# Development of Secured Online Parking Spaces

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## Abstract

In this digital era, everyone is facing parking issues for client-stopping objective areas. Private parking spaces can be shared during their inactive time slots has been identified as the tremendous potential and given to metropolis gridlock and ill-conceived stopping issues in smart urban areas. In this research work, with novel privacy-preserving online parking sharing, you can easily find a parking space near your destination. (DPOPS) payment model is proposed to confess the issue of online parking slot share issues while ensuring the protection of client-stopping objective areas. especially, the online parking slots allocating issue is formalized as a social government assistance expansion problem in a two-sided market, where parking slots distributors, as well as clients, are viewed as suppliers and buyers. This proposed model can be implemented to utilize private vacant spaces as parking slots.

**Keywords:** Online Parking, DPOPS.

**DOI: 10.47750/pnr.2022.13.04.137**

## INTRODUCTION

The rate of private car ownership has been steadily increasing as faster industrialization around the world has resulted in higher growth rates for urban economies, incomes, and living standards of residents in addition to the high expansion of population. Shen etal (1997) asserted that the rise in the number of vehicles in cities is primarily due to population expansion and rising living levels. The majority of people choose to travel by private automobiles over public transportation because tiny city cars are inexpensive and parking is either free or inexpensive. There is plenty of room for off-street parking with new projects like multi-level parking systems that offer discounted parking rates. However, the central business district (CBD) and other older parts of the city do not have sufficient off-street parking, which raises the demand for on-road parking there. Due to the strong demand for on-road parking, cruising occurs in these types of regions where space is unavailable. It has a detrimental effect on traffic in the majority of large cities worldwide, including India. According to research, the average amount of traffic due to parking might account for 30% to 50% of all traffic during peak hours (Shoup, 2006). Therefore, in order to create

Effective parking laws, it is required to conduct of an on-demand assessment for parking in populated parts of the city. Everybody who owns a 4 wheeler requires a parking spot. The need for parking space grows with the increase in number of vehices. Fig. 1 shows the staggering increase in the motor vehicle population in India from fifty-five million in 2001 to two hundred ten million in 2015, as reported by the MoRT&H (Ministry of Road Transport and Highways), India (2018). In India's densely populated urban areas like Mumbai, New Delhi, Bangalore etc., rapidly increasing the rate of motor vehicles growth is highly considered. Surprisingly, it has been observed that while the rate of population growth in Delhi's NCT (National Capital Territory) is just approximately 1%, the rate of motor vehicles growth is about 7% according to base on the DES 2018(Directorate of Economics and Statistics).The composition of vehicles in India, which takes into account two-wheelers (TW), cars, buses, goods vehicles (GV), etc., shows that private vehicles (TW and cars) predominated during the course of the period (more than 85% in 2015). Because of this rapid increase, parking is now a standard feature of both buildings and roads. As a result, it generates a need while designing each infrastructure.

## RELATED WORK

Residents tend to park their vehicles as close to their destination as possible, so they tend to park on the curb. Parking on streets and curbs is dangerous for traffic and a major cause of delays. A high density of on-road parking spaces along the main urban axis impacts local traffic handling. Zooetal.(2014) proposed “share, build, adapt, share” as a way to manage parking in Wujiang District et al. Box(2004) investigated collisions caused by curb parking,

particularly at an angle. The authors argued that curb parking on major city boulevards should be restricted, and that diagonal parking causes two to three times as many accidents as parallel parking. Improper parking is a problem in most major cities around the world. Spiliopoulou and Antoniou investigated unauthorized parking in six major cities in Greece(2012). They found that illegal parking was overcrowded in many places, while legal parking was underutilized. For example, on the island of Kos, we found that only 67% of parking spaces were actually used during peak illegal parking. As mentioned earlier, the reason is that we tend to park as close to our destination as possible, regardless of whether there are permitted or prohibited parking spaces nearby. Lack of parking capacity and lack of enforcement are two other key issues that fuel illegal parking.

With novel privacy-preserving online parking sharing, you can easily find a parking space near your destination. At the beginning of the study. A base simulation and each parking-related component are handled by a separate agent. The percentage of smart cars that allow parking reservations is called the penetration rate.

## PROPOSED METHODOLOGY

### Design Objectives

Differential privacy is a privacy protection method used for PSC destinations is introduced in the next section. First, let's outline the desirable properties of our scheme. Features: To be a viable and effective incentive plan, it must meet the following requirements.

