



# "Design & Implement QR Code Based Smart Parking System"

(A Web Application and an Android application to reserve parking slot as per drivers need)

**PRASHIL GAVHANKAR – AUTHOR & TL**

- **RANI PATEL – TEAM MEMBER**
- **PADMAKANT KHARKATE - TEAM MEMBER**
- **YAMUNA RAUT - TEAM MEMBER**

**GUIDE: - Prof. DEEPAK DESHPANDE**

Department of Electronics & Telecommunication Engineering GURU NANAK INSTITUTE OF ENGINEERING & TECHNOLOGY NAGPUR – 441501

**Abstract:** Now a day's vehicle parking is an important issue and day by day its necessity is increasing. In India we are still using the manual vehicle parking system and that is why we are facing problems like wastage of time and fuel finding free space around the parking ground. Another issue is chaos that happens while parking because there is no particular system anyone can park anywhere that sometime causes damage to the vehicles while moving out or in the parking lot. Security is also an issue there.

To solve these problems we are introducing design and implement QR- code based smart parking system would be mainly focused on assisting driver to easily find vacant parking spaces in a proper parking region and there will be monitor available where the number of available parking slots will be displayed. The user will have to provide his mobile phone number and car's registration number and the operator will give command to open the gate, a car parking tray will come & will park the car in the garage. The user will receive a sms which will contain a code. After the car is parked a time counter will count the amount of money to be dedicated till car is parked out and while parking out the driver reach the spot then security guard give QR code to the driver to scan the QR to scan and payment the money . Thus this project has come up with an optimal solution that gives liberty to the people can also book their own parking space as per their need and specification of the vehicle. The purpose of this project is to make people more convenient to park their vehicle, which in this case is Reservation Based Smart Parking System also be there and anyone can park easily in finding free space parking slots, The question to be addressed here in this module is, how to give parking slots to the drivers?

The project is to mainly answer this particular question addressed by providing a Web Application and an Android application to reserve parking slot as per drivers need. The drivers need to visit the Web Application with the details of their journey and then system also suggests the available parking slots in that area and they can immediately reserve the space by make the payment for allotted time. Then a QR Code has been generated and then users can scan that through the Android Application and then immediately it shows the directions to that parking slot. When driver reach the spot then he has to show the QR to the security guard then security guard scan the QR then immediately the parking time will be started in the server.

### INDEX TERM : CAMPONENTS

SR NO	CAMPONENTS
1	Node MCU
2	Relay
3	QR
4	Power Supply
5	LED'S
6	IR Sensors
7	CCTV cameras
8	Parking sensors
9	Signage & Display Boards

### ❖ INTRODUCTION

Use of automobiles is increasing day by day which leads to various parking issues. Vehicular population is shooting out the roof, no amount of space is sufficient to accommodate stationary vehicles. Management of parking has grown to large extent. The main problem is to manage parking in congested areas. One of the congested area is college campus .However improving parking on campus is important. The problem is parking spaces are either insufficient according to the demands of students or these spaces are poorly allocated. Colleges have to try almost every possible way to deal with problem of campus parking. Parking on campus needs improvement.

Users entering the university are allowed to have a car on campus. With every new freshmen entering parking possess a problem in campus. Problems in parking campus results in users inconvenience, which results in frustration. Parking the car today need parking policies for safety and security reasons. There is always competition for the parking space. A good solution to overcome parking crises would be by increasing the number of parking spaces or else enlarge the parking lots, but this will lead to huge investment. However better management of existing parking spaces will be wise method. The availability of parking spaces should be improved. Another approach for managing parking in campus is by improving the efficiency of the use of existing parking spaces, by informing user about available parking space and guiding him accordingly. Now a day there is growing popularity and affordability of internet –enabled smartphones and because of data available online we can step to solve parking problem. Android smartphone enables user to virtually carry the internet with him.

### ❖ Working

A simple yet modern system based on QR code can easily be adopted by small vendors with less capital investment. Three different apps have been created with android studio and ui is designed with the help of the figma app. On the successful installation of an app, a user gets its unique QR code which contains basic information like name, car number, etc. A user has two different options to book parking spaces.

One can book parking spaces from home or visit a parking lot to book parking spaces. User needs to pay advance charges for booking online via different online payment platforms like Paytm, Google pay, Bhim upi, etc. On successful payment, a parking space is allotted to the user for a particular time. For onsite booking, when a user enters the parking lot he needs to scan his code in the scanner app.

The scanner app scans the code and allots the parking space to the user. The entry time of scanning is being recorded by the system. After completion of the work, the user has to follow the same steps to pay the bill. At exit site user again scans his code and based on the time of utility bill is being generated. The list of slot booked and revenue generated is being displayed in the admin app.

