

# Perceptive Car Parking Booking System With IOT Technology

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**Abstract** – We offer a system for parking reservations and security, maintenance in a private car parking field in an urban metropolis. Our system design is used to eliminate unnecessary time conception to find an empty slot in a car parking field. By the same sheath, we can also save more than 75 to 85 percent of fuel wastage in a car parking area to see the empty parking slot. The reservation processes are happening only by the user. Hence the user visit parking area using an android application through an internet access and find the empty parking slot and a reserve parking slot as per their preference. Here we present the major response to user's reservation action and thus the driver can set aside his own likely parking slot based on the time and cost function. We have projected a system with multi-processing queuing mechanism (MPQM) to avoid multi-user approach problem (MUAP) during the reservation procedure in our perceptive car parking booking arrangement based on IOT technology.

**Key Words:** Android Application, Android Studio, Arduino UNO, Internet of Things, Multi-User Approach Problem (MUAP), QR Code, Ultrasonic Sensor.

## 1. INTRODUCTION

Now a day's congestion of traffic increases rapidly with the increasing growth of population. With respect to the number of population the usage of cars also increased. Due to more usage of car the traffic congestion occurred on the road. Because the finding of free parking slot takes more time. Hence, we lose a certain quantity of time and made more than 75 to 85 percent of fuel wastage to find the empty parking slot in parking area. To solve this problem, we need a special system in the parking area to measure empty space and show the information to the people who looking for the empty space. However, a few systems designed previously to avoid time wastage in car parking area.

In the smart parking allocation and reservation system, a system itself allocates the parking space for every user [1] [2]. In this, the system observes the distance between the user and parking spaces with the help of global positioning system [1]. With this distance measurement the system calculates the average time conception for the user entering the parking space [1]. Then the system allocates the appropriate parking slot for the user [1] [3]. Hence the user may or may not be accepted the allocated parking space [1]. If once the user accepts allocated slot, then the user can able to change his parking slot [1] [4]. In our system all the user can able to reserve own likely parking spot. Hence there is no restriction between the slot reservation, and user request. Here the user reserves his spot with respect the

system framework described. Here each step of the reservation process is differentiated by DLSSM. MUAP is avoided by special queuing process (MPQM) with the embedded process control unit (EPCU) in our smart car parking system [1].

## 1.1 Literature survey

**V. Venkateswaran, N. Prakash, IJRET [1]:** In this paper, they introduce a special system for smart parking reservations and security maintenance in a commercial car parking area in an urban environment. Here they give the major response to user's reservation action and hence the driver can reserve his own likely parking slot based on the cost function. Instead of efficient car parking we need a special security options to make our vehicle very safe. By this case they have provided a better security guidance of barrier gate control security system (BGCSS) with the help of embedded process control unit (EPCU). There are many steps taken to make a reservation with different lighting scheme mechanism (DLSSM).

**Amir O. Kotb, Yao-Chun Shen, Xu Zhu, Senior Member, IEEE, and Yi Huang, Senior Member, IEEE [2]:** In this paper, they introduce a new smart parking system that is based on intelligent resource allocation, reservation, and pricing. The proposed system solves the current parking problems by offering guaranteed parking reservations with the lowest possible cost and searching time for drivers and the highest revenue and resource utilization for parking managers.

**Yanfeng Geng, Student Member, IEEE, and Christos G. Cassandras, Fellow, IEEE [3]:** In this paper the system assigns and reserves an optimal parking space based on the driver's cost function that combines proximity to destination and parking cost.

**Sheelarani, S. Preethi Anand, S. Shamili and K. Sruthi [4]:** In this paper, they proposed a smart parking application, where users will be able to park their automobiles by finding an empty parking lot through Android Application or can even park their automobiles directly through Embedded Hardware. An Intelligent Parking System is implemented based on Slot Allotment.

