

Smart Parking System Based on QR Code

Pradnya Bankar¹, Chaitrali Khanvilkar², Tanmayi Khedekar³, Kiran Landge⁴, G.R.Chillarge⁵

U.G. Student, Department of Computer Engineering, Marathwada Mitra Mandal College of Engineering, Karve Nagar,
Pune, Maharashtra, India^{1,2,3,4}

Assistant Professor, Department of Information Technology, Marathwada Mitra Mandal College of Engineering, Karve
Nagar, Pune, Maharashtra, India⁵

ABSTRACT: In this current era of modern world, almost everyone owns a personal vehicle and it has become a basic need for the humans. Hence, it has been proven statistically that the usage of vehicles is increasing rapidly yearly. Due to the proliferation in the number of vehicles on the road, traffic problems are bound to exist. This is due to the fact that the current transportation infrastructure and vehicle park facility developed are unable to cope with the influx of vehicles on the road. To alleviate the aforementioned problems, the smart parking system has been developed. With the implementation of the smart parking system, patrons can easily locate and secure a vacant parking space at any vehicle park deemed convenient to them. This paper proposes a design of smart parking system where it helps the users to reserve parking slots using android application. This project is aimed to create a system that helps people with personal vehicles to find for parking easily at selected areas.

KEYWORDS: Smart Parking, QR code, Smart Phone, Firebase.

I. INTRODUCTION

In this fast-growing economy, the number of vehicle users increases exponentially demanding more parking space. Traffic congestion caused by vehicle is an alarming problem at a global scale. Vehicle parking problem is a major contributor and has been, still a major problem with increasing vehicle size in the luxurious segment and confined parking spaces in urban cities. Searching for a parking space is a routine (and often frustrating) activity for many people in cities around the world. This search burns about one million barrels of the world's oil every day. As the global population continues to urbanize, without a well-planned, convenience-driven retreat from the car these problems will worsen.

In today's technological world the concept of smart parking system has become an area of interest. The presence of smart phone encourages users to prefer mobile application based solutions. This project proposes an Android based Smart Parking System that integrates with mobile application. It provides a comprehensive parking solution both for the user and owner of the parking space. Features are provided for reserving a parking space, authenticating a reserved user, identifying nearest free space depending on the size of the vehicle, navigating to the parking slot and computes accounts information on daily, weekly and monthly basis.

II. LITERATURE SURVEY

[1] S.Deshmukh et al., "Smart Car Parking System with Android Application", in Asian Journal of Convergence in Technology, Volume 4, 2019.

In this project, the authors addresses and presents the complications of parking and IOT based cloud integrated smart parking system respectively. The real time information about the availability of parking slot in parking area is introduced by the system and it is booked using mobile application.

[2] H.Randhawa et al., "Integrated Car Park System for Smart Parking Solution", in INTI JOURNAL, Volume 38, 2019.

In this proposed system, an integrated car park system using the IoT is implemented by combining with android application.

[3] K.R.Jansi et al., "Automated QR Based Parking System", in Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, India., July 2018.



This proposed system is basically developed to reduce human effort using the simplest of software and hardware available. This system will be performing the tasks of authorization, spot selection and billing.

[4] Ramya B S et al., “Smart Parking System”, in International Journal of Engineering Research & Technology (IJERT), Volume 5, May 2018.

This proposed system is designed by making use of some IOT supportable hardware’s such as sensors and arduino boards. K-means algorithm is used to find out on what days parking were full, and on those days the parking manager can allot some alternative parking lots for the people.

[5] P.Tekade et al., “QR Code Implementation in Car Parking Locator”, Volume 5, March 2017.

In this proposed system, the QR-code based car parking locator system is developed which admin manages application by web portal using web services over internet. In this Android Application, user all has to do is Login – Secret code generates – Shares to admin & Car parking is allotted with QR Code.

[6] T.Satpalkar et al., “Smart City Parking: A QR Code Approach”, in International Journal of Engineering Research & Technology (IJERT), Volume 5, Issue 2, February 2016.

In this proposed system, drivers use this system on their personal devices having the android. QR code is used for encryption and to ease the process of authentication.

III. OBJECTIVES

The objectives of the proposed system are as follows:

- To automate the vehicle parking by regulating and managing number of vehicles that can be parked in given space at a particular time based on the availability of the parking slot.
- To reduce extra time consumption, fuel consumption and headache of vehicle owners for parking.
- To implement a user-friendly system.

IV. MOTIVATION

The main motivation of this project is to reduce the traffic congestion that occurs in and around the urban areas which is caused by vehicles searching for parking. The Smart Parking System is implemented to help the users to find areas where parking is available in that area. Prior to the expected arrival, users can book a slot in the area if it is available. Users can search the parking slot through the mobile application installed and book the available slot. All the need is a working Internet connection. The proposed system provides a complete and secure parking system.

