International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 4, pp 87-91, April-2024

https://doi.org/10.47001/IRJIET/2024.804012

Parking Management System - (A GUI Based Interface)

[1]Sakshi Asodekar, [2]Shubham Shinde, [3]Neha Dubey, [4]Prof. Swati Vyas

[1,2,3]Student, Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India

[4]Professor, Dept. of AI & ML, Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India

***Abstract* - As urbanization continues to surge, the demand for efficient parking management systems becomes imperative to mitigate congestion and enhance overall urban mobility. This mini project proposes a Smart Parking Management System (SPMS) designed to address the challenges associated with traditional parking systems through the integration of advanced technologies. Upon entering the parking area, drivers can access real-time information regarding available parking spaces through the mobile application. Sensors installed in each parking slot detect the presence of vehicles, transmitting data to the central server. Utilizing cloud-based algorithms, the SPMS dynamically allocates parking spaces to incoming vehicles, minimizing the time spent searching for parking spots and reducing traffic congestion.**

Keywords: Parking Management System, GUI, Smart Parking Management System, SPMS.

I. INTRODUCTION

In today's fast-paced world, efficient management of resources like parking spaces has become increasingly crucial. Whether it's a shopping mall, office complex, or residential area, effective parking management systems are essential to ensure smooth traffic flow and optimal space utilization. To address this need, we propose the development of a Parking Management System using python. The system will allow the parking lot administrator to electronically encode and store the records of parking slots availability, parking fees, parking duration, and customers and vehicles information. The records are essential to efficiently manage vehicle parking areas to avoid errors and problems for both the parking administrator and customers.

1.1 Project Aims and Objectives

The aim of the project is to develop a comprehensive Vehicle Management System using Python, facilitating efficient vehicle registration, maintenance tracking, and inventory management. The objective is to streamline operations, enhance organizational productivity, and provide accurate reporting capabilities for informed decision-making in vehicle management processes.

Objectives and Aims:

1. Automate vehicle registration processes to reduce manual effort and errors.
2. Track vehicle maintenance schedules to ensure optimal performance and safety.
3. Manage inventory of vehicles and spare parts efficiently to minimize downtime.
4. Provide real-time monitoring of vehicle status for better fleet management.
5. Generate comprehensive reports to analyze usage patterns and make data-driven decisions.
6. Enhance overall organization productivity by streamlining vehicle management tasks.
7. Improve accountability and transparency in vehicle-related operations through centralized system access and tracking.

1.2 System Objectives

Scalability and Modularity: Scalability and modularity are integral to the Vehicle Management System project. By employing modular design principles, the system ensures that functionalities can be easily extended or modified. Scalability allows the system to accommodate growing data and user requirements efficiently, ensuring optimal performance as the organization expands or evolves.

Performance Evaluation and Optimization: Performance evaluation in the Vehicle Management System involves assessing system responsiveness, reliability, and resource utilization. Metrics such as response time, uptime, and system throughput are measured to ensure efficient operation and identify areas for optimization and improvement.

1.3 Background of Project

The Vehicle Management System project emerges against the backdrop of a growing demand for streamlined vehicle management solutions. Traditional methods relying on manual paperwork and disjointed systems often result in inefficiencies, errors, and delays, posing significant challenges across industries reliant on vehicle operations. These challenges include cumbersome registration processes, lack of timely maintenance tracking, inefficient inventory management, and limited visibility into vehicle status. To

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 4, pp 87-91, April-2024

https://doi.org/10.47001/IRJIET/2024.804012

mitigate these issues, the project aims to develop a comprehensive software solution using Python programming language. This solution will automate vehicle registration processes, enabling seamless registration and documentation management.

Additionally, it will implement features for tracking maintenance schedules, optimizing fleet performance, and managing inventory effectively, reducing downtime and associated costs. Furthermore, the system will provide real-time monitoring capabilities, allowing users to track vehicle status, location, and usage patterns. Comprehensive reporting functionalities will offer insights into fleet operations, facilitating informed decision-making and resource allocation.

II. COMPONENTS

2.1 Software components for processing the system

i) Database:

A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amounts of data, database management systems play a central role in computing, as standalone utilities, or as parts of other applications.

