

# “Park Easy” (IOT Based Parking System)

**Mr. Anup Sonawane<sup>1</sup>, Mr. Adhar Wani<sup>2</sup>, Mr. Dev Khairnar<sup>3</sup>,  
Mr. Nishant Ahire<sup>4</sup>, Mrs. Sanika Ghumare<sup>5</sup>**  
HOD, Department of Information Technology<sup>1</sup>  
Students, Department of Information Technology<sup>2,3,4,5</sup>,  
Mahavir Polytechnic, Nashik, India

**Abstract:** *Parking management is a major challenge due to the increasing number of vehicles in cities. Traditional parking systems often lead to driver delays, inefficiency and frustration. To address these issues, this work proposes the development of an Internet of Things (IoT)-based system using infrared (IR) sensors for real-time monitoring and monitoring of parking lots on the proposed system uses IR sensors strategically placed in parking lots to detect the presence of vehicles. These sensors are connected to a central control unit equipped with IoT capabilities, enabling wireless communication and data exchange over the Internet. Through this network, real-time information about parking availability is transmitted via mobile applications or web platforms to an accessible user interface.*

**Keywords:** IoT (Internet of Things), parking management, IR sensors, real-time monitoring, wireless communication, data analytics, smart parking, urban parking, vehicle recognition, parking availability, mobile applications, web connectivity, scalability, efficiency, sustainability

## I. INTRODUCTION

In IoT-based parking system using IR sensors, detecting of parking occupancy occupancy status is important for effective parking management Every parking space is equipped with IR sensors to detect the presence or absence of vehicles. When the vehicle enters a parking space, the IR sensor registers its presence and transmits this information to the central control unit of the system. Based on data from IR sensors, the system determines the parking space. If the parking lot is full, the system triggers a red light, telling users that the parking lot is now full. Conversely, when the parking lot is empty, the system activates the green indicator light, letting users know that there is a parking lot available. This visual display mechanism simplifies the process for users to search for the best available parking spaces. By instantly communicating the status of the parking lots with colored lights, drivers can instantly see where they can park, without having to search extensively the combination of IR sensors and color-coded signage makes the parking system more efficient, makes parking spaces more user-friendly, and provides an overall parking experience for them improved utilization Furthermore, this approach helps reduce congestion and increase traffic flow to parking lots.

## II. RESEARCH METHODOLOGY

**1. Project Scope and Goals:** To develop an IoT-based parking management system using IR sensors to monitor parking slot occupancy in real time. And the main goal of this project is to Improve parking utilization, provide users with real-time parking information, improve traffic flow, ensure system portability reliable and accurate, and we design cost-effective solutions for urban parking lots.

### 2. System Architecture and Design:

Scalability: Easily expandable for different parking lot sizes.

Reliability: Robust error handling, security measures.

Integration: Compatible with existing infrastructure for comprehensive parking management.

**3. Data Collection and Preparation:** In an IoT-based parking system, the data collection and preparation process are essential to ensure accurate real-time information about an occupied parking slot. This process starts with infrared (IR) sensors to be installed on each parking lot. These sensors detect the presence or absence of vehicles and collect data accordingly. Once the sensors detect the presence of a vehicle, the data is transmitted to a central control unit. Here, the raw data serves to identify the composition of each parking lot. This process involves analysing sensor data and making decisions based on predefined criteria. After the processing step, the data is formatted in a standardized way to ensure consistency and consistency with the rest of the system. This data set is then used to provide users with real-time updates on parking availability. In this process, certain techniques are used to ensure data quality and reliability. Quality checks are conducted to identify and eliminate any anomalies or inconsistencies in the data. In addition, error detection and correction procedures have been established to ensure data consistency.

**4. Website Design:** Our website design for IoT-based parking systems has been carefully designed to provide users with smooth navigation, detailed information and seamless interaction

### **III. PAGE STYLE DESIGN OF THE PROPOSED SYSTEM**

#### **Architecture of the System:**

Our IoT-based parking system architecture seamlessly integrates hardware and software components to efficiently manage parking spaces. Infrared sensors detect the presence of a vehicle, communicate with microcontrollers to control indicator lights and transmit data wirelessly to a central control unit. This unit consisting of a microcontroller or single-pane computer processes sensor data and it communicates with external systems through a communication interface. Middleware facilitates data flow, while user interface software provides real-time access to parking information. The system ensures flexibility, reliability and safety, capable of integrating with existing infrastructure for comprehensive urban parking management.

