International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 04 | April - 2023 Impact Factor: 8.176 ISSN: 2582-3930

Air Quality Monitoring System

Devki Nandgaye[1], Anisha Ganvir[2], Prajakta Thakre[3], Pooja Gajbhiye[4], Ashwini Dhok[5] , Tejas Kamble [6]

[1]Assistant Professor, Department of Information Technology, NIT, Nagpur
[2]B.E Graduate(IV year), Department of Information Technology, NIT, Nagpur[3]B.E Graduate(IV year), Department of Information Technology, NIT ,Nagpur[4]B.E Graduate(IV year), Department of Information Technology, NIT, Nagpur
[5]B.E Graduate(IV year), Department of Information Technology, NIT ,Nagpur [6]B.E Graduate(IV year), Department of Information Technology, NIT ,Nagpur

Abstract -The IOT based quality IOT based air quality monitoring system monitors the air quality over a web server using internet and will trigger alarm when the air quality and it will show the air quality PPM on the LCD as well as on webpage so that air pollution can be monitored very easily. This article proposes an IoT and system that could be deployed at any location and store the measured value in could database perform pollution, analysis and display the pollution level at any given location.

INTRODUCTION

The Air Excellence Guide (AEG) may be a common indicator of air quality. The Air Quality Indicator (AQI) is calculated and supported on air pollutants like CO and NO2 compounds that consume opposing possessions happening the atmosphere and human health. The Air Quality Indicator may be a range that represents the very finest meditation of a specific air unused matter at a particular time. IT\ propose an air quality as well as air pollution monitoring system that allows us to monitor and check live air quality as well as air pollution in an area through Internet of Things (IoT). It uses air sensors (Gas Sensor MQ135) to sense presence of harmful gases/compounds in the air and constantly transmit this data. In addition, system keeps measuring air level and reports it. The sensors interact a with Arduino Uno (Microcontroller) which processes this data and transmits it over the application This allows authorities to monitor air pollution in different areas and act against it [1]. In addition, authorities can keep a watch on the air pollution near schools, and hospitals areas. Normally, little concentrations area unit measured exploitation ppb (parts per billion), that represents units of mass of a material per one billion units of total mass. Parts per million (ppm) may be similar and unremarkable used unit to measure concentrations of pollutants. Determines the requirements of a new system and analyze on product and resource requirement, which is required for the successful system. The product requirement contains

input and output requirements it gives the wants in term of input to produce the required productivity. The resource requirements define in brief about the hardware that are needed to achieve the required functionality. In this project I am going to make an IoT based Air Pollution Detection Monitoring System in which I monitor the Air Quality over a web server using ESP8266 Wi-Fi device and a trigger alarm when the air quality goes down a certain level means when there is amount of harmful gases is present in the air like CO2. It shows the air quality in PPM (Parts Per Million) on LCD and webpage module So, basically it is too much useful for the big hospital for sign in on a digital platform our project makes sure that the nurse can doing at a time whole hospital works and it is profitable for the doctors. In brief this project is work based on time management that a particular nurse manages hertime as well as handle her allotment patients. If in case any critical situation will happens means the liquid present in that bottle will below 15 % then buzzer get started and another nurse will change thatIV bag. The Intravenous bag Monitoring System taking place of time management and notified to thedoctors and alert to the doctors and also did not cause any patients death and emergency if the nursewill properly follow this rules and regulations then she is doing well for her opinion and the doctors alsoimpress on her through this project patients also having properly IV Bags so, we can practically implemented this project in an any hospital via clinics. In the world of automation, things are getting automated, but the adverse effect is pollution. It is important to reduce the pollution level present in ambient air. Air pollution is the introduction of chemicals, biological materials, or other harmful material into the earth's atmosphere, possibly causing disease, death to humans, damage to other living organisms in natural or built environment. One of the major issues in India is air pollution. Coimbatore city, the "Manchester of south India" is one of the smart cities in India. The Iot provides many new chances to the industry and end users in many application fields. Currently, however the Iot itself lacks theory, technology architecture and standard that integrate the simulated world and the real physical worlds in an integrated framework. Architecture challenge Iot encompasses a life-threatening wide range of technologies. Iot involves a cumulative number of smart interconnected devices and sensors (e.g. cameras, biometric, physical and chemical sensors)

