Review on No Parking Vehicle Detection System

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Abstract — As urban areas become more crowded and vehicle numbers rise, managing parking is increasingly challenging. This study focuses on designing a smart parking system to control vehicle access and prevent unauthorized parking. Unlike existing systems that only provide parking availability, our solution addresses unauthorized parking using ultrasonic or IR sensors, a servo motor, and a buzzer. If a vehicle parks in a restricted zone, an alarm is triggered, and if not removed, a GSM module sends an SMS alert to traffic police. Additionally, a camera captures the vehicle image, uploads it to Google Drive, and includes the link in the SMS for better enforcement.

Keywords: Vehicle Detection, Ultrasonic Sensors, IR Sensors, GSM Module, Servo Motor, No-Parking Zone, Traffic Enforcement, Vehicle Access Control, Iot Parking System

I. INTRODUCTION

In growing urban areas, finding parking is a common struggle, particularly in high-traffic locations like shopping malls, hotels, and cinema halls. Traditional parking systems often lead to wasted time, increased fuel consumption, and environmental harm as drivers search for spaces. These systems also fail to prevent unauthorized parking, causing further disruptions.

This study introduces a No-parking vehicle detection system designed to streamline parking management and enhance security. It utilizes advanced technologies like ultrasonic or IR sensors to monitor restricted areas and detect vehicles in no-parking zones. When unauthorized parking is detected, the system triggers an alert and sends an SMS notification to authorities through a GSM module. A camera captures images of the offending vehicle, and the photo is automatically uploaded to cloud storage, providing a visual record for enforcement.

This integrated approach not only improves the efficiency of managing parking violations but also helps reduce traffic congestion, lowers emissions, and prevents illegal parking in restricted zones. By automating these tasks, the system saves drivers time and enhances urban living conditions, aligning with the broader goals of smart city initiatives.

II. LITERATURE SURVEY

Ghosh et al. [1], present an IoT-based smart parking system using ultrasonic sensors to detect and alert for unauthorized parking in restricted areas. The study highlights IoT's effectiveness in real-time monitoring and improving enforcement efficiency, addressing parking violations more effectively. Sharma et al. [2], explored the integration of IoT devices with cloud computing to monitor and manage no-parking zones in real time. Their proposed system includes sensor networks that detect unauthorized vehicles and upload data to a cloud server, which processes the information and generates alerts for traffic authorities. The study highlights the scalability and adaptability of cloud-based solutions for large-scale urban deployments, emphasizing their potential in efficient traffic management and enforcement. Akhtar et al. [3], propose an IoT-enabled framework for detecting and preventing violations in no-parking zones. The system integrates sensors, cameras, and GPS technology to monitor restricted areas and automatically capture images of unauthorized vehicles. The captured data is transmitted to a central server, where it is processed, and notifications are sent to enforcement agencies. The study highlights the potential of IoT in improving the accuracy and reliability of parking enforcement systems.

Kumar et al. [4], discuss the development of a vehicle number plate recognition and parking system, published in the International Journal for Research in Applied Science & Engineering Technology (IJRASET) in 2018. This paper presents an application designed to recognize vehicle license plates (VLP) and manage parking systems, with potential applications in traffic management, parking areas, and border crossings in Nepal. Shah et al. [5] present a novel image processing approach for detecting vehicles parked in no-parking zones, published in 2023 in the International Journal for Research in Applied Science & Engineering Technology (IJRASET). This innovative solution addresses illegal parking in urban areas, which contributes to traffic congestion and environmental issues, aiming to improve urban mobility and reduce environmental impacts.

An IoT-Enabled Framework for No-Parking Zone Violation Detection [6], 2020, published in the Journal of Urban Technology, introduces an IoT-enabled framework aimed at detecting and preventing violations in no-parking zones. The system utilizes a combination of sensors, cameras, and GPS technology to monitor specific areas and automatically capture images of unauthorized vehicles. Kumar et al. [7], Real-Time Monitoring of No Parking Zones Using IoT and Cloud-Based Platforms (2019), published in the IEEE Transactions on Smart Cities, presents a research study that integrates IoT devices with cloud computing to monitor and manage no-parking zones. The system employs sensor networks to detect unauthorized vehicles, uploading the data to a cloud server that processes the information and generates alerts for traffic authorities. This innovative approach enhances the efficiency of parking enforcement and supports better urban traffic management.

III. FEATURES OF THE SYSTEM

A. Real-Time Monitoring

The system utilizes ultrasonic or infrared (IR) sensors strategically positioned in no-parking zones to ensure full coverage. These sensors continuously scan for vehicle presence, enabling immediate detection of unauthorized

vehicles. This real-time monitoring reduces the likelihood of violations going unnoticed, enhancing parking enforcement effectiveness. By proactively addressing unauthorized parking, the system helps maintain order in high-traffic areas and minimizes the environmental impact of prolonged searches for parking.

B. Automated Alerts

When unauthorized parking is detected, the system triggers an alarm and sends an SMS notification to traffic authorities via a GSM module. This automated alert ensures prompt notification, enabling a swift response to violations. The SMS includes essential details like the violation's location and timestamp, facilitating quick action. This immediate notification not only deters potential violators but also reinforces compliance with parking regulations, while reducing the workload on traffic personnel so they can focus on other essential duties.

