



## Smart parking system

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### ABSTRACT

*Now a day the number of personal vehicles usage is increasing on a large scale. People prefer personal vehicles than public transportation. It is very difficult and frustrating as well to find parking space in most metropolitan areas, especially during the rush hours. It is often costly in almost every major city in the world to find proper and secure parking space. Due to this there is a need to provide sufficient parking places providing plenty of slots to help the user park his vehicle safely. The aim of this paper is to propose a design of Android based smart Parking System that regulates the number of cars to be parked on designated parking area. This is done by automating the parking and unparking of the car with the help of an Android Application.*

**Keywords:** Internet of Things (IoT), Radio Frequency Identification (RFID), Driver Request Processing Centre (DRPC), Smart Parking Allocation Centre (SPAC), Wireless Sensor Network (WSN), Near Field Communication (NFC), One Time password (OTP), Android.

### 1. INTRODUCTION

The proposed project is a smart parking booking system that provides customers an easy way of reserving a parking space online. It overcomes the problem of finding a parking space in commercial areas that unnecessary consumes time. Hence this project offers a web based reservation system where users can view various parking areas, select the space to view whether space is available or not. If the booking space is available then he can book it for specific time slot. The booked space will be marked so that it will not be available for anyone else for the specified time. This system provides an additional feature of cancelling the bookings. User can cancel their books space anytime. After booking users are notified about the booking via unique parking number. The client app allows parking booking on android phone. In the server side all the data is maintained in a secured database.

Searching for street parking in crowded urban areas creates many problems, also frustrations for drivers. It has been shown that over 40% of the total traffic volume in urban areas is composed of vehicles cruising for parking. A long queue of cruising vehicles can cause serious congestion with the blocking of only a few streets. With the rapid proliferation of vehicle availability also all usage in recent years, finding a vacant car parking space is becoming more difficult also time consuming. This results in a number of practical conflicts. Parking problems are becoming ubiquitous and ever growing at an alarming rate in every major city. The use of android technology combined with the recent advances in wireless applications could be the key to solve emerging parking problems.

### 2. LITERATURE SURVEY

In this section, we review some studies of smart parking systems based on different techniques such as wireless sensor networks and RFID. Most existing parking systems rarely address the issue of parking space management. Most of the organizations operating car parking, particularly for indoor car parks, use a simple photocell and barrier system to track the total number of vehicles on their premises. This information is usually conveyed to drivers via signs mounted at the entrances and nearby streets. To provide an overview of the different technologies used by others, the following is a summary of the systems we have reviewed. [1] The generic concept of using cloud-based intelligent car parking services in smart cities are monition in paper, as an important application deployed on the Internet of Things (IoT) paradigm.[2] In this we present an IoT based cloud integrated smart parking system. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly.[3] This paper presents a novel Smart Parking System based on the jointly use of different technologies, such as RFID, WSN, NFC, Cloud, and mobile. [4] In this paper proposed "smart parking" system adopts the basic structure of PGI systems. In addition, such a system includes a Driver Request Processing Centre (DRPC) and a Smart Parking Allocation Centre (SPAC). [5]

The paper aims to proposed micro-controller based parking lots and GSM is used for monitoring the available spaces through which the reservation is made with the help of android application for the users.[6] This paper developed and presented a mathematical model. [7]

### 3. PROPOSED WORK

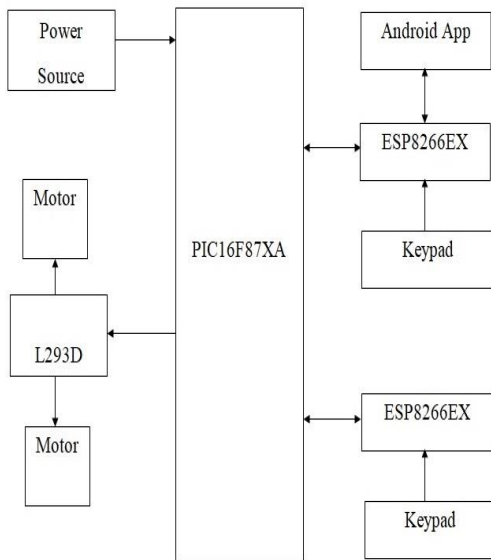


Fig. 1. Block diagram of smart parking system

The interfacing of all the components is done using the PIC16F87XA. The actuation of the physical process is through the motors. User accessible side comprises the Android app and Keypad. The communication of the whole system is through the ESP8266EX module.

### 4. IMPLEMENTATION AND WORKING

In this section we talk about the implementation with working of the system in a real world scenario. The complete process of booking a parking slot, parking a car in that slot and leaving the parking area is explained with the help of the following flow chart.

The steps that a driver needs to follow in order to park its car using our parking system.

