Chapter 13
Efficient Parking Solutions Powered by IoT and Transportation Integration

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ABSTRACT

In the modern era, the issue of vehicle parking has become a significant concern in substantial investments. The conventional approach of locating available parking spaces by manually searching through multiple lanes has proven to be both time-consuming and labor-intensive. Furthermore, it requires parking safely and securely, eliminating the risk of being towed, and at a reduced cost. To tackle this challenge, a cutting-edge parking control system has been developed. This system incorporates secure devices, parking control gates, time and attendance machines, and car counting systems. These features play a crucial role in ensuring the safety of parked vehicles and effectively managing the fee structure for every vehicle's entry and exit. By leveraging IoT-powered technologies, it simplifies the process of locating available parking spaces by providing real-time information, reducing the manual effort required. With IoT, parking management is revolutionized, offering drivers a seamless and secure parking experience while optimizing operational efficiency for parking operators.

INTRODUCTION

The incorporation of Internet of Things (IoT) technology and transportation systems has paved the way for innovative parking solutions that address the challenges faced by cities and urban areas. Assim et al. (2020), proposed IoT-driven parking solutions harness the power of connectivity, data analysis, and real-time information to maximize parking space usage, optimize traffic flow, and elevate the overall parking experience for drivers. By integrating with transportation networks and services, these solutions offer a comprehensive approach to urban mobility.

The IoT-based parking solutions collect and monitor data on the availability of parking spaces, their occupancy status, and the duration of parking sessions in real-time was discussed by Nova et al. (2022). This data is then processed and made accessible to drivers through mobile applications, parking guidance systems, and digital signage. The integration with transportation systems allows for seamless parking-to-transit connections, enabling drivers to find parking spaces near public transportation hubs or ride-sharing pick-up points.

These intelligent parking solutions bring several benefits to cities, drivers, and transportation authorities. Primarily, these solutions enhance parking space utilization by offering precise information about available parking spots, thus reducing the time spent searching for parking and alleviating traffic congestion. This leads to improved traffic flow and reduced emissions, contributing to a more sustainable and eco-friendlier urban environment.

Secondly, Immanuel et al. (2023) proposed IoT-powered parking solutions enhance the parking experience for drivers by offering convenient features such as mobile payment options, parking reservations, and navigation guidance to available parking spaces. Drivers can easily locate, reserve, and pay for parking using their smartphones, eliminating the need for physical payment and reducing the hassle associated with finding parking.

Thirdly, the integration of parking solutions with transportation networks enables seamless connectivity between parking facilities and public transportation services. This integration allows drivers to plan their journeys more efficiently, combining parking with other modes of transportation such as buses, trains, or bicycles. It promotes the use of sustainable and multimodal transportation options, reducing reliance on private vehicles and congestion in city centers.

Furthermore, Rajbhandari et al. (2018) suggested that IoT-driven parking solutions furnish transportation authorities with invaluable data insights, empowering them to make well-informed decisions regarding parking management, infrastructure planning, and traffic policies. Through thorough analysis of parking data, authorities can discern parking patterns, fine-tune parking operations, and introduce demand-based pricing strategies to promote off-peak parking and incentivize the adoption of alternative transportation modes.

In conclusion, the integration of IoT technology and transportation systems in parking solutions offers a transformative approach to urban mobility. Farooqi et al. (2019) elucidated smart parking solutions enhance the efficiency of parking operations, improve traffic flow, and contribute to sustainable transportation. By providing real-time information, seamless connectivity, and data-driven insights, IoT-powered parking solutions are revolutionizing the way cities and drivers approach parking, making urban environments more accessible, convenient, and environmentally friendly.

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