

ABSTRACT

Technological advancements have provided solutions to many challenges faced by various sectors, including air quality monitoring. Air quality is a crucial factor affecting human health and the environment. The decline in air quality can have adverse effects on ecosystems, respiratory health, and human productivity. Therefore, the development of an efficient, real-time, and wide-reaching air quality monitoring system becomes an essential necessity. This system utilizes Internet of Things (IoT) technology integrated with various types of sensors to measure air pollution parameters such as CO₂, NH₃, temperature, humidity, air pressure, and wind speed. Data collected from these sensors is transmitted via Long Range (LoRa) communication technology, enabling long-distance data transmission with low power consumption.

This system is designed to provide real-time data through a web-based dashboard, making it easily accessible to users. By using LoRa, the system can send data from remote or otherwise inaccessible locations that are beyond the reach of conventional communication networks. Testing has shown that this system operates stably and accurately, transmitting data efficiently under various environmental conditions. With its ability to monitor air quality in real time, this system can provide the necessary information for quicker and more accurate decision-making, benefiting governments, the public, and other stakeholders in addressing air pollution issues.

This system also contributes to the development of smart cities by offering an affordable and efficient environmental monitoring solution. By integrating IoT and LoRa technology, this system not only provides accurate data but also supports better decision-making in mitigating air pollution and raising public awareness about the importance of maintaining air quality for health and environmental sustainability.

Keywords: Internet of Things (IoT), Air Quality, Multi Sensor, LoRa, Real-Time Monitoring