V. PROPOSED SYSTEM

The proposed system architecture will help the drivers who are seeking for parking space. In this, drivers can check the availability of parking spaces. The access to the parking information becomes easier and convenient due to smart phone applications. Following diagram depicts the system architecture of Android based Smart Parking System.

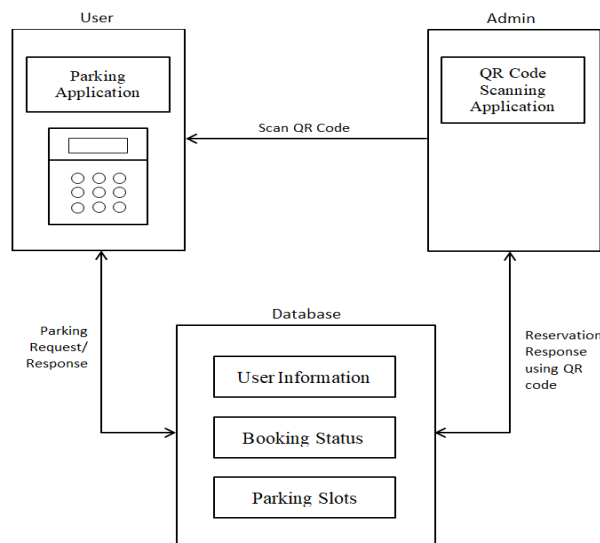


Fig 5.1. System Architecture

Following are the working modules of this project:

1. Admin Module
2. User Module
3. QR Code Generator and Scanner Module
4. Database Module

1. Admin Module:

The admin module is the module that performs the tasks of authorization and giving users the access to the parking slots.

Characteristics of Admin are:

- Login with authentication
- Add Parking Info
- View All user Info
- Scan QR Code of User for Authentication
- Recommendation of Parking according Rating.

2. User Module:

The user module is the module that performs the task of booking and accessing the parking slots.

Characteristics of User are:

- Registration and login with authentication
- View User Profile
- Show Available Parking
- Book Parking Slot
- Show QR Code
- Gives Rating

3. QR Code Generator and Scanner Module:

QR Code is generated when user books a parking slot. In QR Code the identity of the user is encrypted which can be used for authentication process. The admin identifies each user by the randomly generated unique QR code, admin directly scans the QR code by mobile scanner and verify the details and authenticated user.

4. Database Module:

The database module contains database which is made on cloud. It stores all the data and entries of the system. It is accessed by both admin module and user module.

VI. METHODOLOGY USED IN PROPOSED SYSTEM

When user logs in to System for the first time, all details like car no., name, etc. details registered in system. Then next time whenever user wants to login in the system that time if the current details matched with the details stored in the database access is granted.

QR Code:

The abbreviation of the QR code is Quick Response code. It is the trademark for a kind of framework scanner tag (or two-dimensional standardized tag) first structured in 1994 for the car business in Japan. A scanner tag is a machine-discernible optical name that contains data about the thing to which it is connected. Practically speaking, QR codes regularly contain information for a locator, identifier, or tracker that focuses to a site or application. A QR code utilizes four institutionalized encoding modes (numeric, alphanumeric, byte/double, and kanji) to store information productively; expansions may likewise be utilized.



Fig 6.1. QR-Code

Following are the steps of QR Code generator:

1. Choose the text (Unicode string) or binary data (byte string) to encode.
2. Choose one of the 4 error correction levels (ECL). A higher ECC level will yield a barcode that tolerates more damaged parts while preserving the payload data, but will tend to increase the version number (i.e. more modules in width and height).
3. Encode the text into a sequence of zero or more segments. A segment in byte mode can encode any data, but using alphanumeric or numeric mode is more compact if the text falls into these subsets.
4. Based on the segments to be encoded and the ECL, choose a suitable QR Code version to contain the data, preferably the smallest one.
5. Concatenate the segments (which have headers and payload) and add a terminator. The result is a sequence of bits.
6. Add padding bits and bytes to fill the remaining data space (based on the version and ECL).
7. Reinterpret the bitstream as a sequence of bytes, then divide it into blocks. Compute and append error correction bytes to each block. Interleave bytes from each block to form the final sequence of 8-bit codewords to be drawn.
8. Initialize a blank square grid based on the version number.
9. Draw the function patterns (finders, alignment, timing, version info, etc.) onto the appropriate modules. This is formatting overhead to support the QR Code standard, and does not encode any user data.
10. Draw the sequence of (data + error correction) codewords onto the QR Code symbol, starting from the bottom right. Two columns at a time are used, and the scanning process zigzags going upward and downward. Any module that was drawn for a function pattern is skipped over in this step.
11. Either manually or automatically chooses a mask pattern to apply to the data modules. If masking automatically, then all 8 possibilities are tested and the one with the lowest penalty score is accepted. Note that the format information is redrawn to reflect the mask chosen.
12. Now, the algorithmic parts of QR Code generation is finished. The remaining work is to render the newly generated barcode symbol as a picture on screen, or save it as an image file.

