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

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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 changes 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 CO\textsubscript{2} 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.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{A logical view of an end-to-end system of WAP
Application (Khamis and Wah, 2005)}
\end{figure}

The owner of the parking lot will have their own 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

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 5: Screen shot of payment

Figure 6: Total amount left in the user account
Overall the proposed WAP parking system can be illustrated flow-chart in Figure 7.

![Flow-chart of the overall proposed system](image)

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