**Hongwei Wang and Wenbo He [5]:** In this paper they we design and implement a prototype of Reservation-based Smart Parking System (RSPS) that allows drivers to effectively find and reserve the vacant parking spaces. By periodically learning the parking status from the sensor networks deployed in parking lots, the reservation service is

affected by the change of physical parking status. The drivers can access this cyber-physical system with their personal communication devices.

## 2. Proposed work

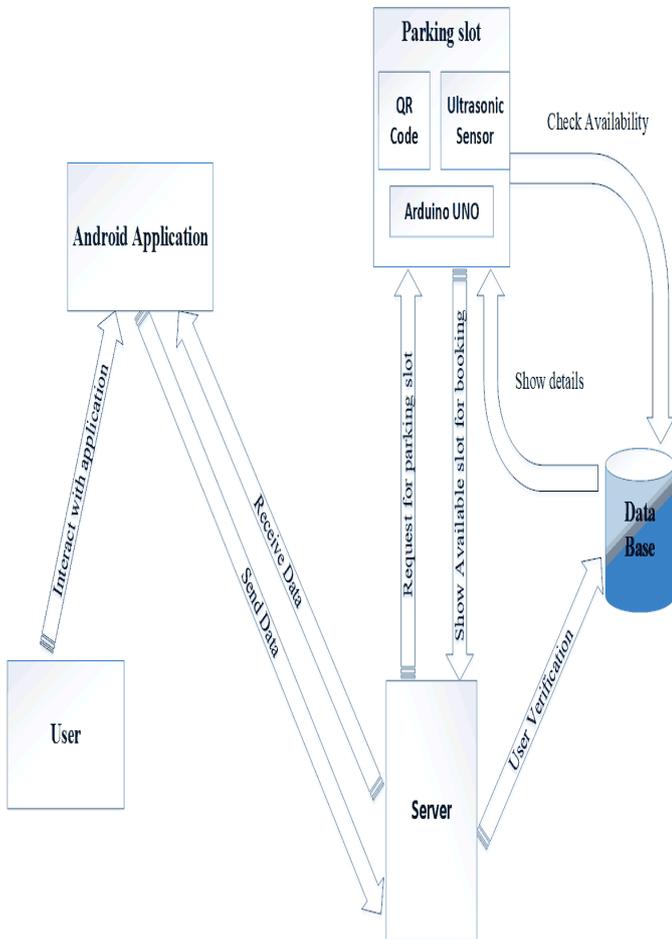


Fig 1: Parking Reservation System design diagram

We are going to design a system which consists of different modules like server, database, user application and parking slot arrangement. We provide an Android application to user because of according to Google there are 1.4 billion active Android devices over worldwide. A user must first download the android application in his android mobile phone. After user must go only one time for registration with specific id (using AADHAR CARD no. or License no.) using the application. Then registered user information is sent to the server system and data stored in the database. The parking slot information is also stored in the database which is always updated, and server manages and update this information and keep sending notification to the user after parking slot booking. User can use android application to book specific parking slot at desired space. When user book specific slot, then the server generates QR code and send to the user (Android Application) and the database through server system. With the help of QR code user will be accessing specific booked parking slot and park the car. At the parking

slot there is a mechanism where we use Arduino UNO and Ultrasonic sensor. Arduino is used for managing ultrasonic sensor and entry gate. The ultrasonic sensor is useful for detecting the car position. When user will scan QR code at the parking slot that time user will be charged or pay for a time duration which is user already mention at the slot booking time through android application. In such critical condition or in some new modification is required for parking system we provide a web site for the Admin user. Admin can manage parking locations and user database through the website. This system design is very simple, effective, eco-friendly and user friendly.

**Arduino UNO R3:** The Arduino UNO R3 is a microcontroller board based on the ATmega328 (data-sheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button [6]. We are using Arduino UNO R3 for controlling entry gate (motor) and ultrasonic sensor.

