

## WiFi-Accessible DIY Indoor Air Quality Monitoring System for Smart Housing

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### Abstract

The implementation of “smart” gadgets for indoor buildings allows for ease of communication, data accessibility, and assistance for everyday consumers and those who are health impaired. Some challenges exist with current off-the-shelf “smart” data tracking technologies such as ownership and privacy of data, and limited modification of software and/or hardware. Additionally, indoor air quality is of major concern for high-risk individuals impacted by air pollutants such as older adults, respiratory health patients, and newborns (1). The Community Sensor Lab’s indoor air quality monitoring system collects environmental data such as particulate matter (PM<sub>2.5</sub>), carbon dioxide (CO<sub>2</sub>) levels, temperature, humidity, and pressure. The system was built using an Arduino microcontroller and sensors that run on open-source code. The Arduino software is programmed to send data collected by the sensors to Google Spreadsheets in close to real-time streaming rates using HTTP methods. In beta testing, posting data to Google spreadsheets was successful, with one of our monitoring systems being able to gather 4 months' worth of data and approximately 62,000 rows of data. However, the collected data was difficult to analyze due to the slow performance of the cloud-based spreadsheet. Although our goal of data accessibility through WiFi connectivity is achieved through our sensors’ ability to post data on Google spreadsheets, we plan to further this accessibility by using non-web-based platforms such as Tableau Desktop and MATLAB to analyze the big data sets collected. Lastly, through the addition of a programming protocol known as provisioning, the WiFi connection setup will be simplified, allowing for a device such as an iPhone to be used to enter WiFi credentials. These devices have the potential to detect elevated levels of air pollutants in real-time. This will be particularly beneficial for individuals who are health impaired, allowing them to take action to improve their indoor air quality and overall health (1).

### Reference

1. Marques, Gonçalo, et al. “Indoor Air Quality Monitoring Systems for Enhanced Living Environments: A Review toward Sustainable Smart Cities.” *Sustainability*, vol. 12, no. 10, May 2020, p. 4024. Crossref, <https://doi.org/10.3390/su12104024>.