ABSTRACT

Air quality is a crucial aspect that needs to be monitored accurately and in real time because it directly impacts human health. Air pollutants such as PM2.5 and PM10 are microparticles that are harmful if inhaled over a period of time. In this research, an Internet of Things (IoT)-based air quality monitoring system was designed, installed on public transportation to conduct portable measurements. This system is equipped with various sensors, including the SCD30 to measure carbon dioxide (CO_2), temperature, and humidity; the MQ-07 sensor to detect carbon monoxide (CO); the DHT22 sensor for temperature and humidity; and the GP2Y1010AUOF sensor to detect PM2.5 and PM10 dust particles.

All sensors are connected to an ESP32 microcontroller, which serves as a data processing center and sends data to a cloud platform via Wi-Fi connectivity. Location data is obtained using GPS integrated with mobile devices, enabling accurate air pollution measurements based on geographic location. Measurement data is displayed in real time via a mobile application and locally via a 16x2 I2C LCD.

System testing was conducted around Telkom University in July 2025. Test results showed that all sensors functioned properly, and data was successfully transmitted and visualized in the application. Furthermore, the system supports mobile air pollution monitoring on a wider scale, providing critical information for road users and relevant agencies. The capstone also evaluated sensor accuracy, data transmission performance, and the overall reliability of the monitoring system. Test results demonstrated that the system was operational and provided relevant information.

Keywords: Internet of Things, Air quality, public transportation, gas sensors, monitoring application, GPS.