### Individual Rationality

In the parking lot allocation auction market, both PSPs and PSCs receive non-negative utility.

### Incentive Compatibility

By reporting actual bid types, all stakeholders can maximize their own profits and ensure objectivity in the shared parking space auction market.

### Balance of weakly budget

The payments from the PSC to the broker must be equal to or greater than the payments from the broker to the PSP. According to research, the higher the penetration rate of ordinary cars, the longer the average driving time. Sattayhatewa and Smith Jr. (2003) developed a logit function-based choice probability model to better describe driver parking behavior during special events. To model parking behavior and its impact on traffic, they created a parking lot destination selection model and a network allocation model. They found that walking time to destination and fee are important parameters for choosing a destination parking lot. Since blended use improvements include business action inside neighborhoods, there is a popularity for parking spots, and stopping is unpredictable around the business segment under private structures during business hours. Studies show that mixed residential and commercial parking lot-sharing strategies can meet the demand for parking spaces while leveraging existing resources (Han et al., 2018; Qin et al., 2011). Han et al. (2018) proposed a model for mixed land-use parking selection that takes into account general parking guidelines for visitor parking. They took into account age, gender, parking time, search/search time, number of available empty spaces and the total number of parking spaces offered, and other parking space tensions to create an MNL model and use Trans CAD Verified using the software. Anthorn (2018) and et al, studied parking behavior in the context of driver heterogeneity and estimated a mixed logit model to reproduce user behavior in choosing a parking option. Santander considered FOSP (free street parking), POSP (paid street parking), PUP (paid underground parking), and park-and-ride facilities. The study found that POSP and PUP users were significantly less likely to find parking spaces than their free street parking(FOSP)users, who were willing to spend a huge amount of time looking for free unoccupied parking lots.

The significance of this research can be summed up as follows:

### Scheme of DPOPS

In this paper, we conduct an initial systematic investigation and propose a novel approach to an online dualauction technique called DPOPS (Destination Privacy-Preserving Online Parking Sharing) that connects PSPs and customers. A threshold-based system minimizes the distance between the customer's destination and the allocated parking space while making the best decisions regarding winner selection and payment in our scheme. A differential privacy-based approach ensures that the privacy of the destination PSC is preserved.

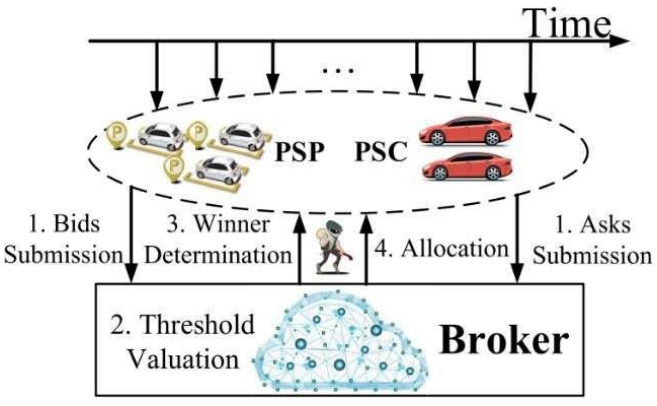


Figure 1: mechanism of DPOPS

### Properties

We demonstrate that the proposed of our demonstrate that Destination Privacy-Preserving Online Parking Sharing

(DPOPS) methodology meets PSC incentive compatibility, individual irrationality, and weak budget balance for all players. We also show that our DPOPS technique can achieve (ε,δ) various privacy protection for PSC destinations.

### Efficiency Analysis

In this paper, we conducting an efficiency loss study for a DPOPS system. Through theoretical analysis, we demonstrate an upper constraint on the efficiency loss of the system and present the relationship between efficiency loss and the number of successful PSPs and customers. Multi-entity online dual auction system.

### Extensive Analysis

We conduct in-depth simulations based on actual scenarios in Beijing, China, and show that the proposed this incentive system performs significantly compared better than two basic systems. Regarding the migration distance of PSC, the results demonstrate that Destination Privacy-Preserving Online Parking Sharing (DPOPS) outperforms the method using exponential process.