- Step 1:** Install the smart parking application on your mobile device.
- Step 2:** With the help of the mobile app look for a parking area for the vacant space available.
- Step 3:** Select a particular parking area.
- Step 4:** Select the amount of time (in hours) for which you would like to park your car for.
- Step 5:** After booking OTP is generated.
- Step 6:** At the time of entry you need to enter the OTP through keypad.
- Step 7:** Gate will be opened only if OTP is valid.
- Step 8:** Park your car.
- Step 9:** At the time of exit again enter OTP.
- Step 10:** You will get the total payable amount (along with fine if any) on your android app.
- Step 11:** Pay the parking charges.

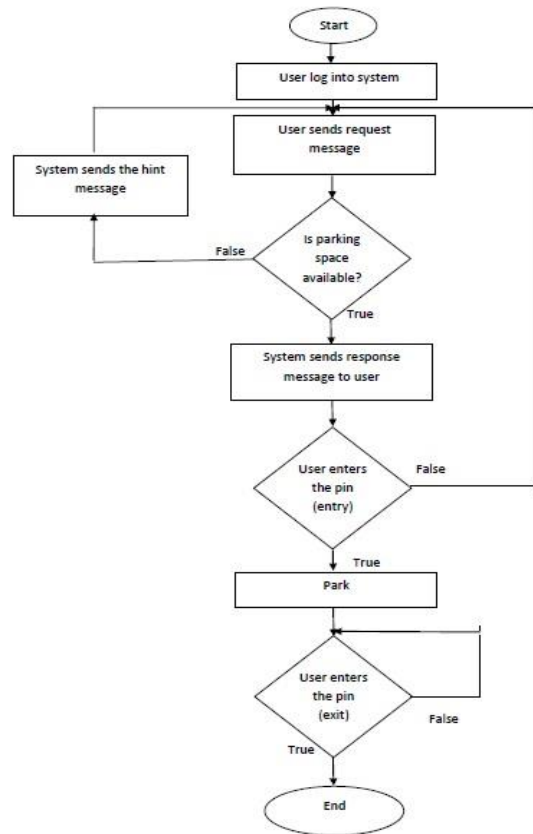


Fig. 2. Flowchart of smart parking system

### 5. RESULT

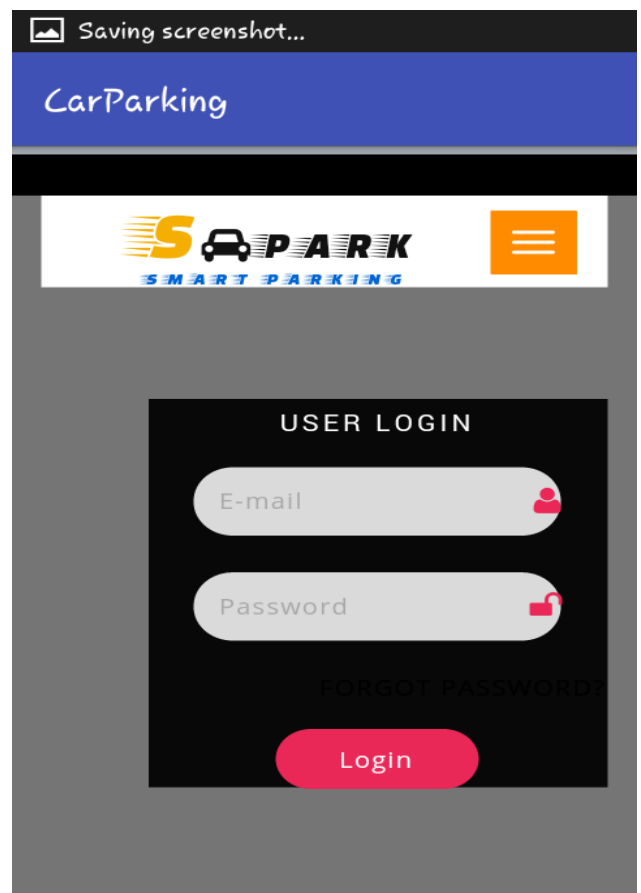


Fig 3. Login window

Through this window the user will login to avail the services.



Fig.4. Parking slots window

With the help of this window the user would be able to see the available parking slot that they could book. After booking OTP is generated and mailed to registered email ID.

