

AIR QUALITY ASSESSMENT USING GAS SENSORS IN URBAN TRAFFIC AREAS IN PERADENIYA, SRI LANKA

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The issue of air quality is a pressing environmental concern, as 99% of the global population resides in areas where air quality standard levels are not met. Onsite and real-time air quality monitoring is required to ensure the respiratory health of the urban population. However, air quality monitoring is difficult to achieve using benchtop equipment such as gas chromatography and mass spectrometry. The primary emphasis of this research was to systematically explore and assess pollution levels by using portable gas sensors in urban areas in Peradeniya, thereby contributing valuable insights to the existing body of knowledge on environmental monitoring in this area. The study analysed NO₂, CO₂, and CO gas levels at designated monitoring locations. The analysis examined the effects of traffic density, time variability, road infrastructure, and environmental conditions. The monitoring device was developed by integrating hardware components with Arduino IDE software. The results implied that emissions from road traffic have a greater influence on CO₂, CO, and NO₂ concentrations than meteorological conditions. The levels of pollution were found to be elevated by approximately 100% in traffic locations, which is a 25% increase compared to normal traffic conditions. The observed trends showed a 20% increase in pollutant gasses in the afternoon and evening. Galaha junction had an approximate 40% increment than Gatambe, and it demonstrates that the pollution levels have varied significantly within short distances. The levels of all three gases were higher at the Galaha and Gatambe junctions compared to the reference location, University ground. Afternoon hours showed higher pollution levels, which were affected by high ambient temperature. Analysis of the present study was limited to a specific area, which may limit the generalizability of the results to overall air pollution and potentially restrict the applicability of findings to urban traffic areas. Further investigations, including multiple geographic locations in the Kandy and Peradeniya areas, are being conducted to calibrate the developed detection system to measure gas concentrations in ppm.

Keywords: Air quality, Arduino IDE software, Gas sensors, Urban traffic