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Intelligent LED brightness control system using internet-of-things technology

Suk-Ju Kang, Yong Duck Ahn, and Moo-Yeon Lee
Dong-A University, South Korea

Light emitting diodes (LEDs) have been substituted with conventional lighting devices in applications that range from plant lights to consumer electronics. This is because they have various advantages including energy efficiency, long life time, and design flexibility. Recently, several algorithms for the LED power management have been studied for reducing the power further by using the internet-of-things (IoT) technology. Especially, LEDs for the plant light turn on all the time because of the intensive indoor cultivation, and hence the power management is the most important factor. This paper proposes a new intelligent LED brightness control system using the ultrasonic distance sensor. After the target brightness is determined, the ultrasonic distance sensor of the proposed algorithm measures a distance between the plant and the LED device in real time. In this case, the proposed algorithm uses the database, which is pre-defined for the optimal point between the brightness and the sensed distance, and generates the pulse width modulation signal for the output brightness. Therefore, the proposed algorithm can constantly maintain the brightness and greatly reduce the power even though the distance is changed. In the experimental result, the proposed algorithm reduced the power consumption by up to 9.8 W compared with the conventional algorithm when the target LED brightness is 100 lux and the distance is changed from 0.4 m to 1m.

Biography

Suk-Ju Kang received a BS degree in electronic engineering from Sogang University, Rep. of Korea, in 2006 and a PhD degree in electrical and computer engineering from Pohang University of Science and Technology, Rep. of Korea, in 2011. He was a senior researcher at LG Display, Rep. of Korea, from 2011 to 2012. He is currently an Assistant Professor of Electrical Engineering at the Dong-A University, Busan, Rep. of Korea. His current research interests include image analysis and enhancement, video processing, multimedia signal processing, circuit design for display and multimedia systems, robot vision system, and LED control systems.

kangx80@gmail.com

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