Design of an IoT Air Purifier and Air-Quality Monitoring System

Bàng Nguyên Lãm
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
dtc16hd5103010259@ictu.edu.vn

***Abstract*—This thesis presents the design and implementation of an air purifier and air-quality monitoring system utilizing IoT technology. The system incorporates sensors such as DHT11 for temperature and humidity, MQ135 for gas detection, and Sharp GP2Y10 for dust density. It is connected to a Blynk platform for real-time monitoring and control via Wi-Fi. The system successfully monitors air quality parameters and controls an LED display, providing real-time data through Blynk. However, the limitations include the need for further testing and validation of the system's effectiveness.**

***Index Terms*—IoT, Air Purifier, DHT11, MQ135, Sharp GP2Y10, Blynk**

I. Introduction

The report introduces the design of an air purifier and air-quality monitoring system using IoT technology. It highlights the necessity of air quality monitoring in modern environments and the application of IoT for real-time data collection and control. The system aims to provide accurate and timely information about air quality parameters such as temperature, humidity, and dust density. The implementation involves the use of specific sensors and a Blynk platform for remote monitoring and control via Wi-Fi [1]. Published articles on the methods and subject of this project provide context for this English summary [6], [7], [8], [9]. Published articles on the methods and subject of this project provide context for this English summary [10].

II. Methods

The author implemented a system using sensors such as DHT11 for temperature and humidity, MQ135 for gas detection, and Sharp GP2Y10 for dust density. The system is connected to a Blynk platform for remote monitoring and control via Wi-Fi. The implementation involved coding the system to read sensor data and transmit it to the Blynk platform. The system also includes a physical button for manual control and an LED display for visual feedback. The code was written in C++ and tested on an ESP8266 microcontroller [1].

III. Results

The system successfully monitors air quality parameters including temperature, humidity, and dust density. It controls an LED display and provides real-time data through Blynk. The implementation includes functions to read sensor data, update the Blynk platform, and control the LED display. The system was tested with various sensor inputs to ensure accurate data transmission. However, no measured evaluation or performance metrics were provided to assess the system's effectiveness [1].

IV. Discussion

The author discusses the implementation of the system, noting the use of specific sensors and the integration with Blynk for remote monitoring. The limitations include the need for further testing and validation of the system's effectiveness. The author acknowledges the potential for the system to be used in various environments but emphasizes the need for additional testing to confirm its reliability and accuracy [1].

V. Conclusion

The thesis concludes with the successful design and implementation of an air purifier and air-quality monitoring system using IoT technology. The author acknowledges the need for further testing and validation of the system's performance. The system successfully monitors air quality parameters and controls an LED display, providing real-time data through Blynk. However, the limitations include the need for additional testing to ensure the system's effectiveness in real-world applications [1].

Supervisor: Hoàng Thị Hải Yến, Thai Nguyen University of Information and Communication Technology (hthyen@ictu.edu.vn).

References

[1] Bàng Nguyên Lãm, "Design of an IoT Air Purifier and Air-Quality Monitoring System," internal undergraduate thesis (original in Vietnamese), Thai Nguyen University of Information and Communication Technology, 2021.
[2] P ạ Q H y Vi điều khiển và ứng dụng Arduino dành cho người tự học. NXB Bách Khoa Hà Nội, 2010
[3] L Mỹ H , P ạ Q H y Lập trình IoT với Arduino. NXB Thanh Niên, 2014
[4] Charlet Platt. Make Electronic. NXB makezine.com
[5] "Efficiency of the HEPA air filter: HEPA filter quality and bypassing". www.air- purifier-power.com. Truy cập ngày 5 tháng 6 năm 2019. 61
[6] Tazin Shaikh, "Iot Based Smart Air Purifier," International Journal for Research in Applied Science and Engineering Technology, vol. 7, no. 5, pp. 1896-1901, 2019. DOI: 10.22214/ijraset.2019.5318.
[7] Heeje Kim, Dohyun Kim, "An-ion air purifier system using IoT Technology," Proceedings of International Conference on Artificial Life and Robotics, vol. 23, pp. 294-297, 2018. DOI: 10.5954/icarob.2018.os2-4.
[8] Kinnera Bharath Kumar Sai, Somula Rama Subbareddy, Ashish Kumar Luhach, "IOT based Air Quality Monitoring System Using MQ135 and MQ7 with Machine Learning Analysis," Scalable Computing: Practice and Experience, vol. 20, no. 4, pp. 599-606, 2019. DOI: 10.12694/scpe.v20i4.1561.

[9] Kulvinder Singh, ”HYBRID AIR PURIFIER,” GLOBAL JOURNAL FOR RESEARCH ANALYSIS, pp. 1-2, 2019. DOI: 10.36106/gjra/6906340.
[10] Dinesh Panicker, ”Smart Air Purifier with Air Quality Monitoring System,” International Journal for Research in Applied Science and Engineering Technology, vol. 8, no. 5, pp. 1511-1515, 2020. DOI: 10.22214/ijraset.2020.5244.