

Controlling the Intensity of a Bulb Based on Surrounding Light Using Arduino and LDR

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Abstract: *This research focuses on the design and implementation of an intelligent lighting system that automatically adjusts the intensity of a bulb based on the surrounding ambient light using an Arduino microcontroller and a Light Dependent Resistor (LDR). The proposed system aims to optimize energy consumption, enhance user comfort, and contribute to sustainable energy usage. The LDR serves as a sensor to measure the intensity of ambient light, producing a voltage signal proportional to the surrounding illumination. This signal is processed by the Arduino, which controls the bulb's brightness using Pulse Width Modulation (PWM) via a driver circuit. The system ensures that the bulb emits minimal light in bright environments and increases brightness in darker conditions, thus maintaining a consistent level of illumination. Experimental results demonstrate the system's responsiveness, accuracy, and ability to significantly reduce unnecessary energy consumption. The paper concludes with an analysis of potential applications, such as smart homes, offices, and streetlights, and suggests future enhancements, including integration with IoT platforms for remote monitoring and control.*

Keywords: Arduino-based lighting control, Light Dependent Resistor (LDR), Automatic brightness adjustment, Energy-efficient lighting system