Figure 1: MySQL

ii) Python

Figure 2: Python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together.

iii) IDLE Compiler

Figure 3: IDLE

IDLE, which stands for "Integrated Development and Learning Environment," is an Integrated Development Environment (IDE) specifically designed for Python.

III. METHODOLOGY

A GUI-based parking management system project typically involves several steps:

1. Requirement Analysis: Understand the needs of the parking system, such as user roles, functionalities, and constraints.
2. Design: Create a visual representation of the system, including user interfaces, navigation flow, and data structures.
3. Development: Implement the system using programming languages and frameworks suitable for GUI development, such as Java with Swing or Python with Tkinter.
4. Database Integration: Set up a database to store information such as parking lot availability, user data, and transaction records.
5. Testing: Conduct thorough testing to ensure the system works as intended, including functionality, usability, and performance testing.
6. Deployment: Deploy the system in the intended environment, whether it's a standalone application or a web-based solution.
7. Maintenance: Provide ongoing support and maintenance to address any issues and make updates or improvements as needed.

IV. RESULT

The result of a parking management system can include optimized space utilization, reduced congestion, improved revenue collection, enhanced security, and better overall user experience for both drivers and parking facility operators.

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 4, pp 87-91, April-2024

https://doi.org/10.47001/IRJIET/2024.804012

Figure 4

4.1 Slot Management

In parking management projects using Python, slot management is crucial for efficient utilization of parking space.

Figure 5

4.2 Slot Booking

Implemented a reservation system that allows users to book parking slots in advance. This could involve a user interface where users select their desired date, time, and duration for parking.

Slot Availability: Ensure real-time updates on slot availability. When a user books a slot, the system should immediately reflect the change in availability to prevent double bookings.

Figure 6

4.3 Slot Navigation

Slot navigation in a parking management system involves optimizing the route to an available parking spot efficiently. One theory could be to use algorithms like Dijkstra's or A* to find the shortest path, considering factors like distance, traffic flow, and available slots. Integration with real-time data can further enhance accuracy and speed, ensuring seamless navigation for drivers within the parking facility.

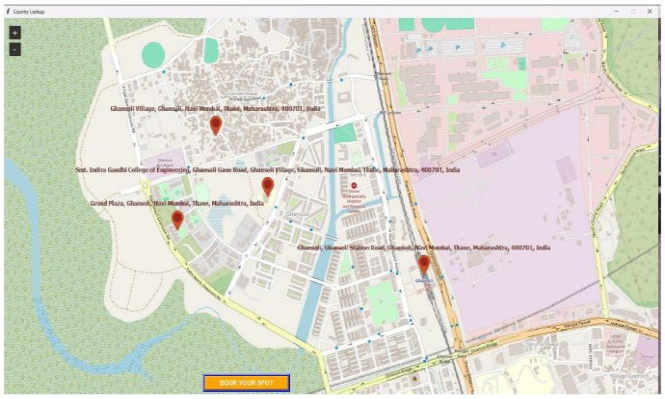

Figure 7

V. CONCLUSION

By leveraging Python's versatility and extensive libraries, we've created a user-friendly interface that streamlines tasks for both administrators and users. The system's modular design allows for easy scalability and customization to meet the specific needs of different organizations or businesses.

Furthermore, the integration of database management ensures data integrity and security, while also enabling seamless retrieval and analysis of information for informed decision-making.

Overall, this Python-based vehicle management system not only enhances operational efficiency but also contributes to better resource utilization, cost reduction, and improved service delivery in the realm of vehicle management. As we continue to refine and expand upon this project, it holds the potential to make significant contributions to various industries reliant on efficient vehicle operations.

VI. FUTURE SCOPE

1. Integration with IoT: Incorporating IoT sensors for real-time monitoring of vehicle health and performance.
2. Fleet Optimization: Enhancing route planning and vehicle allocation algorithms to optimize fleet operations and minimize fuel consumption.
3. Mobile Application: Developing a mobile app for on-the-go access to vehicle information, maintenance alerts, and reporting features.