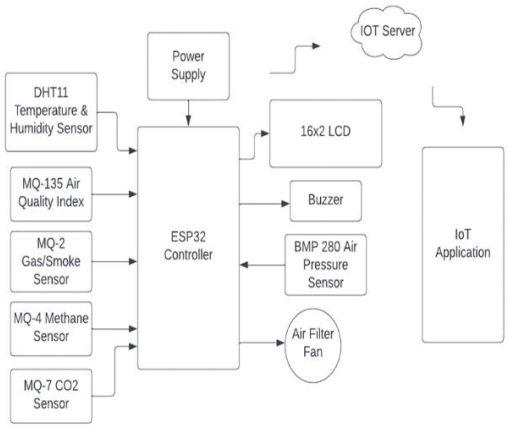
The project is an implementation of IoT (Internet of Things) Based Air Pollution Monitoring System Using Arduino. Air pollution is a growing issue and it is necessary to monitor air quality for a better future and healthy living for all. IoT is getting popular day-by-day, and standards are on its way. Therefore, collection of air quality information is easier. Analysis of monitoring data allows us to assess how bad air pollution from day to day. According to the recent survey, Dhaka, the capital of Bangladesh is the third in the list of most air-polluted city. Thus because of this expansion in the quantity of vehicles contamination is developing quickly and it influences people groups wellbeing too. This air contamination makes disease and harm safe, neurological, regenerative and respiratory framework. In extraordinary cases, it can likewise cause passing. As indicated by overview 50000 to 100000 unexpected losses occurred to us only because of air contamination [2]. Along these lines, there is a requirement for checking air quality and to monitor it. IoT is the system of physical gadgets, vehicles, home apparatuses, and different things implanted with hardware, programming, sensors, and availability which empowers these articles to associate and trade information. IoT permits articles to be noticed or controlled. In this paper, I am proposing and going to piloting a model which IoT to screen air contamination. Objectives of Monitoring Air Quality The air quality monitoring program design dependent upon the monitoring specific objectives specified for the air quality management in the selected area of interest. Defining the output influence, the design of the network and optimize the resources used for monitoring. It also ensures that the network is specially designed to optimize the information on the problems at hand. There might be different objectives for the development of the environmental monitoring and surveillance system. Normally, the system has to provide on-line data and information transfer with a direct /automatically/ on-line quality control of the collected data. Several monitors, sensors and data collection systems to be applied to make on-line data handover and control likely. The important parameters that are considered in the proposed framework include: Carbon Dioxide (CO2) – CO2 is colorless, odorless gas and non-combustible gas. Also, it is measured under the category of smother gases that have ability of interfering the availability of oxygen for tissues. Carbon Dioxide is a gas vital to life in the world, because it is one of the most vital elements evolving photosynthesis process, which converts solar into chemical energy. The concentration of CO2 has amplified due mainly to massive remnant fuels boiling. This increase makes plants grow rapidly.