### Algorithm

**Step 1:** Registration is the first step
**Step1.1:**
**1)User Registration**
**2)Owner Registration**
**Step 2:** Admin needs to verify the details of user and owner respectively.
**Step 3:** After the acceptance the user and owner are allowed to use the website accordingly
**Step 3.1:** owners can upload the lending spaces to online booking
**Step 3.2:** Users can be able book the slots which are displayed
**Step 4:** The user now login into his account
**Step 5:** User now will be able to see the locations on the map and book accordingly.
**Step 6:** After the selection of the location time slot will be selected by user himself.
**Step 7:** After the selection the total amount will be calculated and will be displayed.
**Step 8:** Now the user needs to make the payment to conform his slot.
**Step 9:** After the payment the payment details is viewed in both user and owner login.

### Incentive Schemes

The development of efficient incentive schemes to address resource allocation challenges has gained popularity with examples such as crowd sensing, cloud computing and smartgrids [17]-[20]. Sammy etal. [8] created an honest auction mechanism for matching jobs and resources in the cloud market place. Nevertheless, it has been found that private and confidential information of participants during the auction process can be derived from both external and internal opponents based on the public results generated[3]. While the proposed parking lot sharing market works, PSPs and PSCs will use mobile applications to submit requests (bids and requests) to the cloud platform the request includes bid information such as arrival and departure times, rating, parking/destination. Note that both PSCs and PSPs set their own preferred rental rates based on their willingness. Bid and request information is uploaded to the cloud platform via a mobile application, and the broker determines winning PSPs and PSCs, as well as payment and allocation rules (i.e.,winner determination based on second prize). As a result, the actual payment will not match the rental price generally desired by the participant and it is not the responsibility of his PSC to determine how much to pay for the parking space. Finally, PSPs and PSCs can examine private parking sales results and parking request purchase results, respectively, on their mobile devices. To make this method more viable, let's assume that he PSP and PSC can enter the platform at random. This article considers not only the parking lot location, but also the intended goal of the PSC.

### Location Privacy Threat Model

First, PSC's location information is the most important privacy information in the parking lot sharing auction market. This is because the disclosure of a PSC's location would severely compromise the privacy of the PSC.

For example, the destination information may include the PSC's home and business addresses, as well as recreational facilities, specialty hospitals, etc. that indicate the PSC's passions or health. If amalicious adversary obtains such information, it cannot only serve targeted commercial advertisements, but also threaten her PSC's personal safety, depending on her home address and workplace. Therefore, the parking lot sharing market needs to protect the PSC's destination information. As a result, we plan to create an online incentive emechanism that can efficiently and fairly allocate parking spaces while protecting the privacy of his PSC at his destination. This essay assumes that your communication lines and brokers are secure.

## CONCLUSION

In this research, shared parking slots allocation issues arising among parking availability in commercial zones and parking supplies in urban areas. The shared parking concept is provided according to the shared parking implementation requirements. Next, the feasibility of shared parking between the parking requirements of commercial buildings and private paid parking or public free parking in residential areas will be examined in terms of win-win, convenience, economy, real-time performance, etc. Investigate first by looking at the characteristics of shared parking lots. A bit rate parking space allocation model based on minimum

walking distance and maximum usage is then proposed. This shared parking model gives into account the usage of sidewalks and parking spaces/slots for drivers. It not only accepts admission requests for commercial buildings, but also assigns appropriate free parking spaces based on model hypotheses and parking space time limits. The park allocation model was solved using the PSO method.

## REFERENCES


Dai Luchuan. Based on the "shared parking analysis theory" of the comprehensive development of parking berth scale plots [D]. Chengdu: Southwest Jiao Tong University, 2010. (in Chinese)

O. T. T. Kim, N. H. Tran, C. Pham, T. LeAnh, M. T. Thai, and C. S. Hong, "Parking assignment: Minimizing parking expenses and balancing parking demand among multiple parking lots," IEEE Trans. Autom. Sci. Eng., vol. 17, no. 3, pp. 1320–1331, Jul. 2020.

Q. Li and G. Cao, "Providing privacy-aware incentives in mobile sensing systems," IEEE Trans. Mobile Comput., vol. 15, no. 6, pp. 1485–1498, Jun. 2016.

D. An, Q. Yang, W. Yu, X. Yang, X. Fu, and W. Zhao, "SODA: Strategy proof online double auction scheme for multimicrogrids bidding," IEEE Trans. Syst., Man, Cybern. Syst., vol. 48, no. 7, pp. 1177–1190, Jul. 2018.

