

Parking Space: A Design of WLAN Mobile Phone Application in Urban Area

Ghassan Thabit Jebur^a, Massudi Mahmuddin^b

IT Building, College of Art and Science
Universiti Utara Malaysia
Sintok ,06010
Kedah, Malaysia
Email:
^aghassan_tg@yahoo.com
^bady@uum.edu.my

ABSTRACT

The common problem with the public parking space using automatic machine is that the customers unable to obtain enough information concerning parking lot and wasting customer's time of finding the vacant parking space especially in the parking in the urban area. The idea behind this application is to make the drivers easily access all related parking space information and to match customer's booking needs. This on-going research is also rest on an integrated architecture comprising a WAP cellular phone or standard internet access and free parking spaces interfaced with parking space provider's reservation system.

Keywords

Efficient Car Parking System, WAP Technology, Traffic Congestion

1. INTRODUCTION

Transportation is one of the major urban systems which rises a degree of problems in almost every metropolitan city in this world. Malaysia, one of the developing nations is no exception to traffic congestion created from this urbanization. Urban citizen or those who are work in the cities should receive adequate infrastructure. The need for efficient parking systems is one of the criteria and must be at par with the cities development itself. Well-design city parking system for example plays a similar role and it is indeed vital for every motorist (Wahab, 1989) to avoid congestion and wasting a lot of resources.

There have been various attempts in many cities in introducing a new traffic management policy such as park-and-ride, one-way streets and the introduction of bus lanes. For example in Kuala Lumpur, the park-and-ride facilities can be seen in nearby LRT stations to encourage car users to use the LRT systems. The other approach is introducing higher parking charges. However, this is also failed to minimize the congestion in the city because there still have

free parking spaces or cheaper charges are largely available in many parts of the city. The availability of parking spaces in Kuala Lumpur is due to two factors: first, disagreement from businessmen and secondly, lack of strict enforcement of parking and traffic regulations in the city (Mohamad, 2007).

Parking activities encompass an extensive area that greatly affects overall car mobility. The problem is not easy to accommodate since parking activities influences urban transportation is multi-directional as an integrated component of the overall urban transport supply.

Problem arise when the driver's need affordable and convenient parking space in areas of scarce supply where drivers' search for parking spaces may account for up to 30% (Vianna et. al., 2004) of urban traffic flows and a correspondingly high proportion of CO₂ emissions.

On the other hand, excessive parking offers a source of problems since high initialize cost to build parking facilities and affect sectors in the community including local government, developers, users, residents and nearby businesses (Hodel-Widmer and Cong, 2004). Besides the associated environmental costs, excessive offer often contradicts transport development strategies looking for sustainable mobility, since free parking promotes car usage and in the same time discourage the use of other alternative modes (Hodel-Widmer and Cong, 2004).

With the increase in the number of private vehicles being used by commuters all over the world, finding a suitable car park is becoming more difficult every day in order to solve this problem, a lot of research and development is being done all over the world especially in efficient car parking system (ECPS). Most of this which would not only be able to provide car park vacancy information to the drivers, before they physically reach the car park. This also will also enable

them to pay the car parking while sitting at home or any other convenient places through GSM based SMS technologies and WAP technology.

The rest of the paper is organized as follows. Related intelligent car park technologies are described in Section 2. In Section 3, the WAP technology and its implementation in car park system are proposed. In Section 4, the prototype of the designed is demonstrated. Finally, conclusions are given in Section 5.

2.1 Efficient Parking System

There are many types of efficient car parking system technologies including intelligence car parking system. One important fact on car parking space is that it space limitation in almost every major city. These cars are contributing to traffic congestion, air pollution, and driver frustration (Shaheen, 2005). An innovative parking system for meeting near-term parking demand is needed. The parking process can then be a straightforward and non-stop process (Yan, 2008).

Thus, innovative parking systems for meeting near-term parking demand are needed. With wireless communications, computer control and electronics technologies, intelligent service-oriented parking management can improve parking space utilization and improve driver experience (Yan, 2008). Caliskan et al. (2006) proposes an automatic parking resource report.

Common public parking using automatic machine to receive parking payment and slip printing, but sometimes this makes a long queue to pay with automatic machine, if lot of customer used it at the same time especially in the peak hours. In this parking system customer cannot get up to date parking information about parking lot. The customer did not know where the vacant parking lot is, it is a problem for customer who is in hurry, and it will add more gas to searching vacant parking lot manually.

In reaching this goal, the innovative solution seek to benefit all social segments, to optimize existing parking resources, and to contribute to achieving a more sustainable urban transport; reducing congestion and pollution.

2.2 WAP Technology

Wireless technology is still one of today's hottest topics due to its ability to bring the power of communication and the Internet into the hands of users while overcoming temporal and spatial constraints (Elliott and Phillips, 2004). As the popularity of wireless services grows, manufacturers are enabling wireless devices with an increasing array of features and capabilities.