LITERATURE REVIEW

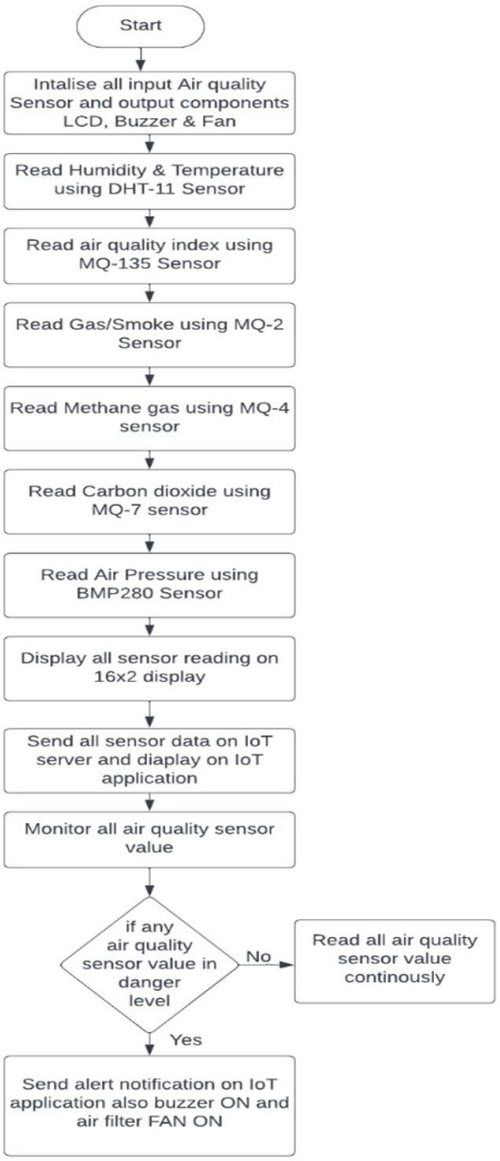
The Literature review is a comprehensive summary of previous research on IOT based Air Quality Monitor Application. Here, we have demonstrated the knowledge and understanding of the following IOT Application and related reviews. We have highlighted gaps that exists in research papers. Though, the literature consists of a lot many research contributions, but, here, we have analyzed some of the research and review papers. The existing approaches are categorized based on the basic concepts involved in the mechanisms. Finally, the findings are summarized related to the scanned and analyzed research papers. Chapter concludes with the motivation behind the identified problem. The IoT system collect and process all kinds of physical or chemical environmental parameters via the locally or widely organized terminals. Typical environmental information includes temperature, humidity, noise, visibility, light intensity, spectrum, radiation, pollution (CO, CO2, etc.)

METHODOLOGY

Internet of Things (IoT) mainly deals with connecting smart devices to internet I have connected the MQ135 gas sensor and ESP32 Wi-Fi device with the Arduino. Connected the VCC and the ground pin of the sensor to the 5V and ground of the Arduino and the Analog pin of sensor to the A0 of the Arduino. Connected a buzzer to the pin 7 of the Arduino which is started to beep when the condition becomes true. The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2 and some other gases, so it is faultless gas sensor for our Air Quality Observing Detection Project. When I connect it to Arduino then it senses? the gases, and I get the Pollution level in PPM (parts per million). MQ135 gas sensor gives the output in form of voltage levels, and I need to convert it into PPM. Sensor is giving us value of 0.1 when there is no gas near it and the safe level of air quality is 0.5 PPM and it is not exceeding 0.5 PPM. When it exceeds the limit of 0.5 PPM, then it starts cause Headaches, sleepiness and stagnant, stale, stuffy air and if exceeds beyond 1 PPM then it can cause increased heart rate and many other diseases. When the value is being less than 0.5 PPM, then the LCD and serial monitor is displayed “Fresh Air”. Whenever the value is increased 0.5PPM, then serial monitor is displayed “Poor Air, Open Windows”. If it is increased 1 PPM, then the buzzer is kept beeping and the LCD is displayed “Danger! Move to fresh Air”. After uploading the code, I am connected to the Wi-Fi of my ESP832 device, the serial monitor. cloud computing has been integrated into a web server for analyzing the data from the device to classify. This platform relies on an IoT and a cloud computing technology to monitor indoor air quality in anywhere and anytime. The device is composed of a microcontroller, pollutant detection sensors, and LTE modem. In the research, the device was designed to measure a concentration of aerosol, VOC, CO, CO2, and temperature-humidity to monitor the air quality. This project proposes an idea to install monitoring applications on smartphones. It is innovative because it provides easy access to the public to monitor real time air quality in their area. It uses low cost and readily available devices such as a dust sensor, carbon monoxide gas sensor, carbon dioxide gases sensor and nitrogen dioxide gas sensor.



