



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 11, November 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Survey Towards Smart Parking System with QR code and IoT

Bandal Shital¹, Prof. Joshi S.G.²

P.G. Student, Dept. of Computer Engineering, Vishwabharati Academy's COE, Ahmednagar, Maharashtra, India¹

Assistant Prof., Dept. of Computer Engineering, Vishwabharati Academy's COE, Ahmednagar, Maharashtra, India²

ABSTRACT: With increasing vehicles and traffic in urban cities it has become difficult to find parking space in usual places. The parking becomes more difficult in busy and unknown places. The proposed system is aimed to make application to enable pre-booking for parking spaces for vehicles with listing of available parking slots with their rates. The application is developed as mobile android app for user module and admin module to make it useful for everyone. The empty parking places with details are identified with help of KNN algorithm. QR code is used for authentication for parking the vehicle at pre-booked parking space. The system developed shows small IoT prototype for implementing smart parking in busy unknown cities with known map to parking slot for vehicle.

KEYWORDS: Smart Parking, QR code, Microcontroller, KNN, IoT, .

I. INTRODUCTION

The traditional process of finding a vacant parking slot is often inefficient: it increases driving time, traffic congestion, fuel consumption and exhaust emissions. To address such problems, smart parking systems have been proposed to help drivers to find available parking slots faster using latest sensing and communications technologies. The smart parking is important since it determines the benefit of the parking lot owner and the efficiency of vehicles which demand to be parked. Parking can be differentiated into two categories: on-street parking and off-street parking. The on-street parking refers to the parking policy that the vehicle parked on the street while off-street parking refers to the policy for parking vehicle in a parking lot. In the modern era, it's very difficult to build a new infrastructure for parking. Along with the exponential growth in the automobile industry, parking problems increase at the same pace. Most of the existing parking system includes various sensors like the ultrasonic sensor, GPS (Global positioning system). The installation cost of these types of sensors needs huge investments along with daily maintenance charges. These types of sensors cannot be operated in an open parking space. Most of the sensors are easily affected by rain or sun rays. These types of systems cannot solve most of the problems prevailing in the parking industry. The use of hydraulics in modern automated parking systems needs a huge capital as well as electric power investment. The new parking system needs much change in existing infrastructure and is not feasible for a small vendor. The cost of building a new parking space along with sensors is the reason behind the nonpopularity of the hardware-based parking system. The use of manpower to operate a modern parking system can also be overcome by the new prescribed system.



The motivation behind the proposed system is to reduce time and human efforts in searching car parking slot. To track car parking places to our nearest locations, check for available space to park the car and generate QR code for authentication. This system can reduce the time for searching nearest parking slots. The Objectives covered for this system are to reduce time and human efforts in searching car parking slot, to track car parking places to our nearest locations, to search available space for park the car, to prevent disputes in the car park.

Paper is organized as follows. Section I introduces the

system while section II describes the earlier system in smart parking with literature review. Section III proposes the system, its methodology and architecture. It gives the flow of system. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

II. RELATED WORK

1) Edge computing-enabled secure and energy-efficient smart parking: A review

Edge computing is a crucial technology that supports sensor level processing, which is a significant element for data privacy and security in Smart Parking applications. Smart Parking would be able to guide the driver directly to the parking spot, which will minimize or even eliminate the issues in the existing mechanism. It is noteworthy that it is necessary to ensure that the Smart Parking system is secure, because IoT devices are very much prone to security attacks. Further, introducing energy-efficient techniques in Smart Parking will contribute to a greener environment and an economically efficient model.

2) Mobile Application for Smart Parking Systems

A smart parking system is an application that can help users get information about the available parking spaces in a place. In a smart parking system, there are implications of several technologies that can solve problems in the parking system. The use of the Internet of Things is done by connecting sensor devices scattered in each parking lot to the Internet network, and then, data from each sensor will be stored on the server. To connect the sensor to the Internet network requires a component device such as the ESP8266-01. This tool helps Arduino to connect to the Internet network.

3) Enhanced Framework for Secure Smart Parking Management

The Internet of Things (IoT) is able to connect billions of devices and services at any time in any place, with various applications. The Internet of Things (IoT) connects surrounding environmental objects to the internet, allowing them to be accessed from any remote place. Smart parking systems typically gather data on available parking slots in a certain geographic region and process it in real time to allow vehicles to park in those spaces.

4) A Digital Twin Prototype for Smart Parking Management

A proto-type of the proposed smart parking system is developed and tested in a multi-bay car park. The research results demonstrate the effectiveness of the system and methods in the identification of occupied parking bays and vehicle tracking. The proposed approach provides an affordable solution for vehicle drivers and car park owners. In addition, it offers a convenient user experience by helping drivers identify available parking spaces around their destination and allows car park owners to monitor their facilities in real-time.

5) Arduino project for smart parking system

The created system can control allowed vehicle admission into parking areas while blocking unauthorised vehicles. Currently, smart parking or parking guidance systems just receive available parking spot information from deployed sensor networks and then simply distribute it to drivers. We'll utilise an Arduino UNO, a servo motor, IR sensors, and an LCD display in this project. IR sensors detect vehicles entering and exiting parking lots and transmit a signal to Arduino; an LCD shows the number of parking spaces available.

