijisrt.com International Journal of Innovative Science and Research Technology

[7] "Survey- Pollution Monitoring using IoT" Jhanvi Arora, Utkarsh Pandya, Saloni Shah and Nishant Doshi Elsevier B.V. 2019 rect.com

[8] "Iot Based Air Pollution Monitoring System" Vijayakumar Sajjan and Pramod Sharma IJITEE Volume-8, Issue- 9S2, July 2019

[9] "Arduino-Based Real Time Air Quality Monitoring System" Abdullah Al Ahasan, Saumendu Roy, Rozina Akter and Zakir Hossain Volume-6, Issue-4, July 2018

[10] "Air Pollution Monitoring system" SnehalSirsikar and Priya Karemore IJARCCE Vol. 4, Issue 1, January 2015

AUTHOR PROFILE

Uddesh U Naik
Student,
Shree Rayeshwar Institute of Engineering and Information TechnologyShiroda-Goa, India
uddeshnaik564@gmail.com