

A preliminary Study on the Basic Model of Smart Lighting Control System in Consideration of Lighting Energy Saving at Night

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Abstract. The smart lighting control system using IT technology draws a lot of attention recently but it is determined through the review of preceding studies that there is lack of consideration regarding night time. Therefore, in this study, the smart lighting control system applied with the user position recognition technology and dimming lighting control technology is suggested for saving lighting energy at night. According to this proposal, the indoor space is divided and managed into specific zones and the lighting energy is saved by responding in real time according to the movement of user position.

Keywords: Smart Lighting Control System, Location Awareness Technology, Lighting Energy Saving at Night

1 Introduction

Due to accelerated industrialization and urbanization, energy consumption in buildings continues to increase so that the preparation of countermeasures is demanded. The lighting energy in buildings is essential for pleasant activities of users but it accounts for more than 20 % of total energy consumption in buildings so that studies regarding its effective control method are necessary. The lighting control during daytime is influenced by natural lighting but in case of night time, the lighting control completely depends on artificial light source so appropriate control measures are necessary. Therefore, the smart lighting control system applied with the user position recognition technology and dimming lighting control technology is suggested in this study.

2 Smart Lighting Control System

The smart lighting control system is the lighting control method to realize the optimal energy consumption by recognizing and calculating surrounding environments and

controlling lighting fixtures. The smart lighting control system reduces more energy consumption than the previous lighting control methods and provides proper illumination level through the automated system, real-time situational judgement and performance to maintain proper illumination level [1]. Various indoor and outdoor information may be used in the process to recognize surrounding information and appropriate control algorithm for such information is required. In this study, the user position information and measurement of indoor illumination are set for the data collection range and the position recognition technology and dimming lighting control technology are applied in order to suggest the smart lighting control system to improve lighting energy efficiency at night.

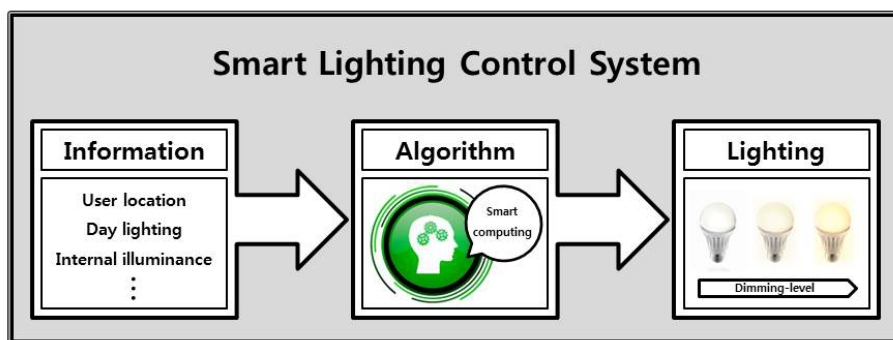
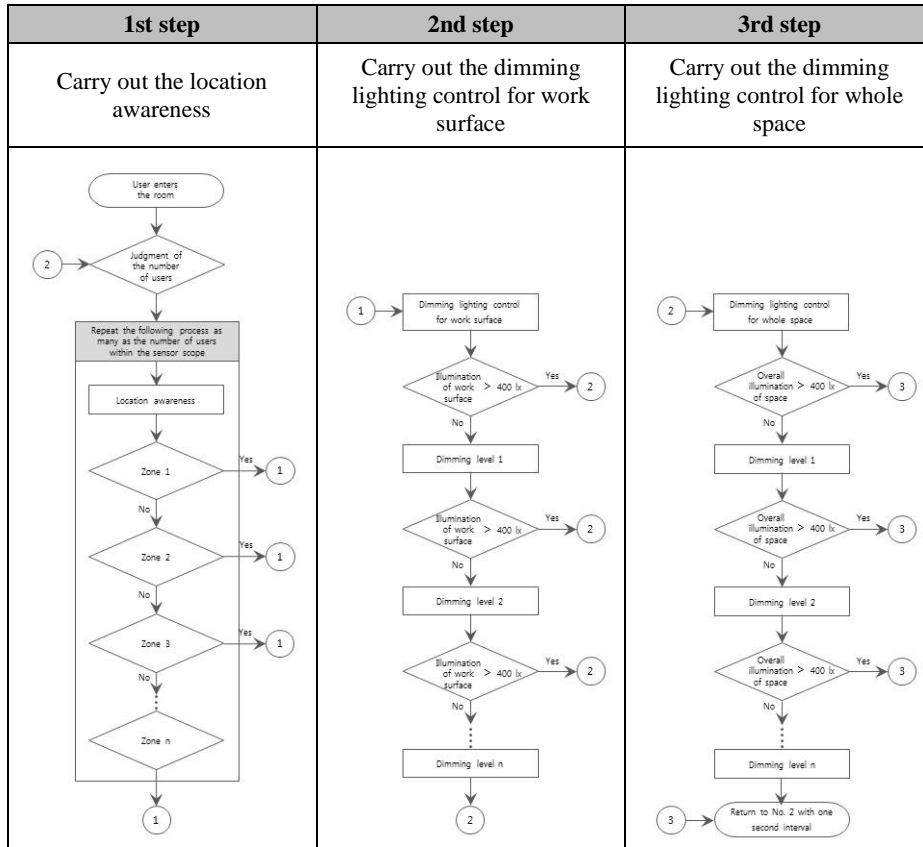


Fig. 1. Smart lighting control system

3 Suggestion of Smart Lighting Control System for Lighting Energy Saving at Night

In this study, the illumination of zone where the user is located is set based on 400lx according to the user position in night environment with no influence of natural lighting and the overall surrounding lighting is set to maintain 100lx. The control flow charge of smart lighting control system suggested in this study is as shown in Table 3 and its main contents are as shown below. First, lighting control begins when the user enters into the space and the position movement of user in the space divided into zones is traced. Second, the illumination of work surface in the zone where the user is located is measured and if it falls below 400lx based on the illumination standard, dimming control of lighting is carried out. Third, the overall surrounding lighting is excluded from the main work surface and maintained at 100lx. Fourth, proper illumination is provided continuously by tracing the movement of user, and when the user leaves the zone, lighting is turned off to finish lighting control. The energy saving performance of suggested basic model was verified through the performance evaluation at the test bed. The contents of the measurement results and comparative analysis will be included in the journal after the workshop.

Table 1. Flow chart : User and location awareness applied smart lighting control system



4 Conclusion

In this study, the plan of smart lighting control system is suggested for saving lighting energy at night and the flow chart for its control is presented. The validity of suggested basic model is verified through the performance evaluation and it is expected that the result of this study could be used for finding more effective energy saving measures in future studies.

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