#### **Design of the User Interface:**

The user interface (UI) design of our IoT-based parking system prioritizes ease of access and seamless interaction with real-time parking availability information. Dashboard providing parking availability information the general availability and availability including contextual information for users at check-in. A visually an interactive map interface is presented showing the layout of the parking lot with color-coded icons indicating slot available. Users can search and select parking spaces by location, duration, or vehicle size, while real-time updates ensure up-to-date information. Reservations and orders allow users to book reservations in advance, and provide confirmation information. Connection and mapping services provide navigation to available slots directly from the UI. Profile settings offer personalization, and notifications and alerts keep users informed. A dedicated help and support department assists users with Q&A, tutorials and customer support interactions. Designed for accessibility and responsiveness, our UI ensures the best user experience across all devices, making it easy to manage parking efficiently in cities in large quantities.

#### **Security Procedures:**

Security is paramount in our IoT-based parking system, ensuring the protection of user data, maintaining system integrity and preventing unauthorized access. We use strong encryption for data transmission, implement access control procedures, conduct regular security audits, and adhere to secure software development practices. Further enhancing the anti-threat resilience of our system by complying with data privacy laws, physical security measures and incident response systems. These comprehensive security measures support confidentiality, integrity and availability, and it provides users with a safe parking experience.

#### **Design for Responsiveness:**

Responsiveness is a key component of the user experience in our IoT-based parking system, ensuring accessibility across devices and screen sizes. The design prioritizes flexibility, and the design elements dynamically adjust to provide the best viewing experience. Whether you access it on a desktop, laptop, tablet, or smartphone, the user interface has been scaled and reconfigured to fit a variety of screen resolutions. Intuitive web design, customizable graphics, fluid

typography and readability and usability on various devices They are numerous. Additionally, touch devices include touch-sensitive controls and gestures to enhance communication. By prioritizing responsiveness our system ensures consistent and convenient access to parking information, improving user satisfaction and usability across platforms on the is greater.

**Mechanism of User feedback method:**

To further improve our IoT-based parking system, it is important to streamline user feedback to ensure user satisfaction. We use a multi-pronged approach to collect feedback from users. First, in the user interface we include feedback forms or surveys where users can report their comments, suggestions, or any problems they encounter while using the system These feedback forms are accessible and easy to display, encouraging user engagement. In addition, we use communication channels such as email or dedicated support portals to enable users to contact us directly with their comments or questions. Additionally, periodic user meetings or focus groups can be held to gather in-depth and desirable insights from users. By actively soliciting and incorporating user feedback into our system development process, we can better meet user needs, increase usage, and ensure the continued consumption of our IoT-based parking system victory.

**Documentation and Training:**

Successful documentation includes system design, installation procedures, and operating instructions, which serve as valuable resources for system administrators, developers, and end-users Provided training programs designed for hands-on demonstrations and interactions workplace including to ensure system administrators and users are proficient in system implementation functionality and of the undertaking By empowering users to power our IoT-based parking system all are used, increasing productivity and user satisfaction.

