

# Smart Car Parking by Considering Pricing and Reservation

Linta John<sup>1</sup>, Sreelakshmi K<sup>2</sup>, Anju Rachel Oommen<sup>3</sup>

<sup>1,2,3</sup>Mount Zion College of Engineering, Kadamannitta, Pathanamthitta, Kerala

**Abstract:** *In modern life, the great problem that we are facing is not having an efficient car parking system. Park a vehicle in shopping complexes, cities with dense traffic is very crucial thing. Car parking is done by manually and basically park a car is totally depend on experience and luck. Smart Parking System based on reservation, pricing gives efficient parking area. Smart Parking System always gives information about the vacant spaces in the area and also provide guarantee parking. IoT connects surrounding things to the network. By using Smart Parking System the user can find the parking area without put over effort. By using this average waiting time can be reduced.*

**Keywords:** Smart Parking System, Internet of Things, Pricing, RFID, Zigbee

## 1. Introduction

From the development of traffic systems, an intelligent parking system was created to decrease the cost of hiring people and for maximum use of resources for car-park owners. Currently, the common method of finding a parking space is manual that means driver usually finds a space in the street through luck and experience. This process takes time and effort and may lead to the worst case of failing to find any parking space. If the driver is driving in a city with a density of high. The alternative is to find a predefined car park with high capacity. Different wireless network technologies like as radio frequency identification (RFID), Zigbee, wireless mess network, and the Internet. This study aims to give information about nearby parking spaces for the driver and to make a reservation using devices such as smart phones or tablet PCs. Internet-of-Things technology (IoT) has created a great thing in many fields in life also in smart-parking system (SPS) technology, to resolve the stated problems and make advantage of the significant development in technology Internet of Things (IOT) has an important role in connecting the nearby environmental things to the network and made easy to access those things which is away from any remote location. Generally people are facing a great problems on parking a vehicle in parking area in a city. In 1999, Internet of things was first introduced at auto ID center and Kevin Ashton was first used by. This evolving as a latest burning technology, it promises to connect all our nearby things to a network and communicating with less human involvement. There is no common architecture exists till and internet of things is in beginning stage and there is lot of researches and implementations are currently being going and thus there is no guidelines or boundaries exists. So the internet of things has different definitions. Simply it is defined as the things that present in the physical world or in an environment with sensors are attached or IOT technology grows in different fields like smart applications but not yet found boundary constraints of this technology. Currently some smart applications are used. Whereas sensing includes the speed of vehicles sensing and humans or any objects, temperature sensing, pressure etc. By uses some technologies called GPS, Wi-Fi, BT/BTLE; RFID etc these devices are connected. More peoples are living in city because of this the cities have reached full of its capacity.

People uses vehicles so there is large number of vehicles exists. But people spend their valuable time for searching parking area to park their vehicles. Thus problem occurs in the traffic and it leads to a fed up job to find the parking space to park their vehicle. The traffic problem is occurs because of the increase in the number of vehicle in urban areas so people are wasting their time for searching the parking area. Normally to park their vehicles with embedded systems and make connected to network by using wired or wireless connections. With the improvement in economic behavior and the living standard, the number of people in India who have automobiles and motorcycles have recently increased. Thus, parking is a big problem to facilitate traffic network. During the rush hours, searching for parking space in most metropolitan areas, is difficult for drivers. The difficulty arises from not even knowing where the available spaces may be. The daily concern for most drivers, searching for a vacant car parking space in a metropolitan area and it is very time consuming. It commonly produces more traffic congestion and air pollution. A recently done survey states that during rush hours in most big cities a vehicle takes, the traffic generated by cars searching for parking area takes about 40% of the total traffic. To decrease such traffic congestion and many smart parking systems is aiming. The current smart parking systems only give the information of available parking area, reservation authority which manages the database, and give the parking information to direct. Since these systems cannot lead the drivers to their desired parking destinations, sometimes it make the situation worse, they are not “smart” enough. If the total number of free spaces in an area is less and have more drivers, the one who get the parking information, will head for these spaces. It will cause server complaint. It is, therefore, very important strongly to provide an effective strategy to address these concerns. One the important problem is developing a big parking space for several complexes and other types of institutions that requires large parking space. All most every visitor might spend up to 30 to 45 minutes for find an empty parking space.

