



## Smart and Secured Parking System (SSPS)

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**Abstract**— Innovative parking systems for meeting near term parking demand are needed. The rapid increase in the number of vehicles on the road has led to serious traffic congestion and finding a parking space is a very big concern. The drivers do not know where the available space may be at the time of parking. For the limited places left, a lot of vehicles try to park at the same space. SSPS allows drivers to find and reserve a vacant parking space in an efficient manner by checking the status of the parking lot. It guides the vehicle to the nearest free parking space through real-time parking navigation service. SSPS is a novel, secure and intelligent parking system (SSPS) based on secured wireless network and sensor communication. The end-users can easily access this software with their personal communication devices. We address hardware/software architecture, implementations, and analytical models and results. Compared to the existing reservation-based models this software has an additional feature of access control through log-in, monitoring amount of time the vehicle has been parked for billing purpose and intelligent auto-theft prevention mechanism.

**Keywords**— Internet of Things (IoT), Radio Frequency Identification (RFID), Wireless sensor networks (WSN), Zigbee, GPS (Global Positioning System)

### I. INTRODUCTION

This project will consist of a user friendly application software that mainly helps and assists the vehicle drivers through the whole procedure of parking. Major modules of the software App will include logging in the application, checking parking space availability, booking a slot, finding the booked space and payment gateway. The application of this project extends to all the people who own vehicles and manage the parking lots. This covers almost the entire population of a country and is therefore highly applicable. In this article we describe the specific system requirements of the Smart and Secured Parking Management project. This would include performance requirements, system constraints, and project assumptions. Any specific detail that is needed about the standards or technology used to define these requirements, constraints, and assumptions are within the scope of this document. The parking reservation is safe and privacy preserved. The parking navigation is convenient and efficient. The whole parking process will be a non-stop service at the end the user can pay through various media. The prediction of revenues can be made based on which new business promotion can be made. In SSPS, new promotions can be published through wireless network.

### II. LITERATURE REVIEW

There are existing smart parking systems and many still undergoing developments. These softwares make use of Internet of Things (IoT), Radio Frequency Identification (RFID), Wireless sensor networks (WSN), Zigbee technology to sense the presence of a car and in parking meters at the payment gateway. Various cameras and sensors are used to monitor the parking lot. There are other models which include multi-storied parking, booking of parking using Short Message Service. People are working on increasing the efficiency of cloud-based smart-parking systems. In addition, there are Parking Management Servers with IoT hardware platform and Mobile App. Further a lot of these softwares use various shortest path algorithms and synchronize it with the GPS (Global Positioning System) and maps for better user interface. We have proposed a secured version of this parking system which has the best features of all the existing work for better usability and user experience. The existing systems are lacking security and may be high on cost and maintenance however, our proposed model is an integration of security with the other features in order to cater the needs of emerging economies where the traffic problem is severe and the budget is low with frequent security issues.

### III. PROPOSED FRAMEWORK

This project aims at providing smart parking service with additional facilities like security. It is a very useful and purposeful concept which can be used as a possible procedure to manage parking and finding parking space easily in countries having high population and heavy traffic congestion. The smart and secured parking system makes use of latest technology such as Internet of Things, Radio Frequency Identification, Wireless Sensor Networks, cloud computing, Big Data Analytics etc. for the benefit of all the stakeholders at large. Therefore, there was an urge to know these technologies and apply them to solve the problem of parking cars and managing parking lots which has become a big concern for the present as well as the future car parking scenario. In the proposed work the user SHALL be able to login via their phone number or Facebook or google+ ID, have access to its location using GPS (Global Positioning System).

He shall be able to login using a unique username. He will be able to add more than one car to his/her account and specify the car number for every car. The system shall provide the facility to see the nearest locations including malls, hospitals, restaurants etc. or select desired parking lot. He/she shall be able to select nearest parking lot and see availability of empty parking slots. He/she will be able to book his/her car's parking prior to entering the lot and see the description of the parking lot including price, time, or discounts (if any). The system shall then guide the car to the booked location using GPS navigation integrated with the shortest path algorithm after all the security checks. The system will compute the cost using a parking meter and allow the user to pay online through the secure payment gateway or through smart cards with RFID readers or any wallet service (if any). In this project we plan to incorporate the fingerprint mechanism, surveillance cameras, anti-theft mechanism to enhance security features and reliability of the system. From the perspective of the parking manager there shall be alerts when the defaulters do not make the payment, there is provision for on-spot booking and payment. The system shall have all the details saved on the cloud database. He shall be able to study and analyse the pattern of parking and behaviour of the car drivers. Further this software will benefit the malls and hospital to estimate the rush and manage their own staff to meet the needs accordingly. The car drivers will save time and fuel. The parking manager will have access over SSPS and SSPS will keep a database of all the car drivers and dynamically update the vacancies in the parking lot with the help of RFID/ IoT/ WSN. The sensor will also record the time duration for which the car was parked and send the information to the parking meter and the user through SSPS APP.