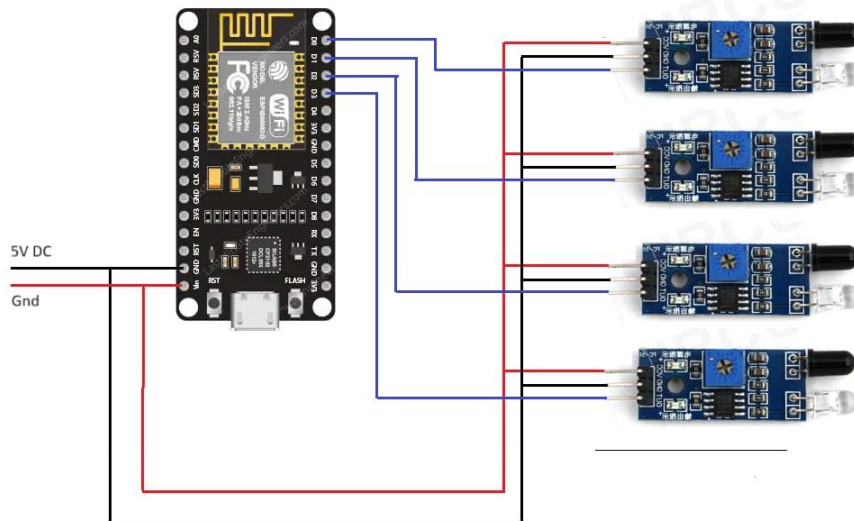


Fig1: Circuit Diagram

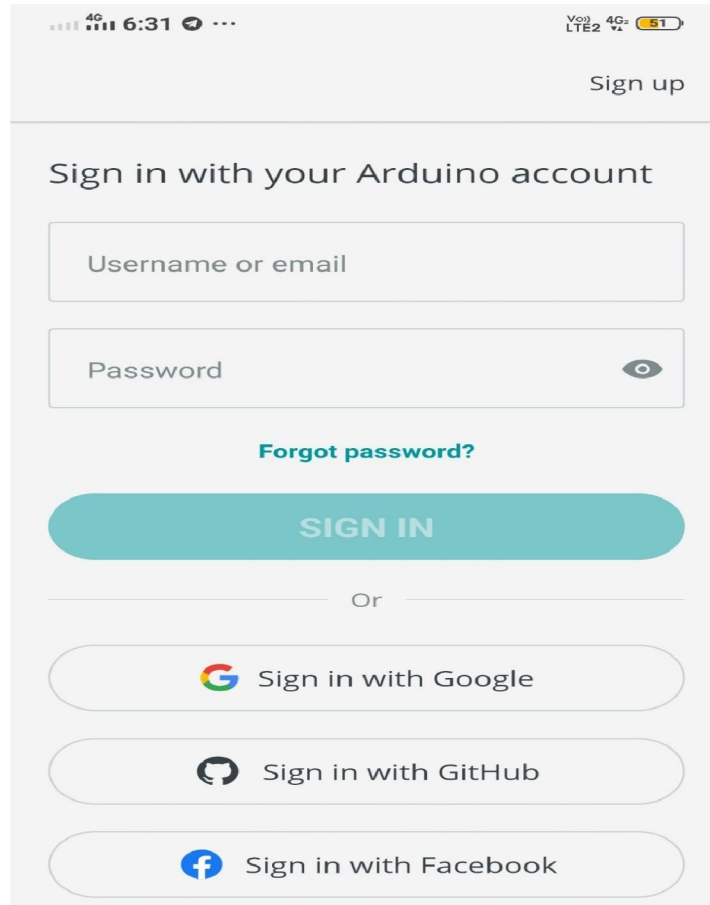


Figure 2. User Interface

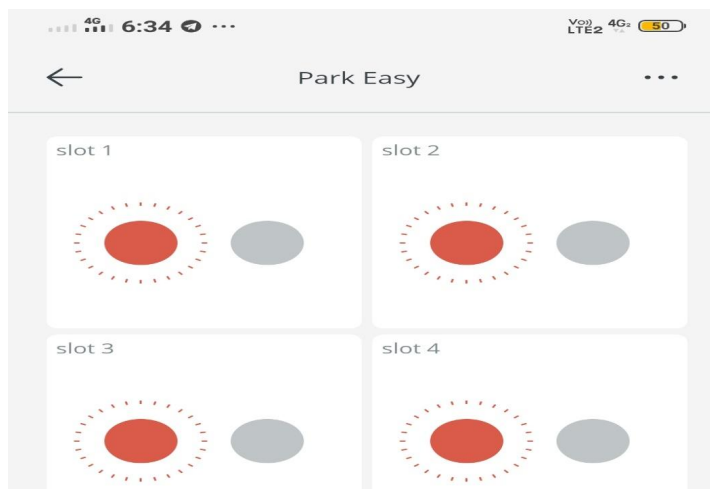


Figure 3. Parking Slots

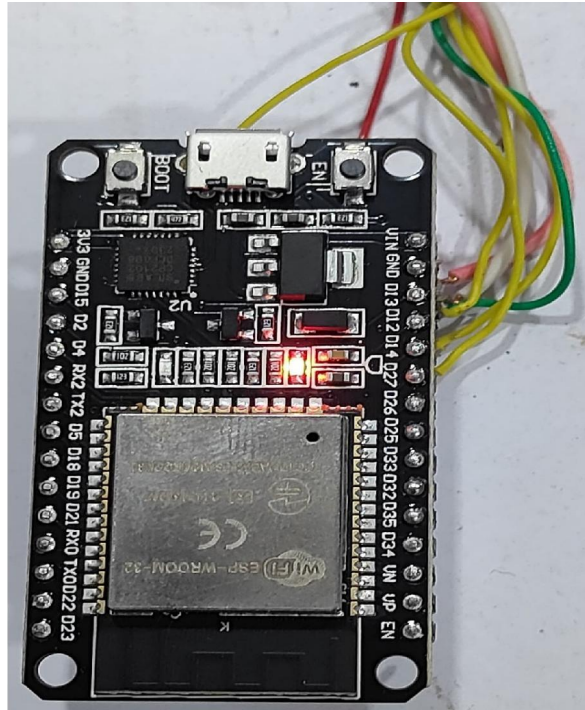


Figure 4. ESP-32 Module

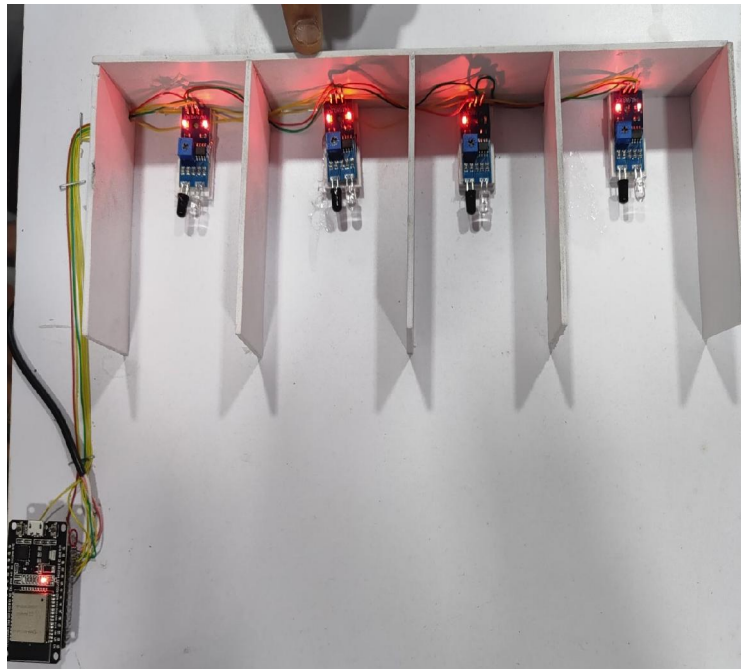


Figure 5. Parking Hardware

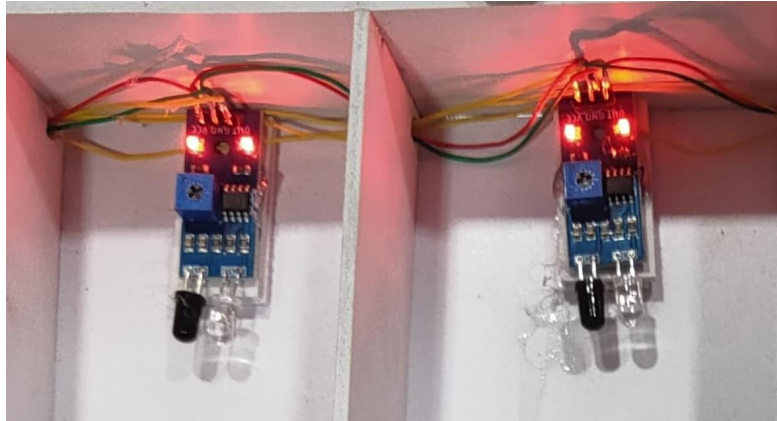


Fig6: IR Sensor

#### IV. CONCLUSION

In conclusion, the emergence of IoT-based parking systems heralds a revolutionary era in urban parking design. These systems streamline operations and increase efficiency by providing real-time parking information to users. The convenience of easy parking and storage via mobile apps or connected devices means a significant departure from traditional manual search methods, reducing stress for drivers and generates the most revenue for car park operators while providing efficient parking while encouraging efficiency. Data collected from IoT sensors enables decision makers to gain insights into parking patterns and occupancy patterns, facilitating informed planning and service improvements that affect when reduced walking to parking Modular design ensures flexibility, allowing for adaptation in various ways to the environment and scale to meet growing demand. IoT-based parking systems are therefore emerging as a comprehensive solution ready to tackle the urban parking complexity, offering benefits to users and a they do all the work.

