A Review on Smart Parking System

Komal Sonar[1] Madhuri Deshmukh[2] Gunjan Chaudhari[3] Yogita Somvanshi[4]
[1,2,3,4]Department of Computer Engineering
[1,2,3,4]LOGMIEER, Nashik

Abstract— Parking in major cities, particularly with traffic, directly efforts the efforts flow and people's life. In this paper, we found a new smart parking system that is based on intelligent resource allotment, reservation, and pricing. The proposed system solves the current parking problems by giving guaranteed parking reservations with the lowest manageable cost and searching time for drivers and the highest receipts and resource implementation for parking managers. The searching for parking space in most modern cities especially during the rush hours, is difficult for drivers Parking in the major cities, particularly with dense traffic, directly effects the traffic flow and people's life New fair pricing information are also proposed that can be implemented in practice.

Key words: Dynamic pricing, dynamic resource allocation, mixed integer linear programming (MILP), reservation, smart car parking, mobile app

I. INTRODUCTION

Now a Days, Car Parking Problem is a major contributor and has been still a major problem with increasing number of vehicle is size in the luxuries segments , we develop a New Smart Parking System that typically obtain the information about available parking spaces in a particular geographical areas and placing the vehicle in a real time at available position.

Searching for a vacant parking space in a areas is a daily concern for most drivers and it is time consuming. It commonly results more traffic and air pollution. In this paper, we present a new smart car parking system, with static resource scheduling dynamic resource allocation. With the increase of financial behavior and the update of living standard, the ratios of the people in India who own automobiles and motorcycles have recently increased giving traffic. Parking issue will be biggest challenge to facilitate traffic network and ensure for urban life quality. Searching for parking space in most crowded areas, especially during the rush hours, is difficult for drivers.

II. PREVIOUS WORK

Parking Guidance and Information (PGI) systems have been widely used as a parking management tool and evidence suggests that these are able to alter drivers' car park choices (Placket al., 1990; Thompson & Bonsall, 1997). However, it is widely accepted that there is a lack of a comprehensive understanding of drivers' behavioral responses to PGI systems, which prevents efficient development of effective parking management strategies.

Suppose curb parking is free but all the areas are occupied, and off-street parking is expensive but immediately available. In this case, you can cruise to find a curb area being vacated by a departing motorist, or pay for off-street parking right away. But in this system, drivers choose whether to cruise or to pay, and it predicts several results: you are more likely to cruise if curb parking is of low cost, off-street parking is expensive, fuel is cheap, you want to park for a long time, you are alone in the car, and you have a low value on saving time. This system gives information to the car owners or drivers that the area in which they are goes to park their vehicle is in market price or expensive.

III. COMPARATIVE ANALYSIS

a) 'Cruising for parking', 2006, Donald C. Shoup. In this paper they are states the theory about cruising for parking. When a resource is equally owned, the right of ''first possession'' means that anyone who gets the resource has the right to use it. Free curtail parking is an example of communal ownership, because drivers got it on a first-come, first-served basis. If all the curtail spaces are occupied, drivers must cruise to find a area vacated by a departing car. cruise for parking most likely began soon after the wheel was invented.

b) 'The time looking for a parking space: strategies, connected nuisances and stakes of parking management in France', Eric Gantlet and Amelie Lefauconnier, 2006, SARCOMA has lead a research study for the PREDICT (French research program) and the ADMEN (Agency for surroundings and supervision of energy) in order to evaluate the stake linked to the time lost by car users while look for a parking space in France. Vehicles looking for a parking space represent a basic component of rural traffic obstruction. This component cannot be elude in a context where a lot of efforts are done to reduce traffic bother and gas emissions. Few studies have been led in France to quantify the stakes related to this trend

c) 'The management of city centre parking traffic: drivers' information needs and the effectiveness of parking guidance and information systems', David J Ling, Ioannis Tsopelas and Timothy J McCarthy Manchester Centre for Civil & Construction Engineering, University of Manchester foundation of Science & Technical Knowledge, UK 2004. This paper aims to provide a better understanding of drivers' behavioral response towards PGI systems. In particular, the results that are presented here focus on the effects of PGI systems' operation on drivers' behavior regarding the choice of car park, as well as on their needs for parking information. The introduction of a PGI system in Manchester offered an excellent opportunity to develop an evaluative framework within which, "before" and "after" surveys could assess the influence of a PGI system.