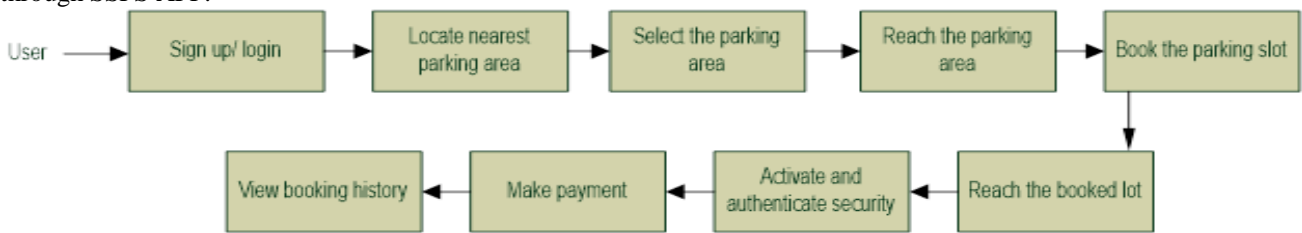


Figure 1.1 User Point Of View

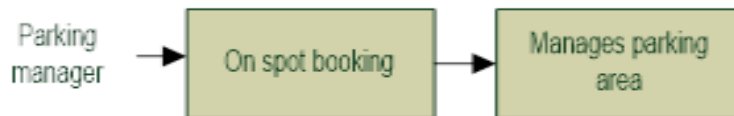


Figure 1.2 Parking Manager Point Of View



Figure 1.2 Admin Point Of View

#### IV. MODULE DESCRIPTION

##### 1. LOGGING IN:

The smart parking application enables the user to first sign up using a Facebook id or any other email id. The user shall fill in the profile given and add details of all vehicles he/she have. There will be two different signup options, one for the end user and one for the parking facility manager. Purpose: Enabling the user to login/signup with his/her account so that all the data can be saved in his profile for further use. Input: Registered Email Address and password required to login. Processing: First time users need to sign up first with email id and fill the profile. Then login using registered email address to book a parking slot. Output: The user will be logged in inside the application and will now be able to use the app efficiently. First time end user need to Sign up using any email id or Facebook. If the end user already has signed up the he has to provide the username and password and sign in.

##### 2. BOOKING:

Booking an empty slot at a desired parking slot. Input: The name of parking slot and time depending on book later or book now option. Processing: If book now is selected user's car gets a slot booked in the specified parking lot or the slot gets booked for the mentioned time in later booking. Output: The user gets the notification of availability for the particular slot and payment gateway pops out. The end user books a parking slot. The parking manager books slot for a guest user.

##### 3. PAYMENT GATEWAY:

Payment of parking ticket. Input: user will have to choose the payment option. Pay through saved card details or pay through net-banking/debit/credit card. Processing: If user has selected the saved card payment option, then payment will initiate with saved card bank account or if user has selected to pay through net-banking/debit/credit card then payment will initiate by selecting a bank. Output: Parking ticket will be generated if user has successfully done the payment.

V. DISCUSSION

Walking distance is defined as distance from a driver’s selected parking space to the destination. This important factor reflects the willingness of drivers when selecting parking spaces. The driver commonly wants to choose the most convenient parking space where it is closest to his destination. In the proposed model of smart parking management system, the drivers select the parking spaces depending on this factor, which indicates their satisfaction. In our proposed model, traffic volume is specifically defined as the amount of traffic generated by parking searching. This factor is not negligible and associated with the traffic congestion. The proposed smart parking management system is design to reduce the traffic volume caused by parking searching, as well as satisfy the need of drivers. We investigate the performance of the proposed smart parking system using these performance metrics. Through our analysis and observation this model would reduce the cost by 25% and hence this is more practical compared to other models.