For example, many personal digital assistants (PDAs) now operate as cell phones and vice versa. The WAP is also envisioned to be a Web in the pocket. As the benefits of the WAP are recognized and become more widely used, the impact it has on everyday lifestyle is obvious. The WAP brings with it the convenience of distributing information efficiently regardless of geographical boundaries and time.

By using WAP enabled devices, any legitimate user can browse the WAP site and request for services after signing up with the system (Elliott and Phillips, 2004). This project is being conducted with the intention of improving the convenience of information retrieval and site information maintenance.

3 DESIGN OF THE PROPOSED PARKING SYSTEM

The WAP based parking space system is a combination of three-tier web architecture and the WAP architecture. The system would be utilizing the three-tier architecture to allow the optimization of information flow and transfer between the web server and the database server. Application processing is the most volatile part of the system and it can be easily updated because it is centrally located.

Figure 1 shows processing logic distribute between the application logic and data management, thus providing for rapid client request.

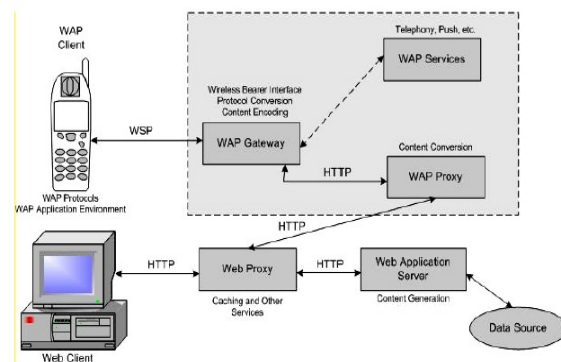


Figure 1: A logical view of an end-to-end system of WAP Application (Khamis and Wah, 2005)

The owner of the parking lot will have their own the mobile parking WAP system. User/customer are able to browse information of each parking space of various location. Content regulation must be displayed clearly to the user. If user agreed with the term and condition of the parking regulation, the system gives direction to the next page button to cancel and out from the system.

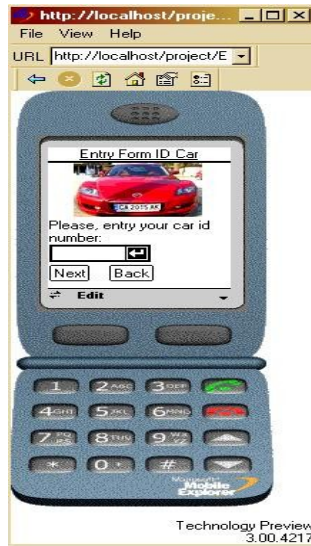


Figure 3: Screen shot of car registration number

Figure 3 shows how the interface to the car to key-in the car registration number. This car identification number is stored into a database. This information is important to for future use if some mistake or request happen. Data contains of the transaction of the car can be retrieved from the database has been saved previously and send it to user or customer using wireless in order to provide on-line parking space information.

The system also transfers parking space information of which levels in the selected particular building. This give user time to decide where is the suitable parking space and order directly. User/customer will receive booked parking space information from the system this grant the user/customer to place their car to parking area. Figure 4 shows a screen design of the proposed system.

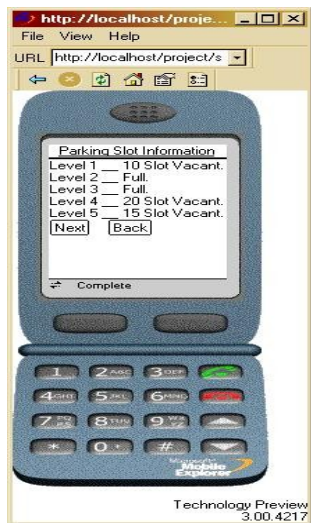


Figure 4: Screen shot of available parking space



Figure 5: Screen shot of payment

If user/customer decides to book on the certain parking space, the next process is the payment. At this stage, user have to choose one of banks in which user has account there for paying the parking charge. A wide selection of baking will be displayed for the user to choose. As we see on the Figure 5, the selected bank has been chosen. At this stage, user has to input the account number and how long they need to park at the selected car park. The WAP parking system will calculate total amount left in the customer's account. The system will display this information and time left if the user wants to park their car at the selected parking space. Figure 6 shows the screen design of the information. In this stage, the system presents printed the time need to park the car together with car identification number that has been inserted before.



Figure 6: Total amount left in the user account

Overall the proposed WAP parking system can be illustrated flow-chart in Figure 7.