d) 'The Approaches for Availability of Parking Spots on On- Street and Off- Streets', I Mahadeva Darshan R, II Rajesh N, April 2016. In this paper, they study the model and approaches used for providing availability parking spots to vehicles. These models are used to predict parking availability with high accuracy. The

prediction errors are used to recommend the parking location with the highest possibility of having at least one parking spot available at the estimated arrival time.

e) 'Car parking system', Europe, united states and Japan shaheen et al, 2005 This smart parking system is implemented mainly the Europe , United states and Japan shaheen et al,2005 is developed with the incorporation of advanced technologies and researches from various academic discipline. With its deployment in the car park, it is hoped that it would solve the aforementioned problems face by the patrons within the car park.

f) 'A Comparative Review on Car Parking Technologies', R.Ranjini1, D.Manivannan 2 School of Computing, SASTRA University, Tirumalaisamudram, Thanjavur, Tamilnadu, India -61340 may-2013.

g) This paper studies about the information technology used for various parking systems for vehicles. This technology embeds microchips and sensors within vehicles, traffic lights, roads and makes transport system to communicate using wireless technologies. Intelligent transport system embodies several functionalities such as traffic monitor, parking assistant, and vehicle monitoring by making the system smarter. Parking plays a vital function amongst them. Developing countries are facing major parking management problems. Most of the existing parking methods do not satisfy the user's requirements.

h) 'A Reservation-based Smart Parking System', Hongwei Wang, 2011.

i) In this paper, they mainly focus on designing a new smart parking system that assist drivers to find parking spaces in a specific parking district. In addition, an important goal of the system is to decrease the traffic searching for parking, hence decrease energy consumption and air pollution.

j) 'Smart Parking System Based On Reservation', 2014 Mohit Patil 1, Rahul Sakore. In this paper, they mainly focus on designing a new smart parking system that assist drivers to find parking spaces in a specific parking district. In addition, an important goal of the system is to decrease the traffic searching for parking, hence decrease energy consumption and air pollution. With the increase of economic behavior and the upgrade of living standard, the ratio of public in India who own automobiles and motorcycles have lately increased giving a boost to Metropolitan Traffic. They design and realize a prototype of Smart Parking System based on Reservation (SPSR) that allows drivers to effectively find and reserve the vacant parking spaces. By sometimes learning the parking status from the host parking database management in parking lots, the reservation service is artificial by the change of physical parking status.

k) 'A Secure Parking Reservation System Using GSM Technology', 2013, Yusnita Rahayu and Fariza N. Mustapa. For this project, we mostly focus on designing a smart and secure parking reservation system that allow drivers to reserve and park their vehicle in safety condition. This process separated into two parts which are security reservation module and parking lot monitoring module. In this paper, a secure parking reservation system using Global System for Mobile communications (GSM) technology has been perform. It helps the drivers from facing the problem that always occurs at the car park, such as time being exhausted in searching for the available parking spaces and keep on circling the parking area until they found an empty parking spot. This problem typically occurs in urban areas, where number of vehicles are higher as compare to the availability of parking spaces. In this planned system there are two modules have been developed such as parking lot monitoring and security condition modules. For the parking lot monitoring module, the layout animatronics is used to display the parking lot status.

l) 'Trading public parking space', 2009 Evangelia Kowalski Merkourios Megalopolis Ohioans Suffragist .This paper investigates normative abstractions for the way drivers follow parking space and respond to pricing policies about public and private parking facilities. The drivers are viewed as important agents who make harmonious decisions while activity to minimize the cost of the acquired parking spots. They propose auction-based systems for realizing central parking allocation schemes, whereby drivers bidding for public parking space and a primal authority coordinate the parking duty assignment and payments. These are compared against the conventional awkward parking search practice under fixed parking service cost, formulated as a resource selection game instance.