Following are the steps of QR Code scanning or recognizing:

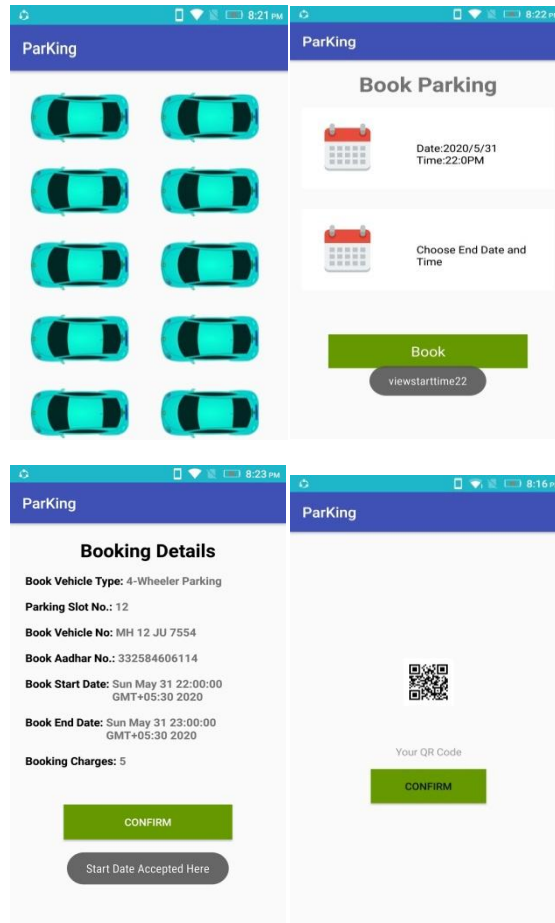
1. Binarization.
2. Obtain the approximate region of QR code, and implement coarse positioning for QR image according to the finder patterns.
3. Implement accurate positioning according to the alignment patterns.
4. Calculate the angle of inclination to rotate QR image, and implement rectification processing. Obtain version number and implement self-adaptive sampling.
5. Decode based on corrected image and input a standard 2D matrix.



VII. RESULTS

User Application:

Where user can book a slot and gets QR code after booking.



Admin Application:

Where admin scans the user's QR code.



VIII. CONCLUSION

Thus, this developed Android based Smart Parking System optimizes the parking management of the vehicles in the city. It concludes to allow the user to view the status of any parking slots and based on the users need and requirements he/she can book a parking slot. Generally, the customers tend to go to the parking slots and then see if there is vacancy then they park their vehicle or else they find some other location. So instead of this, if the users already knew that the parking slots where the user is going to visit has vacancy or not and if not then from the application user could find another parking slot. So, this project aids the users in finding and booking a parking slot by saving their time and fuel and also relieving traffic on roads. This system is implemented to balance the benefits for both the service providers and the users as per their requirements.

In future provide more parking lots services thereby reducing the traffic problems. Also, the enhancement can be done by including the pass system for the customers that very often use the parking spaces by studying the data collected through the application.

REFERENCES

- [1] S.Deshmukh et al., "Smart Car Parking System with Android Application", in Asian Journal of Convergence in Technology, Volume 4, 2019.
- [2] H.Randhawa et al., "Integrated Car Park System for Smart Parking Solution", in INTI JOURNAL, Volume 38, 2019.
- [3] K.R.Jansi et al., "Automated QR Based Parking System", in Department of Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, India., July 2018.
- [4] Ramya B S et al., "Smart Parking System", in International Journal of Engineering Research & Technology (IJERT), Volume 5, May 2018.
- [5] P.Tekade et al., "QR Code Implementation in Car Parking Locator", Volume 5, March 2017.
- [6] T.Satpalkar et al., "Smart City Parking: A QR Code Approach", in International Journal of Engineering Research & Technology (IJERT), Volume 5, Issue 2, February 2016.
- [7] R.Kumar et al., "An App-based Smart Interconnected Parking System", International Journal of Computing and Technology (IJCAT), Volume 3, Issue 3, March 2016.
- [8] S.Majumdar, "A new encrypted Data hiding algorithm inside a QR Code™ implemented for an Android Smartphone system: S_QR algorithm", International Journal of Innovative Research in Advanced Engineering (IJIRAE), Volume 2, Issue 4, March 2015.
- [9] Xiting Liu, "ART-UP: A Novel Method for Generating Scanning-robust Aesthetic QR codes", in Journal of Latex Class Files, Volume 14, Issue 8, August 2015.
- [10] T.Sivasakhti, J.Keerthika, "Parking availability prediction and automatic parking system", In International Journal of Computing Communication and Information System (IJCCIS), Vol.08, 2016.
- [11] <http://www.scmp.com/news/china/society/article/2118751/beijing-lookssmart-solutions-solve-city-parking-problems>.
- [12] <http://www.globaltimes.cn/content/963391.html>.