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A Solar Powered LED Street Light with Auto-Intensity Control

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Abstract: *This paper presents the design and implementation of a solar-powered LED street lighting system with automatic intensity control. The system uses a photovoltaic (PV) panel to harvest sunlight and charge a battery via a charge controller. An Arduino Uno microcontroller with a real-time clock (RTC) schedules and adjusts LED brightness throughout the night. Key components include a monocrystalline solar panel, charge-control circuitry, voltage-sensing divider, Arduino Uno (ATmega328P), DS3231 RTC, and a high-power LED array. The hardware and control circuits were simulated and then built; tests confirmed proper charging, on/off switching, and dimming behavior. Results show the light turns on at dusk, maintains full brightness during peak hours, dims in late-night low-traffic periods, and switches off at dawn, thereby conserving energy. This eco-friendly system achieves reliable illumination with reduced power waste and maintenance.*

Keywords: Solar Energy, LED Street Light, Auto-Intensity Control, Arduino, LDR Sensor, Renewable Energy

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