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Parking Management System Using IoT and Tesseract OCR (ANPR)

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Abstract: *Urban traffic congestion and inefficient parking space utilization have become pressing challenges in smart city development. This research presents a low-cost, scalable, and intelligent Parking Management System that integrates IoT-based real-time slot detection with Optical Character Recognition (OCR) for automated vehicle verification. The system utilizes an ESP32 microcontroller interfaced with IR sensors and a multiplexer to monitor up to four parking slots, updating their status on a web dashboard via Wi-Fi. For access control, a laptop-mounted camera captures vehicle number plates, processed locally using Tesseract OCR in Python. Verified plates are transmitted serially to the ESP32, which authenticates them against a predefined list and controls a servo motor-driven gate mechanism accordingly. The system also incorporates an ultrasonic sensor for entrance monitoring, eliminating false triggers. This hybrid approach ensures secure entry, real-time monitoring, and centralized control, offering a promising solution for smart campus, commercial, and residential parking infrastructure.*

Keywords: ANPR, License Plate-Triggered Automation, OCR, ESP32 Microcontroller

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