### A. Parking Space Distribution and Allotment

The whole parking lot is divided into 3 sub divisions. One for online parking, second for onsite parking and third for dispute solving. Each vendor on analysis can change the layout for his parking space in the vendor (admin) app. The use of a third space is to solve any conflict and are generally less in number. Parking spaces are allotted on a first-come-first-served basis. The nearest parking lot is filled first then the farthest one. These will help the user to save time and also reduces the problem of traffic in the parking area as cars move in a well-defined path. In Fig. one layout is shown for a parking space where a number of onsite users are more as compared to online booking. Moreover, the third lot is kept small and can be used if someone parked in wrong allotted parking space. In such case the penalty will be charged by the user. One has option to extend the time of parking only till 30 mins of booking. Each slot is allotted after intervals of 30 mins only. In case user parked the car in the same slot after the time extension, and same slot is booked by some another user than to avoid concurrency the user will be diverted to “C” parking lot which is used to solve such types of issues. Also some grace time is also given to each user as decided by the vendor of the parking lot

### B. Different Application designed for system

#### 📱 User app

- Secure user login page where user need to fill up some basic information and its QR code will be generated .
- Then parking mode will be displayed- online or offline.
- Payments and space allotted history can also be accessible from user app.
- Current bills and related information is also shown in app.
- Fig. shows the prototype designed in app. A user “Dev Patel” has successfully registered and a unique QR code is generated for him .
- Fig. demonstrates two options given to user for booking- Book online and Onsite Booking.
  - Unique QR Code generated for use
  - Options available for booking parking space.

### Admin app

- This app will monitor online and offline parking space allotment.
- It has access to edit parking allotted space and increase or decrease or shut down the parking space allotment.
- It has also access to the payment history of any customer and also enforce penalty on customer (if applicable).
- Any query or feedback is directly linked from user app to an administrative app.
- Graphical representation of daily generated revenue from parking charges is also an added feature.
- Fig. shows GUI options given to admin

### Scanner app

- Scanner app will scan the QR code of the user and allot the nearest available parking space.
- It will store the allotted space to firebase (database).
- Real time allotment of parking space is done with the help of fire base.
- Also scanner app stores the entry and exit time of the user and generate a bill.
- Generated bill is being displayed both on admin as well as user app.
- Fig. shows the GUI of scanner app .Parking space is allotted to the user after QR code is scanned.

We recently went through many research papers which have published idea or mechanisms related to our sort of process on parking in a different set of conditions, but their core idea is satisfactorily different from ours in variety of areas like its specifications, process, and outcomes.

There are majorly two research papers which are similar to ours, SmartphoneBased car searching system for Parking lot [1] – Jun Li, Yang an In the paper they tried to make a system that finds your car from the parking area with the help of QR code. Their process is done by their app and real-time navigation protocol.

### Results

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.

Following is a comparison of building costs for generic APS and multi-story parking garages:

Applications	Type	Parking spaces	sq ft (m) per sq	Building Cost	Cost per Space
Freestanding Above Grade	Parking Garage	200	320 (30)	80 L	100
	ASP	200	225 (20.9)	92 L	200
Below Building Above Grade	Parking Garage	200	450 (42)	1.2 Cr	250
	ASP	200	225 (20.9)	1.2 Cr	300
Below Building Below Grade	Parking Garage	200	450 (42)	1.9 Cr	400
	ASP	200	225 (20.9)	1.9 Cr	400

### Applications of Project

By virtue of their relatively smaller volume and mechanized parking systems, APS are often used in locations where a multi-story parking garage would be too large, too costly or impractical. Examples of such applications include, under or inside existing or new structures, between existing structures and in irregularly shaped areas. APS can also be applied in situations similar to multi-storey parking garages such as freestanding above ground, under buildings above grade and under buildings below grade. The direct comparison of costs between an APS and a multi-story parking garage can be complicated by many variables such as capacity, land costs, area shape, number and location of entrances and exits, land usage, local codes and regulations, parking fees, location, and aesthetic and environmental requirements

### Future Scope

The Smart parking system based on Slot booking is implemented, using the Android application. Using the slot allocation method we can book our own cheapest parking slot. It is an efficient one for solving parking problems, which overcomes the traffic congestion also provides automated billing process.

The system detects if parking slots are occupied using IR sensors. Also it uses IR technology to sense if a vehicle has arrived on gate for automated gate opening. The system reads the number of parking slots available and updates data with the cloud server to allow for checking parking slot availability