m) 'i Parker—A New Smart Car-Parking System Based on Dynamic Resource Allocation and Pricing', Amir O. Kotb, Yao-Chun Shen, Xu Zhu, 2016. In this paper, they present a new smart car parking system, named i Parker, with static resource scheduling, dynamic re-source allocation and pricing models, to optimize the parking system for both parking managers and drivers. The contributions of our work include: 1) increasing parking resource utilization, 2) increasing parking revenue, 3) improving parking experience of drivers by lowering cost, parking spot searching and walking times. Our work is different from the one in where a dynamic resource allocation model was proposed. The main limitations of that model are that only reservation for limited period of time (e.g., few minutes) was allowed, fixed price was used and revenue was not taken into account and only a single choice of destination was considered. Whereas our model allows a driver to reserve a parking space for any time in future, the revenue is considered and new pricing models are introduced. In addition, a parking solution with their individual journey planners is proposed.

Paramet er	Paper 1 (2004)	Paper 2 (2006)	Paper3 (2006)	Paper4 (2009)	Paper 5 (2009)	Paper6 (2011)	Paper7 (2013)	Paper 8 (2013)	Paper 9 (2014)	Paper 10 (2016)	Paper 11 (2016)
Paper	The	Cruisin	The time	Car	Tradin	A	A Secure	A	Smart	The	iParker

Name	Management Of City Centre Parking Traffic: Drivers' Information on on Needs & The effectiveness of parking guidance.	g For Parking	Looking for a parking space: strategies, associated nuisances and stakes of parking management in France.	park system: A review of smart parking system.	g Public Parking Space.	Reservation - based Smart Parking System.	Parking Reservation System Using GSM Technology.	Comparative Review on Car Parking Technologies.	Parking System Based On Reservation.	Approaches for Availability of Parking Spots on On - Street and Off - Streets.	— A New Smart Car - Parking System Based on Dynamic Resource Allocation and Pricing
Author	1) Eric Gantelet 2)Amélie Le fauconnier	1)Donald C.Shoup	1)Keechul Jung	1)N.M.Noor 2)Z.Razak	1)EvangeliaKokolaki 2)IoannisStavrakakis	1)Hongwei Wang	1)Yusnita Rahayu 2)Fariza N. Mustapa	1)R.Ranjini 2)D.Manivannan.	1)Mohit Patil 2)Rahul Sakore	1)Mahadea Darshan R 2)Rajesh N	1)Amir O. Kotb 2)Yao - Chun Shen, 3)Xu Zhu
Domain	Data Mining	Mobile Computing	Embedded System	Wirelwss Sensor Networks	Computation &Data Security	Wireless Sensor Networks	Mobile Computing,Data security	WSN,mobile Computing	Mobile Computing,Embedded system	Wirelwss Sensor Networks	Mobile Computing
Issue	1)Neighbors fight a new development because it does not provide enough parking.	1)Cars are sitting unused on the street for long periods., urban traffic congestion.	1)Proliferation issue ,traffic problem are bound to exists, Increase parking supply. 2)On - street parking spac	1)The social cost and the Price of Anarchy. 2)More expensive 3)Cruising cost in terms of time and fuel	1)No enough parking spaces available. The present parking spaces are not maintained properly.	1)System is to reduce The traffic searching for parking. 2)Increaseenergy consumption and air pollution .3) complexity in systems.	1)The users are not guided efficiently to park the vehicles, 2)we simulate these different parking management strategies under realistic	1)Major issues related are that people park vehicles on sides of the road as there are no enough parking spaces available. The present parking spaces are not	1)Searching for parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers.	1)The prediction errors are used to recommend the parking location with the highest having at least one parking spot available	1)Fixed price was used and revenue was not taken into account and only a single choice of destination was considered.