#### ACKNOWLEDGMENT

We would like to express our heartfelt gratitude to all those who have contributed to the completion of this research paper on IoT-based parking systems. Firstly, we extend our appreciation to our dedicated team members for their tireless efforts and collaborative spirit, which have significantly enriched the content and quality of this paper. Furthermore, we are thankful for the support provided by [Mahavir Polytechnic,Nashik] and its resources, which have played a crucial role in facilitating the execution of this research project. We also extend our thanks to the participants and stakeholders who generously shared their insights and expertise, thereby enhancing the depth and comprehensiveness of our study. Lastly, we express our gratitude to our families and friends for their unwavering encouragement and understanding throughout the research process. Their support has been a constant source of motivation.

#### REFERENCES

- [1] Peresters, V., Beltran, R., & Tzovaras, D. A survey of internet of things (IoT) in smart parking.
- [2] L. D., D. B., Urs, S. R., & Garg, D. IoT-based intelligent parking systems: A review.
- [3] Asri, M., Hasan, M., & Amin, M. Design and implementation of IoT-based smart parking systems.
- [4] Bhandari, A., & Dhiman, Y. IoT-based smart parking system using LoRaWAN technology.
- [5] Khatoon, K., Taherdoost, H., & Sajid, M. Enhanced IoT-based smart parking system using machine learning algorithms.
- [6] Kazmi, W., Gani, A., & Shiraz, M. Security and privacy issues in IoT-based smart parking systems: A review.
- [7] Gupta, A., Kumar, A., & Singh, G. Energy efficient IoT-based smart parking system using solar-powered sensors.
- [8] Singh, A., Singh, H., & Singh, R. Integration of blockchain technology in IoT-based smart parking systems.