A Remote Long-Range Localized Air Pollution Monitoring System

ABSTRACT

Air pollution is a global issue that affects us every day, which brings about the need to monitor air quality regularly. However, fixed air monitoring systems in Malaysia are only situated in several areas, and the public is unaware of air quality conditions in terms of pollutants at specific locations. In efforts to tackle localised air pollution, this paper proposes to construct a low-cost remote air quality monitoring system and develop a web application to act as an interface for users. The proposed system comprises a sensor system and a ground terminal, which are connected using Long Range (LoRa) technology. Both units function to measure air quality parameters such as carbon monoxide (CO), sulphur dioxide (SO2), ozone (O3), particulate matter (PM) particles, etc., and upload the collected data onto the Internet of Things (IoT) platform. The functionality of the prototype was verified by testing it in different environments. The sensor's data was also verified to be accurate through data comparisons, where the majority of percentage differences fell below 10%. Performance analysis was then performed through statistical measures such as standard deviation, mean, etc., to categorise the data in each tested area. The low-cost nature of this proposed system would benefit everyone, especially underdeveloped countries that are always under threat of poor air quality.