Smart healthy home model for indoor air quality improvement using AI

Hyeonjeong Yang(heonjeongyang@kict.re.kr)[1], Sooam Kim[2], Eunkyoung Hwang[3]
Hyunsoo Lee[4]
[1]Research Specialist, [2]Senior Research Fellow, [3]Research Fellow, [4]Professor

Abstract

One of the most important issues related to health in housing is fine dust. The apartment housing models equipped with the function to reduce fine dust based on technologies including the air cleaner and ventilation system are being introduced in the country. Based on the fine dust generation scenarios in housing, this paper discusses the smart healthy home model planning, system and AI-based control schemes for providing the environment with optimal air quality in accordance with the residents' situation. Specific contents are as follows. First, six fine dust generation scenarios in housing and three ways to deal with fine dust in consideration of the building system were delineated, and 10 relevant facilities and equipment were summarized through a review of relevant literature. Second, space control elements and systems for each scenario were summarized and the smart healthy home model was designed to enable automatic control for each situation. The smart home system was designed based on the Arduino system, and its installation and data collection methods were summarized. Third, the AI-based control schemes were established using MS azure and the designed model was verified. With regard to the verification result, the possibility of AI-based optimal customized air environment control for residents was drawn, and the points requiring improvement for the space and facilities for designing the smart healthy home system and establishing Big Data were presented.

The smart healthy home model drawn in this study comprehensively considers data such as the residents' situation and environment and presents the direction of advanced future housing that can provide optimal air environments based on the analysis of the residents' living patterns - unlike various ventilation systems that depend on separate facilities and equipment currently available on the market. This study is distinguished from previous studies in that the method to plan and control building systems as well as facilities and equipment is comprehensively discussed.

Keywords: *Smart Healthy Home, Indoor Air Quality, AI Control Process, Micro Dust*

Biography

As a Research Specialist in the Department of Living and Built Environment Research under the Korea Institute of Civil Engineering and Building Technology, she carries out research in the field of architectural planning and design. Her main fields of research include the designing of apartment housing, technology development and system improvement, and she is responsible for presenting the direction of future housing with digital technologies.