

ABSTRACT

The increasingly worrying decline in air quality, especially in urban areas due to the increasing number of motorized vehicles and industrial activities, poses a serious threat to public health and the environment. One way to overcome this problem is to monitor air quality in real time. This study aims to design and build an Internet of Things (IoT)-based air quality monitoring system using the ESP32 microcontroller. This system is designed to monitor the main parameters of air pollution, namely carbon monoxide (CO), sulfur dioxide (SO₂), ozone (O₃), and dust particles (PM10) using MQ-7, MQ-136, MQ-131, and GP2Y1010AU0F sensors. Sensor data is sent in real time via the Blynk application, so users can monitor air quality via their mobile devices. Testing was carried out by comparing the results of sensor readings with standard measuring instruments and observing system performance in different environments such as urban and mountainous areas. The test results showed that the system was able to provide accurate and stable data, as well as provide ease of remote monitoring. This research is expected to contribute to increasing public awareness of the dangers of pollution and encouraging preventive actions in maintaining air quality.

Keywords : *Internet of Things, Air Quality, ESP32 Microcontroller, Pollution Sensors, Real-time Monitoring.*