Air Quality Status in UKM (Malaysia) using Aerobox Low-Cost Sensor under the $PM_{2.5}$@Asia Network

Nur Izzati Zaini[1*], Maggie Ooi Chel Gee[2], Sheng-Hsiang Wang[3]

[1]UKM-YSD Chair for Sustainability, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Bangi, Selangor
[2]Centre for Tropical Climate Change System, Institute of Climate Change, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia
[3] Department of Earth Science, National Central University, Taoyuan, Taiwan.

Abstract

This study investigates air quality condition at Universiti Kebangsaan Malaysia (UKM) under the $PM_{2.5}$@Asia Network University Social Responsibility (USR) initiative. Three Aerobox sensor-display units, developed by ideaNCU/ideaSky Lab, National Central University Taiwan, were installed at strategic campus locations: EOC IPI Office Lobby, Kolej Pendeta Za'ba Student Cafeteria, and the UKM Mosque Prayer Hall. These plug-and-play devices enable real-time data collection and display, making installation and maintenance simple while raising awareness among campus occupants. These devices monitor particulate matter (PM) levels, CO_2, temperature, and humidity, with display panels informing students and staff of air quality conditions in various settings. This initiative supports UKM's commitment to a healthier campus and environmental health. Data collection took place from February 2024 to June 2025. However, there are some periods with missing data within this timeframe. This effort serves as a baseline for future long-term monitoring. Results show different air quality levels at all locations. The student cafeteria recorded the highest levels of PM and CO_2, likely due to cooking activities and gathering of crowds. This means the cafeteria has a high emission level of PM and are not well ventilated. UKM Mosque Prayer Hall (semi-open area with occasional crowd gathering) record high PM as the area is much more open and could represent the outdoor ambient air quality more than the remaining two areas. The office lobby showed stable weather conditions, though CO_2 was higher during working hours. The Aerobox captures different weather and air quality profiles, supporting better understanding of campus atmospheric conditions.

Keywords: Low-cost Air Quality Sensor, Real-time Monitoring, Weather Parameters, University