## 2. Literature Survey

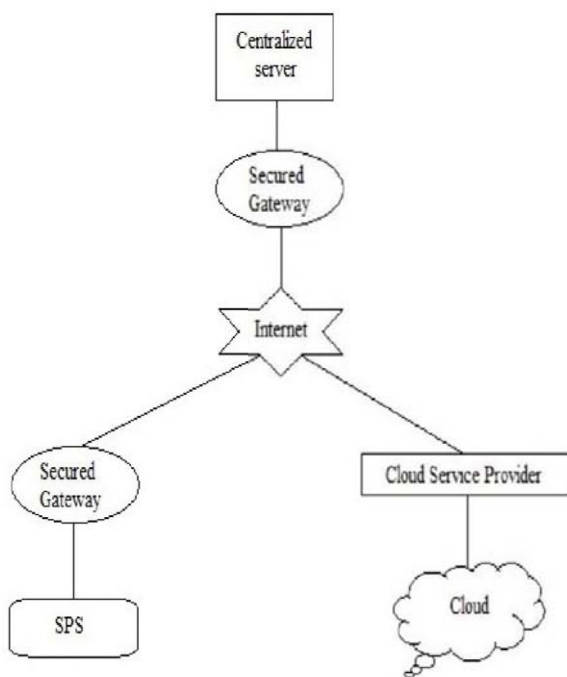
In this paper [1] the designed parking system is applicable for parks which are covered, open and also street side

Volume 5 Issue 10, October 2016

[www.ijsr.net](http://www.ijsr.net)

Licensed Under Creative Commons Attribution CC BY

parking. The fig.1 shows the architecture of for smart parking system using cloud based IOT, which contains provider called cloud server which gives status information about the parking slots in a parking area. The duty of the centralized server is to manage and store entire smart parking systems information like total number of slots, availability of vehicles etc. By using some secured gateways through network and all these information will be accessed. This parking system consists of several components and their functionalities are, a centralized server which maintains the databases that contain information about parking spaces present in the area. The other one is the Raspberry pi which is a microcontroller and is used to implement the parking system and is attached with raspberry pi camera.



**Figure 1:** Architecture of the system

The other one is the Image capture here for capture the picture of parking area continuously Pi-camera is used and is used to validate the slots to check that is either filled or empty. The Navigation system is the other one, this indicates the availability of parking slots to the users and direct the users to the exact location, that is, the nearest parking area from current location. Display device is the next one, this is a monitor or tab which display the admin side interface, he can capable to modify the parking lots by evaluation the device. The next is the User device; here the user can connect with the parking system by using their smart phones. The features of raspberry pi 2 is incorporates with SPS and is attached with pi camera. In the top of street lamp or at the ceiling of indoor parks a pi camera is mounted and the camera is capable of monitoring on each parking slots continuously to check whether if the particular slot is filled or empty. The central server have the capability of providing information about multiple slots in a single parking area and also multiple parking areas in a single city, By using some protocols such as HTTP, CoAP, this can be accessed.

In this paper [2], the proposed system is to help owners of the shopping complex to install a system with low cost, and by replacing with Zigbee technology it is able to reduce installing cost of wired connection for sensors. In PCB drill process data management and the WLAN application, and any wireless application Zigbee can be used. This system also has a display status and it will show the current empty parking spaces. The proposed system provides cost effective solution for parking a vehicle. Instead of using and maintain cable, the proposed system develop a system that use wireless technology of Zigbee and it will notify the visitors about empty and non-empty parking lot. The proposed system reduces the man power. By using the proposed system, by following the direction of the system, visitors or users can simply occupy the parking lots easily. This system also helps for the searching of vacant parking lot in shorten time.