**Android:** Android is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touch screen mobile devices such as smart phones and tablets. As of May 2017, Android has two billion monthly active users, and it has the largest installed base of any operating system [7]. Hence, we have decided to build an Android application which is used for interacting with user and booking parking slot for a specific time duration.

**Android Studio:** Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development [8]. We use Android Studio to build an Android Application.

**Apache Tomcat:** Apache Tomcat implements several Java EE specifications, including Java Servlets, Java Server Pages (JSP), Java EL, and Web Socket, and provides a "pure Java" HTTP web server environment in which Java code can run [9].

**Ultrasonic Sensor:** It emits an ultrasound at 40 000 Hz, which moves through the air and if there is an object or obstacle in its path It will rebound back to the module [10]. This ultrasonic sensor is used for detecting the car distance from the entry gate.

**Quick Response (QR) Code:** A QR Code is a two-dimensional barcode that is readable by smartphones. It allows to encode over 4000 characters in a two-dimensional barcode. "QR Code" is a registered trademark of DENSO WAVE INCORPORATED [11]. We are using QR code for identification of a valid user at the time of user enter the parking slot.

## 3. CONCLUSIONS

We have suggested a smart car parking arrangement to attain gentle and efficient usage of car parking area. Basically, this system work systematically detects the non-

reserved parking slot and updates the data in server side using web page which is designed for the distinct parking area. The average time consumption for update the information is very less than former systems. We spring up an effective parking reservation system where the user can reserve their slot using their android application or with the aid of an embedded hardware. This system is efficient and useful in metropolitan cities. This system can be applied to avoid dense traffic in the parking areas like shopping malls, theaters, tourist spots and other busy areas, thereby cutting time and the use of the fuel and contamination.

## REFERENCES

- [1] V. Venkateswaran, N. Prakash, "INTELLIGENT APPROACH FOR SMART CAR PARKING RESERVATION AND SECURITY MAINTENANCE SYSTEM", IJRET journal. Vol. 3, pp. 248-251, January 2014.  
  
<http://esatjournals.net/ijret/2014v03/i02/IJRET20140302042.pdf>
- [2] Amir O. Kotb; Yao-Chun Shen; Xu Zhu; Yi Huang, "iParker—A New Smart Car-Parking System Based on Dynamic Resource Allocation and Pricing". IEEE Trans, 2016. Vol. 17, no. 9, pp. 2637 – 2647  
  
<http://ieeexplore.ieee.org/document/7465828/>
- [3] Yanfeng Geng and C.G. Cassandras, "New "Smart Parking" System Based on Resource Allocation and Reservations", IEEE Trans. Intel. trans sys, vol. 14, pp. 1129-1139, September 2013.  
  
<http://ieeexplore.ieee.org/iel7/6979/4358928/06492250.pdf>
- [4] P. Sheelarani, S. Preethi Anand, S. Shamili and K. Sruthi, "EFFECTIVE CAR PARKING RESERVATION SYSTEM BASED ON INTERNET OF THINGS TECHNOLOGIES". WCFTR'16, 2016.  
  
<http://ieeexplore.ieee.org/document/7583962/>
- [5] Hongwei Wang and Wendo He, "A Reservation-based Smart Parking System" 2011.  
  
<http://ieeexplore.ieee.org/iel5/5888675/5928760/>
- [6] <http://www.trossenrobotics.com/p/arduino-uno.aspx>
- [7] [https://en.wikipedia.org/wiki/Android\\_\(operating\\_system\)](https://en.wikipedia.org/wiki/Android_(operating_system))
- [8] [https://en.wikipedia.org/wiki/Android\\_Studio](https://en.wikipedia.org/wiki/Android_Studio)
- [9] [https://en.wikipedia.org/wiki/Apache\\_Tomcat](https://en.wikipedia.org/wiki/Apache_Tomcat)
- [10] <http://howtomechatronics.com/tutorials/arduino/ultra-sonic-sensor-hc-sr04/>

[11] <https://www.the-qr-code-generator.com/whats-a-qr-code>

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