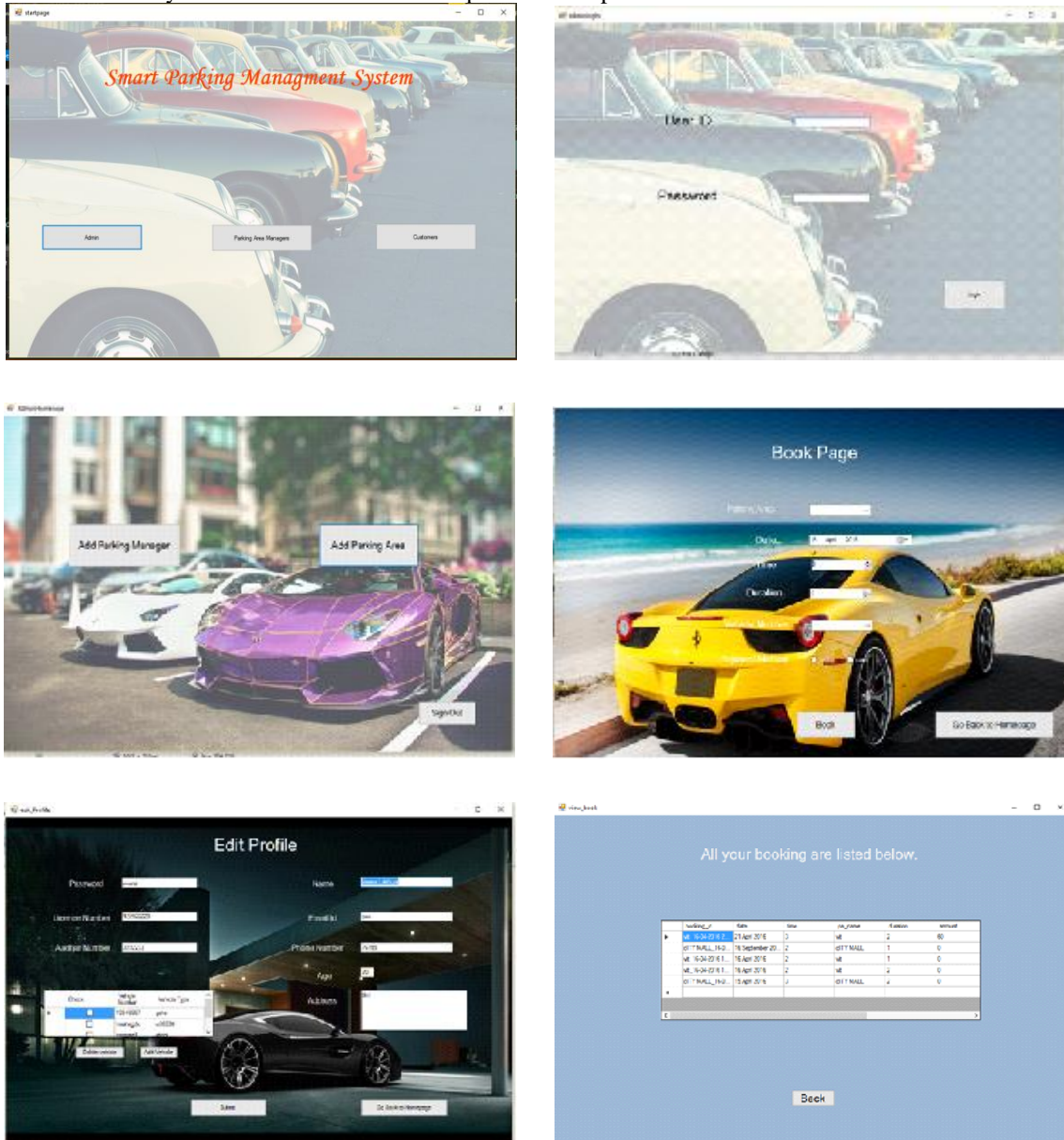


Figure 1. GUI Of The System

VI. CONCLUSIONS

SSPS helps you quickly find parking space in your desired location for the required amount of time. It provides a secure payment gateway through which users can pay for parking and check verify their past bills. SSPS uses latest technologies such as GPS and IoT to communicate with local networks in finding available parking space. It also provides additional facilities such as car security. An alarm gets activated if some tries to open the car other than you. All in all, SSPS provides quick and easy car parking system with additional security. Hence we conclude that SSPS is can be applied in real time scenarios in countries where the economy is still under development.

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**REFERENCES**

- [1] Sripriya Srikant Adhatarao, Omar Alfandi, Arne Bocham, Dieter Hogrefe, *Smart parking system for vehicles*, 2014 IEEE Vehicular Networking Conference, [3-5 Dec. 2014]
- [2] Jihoon Yang, Jorge Portilla, Teresa Riesgo, *Smart parking service based on Wireless Sensor Networks*, IECON 2012- 38<sup>th</sup> Annual Conference on IEEE Industrial Electronics Society, [25-28 Oct. 2012]
- [3] Elena Polycarpou, Department of Communication and Internet Studies, Cyprus University of Technology, Cyprus, Lambros Lambrinos, Eftychios, *Smart parking solutions for urban areas*, WoWMoM.2013 IEEE 14th Int<sup>er</sup>national Symposium, June (2013)
- [4] Zeydin Pala, Nihat Inanc, *Smart Parking Applications Using RFID Technology*, RFID Eurasia, 2007 1<sup>st</sup> Annual Istanbul, Turkey.
- [5] Noor Hazrin Hany Mohamad Hanif, Mohd Hafiz, Hanita, *Smart parking reservation system using short message services (SMS)*, ICIAS, 2010 International Conference, Kuala Lumpur, Malaysia.
- [6] (2002) The IEEE website. [Online]. Available: <http://www.ieee.org/>
- [7] M.O. Orrie, B. Silva, G. P.Hancke, *A wireless smart parking system*, University of Pretoria, IECON 2015- Yokohama, South Africa