				consumption.			traffic.	maintained properly.		at the estimated arrival time.	
Algorithm		1.On street algorithm 2.Off street algorithm.	1.Searching algorithm	E-Parking algorithm	Auction-Based parking allocation.	Reservation based algorithm	1.Security reservation 2.Parking lot monitoring	1.Vehicle detection 2.E-Parking algorithm	1.Blind Search algorithm	1.Propogation 2.cull algorithm 3.Descent algorithm	1.MILP 2.Real time rservation. 3.Shared time reserva
Implement Platform	Database	Java	Android	Java & database	Java Platform	Java Platform	Android Platform	Android Platform	Java	Android &database	Java & Android
Application	This paper presents a model of how drivers choose whether to cruise or to pay, and it predicts several results: you are more likely to cruise if curb parking is cheap, off-street parking is expensive, fuel is cheap, you want to park	A methodology has been developed grouping field-studies and interviews carried out in order to precisely evaluate the aggregate amount of time lost in searchin	in the first place todevelop a performing methodology to estimate the time lost in a limited sectorsearching for a parking space.	Quantitative and monetary evaluation of the extent of the nuisances linked to the search-traffic. Investigation on the ways of reducing time spent looking for a parking space and	Auction-based systems for realizing centralized parking allocation schemes, where by drivers bid for public parking space and a central authority coordinates the	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.	In this system there are two modules have been developed such as parking lot monitoring and security reservation modules.	We implement Intelligent transport system embodies several functionalities such as traffic monitoring, parking assistant, and vehicle monitoring by making the system smarter.	we design and implement a prototype of Smart Parking System based on Reservation (SPSR) that allows drivers to effectively.By periodically learning the parking status from the host parking database management in parking	In this, a secure parking reservation system using Global System for Mobile communications (GSM) technology has been performed.	The new system is based on mathematical modeling using mixed-integer linear programming (MILP) with the objective of minimizing the total monetary cost for the drivers and maximizing the utilization of parking resources.

	for a long time .	g for a parking space		their conseq ue nces on the cities.	parkin g assign m ents and payme nt s.				lots.		

Table 1: Comparative Table

IV. CONCLUSION

In this paper, we have proposed new smart parking system, name iParker, which is based on MILP model, that gives the optimal for statistically and dynamically allocating parking resources to parkers, in order to providing feasible reservation options. As well as the new concepts we are introducing in this paper are, the combinations of real-time reservations, with dynamically performing system decisions and pricing according to real-time utilization information and offering the drivers, to the choice of choosing multiple destinations and their reservation type i.e. static and dynamic. We are also have proposed pricing policies for both static and dynamic reservation, that maximize the profit from parking.

In the future, we hope to evaluate our system using real-time data greater number of resources and destinations.

REFERENCES

[1] Cruising for parking donald c. shoup department of urban planning, university of california, los angeles, los angeles, ca 90095-1656, USA readily available online 24 july 2006.
[2] The management of city centre parking traffic: drivers' information requirements and the effectiveness of parking guidance and information systems david j ling, ioannis tsopelas and timothy j mccarthy manchester centre for civil & construction engineering, university of manchester institute of science & technology, uk 2004.
[3] The approaches for availability of parking spots on on-street and off-streets I mahadeva darshan r, II rajesh n International journal of advanced research in Computer science & technique (ijarcst 2016) 38 vol. 4, issue 2 (apr. - jun. 2016).
[4] Car park system ; a review of smart parking system and its technique m.y.i. idris, y.y.leng, e.m. tamil, n.m. noor and z.razak, information technique journal 8/2; 101-113, 2009.
[5] 'The time looking for a parking space: strategies, associated nuisances and stakes of parking management in france', Eric Gantelet and Amelie Lefauconnier, 2006
[6] 'Car parking system', Europe, united states and Japan shaheen et al, 2005.
[7] 'A Comparative Review on Car Parking Technologies', R.Ranjini1, D.Manivannan 2 School of Computing, SASTRA University, Tirumalaisamudram, Thanjavur, Tamilnadu, India -61340 may-2013.
[8] 'A Reservation-based Smart Parking System', Hongwei Wang, 2011.
[9] 'Trading public parking space', 2009 Evangelia Kokolaki Merkourios Karaliopoulos Ioannis Stavrakakis.
[10] 'A Secure Parking Reservation System Using GSM Techniques', 2013, Yusnita Rahayu and Fariza N. Mustapa.
[11] 'iParker—A New Smart Car-Parking System Based on Dynamic Resource distribution and Pricing', Amir O. Kotb, Yao-Chun Shen, Xu Zhu, 2016.

