

ABSTRACT

This research aims to identify indoor air quality by measuring CO, CO₂, PM_{2.5}, temperature, and air humidity parameters, as well as adding environmental radiation measurements with Geiger Counters and Particle Detectors in real-time. The designed hardware system is placed in a separate chamber but remains wirelessly connected via the ESP-NOW protocol. Additionally, this system employs a validation system to process data received from the hardware system via Wi-Fi. All validated data is visualized through the Birulangit Monitoring Website to facilitate users in obtaining information about indoor air quality and radiation. The research was conducted at Deli Building, Engineering Service Community (ESC) laboratory room, Telkom University from January 4th to 11th, 2024. The research results indicate that the expected radiation dose is around 2.46 mSv/year for alpha particles and 1.814 mSv/year for beta and gamma particles, approaching the world average value of 2.4 mSv/year. The indoor CO₂ concentration is within safe limits (422.27 - 845.14 ppm), but PM_{2.5} exceeds the standard (43.79 - 73.58 µg/m³) due to laboratory activities. It is noted that there is no correlation between radiation dose and air quality. This research is capable of identifying indoor air quality and environmental radiation by operating systems in real-time.

Keywords: *Air Quality, Environmental Radiation, Validation System, and Website Monitoring.*