



EPark- Software Based Parking System

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Abstract — As the addition of busses lingers to grow, bays chairs are at a supreme in city street. In adding together, due to the lack of phone about lane parking spaces, observed spinning in the highways not only costs chauffeurs' time and fuel, but also increases city blocking. In the provoke of the recent leaning to build fitting, green, and energy-efficient smart cities, frequent techniques adopted by high-status smart parking systems are reviewed, and the performance of the various approaches are compared. A mobile sensing part has been residential as an substitute to the fixed sensing approach. It is mounted on the passenger side of a car to measure the distance from the vehicle to the bordering edge obstacle. By extracting parked vehicles' facial appearance from the together trace, a supervised learning algorithm has been developed to estimate roadside parking occupancy. Multiple road tests were conducted around Wheatley and Guildford (Surrey) in the U.K. In the holder of exact GPS readings, superior by a map matching technique, the accuracy of the system is above 90%. A quantity estimation model is derived to gauge the density of sensing units obligatory to cover urban streets. The view is quantitatively compared with a fixed sensing resolution. The results be evidence for that the mobile sensing draw near can make at the same level as fixed sensing solutions when accurate location in turn is available but substantially fewer sensors are needed compared with the fixed sensing structure

INTRODUCTION

The continuous growth of vehicles and the waves of urbanization made street parking spaces a premium feature in most cities. The lack of real-time knowledge about the roadside parking occupancy causes vehicles to drive around This not only wastes time and fuel, but also increases traffic flows. A downtown traffic study on several major cities reveals that cruising for kerb vacancies is an often overlooked source of congestion, accounting for up to 30 percent of total traffic flows.¹ The frustrating search process, along with the time and fuel wastes are the type of challenges or issues that an Intelligent Transportation System (ITS) aims to address, or broadly dialog, to physique fitting, jade and energy-efficient Shrewd Municipalities. There are countless ITS or Smart City projects related to parking monitoring with different focus points, such as private parking off-street parking and on-street parking. The first type, private parking projects, originate from the peer-to-peer based sharing economy, where the concept is to rent out owners' spare facilities - e.g. Airbnb for rooms, Uber for cars, and JustPark for empty driveways. In the UK alone, there are an estimated 17 million residential parking spaces such as garages and parkways. The second type, off-street parking, refers to municipal car parks or large fields that can accommodate hundreds of vehicles. The overall occupancy of off-street car parks can be easily monitored by applying entrance counters, acoustic or vision based sensing techniques. Individual bays can also be monitored using fixed sensors in each parking bay which can be used to guide drivers to available spaces. The parking availability can be disseminated via mobile applications (App) or web portals (e.g. Parker and Parkopedia). The third type, on-street or roadside parking, refers to parking spaces along public roads and is the focus of this paper. It accounts for a considerable fraction of urban parking, and can be a convenient option for drivers. However, on-street parking spaces are not usually monitored. The reasons are twofold. Firstly, placing a sensor in each parking space is not a scalable solution when there are a large number of distributed spaces to monitor. In addition compared to off-street parking, on-street parking has a more challenging environment, (e.g. harsh weather or light conditions) which may impair the sensors' performance (e.g. camera). Other considerations involve road installation, maintenance and municipal coordination issues.

LITERATURE SURVEY

Mathematical Formulation of a Deterministic Parking Reservation System (PRS) With Fixed Costs

AUTHORS: K. C. Mouskos, J. Tavantzis, D. Bemstein and A. Sansil

A problem faced in major metropolitan areas, is the search for parking space that results in tremendous loss in productivity time, excess pollution, and driver frustration. The most traditional methods utilized to alleviate the search for parking are fixed signs to parking lots, variable message signs that continuously update the number of available parking spaces at specific parking lots, route planning algorithms from an origin to a specific parking lot, as well as disincentives to the use of personal automobiles through parking pricing and strict enforcement of parking violations. An innovative methodology to address at least partially the search for parking is through a parking reservation system. In this paper, a mathematical formulation is presented for performing parking space assignment to the users based on the minimization of the system wide parking cost subject to the assignment constraints and the parking lot capacity constraints. The problem can be solved with any commercially available solver and it can be shown to yield binary integer solutions.