FLOWCHART



OUTPUT

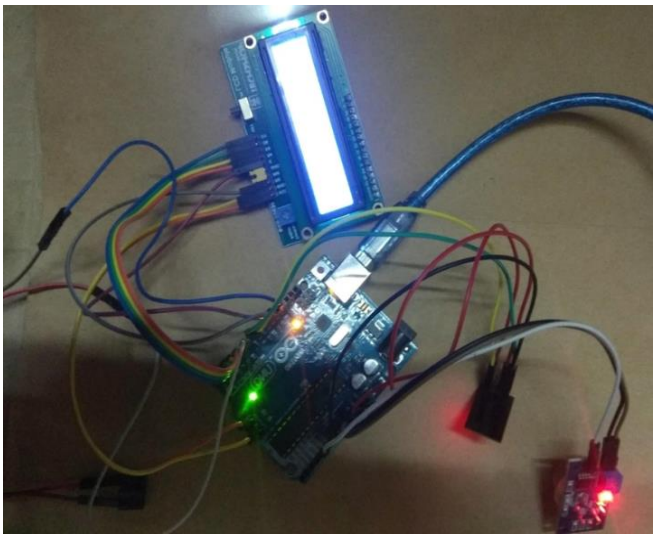


Fig.3 Interior Design of The Project

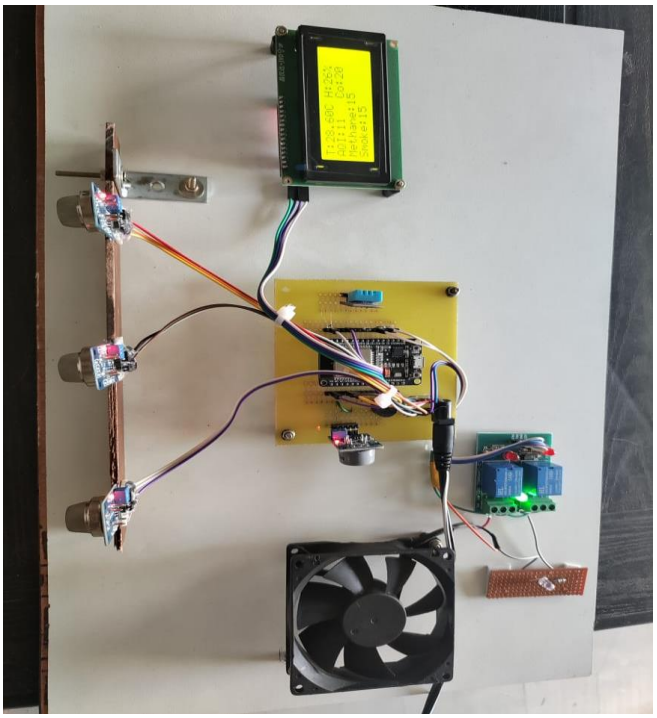


Fig.4 Actual Output of the project

CONCLUSION

The wireless air pollution monitoring System provides real time information about the level pollution, as well as provides an alert in case of drastic change in quality of air. The air quality index value is calculated and the nature of the air quality in that area is determined which is also displayed through the app. Along with this, the health effects for the corresponding air quality is display to create awareness among the public. Additionally they could also get to know the temperature and weather in that region. The users will not get disturbed with irrelevant data as the values displayed are location specific and help them stay tuned to the current status of air pollution.

OUTCOME

- IOT Technology is proposed to improve quality of air. With the use of IOT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issues proposed this paper.
- The system to monitor the air of environment using Arduino microcontroller
- It`s efficient and low cost because sensor is clubbed by using internet of things (IoT) and Arduino microcontroller.
- The users will not get disturbed with irrelevant data as the values displayed are location specific and help them stained to the current status of air pollution.

