

IoT-Based Smart Parking space identification and parking slot monitoring system

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ABSTRACT -This project focuses on creating an IoT-driven smart parking system to monitor and manage parking spaces effectively. By leveraging IoT technology, the system ensures real-time data collection on parking slot availability, which is accessible through an online dashboard. The primary goal is to address parking congestion problems by allowing drivers to easily locate vacant parking spots. Through continuous monitoring and data analysis, the system aims to optimize parking space utilization, streamline traffic flow, and enhance overall parking efficiency. Ultimately, it offers a convenient solution for both drivers and parking management authorities to mitigate congestion and improve urban mobility.

I. INTRODUCTION

In recent times the concept of smart cities has gained great popularity. Using the evolution of Internet of things, idea of smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. Traffic in metropolitan cities in India is the common issue faced by people. People prefer to own cars because cars offer an unmatched combination of speed, autonomy, and privacy. Parking problems in cities and urban areas are becoming increasingly important and have been one of the most discussed topics by both the general public and professionals. The imbalance between parking supply and parking demand has been considered as the main reason for metropolis parking problems. Moreover, the parking system plays a key role in the metropolitan traffic system, and lacking of it shows closed relation with traffic congestion, traffic accident, and environmental pollution.

Although efficient parking system can improve urban transportation and city environment besides raising the quality of life for citizens, parking problem is an often-overlooked aspect of urban planning and transportation. Urban planners should seek more efficient and innovative solutions for parking problem on the level of management, planning, and designs. Car parking is a major problem not only in urban areas but also in developed and developing countries. Following the rapid incense of car ownership, many cities are suffering from lacking of car parking areas with imbalance between parking supply and demand which can be considered the initial reason for metropolis parking problems. This imbalance is partially due to ineffective land use planning and miscalculations of space requirements during first stages of planning. Shortage of parking space, high parking tariffs, and traffic congestion due to visitors in search for a parking place are only a few examples of everyday parking problems.

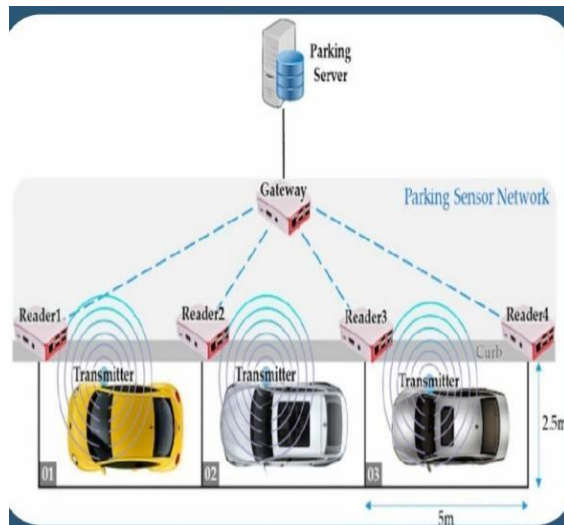
Difficulty in finding vacant spaces quickly in a multilevel parking lot is difficult if not impossible, especially on weekends or public holidays. Finding spaces during weekends or public holidays can take more than 10 minutes for about 66% of visitors. Stadiums or shopping malls are crowded at peak periods, and difficulty in finding vacant slots at these places is a major problem for customers. Insufficient car park spaces lead to traffic congestion and driver

frustration. Another problem is Improper Parking made by drivers. If a car is parked in such a way that it occupies two parking slots rather than one, this is called improper parking

.Improper parking can happen when a driver is not careful about another driver's rights. This is tackled by the development of automated smart car parking system. This project is an IoT based cloudintegrated smart parking system. This system checks out the availability of the vehicle in the parking area and displays the slot number of an empty slot on an LCD display for a new car entering at the gate. The information of the empty slot is also uploaded on to the thingspeak cloud platform. Raspberry pi is used to control the whole mechanism

EXISTING SYSTEM

Previous research has extensively delved into IoT- based parking systems, primarily examining aspects such as sensor integration, data acquisition, and the design of user interfaces. Despite these efforts, numerous existing solutions exhibit shortcomings in scalability, real-time monitoring capabilities, and the provision of user-friendly



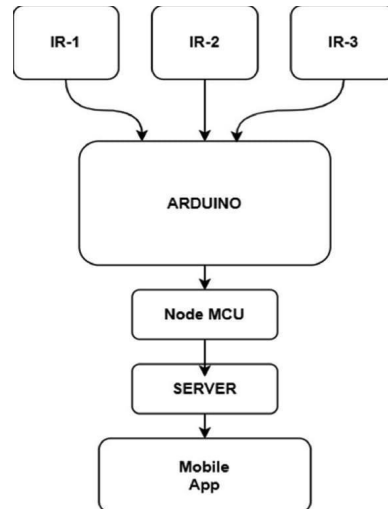
interfaces.

PROPOSED SYSTEM



Our proposed solution aims to harness IoT sensors strategically deployed within parking slots to detect the presence of vehicles. These sensors will be equipped to wirelessly transmit data to a centralized system for efficient processing and analysis.