Cruising for parking

AUTHORS: Donald C. Shoup

Suppose curb parking is free but all the spaces are occupied, and off-street parking is expensive but immediately available. In this case, you can cruise to find a curb space being vacated by a departing motorist, or pay for off-street parking right away. 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 for a long time, you are alone in the car, and you place a low value on saving time. The model also predicts that charging the market price for curb parking—at least equal to the price of adjacent off-street parking—will eliminate cruising. Because the government sets curb parking prices, planners and elected officials strongly influence drivers' decisions to cruise. The failure to charge market rates for curb parking congests traffic, pollutes the air, wastes fuel, and causes accidents. Between 1927 and 2001, studies of cruising in congested downtowns have found that it took between 3.5 and 14 min to find a curb space, and that between 8 and 74 percent of the traffic was cruising for parking.

Understanding drivers' perspective on parking guidance information

AUTHORS: Yanjie Ji, Weihong Guo, Phil Blythe, Dounan Tang, Wei Wang

Parking guidance and information (PGI) systems are thought to enable a more efficient control and management of the traffic and the use of the available car park in urban areas. Despite the installation of PGI systems in many cities and their operation for a number of years, the levels of usage of PGI remain much lower than expected. To guide investment and operational decisions, this study examines the existing PGI systems from the drivers' perspective. The results show that PGI is not efficiently used and often ignored by drivers because of the inaccurate or out-of-date nature of the information it is displaying. Habitual behaviour also played an important role in the choices of a car park. However, the results of the research also show that there is a desire for more accurate, dynamic and personalized parking information through different means at pre-trip stage and en-route stage. The results of this survey should provide some guidance in the design of future PGI systems.

Effects of Parking Availability Information on System Performance : A Simulation Model Approach

AUTHORS: Yasuo Asakura and Masuo Kashiwadani

The objective of this paper is to evaluate the effects of different types of parking availability information on system performance using a simulation model. The model consists of three sub-models; demand, performance and information service models. The model is designed to describe the dynamic interaction between demand and system performance and it is possible to examine the time to time fluctuation of driver's parking choice decisions and resulting congestion in car parks. The model can distinguish the difference of a driver's parking choice behavior between with and without availability information, and compare the effects of the different types of availability information. Numerical examples

are calculated and it is found that the difference of effects among information types depends on the congestion level of the system.

Smart Parking Systems and Sensors: A Survey

AUTHORS: G. Revathi, V. R. Sarma Dhulipala

In this paper, we explore the concept of the smart parking system and their categories. The classifications of various existing systems are explained. The parking system handles various technologies, and the categories of those techniques are given. The functions of the nodes in wireless sensor networks are classified.

Intelligent Parking Reservation Service on the Internet

AUTHORS: K. Inaba, M. Shibui, T. Naganawa, M. Ogiwara, N. Yoshikai

The intelligent parking service is a part of ITS (Intelligent Transportation Systems) in which parking facilities are conceived in terms of various new functions they can provide. This service would not simply manage the internal operation of a parking facility. Rather, it should be designed to be compatible with a wide range of aspects that are intertwined with parking facilities. One of the features of the system developed in NTT is a parking reservation service that allows drivers to reserve a parking spot through the Internet when parking space is available. The system enables motorists to find available parking spaces at their destinations easily and quickly by using the Internet. When used together with a smart card, the

system can provide the motorists with recognition and payment services. This paper depicts the service concept of intelligent parking reservation systems and the overview of the prototype developed in NTT.

In this paper, we discuss an intelligent parking system which provides parking lot reservation service by the Internet, and we show some results of feasibility studies

Auction-based Parking Reservation System with Electricity Trading

AUTHORS: So Hashimoto, Ryo Kanamori, Takayuki Ito

Parking reservations can reduce the amount of time lost by drivers searching for parking spaces near their destination. For the development and planning of smart cities with electric vehicles, it is important to control parking spaces as places for charging and power management with Vehicle-to-Grid systems. This study proposes an auction-based parking reservation system that includes electricity trading, and uses simulation combined with a driver parking duration model to evaluate it. The driver parking duration model is constructed using actual parking data that can estimate parking times after parking fees have changed.