6) A survey on smart parking systems in urban cities

Smart parking sensors and technologies assist drivers in finding vacant parking slots while they are on the way to their destination. Considering the needs, wants, and demands of metropolitan cities, in this article, we have reviewed the recently published articles, mostly from the last 5 years, on smart parking systems augmented with sensors, embedded systems, context - awareness capability, and IoT which yields in saving time, fuel, energy, and reduces the stress of the drivers. To accomplish this, we have reviewed different models on smart parking solutions based on algorithmic formalisms, theoretical frameworks, formal models, smart device - based prototypes as well as real - time applications, and verifying the correctness properties of the system

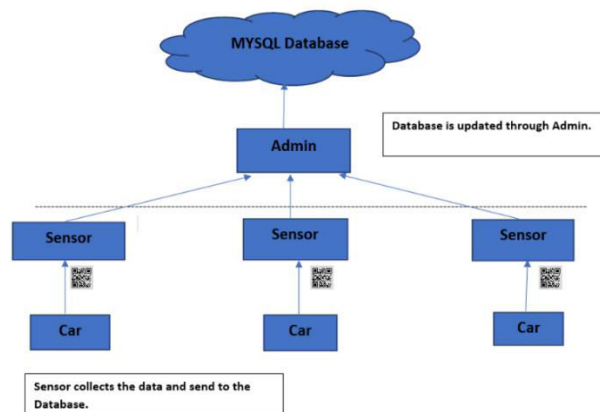
7) IoT based smart parking model using Arduino UNO with FCFS priority scheduling

The parking availability detection is capable to find solutions for an empty vehicle parking area for monitoring and reduces users search time as per an automated smart parking model using the internet of things, sensing devices and Arduino UNO ("Uno" means one in Italian languages) in giving priority to users with scheduling model is actual

findings with Smart systems. This study proposed an automated parking system to function on a real-time basis to detect all empty parking places based on the internet of things platform, with help of sensors. Arduino UNO platform brings automation to this system on per priority basis to all the users with scheduling techniques.

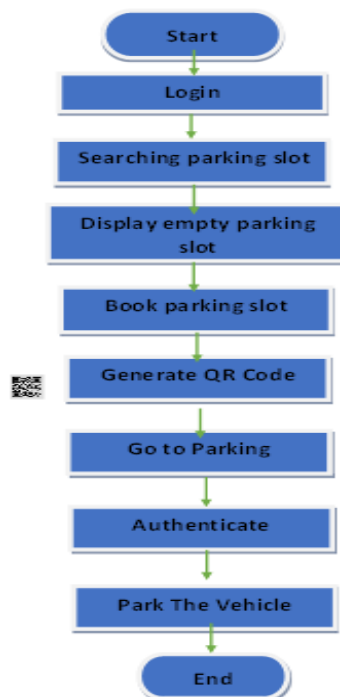
IV. METHODOLOGY

A) System Architecture:



B) System Flow

The application is developed as mobile android app for user module and admin module to make it useful for everyone. The empty parking places with details are identified with help of KNN algorithm. QR code is used for authentication for parking the vehicle at pre-booked parking space. The system developed shows small IoT prototype for implementing smart parking in busy unknown cities with known map to parking slot for vehicle.



V. CONCLUSION

The proposed parking system that improves performance by reducing the number of users that fail to find a parking space and minimizes the costs of moving to the parking space. The simulation of our system achieved the optimal solution when most of the vehicles successfully found a free parking space. The average waiting time of each car park for service becomes minimal, and the total time of each vehicle in each car park is reduced. The allotment of the parking slot by an autonomous searching method makes the parking of vehicles at public places more efficient. The searching and allotment of parking slot, based on the status of available slots, as communicated to the microcontroller, makes the path-tracing for the vehicle, to the appropriate free slot, easier. The proposed system makes use of Android application to facilitate the parking and retrieval of the vehicle, for the user. We hereby aim to reduce the human efforts required for parking of vehicle at public places like shopping malls, public parking, 5- star hotels etc. Thus, the proposed design would provide an efficient car parking system by using an efficient searching method.

REFERENCES

- [1] Lee, Cheng & Leng, Fabian & Ariyaluran Habeeb, Riyaz Ahamed & Amanullah, Mohamed Ahzam & Habib ur Rehman, Muhammad. (2022). Edge computing-enabled secure and energy-efficient smart parking: A review. *Microprocessors and Microsystems*.93. 104612. 10.1016/j.micpro.2022.104612.
- [2] Santoso, Danny & Hakim, Muhammad & Rachfian, Muhammad & Hidayat, Muhammad & Spits Warnars, Harco Leslie Hendric. (2022). Mobile Application for Smart Parking Systems.
- [3] Ulla, K. (2022). Enhanced Framework for Secure Smart Parking Management. *International Journal for Research in Applied Science and Engineering Technology*. 10. 240-245.10.22214/ijraset.2022.45255.
- [4] Zou, Yang & Ye, Felix & Li, Angela & Munir, Mustapha & Sujjan, Sujesh & Hjelseth,Eilif. (2022). A Digital Twin Prototype for Smart Parking Management.
- [5] Khan, Muskan. (2022). Arduino project for smart parking system.
- [6] Zulfiqar, Haidar & Mahfooz Ul Haque, Hafiz & Tariq, Faiza & Khan, Rashad. (2021). A survey on smart parking systems in urban cities. *Concurrency and Computation: Practice and Experience*. 10.1002/cpe.6511.
- [7] Veeramanickam, M.R.M. & Venkatesh, B. Bewoor, Laxmi & Bhowte, Yogesh & Moholkar, Kavita & Bangare, Jyoti. (2022). IoT based smart parking model using Arduino UNO with FCFS priority scheduling. *Measurement: Sensors*. 24. 100524.10.1016/j.measen.2022.100524.
- [8] T. Anusha (2022). Efficient Communication Model for a Smart Parking System with Multiple Data Consumers. *Smart Cities*. 5. 1536-1553. 10.3390/smartcities5040078.27



SJIF Scientific Journal Impact Factor

Impact Factor: 8.423



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details