ISSN (online): 2581-3048
Volume 8, Issue 4, pp 87-91, April-2024
https://doi.org/10.47001/IRJIET/2024.804012

4. Driver Management: Introducing features for driver scheduling, performance tracking, and training management to ensure compliance and safety.
5. Vehicle Tracking: Integrating GPS technology for real-time vehicle tracking, theft prevention, and recovery.

ACKNOWLEDGEMENT

As every project is ever complete with the guidance of experts. So we would like to take this opportunity to thank all those individuals who have contributed in visualizing this project. We express our deepest gratitude to our project guide Prof. Swati Vyas Ma'am (CSE(AIML) Department, Smt. Indira Gandhi College of Engineering, University of Mumbai) for her valuable guidance, moral support and devotion bestowed on us throughout our work. We would also take this opportunity to thank our project coordinator Prof. Vandana Shinde Ma'am for her guidance in selecting this project and also for providing us all the details on proper presentation of this project. We extend our sincere appreciation to our HOD ma'am and entire professors from Smt. Indira Gandhi College of Engineering for their valuable inside and tip during the designing the project. Their contributions have been valuable in many ways that we find it difficult to acknowledge them individually.

REFERENCES

[1] Shoup, Donald C. "The high cost of free parking." Journal of the American Planning Association 73.4 (2007): 497-510.
[2] Samy, Gobinath, et al. "A review on smart parking management system using IoT." 2017 IEEE International Conference on Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials (ICSTM). IEEE, 2017.
[3] Pradhan, Manoj Kumar, et al. "Smart parking system using Internet of Things." 2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC). IEEE, 2017.
[4] Verma, Gaurav, et al. "Parking management system using IoT and mobile computing." 2017 International Conference on Intelligent Sustainable Systems (ICISS). IEEE, 2017.
[5] Qureshi, M. A. "Design and development of smart parking management system using IoT." 2018 IEEE 8th Annual Computing and Communication Workshop and Conference (CCWC). IEEE, 2018.
[6] Al Ameen, M. A., et al. "Smart parking management system using IoT." 2018 International Conference on Smart City and Emerging Technology (ICSCET). IEEE, 2018.
[7] Mohanraj, V., et al. "Design and implementation of smart parking management system using IoT." 2018 International Conference on Inventive Research in Computing Applications (ICIRCA). IEEE, 2018.
[8] Anwar, Sajjad, et al. "Smart parking management system using Internet of Things." 2018 21st Saudi Computer Society National Computer Conference (NCC). IEEE, 2018.
[9] Sadiq, Muhammad Abdullah, et al. "A review of smart parking system technologies." 2019 International Conference on Communication, Computing and Digital Systems (C-CODE). IEEE, 2019.
[10] Kumar, N. Senthil, et al. "IoT based smart parking management system." 2019 2nd International Conference on Inventive Research in Computing Applications (ICIRCA). IEEE, 2019.
[11] Bhaskar, Prasanth, and Uday Kiran. "Smart parking management system using IoT." 2019 International Conference on Communication and Signal Processing (ICCSP). IEEE, 2019.
[12] Afolabi, Temitope Sunday, et al. "IoT-based smart parking management system." 2019 International Conference on Computer Communication and Informatics (ICCCI). IEEE, 2019.
[13] Islam, Md. Jahangir, et al. "Smart parking management system using IoT." 2019 International Conference on Innovation in Engineering and Technology (ICIET). IEEE, 2019.

AUTHORS BIOGRAPHY

Sakshi Asodekar,
Pursuing Second year in B.E. CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.

Shubham Shinde,
Pursuing Second year in B.E. CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.

Neha Dubey,
Pursuing Second year in B.E. CSE (AI&ML) at Smt. Indira Gandhi College of Engineering, Ghansoli, New Mumbai, Maharashtra, India.

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 8, Issue 4, pp 87-91, April-2024

https://doi.org/10.47001/IRJIET/2024.804012

Citation of this Article:

Sakshi Asodekar, Shubham Shinde, Neha Dubey, Prof. Swati Vyas, "Parking Management System - (A GUI Based Interface)", Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 8, Issue 4, pp 87-91, April 2024. Article DOI https://doi.org/10.47001/IRJIET/2024.804012

****

