Foreword and Editorial

Asia-Pacific Journal of Advanced Research in Electrical and Electronics Engineering

We are very happy to publish this issue of an Asia-Pacific Journal of Advanced Research in Electrical and Electronics Engineering by Global Vision School Publication.

This issue contains 3 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

In the research paper "Changes of Electroencephalogram(EEG) during robot programming activity in the LED illuminance system with three-type color temperature", the purpose of this study is to analyze EEG changes of students according to color temperature of LED illuminance during programming of a robot. In order to do so, we measured and analyzed EEG (delta, alpha, theta, and beta waves) while subjects performed programming under an LED illuminance system with color temperatures of 3000K, 5000K, and 7000K. As a result, for robot programming, an LED illuminance system with a color temperature of 7000K is recommended; this system has been shown to affect not only the prefrontal but also the occipital lobe and the left as well as the right brains. In addition, the stability and concentration of the group with mainly the alpha wave in the occipital lobe was found to be dominant over the group of alpha waves from the prefrontal lobe, especially at 7000K. However, the activity value was also high at 5000K. This is an example showing that the effect of lighting is different according to individual characteristics.

In the paper "Proposal and Performance Evaluation of Automatic Blind Algorithm Based on Illuminance Sensors", in order to reduce the cooling load caused by solar radiation inflow, blind applications and automatic control methods are being studied from various angles. However, automatic control systems using insolation sensors are difficult to commercialize due to the high cost of the sensor. Therefore, the purpose of this study is to propose a slat control algorithm based on illuminance sensors for a triple-glazed window with integral blinds. The validity of the proposed algorithm would then be verified through a simulation performance evaluation. The case settings for performance evaluation are as follow: Case 1 (double-hung window), Case 2 (triple-glazed window), Case 3 (triple-glazed low-E window with integral blinds), and Case 4 (triple-glazed window with the algorithm proposed in this study). The performance evaluation results are as follow. 1) As a result of cooling energy calculation, Case 4 shows the lowest rate of cooling load compared to other cases. 2) As a result of deriving the PMV, Case 4 was -0.9 ~ 0.7 throughout the year, which is most similar to the thermal comfort range compared to other cases.

In the paper "A preliminary Study on Daylight Duct Design for the Advanced Luminous Environment", with recent rises in energy consumption, research and technology development related to energy reduction has become a significant priority, and the demand in this area is increasing. In particular, as energy consumption in the building sector is increasing, various systems are being developed to solve this problem. One such system, the Daylight Duct, is a natural lighting system that transfers the natural light from the outside into specific areas in the house, and as its efficiency has been recognized, its utilization is

increasing. However, the conventional daylight duct is limited to improving lighting efficiency, as it transfers external natural light to a certain area regardless of indoor conditions such as the presence of occupants, due to its reliance on a single light diffuser. Therefore, this study proposes a daylight duct design with multiple light diffusers to improve the lighting efficiency of the daylight duct, and presents a driving system and control factors for controlling the opening and closing of the light diffuser. The results of this study suggest that efficient building energy saving is possible, not only by improving the indoor lighting environment but also by preventing unnecessary lighting. However, this study only suggests the design of the daylight duct, and does not include a quantitative performance verification for the design. Therefore, it should be verified through a variety of methods in future research.

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