C. Visual Documentation

The system includes a high-resolution camera that activates when an unauthorized vehicle is detected in no-parking zones, capturing clear images of the violation. These photos are uploaded to a cloud storage platform for secure and easy access. This feature provides authorities with concrete evidence of violations, helps identify repeat offenders, and enhances driver accountability. Additionally, having visual documentation can streamline legal processes related to parking fines and disputes, strengthening the system's effectiveness in enforcing parking regulations.

IV. EXISTING SYSTEM ARCHITECTURE

As urban populations continue to expand, the growing number of automobiles has intensified the challenge of managing parking spaces in cities. One of the critical issues faced by urban planners and traffic management authorities is the prevalence of unauthorized parking in no-parking zones, which disrupts traffic flow, reduces the availability of legitimate parking spaces, and compromises overall urban safety. Traditional parking management systems, while providing basic guidance on available parking spots, often lack the capability to effectively monitor and enforce no-parking regulations. Current solutions do not adequately address the issue of vehicles parked in unauthorized areas, leading to inefficiencies in parking management and enforcement. The lack of a robust, automated system to detect and respond to unauthorized parking poses significant challenges:

Inefficient Enforcement: Manual enforcement of no-parking regulations is time-consuming, resource-intensive, and prone to delays, leading to reduced effectiveness in deterring violations.

- Lack of Visual Evidence: Traffic authorities often struggle to gather sufficient evidence to enforce penalties, making it difficult to hold violators accountable.

To address these challenges, there is a need for an advanced smart parking system that not only guides drivers to available parking spots but also actively monitors no-parking zones, detects unauthorized vehicles, and facilitates efficient enforcement through automated alerts and visual documentation. This study aims to develop a smart parking system that integrates real-time detection of unauthorized vehicles using sensors, automated alert mechanisms, and a camera-based evidence collection system. The solution will enhance the enforcement of no-parking regulations, contributing to improved traffic management, urban safety, and overall parking efficiency.

V. PROPOSED SYSTEM ARCHITECTURE

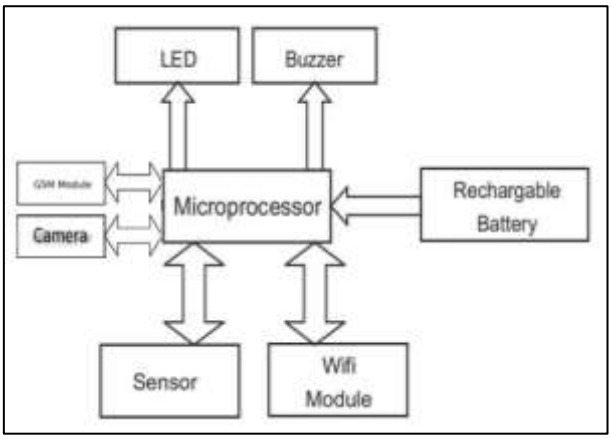

Fig. 1: Proposed Diagram

VI. PROPOSED METHODOLOGY

Internet of Things (IoT) is the networking of physical items with electronics built into its design to enable communication and the detection of interactions between them or with the surrounding environment. IoT-based technology will provide higher levels of services in the future years, effectively altering how individuals go about their everyday lives. Just a few categories where IoT is well established include improvements in medical, power, agriculture, smart cities, and smart homes. As of right present, there are more than 9 billion "Things" linked to the Internet. The Internet of Things (IoT) has revolutionized the world with its ability to connect devices and make them work together seamlessly. The IoT can be used to create innovative solutions that solve real-world problems. people are still Parked there vehicle in no parking area so we have proposed the system in which we have create a module in that we have used the ultrasonic sensor or IR sensors and servo motor buzzer , to detect the vehicle in that No parking.

VII. CONCLUSION

The rapid urbanization and the increasing number of vehicles on the road have made efficient parking management a critical concern for modern cities. Traditional parking systems, while addressing some aspects of parking availability, fall short in effectively managing unauthorized parking in no-parking zones. This gap highlights the need for a more advanced solution that not only informs drivers of available parking spots but also enforces parking regulations in real-time. The smart parking system developed in this study addresses this challenge by integrating a range of technologies, including ultrasonic sensors, IR sensors, servo motors, buzzers, and GSM modules. This system effectively detects unauthorized vehicles in no-parking areas and

initiates a series of automated responses, from triggering alarms to notifying traffic authorities via SMS. The addition of a camera feature further enhances the system's capabilities by providing visual evidence of parking violations. By automatically capturing and uploading photos of unauthorized vehicles to Google Drive, the system not only improves the enforcement process but also ensures accountability and transparency. In conclusion, the smart parking system proposed in this study offers a comprehensive solution to the challenges of unauthorized parking in urban areas. By combining real-time detection, automated alerts, and visual documentation, the system significantly improves parking management and enforcement, contributing to safer and more organized urban environments. This approach paves the way for more secure, efficient, and scalable parking solutions that can adapt to the evolving needs of modern cities.

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