Control System of Smart Shading and Indoor Lighting Systems

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ABSTRACT

This paper presents a novel approach for estimating the position of the sun. while the sun moving from east to west, each array comprises a symmetrical arrangement of six cells inclined at angles of either 15 ° , 45 ° , 75 ° ,105 ° , 135 ° , 165 ° to the horizontal, respectively. When the sun and solar cell is vertical, the output voltage value of solar cell is largest. A mathematical correlation is derived to express the relationship between the comparative output voltage of each solar cell (V/Vmax) and the solar position. The sun ’ s position is then computed by averaging the elevation angles derived from the comparative output voltages of all of the cells within the array. After combining the solar orientation detection system, a lux meter, sun shading unit and LabVIEW program, a control system of smart shading and indoor light systems is structured. When a low lux value is measured by indoor lux meter, the program will send command to turn on the artificial light source turn on or change the shading angle to control the indoor environmental illumination automatically. When at apropriate angle, indoor brightness improved and the use of artificial light source reduced as the result of light reflecting. The experimental results are helpful to develop an optimal indoor environmental illumination control module for improving the living environment more comfortable and energy saving.

Keywords : solar cell ; solar position ; smart shading ; indoor lighting system

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