

IoT-Based Brightness Control of LED Lighting for Industrial Applications

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Abstract: This paper presents an IoT-based intelligent lighting system designed to automatically adjust LED brightness in industrial environments according to ambient light conditions and operational requirements. The system utilizes the ESP8266 NodeMCU microcontroller to establish WiFi connectivity and implement Pulse Width Modulation (PWM) for precise control of LED panels. By dynamically adjusting illumination levels based on natural light availability and operational needs, the system significantly reduces energy consumption while maintaining optimal lighting conditions for worker productivity and safety. Testing conducted in a 14×12 feet industrial space demonstrated substantial energy savings compared to conventional lighting systems. The proposed solution offers remote monitoring capabilities, scalability, and integration with existing industrial infrastructure, making it a cost-effective approach to enhancing energy efficiency in industrial lighting applications.

Keywords: Internet of Things (IoT), LED lighting, Energy efficiency, Industry 4.0, PWM control, ESP8266, MOSFET, Smart lighting