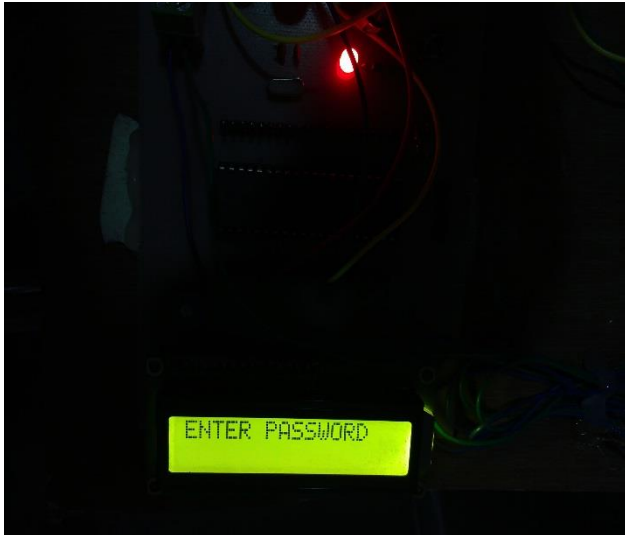


Fig. 5. OTP window

At the time of entry, the OTP which was mailed to registered email-ID should be enter though keypad.

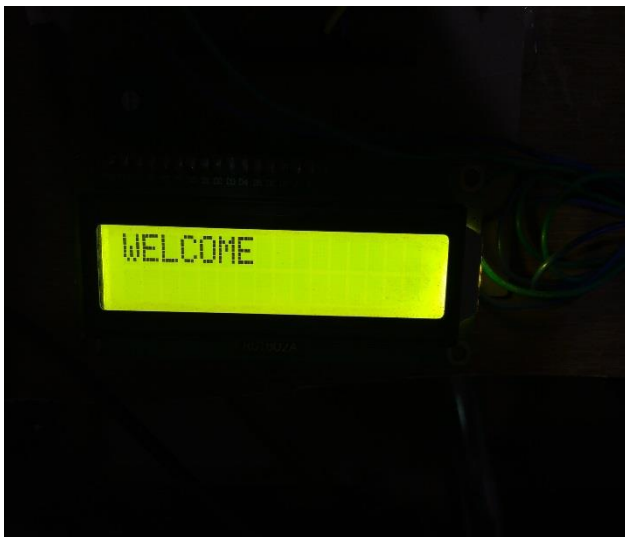


Fig. 6. Welcome window

Gate would be open only if OTP is valid and LCD shows WELCOME message.

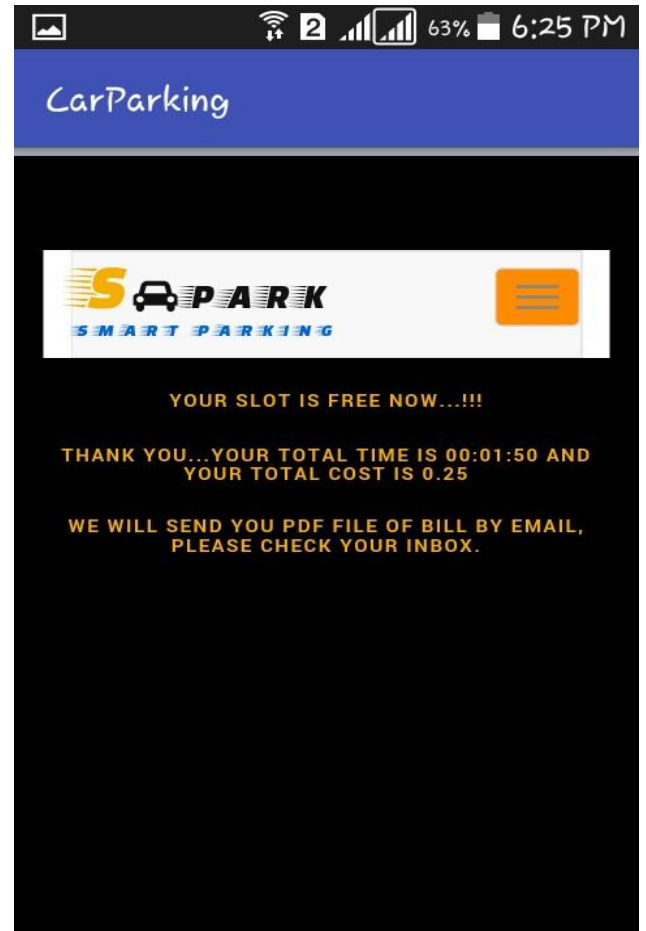


Fig. 7. Payment window

The total charges for the parking session will also be provided to the user once the user exit the parking slot, further on the vacant parking slot will again be available to another user through the app.

## 6. CONCLUSION

In this paper, we have presented the concept of Smart Parking System which will be able to reduce the traffic congestion which will improve the citizen's quality of life. Android mobile application called Car parking, a driver can find the parking spaces available in a given area and get the parking fee.

## 7. 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. This work could be further extended as a fully automated system using multilayer parking method. Safety measures such as tracing the vehicle number face recognition of the drivers so as to avoid theft & automatic billing process can also be designed. We plan to expand the tests on the real time environment where the users can have the "Smart Parking" system in their handheld devices.

## 8. ACKNOWLEDGMENT

We have taken efforts in this project. However it would not have been possible without the help from various sources. We

would like to express our special thanks to the authors whose papers we have consider for reference.

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