ABSTRACT

Indoor air quality is crucial to observe because most people spend 90% of their time in the room which is influenced by $PM_{2.5}$ and CO_2. If the occupants are exposed continuously, it will affect their health significantly. Hence, it is necessary to control indoor air quality if it exceeds the quality standard. One technology to reduce indoor air pollution is an air purifier that consists of an exhaust fan, HEPA and activated carbon filter. One of the developments is the smart air purifier that can automatically adjust the fan speeds so as can minimizes electricity costs. The system is designed based on fuzzy logic from pollutant concentrations so that it can make 0%, 50%, and 100% PWM fan duty cycle and the power consumption can be adjusted. In addition, testing in a test chamber so that the pollutants concentration can be controlled, and the smart air purifier performance can be analyzed. The test results show the $PM_{2.5}$ reduction rate is 0.0147 s^{-1}, the CADR is 2.39 ft^3/min, and can minimizes 29.26% of the commercial air purifiers electricity cost. The CO_2 test results didn't show a reduction, so an experimental setup evaluation of the CO_2 capture filter type used was needed.

Keywords: *activated carbon, CO_2, HEPA, $PM_{2.5}$, smart air purifier*