REFERENCES

[1] G. Parmar, S. Lakhani, and M. Chattopadhyay, “An IoT based low-cost air pollution monitoring system,” in 2017 International Conference on Recent Innovations in Signal processing and Embedded Systems (RISE), Bhopal, India, October 2017.
View at: Publisher Site | Google Scholar

[2] K. Okokpujie, E. Noma-Osaghae, O. Modupe, S. John, and O. Oluwatosin, “A smart air pollution monitoring system,” International Journal of Civil Engineering and Technology, vol. 9, pp. 799–809, 2018.
View at: Google Scholar

[3] K. A. Kulkarni and M. S. Zambare, “The impact study of houseplants in purification of environment using wireless sensor network,” Wireless Sensor Network, vol. 10, no. 03, pp. 59–69, 2018.
View at: Publisher Site | Google Scholar

[4] World Health Organization, Air Pollution and Child Health-Prescribing Clean Air, WHO, Geneva, Switzerland, 2018, September
2018, https://www.who.int/ceh/publications/Advance-copy-Oct24_18150_Air-Pollution-and-Child-Health-merged-compressed.pdf.

[5] G. Rout, S. Karuturi, and T. N. Padmini, “Pollution monitoring system using IoT,” ARPN Journal of Engineering and Applied Sciences, vol. 13, pp. 2116–2123, 2018.
View at: Google Scholar

[6] B. C. Kavitha, D. Jose, and R. Vallikannu, “IoT based pollution monitoring system using raspberry–
PI,” International Journal of Pure and Applied Mathematics,

vol. 118, 2018.
View at: Google Scholar

[7] D. Saah, M. Shinde, and S. Thadeshwar, "IoT based air quality monitoring system using wireless sensors deployed in public bus services," in ICC '17 Proceedings of the Second International Conference on Internet of things, Data and Cloud Computing, Cambridge, United Kingdom, March 2017.
View at: Publisher Site | Google Scholar

[8] J. Liu, Y. Chen, T. Lin et al., "Developed urban air quality monitoring system based on wireless sensor networks," in 2011 Fifth International Conference on Sensing Technology, pp. 549–554, Palmerston North, New Zealand, December 2011.
View at: Publisher Site | Google Scholar

[9] United States Environmental Protection Agency, Managing air quality - air pollutant types, October 2018, https://www.epa.gov/air-quality-management-process/managing-air-quality-air-pollutant-types.

[10] C. Arnold, M. Harms, and J. Goschnick, "Air quality monitoring and fire detection with the Karlsruhe electronic micronose KAMINA," IEEE Sensors Journal, vol. 2, no. 3, pp. 179–188, 2002.
View at: Publisher Site | Google Scholar

[11] S. Abraham and X. Li, "A cost-effective wireless sensor network system for indoor air quality monitoring applications," Procedia Computer Science, vol. 34, pp. 165–171, 2014.
View at: Publisher Site | Google Scholar

[12] O. A. Postolache, D. J. M. Pereira, and S. P. M. B. Girão, "Smart sensors network for air quality monitoring applications," IEEE Transactions on Instrumentation and Measurement, vol. 58, no. 9, pp. 3253–3262, 2009.
View at: Publisher Site | Google Scholar

[13] Y. Jiangy, K. Li, L. Tian et al., "MAQS: a personalized mobile sensing system for indoor air quality monitoring," in Proceedings of the 13th international conference on Ubiquitous computing, pp. 271–280, Beijing, China, September 2011.
View at: Publisher Site | Google Scholar

[14]S. Bhattacharya, S. Sridevi, and R. Pitchiah, "Indoor air quality monitoring using wireless sensor network," in 2012 Sixth International Conference on Sensing Technology (ICST), pp. 422–427, Kolkata, India, December 2012.
View at: Publisher Site | Google Scholar

[15] S. Zampolli, I. Elmi, F. Ahmed et al., "An electronic nose based on solid state sensor arrays for low-cost indoor air quality monitoring applications," Sensors and Actuators B: Chemical, vol. 101, no. 1-2, pp. 39–46, 2004.
View at: Publisher Site | Google Scholar