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Automated Environmental Control for Energy Efficiency in Malls

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Abstract: *An intelligent and scalable environmental control system has been developed to optimize energy consumption in malls using real-time sensor data and automated control. The prototype leverages an Arduino microcontroller integrated with IR sensors for people counting, a DHT11 sensor for temperature and humidity, and an LDR for light intensity detection. Lighting is represented using LEDs, which activate based on the number of occupants, while fan speed is adjusted according to ambient temperature. The ESP8266 module hosts a wireless local dashboard, enabling real-time monitoring of occupancy, environmental conditions, and device states. By dynamically adjusting resources based on human activity and environmental inputs, the system enhances energy efficiency and promotes sustainability in commercial spaces.*

Keywords: Energy optimization, IoT, Arduino, occupancy-based automation, ESP8266, environmental control, mall energy management, smart systems

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