

ABSTRACT

Urban and semi-urban areas are increasingly experiencing challenges related to unregulated roadside parking, leading to traffic congestion, reduced road safety, and inefficient space utilization. Traditional parking systems lack automation, real-time monitoring, and smart feedback mechanisms, resulting in user frustration and poor space management. This project proposes a Smart Roadside Parking Management System using IoT technologies to address these challenges through intelligent monitoring, allocation, and guidance mechanisms. The proposed system employs **IR sensors** embedded along designated roadside parking zones to detect vehicle presence and occupancy in real-time. The data collected by these sensors is processed by an ESP8266 microcontroller, which communicates with a centralized database over Wi-Fi in the prototype stage. This allows for dynamic updating of parking availability status, accessible through a web interface or mobile application. Visual feedback is provided on-site using **LED indicators**, and digital display boards show real-time slot availability for approaching drivers. For real-world deployment, the system can be enhanced with **RF modules** to ensure reliable offline communication and integrated with cloud-based platforms for remote data logging, analytics, and user interaction. Optional modules such as surveillance cameras for number plate recognition and billing, environmental sensors to monitor pollution levels, and mobile payment APIs further increase the functionality and scalability of the solution. This smart parking system not only reduces time spent searching for parking but also aids in better traffic regulation, law enforcement, and resource optimization. It represents a significant advancement in smart city infrastructure, promoting safer, smarter, and more efficient roadside parking practices.