8. Car Parking System an Android Approach

AUTHORS: Nikhil Palde , Chhaya Nawale , Sunita Kute

Now days with the increase in vehicle production and world population, more and more spaces and facilities are required. In this project a new parking system called car parking system an android approach is proposed to assist driver to find vacant spaces in a parking in a shorter time. Different technologies are reviewed and compared to determine the best technology for developing this system. This system uses IR sensors to detect the presence of vehicle in parking slot and display the vacant slot. We create the separate application on the smart phone and by using this application we find shorter and easier path to reach the destination with the help of Bluetooth module. Features of car parking system an android approach includes vacant parking space detection, display of vacant parking slots and give direction on smart phone application to move toward vacant parking slot. This project also describes the use of a parking system in proper and efficient manner from the entrances into a parking area until the finding of a vacant parking slot. This prototype of car parking system an android approach will help car owners to improve their facilities inside car parking area to effectively guide car driver to vacant parking slot inside car parking area. This system is designed in two floors and each floor contains three parking slots and we can extend it as per our requirements. This system architecture defines the essential design features such as location of sensors, required number of sensors and LCD display board.

IoT based Smart Parking System

AUTHORS: Abhirup Khanna, Rishi Anand

In recent times the concept of smart cities have gained great popularity. Thanks to the evolution of Internet of things the idea of smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. In this paper, we present an IoT based cloud integrated smart parking system. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. The paper also describes a high-level view of the system architecture. Towards the end, the paper discusses the working of the system in form of a use case that proves the correctness of the proposed model.

Smart Car Parking Management System Using IoT

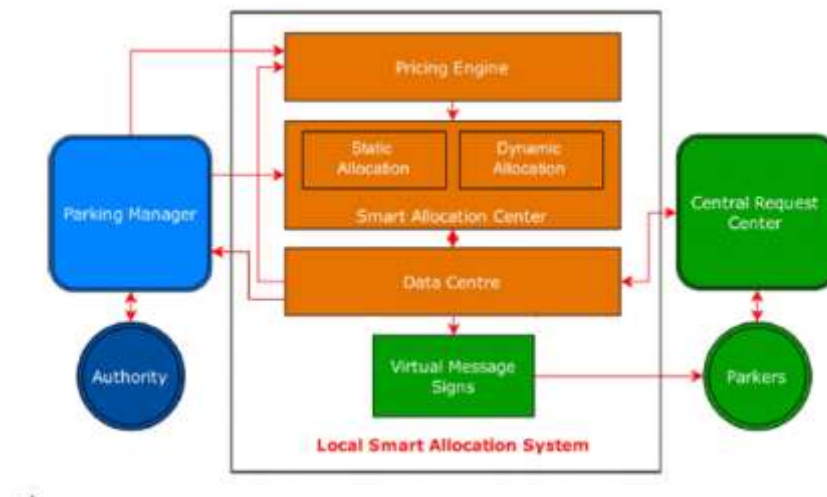
AUTHORS: Aniket Gupta, Sujata Kulkarni, Vaibhavi Jathar

Proliferation in the number of vehicles is leading to problems of vehicles parking at an appropriate place especially the car parking. This indirectly leads to traffic congestion. This is because of the fact that current transportation infrastructure and car park facility are unable to cope with the arrival of large number of vehicles on the road. To alleviate the aforementioned problem, authors proposed a Smart Parking Management System that helps users to automatically find a free parking space with a smaller amount. Smart Parking involves use of Ultrasonic sensor, Arduino Uno, ESP8266-01 Wi-Fi Module, Cloud server. IOT based new parking platform enable to connect, analyze and automate data gathered from devices and execute smart parking possible. Smart parking would enable vehicle occupancy, monitoring and managing of available parking space in real-time that reducing the environmental pollution. Proposed system provides optimize usage of parking space and get considerable revenue generation.

III. PROPOSED SYSTEM

We present a new smart car parking system, named iParker, with static resource scheduling, dynamic resource 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.

IV. SYSTEM ARCHITECTURE



CONCLUSION

We have proposed iParker, a new smart parking system which is based on MILP model that yields optimal solution for dynamically and statically allocating parking resources to parkers—providing flexible reservation options. The new concepts introduced in this is the combination of real-time reservations with share-time reservations. We also have proposed pricing policies for both static and dynamic reservations that maximize the profit from parking. Extensive simulation results indicate that the proposed system significantly cuts the total effective cost for all parkers.

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