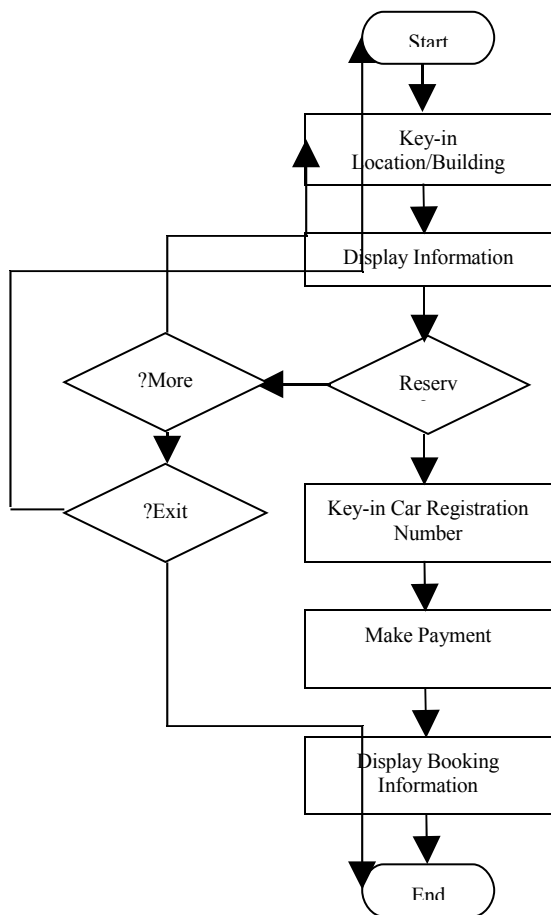


Figure 7: Flow-chart of the overall proposed system

4 CONCLUSION AND FUTURE WORK

The WAP communication channel enable drivers to obtain early information on available parking space, make a reservation, access the reserved place and pay for the service that has been booked. In reaching this goal, the innovative solutions seek to benefit all social segments, to optimize existing parking resources and to contribute to achieving a more sustainable urban transport, reducing congestion and pollution.

Amongst the wide range of parking solutions that can contribute to reduce parking problems or regulate parking activities is by introducing mobile parking solution an innovative e-business application for parking space optimization. User can identify their parking space in advance and this will reduce their searching available parking space and contributes for the congestion and pollution problem.

The idea behind parking space application is make the drivers to find parking offer matching their needs and to serve all transport segments where a parking space is needed, in other words the parking space application acts as a parking brokerage service. Technically, the research rest on an integrated architecture comprising a WAP cellular phone or standard internet access and free parking spaces interfaced with parking space provider's reservation system.

The next step of this work is to evaluate user acceptance test of the proposed system. This assessment will be conducted in a three different cities.

REFERENCES

- Kaliskan, M., Graupner, D., & Mauve, M. (2006). Decentralized discovery of free parking place. Proceeding of the 3rd International Workshop on Vehicular Ad Hoc Networks, Los Angeles, CA, USA, pp. 30-39.
- Elliott, G., & Phillips, N. (2004). *Mobile commerce and wireless computing systems*: Person Education, Addison-Wesley Publishing.
- Foo, S. M., Hoover, C., & Lee, W. M. (2001). *Dynamic WAP application development*: Greenwich: Manning Publication Co.
- Hodel-Widmer, T. B., & Cong, S. (2004). *PSOS, Parking Space Optimization Service*, Proceeding of the 4th Swiss Transport Research Conference (STRC 2004), Monte Verita/Ascona, March 25-26.
- Khamis, N., & Wah, A. G. (2005), The Student Information System Using WAP Technology, *Malaysian Online Journal of Instructional Technology*, 2(1).
- Mohamad, J., & Kiggundu, A. T. (2007). The Rise of The Private Car in Kuala Lumpur, Malaysia - Assessing the Policy Options -, *IATSS Research*, 31(1), pp. 69-77.
- Shaheen, S. A. (2005). *Smart Parking Management Field Test: A Bay Area Rapid Transit (BART) District Parking Demonstration*, Institute of Transportation Studies, University of California, Report No. UCD-ITS-RR-05-02.
- Vianna, M. M. B., Portugal, L. d. S., & Balassiano, R. (2004). Intelligent transportation systems and parking management: implementation potential in a Brazilian city, *Cities*, 21(2), pp. 137-148.

- Wahab, I. b. (1989). Computer based parking system for local authorities in Malaysia. Proceeding of the *1st International Conference on Computers in Urban Planning and Urban Management*, Hong Kong, August 22-25, pp. 77-87.
- Yan, G., Olariu, S., Weigle, M. C., & Abuelela, M. (2008). SmartParking: A Secure and Intelligent Parking System Using NOTICE. Proceeding of the *2nd International IEEE Conference on Intelligent Transportation System (ITSC 2008)*, Beijing China, October 12-15, pp. 569-574.