Zhu, M. Li, Z. Zhang, and Z. Qin, "ASAP: An anonymous smart parking and payment scheme in vehicular networks," IEEE Trans. Dependable Secure Comput., vol. 17, no. 4, pp. 703–715, Jul. 2020.

C. Dwork, "Differential privacy: A survey of results," in Proc. Int. Conf. Theory Appl. Models Comput. London, U.K.: Springer, 2008, pp. 1–19.

R. Zhu and K. G. Shin, "Differentially private and strategy-proof spectrum auction with approximate revenue maximization," in Proc. IEEE Conf. Comput. Commun., Apr./May 2015, pp. 918–926.

M. Alam, D. Moroni, G. Pieri et al., "Real-time smart parking systems integration in distributed ITS for smart cities," Journal of Advanced Transportation, vol. 2018, Article ID 1485652, 13 pages, 2018.

H. Chai, R. Ma, and H. M. Zhang, "Search for parking: a dynamic parking and route guidance system for efficient parking and traffic management," Journal of Intelligent Transportation Systems, vol. 23, no. 6, pp. 541–556, 2019.

R. Carli, M. Dotoli, and R. Pellegrino, "A hierarchical decision-making strategy for the energy management of smart cities," IEEE Trans. Autom. Sci. Eng., vol. 14, no. 2, pp. 505–523, Apr. 2017.

R. Schlegel, C.-Y. Chow, Q. Huang, and D. S. Wong, "User-defined privacy grid system for continuous location-based services," IEEE Trans. Mobile Comput., vol. 14, no. 10, pp. 2158–2172, Oct. 2015.

Finding Out All the Parking Spaces in Beijing. Accessed: Sep. 16, 2017.

S. M. Nir, "Car-share companies get coveted parking in New York City," New York Times. Accessed: May 31, 2018.

X. T. R. Kong, S. X. Xu, M. Cheng, and G. Q. Huang, "IoT-enabled parking space sharing and allocation mechanisms," IEEE Trans. Autom. Sci. Eng., vol. 15, no. 4, pp. 1654–1664, Oct. 2018.

O. T. T. Kim, N. H. Tran, C. Pham, T. LeAnh, M. T. Thai, and C. S. Hong, "Parking assignment: Minimizing parking expenses and balancing parking demand among multiple parking lots," IEEE Trans. Autom. Sci. Eng., vol. 17, no. 3, pp. 1320–1331, Jul. 2020.

C. M. A. for Planning. Parking Strategies to Support Livable Communities. Accessed: May 2012. T. H. Luan, L. Gao, Z. Li, Y. Xiang, G. Wei, and L. Sun, "Fog computing: Focusing on mobile users at the edge," Feb. 2015, arXiv: 1502.01815. [Online]. Available: https://arxiv.org/abs/1502.01815.

T. H. Luan, L. Gao, Z. Li, Y. Xiang, G. Wei, and L. Sun, "Fog computing: Focusing on mobile users at the edge," Feb. 2015, arXiv:1502.01815. [Online]. Available: https://arxiv.org/abs/1502.01815.

A. E. Roth, "Deferred acceptance algorithms: History, theory, practice, and open questions," Int. J. Game Theory, vol. 36, nos. 3–4, pp. 537–569, Mar. 2008.

A. E. Roth and M. A. O. Sotomayor, Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis (Econometric Society Monographs). Cambridge, U.K.: Cambridge Univ. Press, 1990.

Y. Gao, Y. Wu, H. Hu, X. Chu, and J. Zhang, "Licensed and unlicensed bands allocation for cellular users: A matching-based approach," IEEE Wireless Commun. Lett., vol. 8, no. 3, pp. 969–972, Jun. 2019.

Siva Kumar Depuru, K.Madhavi, Autoencoder Integrated Deep Neural Network for effective analysis of malware in distributed Internet of Things (IoT) Devices, The International journal of analytical and experimental modal analysis, Page No: 226-232, Volume XI, Issue XII, December/2019.

Saran S, Sakthi Prakash S, Sachin M, Naveen Kumar N, Sivanantham S (2020). Simulation of Distributed Smart Street System. In International Journal of Recent Technology and Engineering (IJRTE) (Vol. 8, Issue 6, pp. 4663–4666). Blue Eyes Intelligence Engineering and Sciences Engineering and Sciences Publication - BEIESP. https://doi.org/10.35940/ijrte.f9311.038620