The price of parking and broadcast lives parking availability information to users (also drivers) are determines by the management system. When the user receives the parking information, he selects desired parking lot and male reserves that space. SPSR generates a QR code which is unique and sends to the user when user reserves a parking space. So, the parking resources status is changed by users parking decisions. The parking lot state is the number of total spaces versus filled spaces. Parking lot has access to the Internet for the communication with the management system and users. And share parking information with others. For authenticating the user's identity individually and reservation request in every parking lot, a reservation authority is deployed. By using the unique QR code that is send by the management system to the user at the time of reservation, the Reservation authority identifies each user. The reservation authority will updates the parking information to hold the reserved space for the user when the reservation order is confirmed. The system updates the state of the parking lot depending on the information received. Depending on the of parking lots state, the system (1) will observe the occupancy status and level of congestion, (2) the parking prices will determines, on the basis of their pricing scheme, (3) will release the prices to of the all users periodically, and (4) for further analysis it will store the parking information, and also QR code and prices. The system considered as the centralized decision-making thing in a planned economy. All the pricing decisions will make by the system by considering the state of parking lots and also by user demands. The proposed system is a closed-loop system, and its parking price is dynamically adjustable, and hence reduces the traffic for searching parking. By using the QR code, when user reaches the parking spot, each user has been identified and it is by placing the reservation authority on the gate. By scanning the QR code, host demands for the QR code and verify the details. So to make his reservation, the user does not need to communicate with his desired parking lot host. By using the host QR code scanner and verify the details just like a centralized system, he can directly scan the QR code. Reservation is highly reduced due to this communication overhead. Also, every parking lot reservation information is managed by its own, this makes the reservation requests from users easily.

In this paper [4], is derived from the concept of IoT. The proposed system uses the WSN, which consists of RFID technology for monitoring the car parks. The number of free parking spaces in each car park is counts by RFID reader. The implementation of scale system at low cost can be done by using RFID. A mechanism is provided by the system that prevents problems in the car park and helps minimize wasting time for looking for a parking space. During which time, users reserve a space, then the system will updates the parking space status to pending. If no car is parked in that space, after a certain time the system changes the status to available. From the WSN node, the system will update the status. So, the status of the parking system is always be updated. To plot the parking time for each parking space the system will help.

### 3. Conclusion

A good parking system is necessary, with a parking system we can reduce the number of users that fail to find a parking space and also minimizes the costs of moving to the parking space. The architecture and system has been successfully simulated and implemented in a real time. It reduces the average waiting time of users for parking. The advantage of system is it achieved the optimal solution for found successful free parking space. The average waiting time gets minimal, and the total time of each vehicle in each car park is reduced.

### 4. Acknowledgement

We would like to thank, first and foremost, Almighty God, without his support this work would not have been possible. We would also like to thank all the faculty members of Mount zion college of engineering, for their immense support.

### References

- [1] Basavaraju S.R., "Automatic Smart Parking System using Internet of Things," International Journal of Scientific and Research Publications, Volume 5, Issue 12, December 2015 (journal style)
- [2] Mohit Patil, Rahul Sakore, "Smart Parking System Based On Reservation," Department of Computer Engineering, Ramrao Adik Institute of Technology, D. Y. Patil Vidyamargi, Sector 7, Nerul, Navi Mumbai, India Mumbai University, Paper id j2013299
- [3] Thanh Nam Pham, Ming Fong Tsai, Duc Binh Nguyen, Chyi Ren Dow, Der Jiunn Deng, "A Cloud Based Smart Parking System Based on Internet of things Technologies," Department of Information Engineering and Computer Science, Feng Chia University, Taichung 407, Taiwan. (journal style)
- [4] Hamzah Asyran Bin Sulaiman, Mohd Fareez Bin Mohd Afif, Mohd Azlishah Bin Othman, Mohamad Harris Bin Misran, Maizatun Alice Binti Meor Said Faculty of Electronics and Computer Engineering University Teknikal Malaysia Melaka 76100 Durian Tunggal, Melaka, Malaysia.

### Author Profile



**Linta John** obtained the Degree of Bachelor of Technology in Computer Science and Engineering from Mount Zion College of Engineering in 2016. She is now pursuing her master degree in Computer Science with specialization in Computer Science and Engineering at Mount Zion college of Engineering under Kerala Technological University.



**Sreelakshmi K** obtained B.Tech in Computer Science and Engineering, and M.Tech in Cyber Forensics and Information Security from CUSAT University. She is currently working as Assistant Professor in Mount Zion College of Engineering.