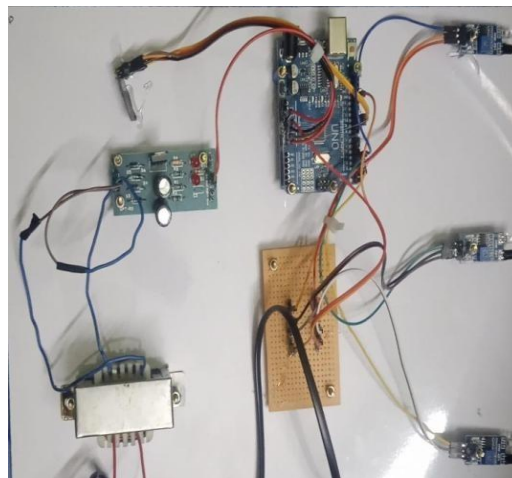
By leveraging this IoT infrastructure, our system will enable real-time monitoring of parking occupancy, allowing users to access up-to-date information regarding parking availability. The heart of our solution lies in the development of a user-friendly dashboard accessible via the internet or a dedicated mobile application.



This dashboard will serve as a centralized hub for users to conveniently view parking availability in real-time, facilitating informed decision-making when searching for parking spaces. Emphasis will be placed on designing an intuitive and visually appealing interface to enhance user experience. Additionally, our solution will prioritize scalability to accommodate the needs of various parking environments, from small lots to extensive multi-level parking structures. By integrating seamless data transmission, real-time monitoring capabilities, and a user-friendly interface, our proposed model aims to address the limitations observed in existing IoT-based parking systems, providing a comprehensive solution for efficient parking management.

EXPLANATION

In the parking infrastructure, sensors are deployed within parking slots to detect the presence of vehicles, promptly sending signals to microcontrollers. These microcontrollers, acting as data processors, analyze the incoming sensor data and subsequently transmit it wirelessly to a centralized system. This central hub serves as a repository, aggregating and consolidating data streams from all parking slots across the facility. Through seamless integration, the centralized system feeds this compiled data into a web-based dashboard accessible to users.

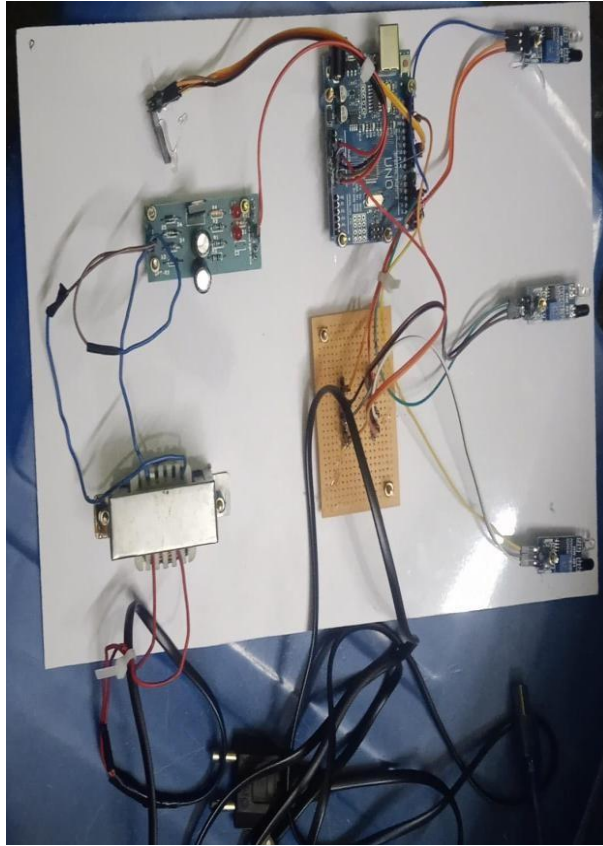


EXPERIMENT AND RESULTS

The prototype was developed and desired output was obtained. The working setup is shown in figure. When a car appears at the entrance, the status of each parking slot whether it is vacant or occupied is captured by ultrasonic sensor and uploaded onto the thingspeak cloud. The vacant parking slot number is displayed on LCD display. The gate is controlled by the person in the control room. He can control whether to open or close the gate by using a

website.

Website has two radio buttons. On clicking on “Gate open” option, the gate is opened and on clicking on “gate close” option, the gate will be closed.



The web page would be opened in the browser with URL as shown in the terminal in figure. The web page has two radio buttons corresponding to gate open and gate close. Opening and closing of that gate can be controlled by clicking on the radio button. This feature is used for security aspect

CONCLUSION

The IoT-based smart parking system represents a groundbreaking advancement in urban infrastructure, offering a scalable, efficient, and user-centric approach to parking management. By harnessing the power of IoT technology, this system enables the remote monitoring and optimization of parking spaces, providing real-time information to drivers and parking administrators alike. Its intuitive user interface, coupled with proactive management features, not only simplifies the parking experience for drivers but also holds the potential to alleviate traffic congestion and reduce carbon emissions in urban areas. As cities worldwide grapple with the challenges of rapid urbanization and limited parking resources, the deployment of such innovative solutions becomes increasingly imperative.

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