

Parking Guidance and Information System

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ABSTRACT

This era of technology and globalization has led to population explosion. Not only new cities are emerging and booming but the existing cities are also getting overcrowded. Each day thousands of new vehicles are being introduced to roads. However with the existing infrastructure it's difficult to accommodate these vehicles. This connotes that in future, parking issues will pose a big challenge to facilitate traffic network and ensure living standards of city. This calls for proper management of the available space on roads. The Parking Guidance and Information System is one of important systems for Advanced Traveler Information Services. This research proposes a parking guidance and information system which integrates GPS and 3G network for a map on the Geographic Information System to solution in adequate of road side information signboard. The system proposed in this study mainly includes Parking Host, Parking Guidance and Information Server, Geographic Map and Information System as well as Parking Guidance and Information Browser. The study results show this system can increase driver's efficiency to find parking space and efficiently enhance parking convenience in comparison with roadside signboard system.

Key words: mobile communication, Geographic information systems, Global Positioning System, Ultrasonic transducers

INTRODUCTION

IN METROPOLIS, Parking lot not only facilitates the public to solve the parking requirements, and also plays an important role in upgrading the quality of life, efficiently adjustment the urban traffic and upgrade local prosperity. There is no correlation between parking lots. For drivers, seeking parking space will take a chance. Many people line up to wait for parking outside parking lot, especially at more prosperous area. When a driver urgently seeks for parking space, a parking management system can demonstrate the importance if it can show the most efficient way to meet the requirements of a driver within the shortest time. Using each kind of technology to assist management systems has been a trend. The rate to own a car in Taiwan has been increasingly enhanced, leading to a big problem metropolitan traffic. How the parking space available can efficiently and correctly transmit to drivers has been one of important issues for the urban development. According to a study report from the institute of transportation .ROC, seeking parking space shared about 30% in detour traffic. Therefore, how to efficiently provide the parking information to drivers will be an important issue. As shown in previous study, what drivers most concerned was parking space available in a trip when arriving the parking lot, but not parking information before the departure [8]. Therefore, we must establish a

real-time and accurate parking guidance and information system for drivers. The Parking and Guidance Information System, developed in advanced countries for many years, had been recently available in each city. The parking information, such as the location of parking lot, direction, availability and so on, can be transmitted to drivers by each kind of channel via this system to solve parking issues. From a study paper [1], the Parking Guidance and Information System would be beneficial to solve the parking problem and enhance the utilization rate for each city in the world would . However, the most of parking guidance information are displayed by roadside signboard as shown in Fig. 1. Therefore, this study expects to establish a real-time Parking Guidance and Information System, including Parking Lot Host, Parking Guidance and Information Server as well as Internet Browser. Drivers can acquire real-time parking information provided by this system via Internet Browser. Drivers not only can acquire the information from roadside signboard in the future, but also directly obtain a lot of information on parking lots via this system.

All operating systems almost support Internet and build in browsers compliant with HTTP. In order to smoothly execute this system on each platform, this study doesn't program user interface software but uses Internet Browser as user interface. Internet Browser in this system mainly plays a role in data transmission, receiving and screen display. In order to conveniently demonstrate, this study will adopt a notebook computer as a platform of Internet Browser.

INTRODUCTION TO 3G WIRELESS NETWORK SYSTEM

Most authors will be able to prepare images in one of the allowed formats listed above. This section provides additional information on preparing PS, EPS, and TIFF files. No matter how you convert your images, it is a good idea to print the files to make sure nothing was lost in the process.

3GPP (Third-Generation Partnership Project) was responsible to work out and maintain the standard of 3G mobile communication. 3GPP was founded in December 1998. The purpose was to establish the third generation mobile communication standard. The coverage included network architectures, 3G terminals and 3G services. In March 2001, 3GPP announced the first version of wireless multimedia streaming services, briefly called as 3G-PSS (Packet-Switched Streaming Services). 3G-PSS worked out an application platform of multimedia wireless transmission related to voice, image and video with a bandwidth about 2Mbps, which had met the requirements of MPEG-4 video real-time transmission bandwidth. Two parts were specified in 3GPP-PSS, including communication protocol and encoder/decoder. In communication protocol, 3G-PSS mainly adopted the following transmission protocols: SDP (Session Description Protocol), RTSP (Real-Time Streaming Protocol), SMIL (Synchronized Multimedia Integration Language), HTTP/TCP and RTP (Real-time Transfer Protocol). In addition, for decoder, 3GPP supported the following media formats:

- 1) Video: ITU H.263 and ISO MPEG-4 Simple Profile.
- 2) Audio: MPEG-4 AAC-LC (low complexity).
- 3) Voice: Adaptive Multi-Rate (AMR) Speech Codec.
- 4) Image: JPEG and GIF.
- 5) Text: XHTML- Encoded and Formatted Text.

The evolution and classification related to 3G network technologies can refer to Table 2. With the increasing demands of bandwidth, this system can transmit more abundant and real-time parking information.

INTRODUCTION TO GPS

The full name of GPS is Global Positioning System, initially developed by the US government for cold war. With the end of cold war, GPS has opened for civil use. One of most important applications is drive navigation. GPS is a system which calculates the user location by receiving GPS satellite signals in space; through GPS and Geographic Information System (GIS), regardless of users on land, sea or air, it can accurately measure the location on a map. The output value related to GPS has annually reached US\$20 billion, and increased with 10%~25%.

PROPOSED SYSTEM

System Description

With the increase of economic behavior and the upgrade of living standard, This research proposes a parking guidance and information system which integrates GPS and 3G network for a map on the Geographic Information System to solution inadequate of roadside information signboard. The system proposed in this study mainly includes Parking Host, Parking Guidance and Information Server, Geographic Map and Information System as well as Parking Guidance and Information Browser. The parking information, such as the location of parking lot, direction, availability and so on, can be transmitted to drivers by each kind of channel via this system to solve parking issues. Parking Guidance and Information Server not only saves and provides the availability information to Parking Guidance and Information Browser for inquiry, but also plans and produces a parking lot guidance map transmitted to Parking Guidance and Information Browser, so that a user can refer to a guidance map and leave for parking lot.

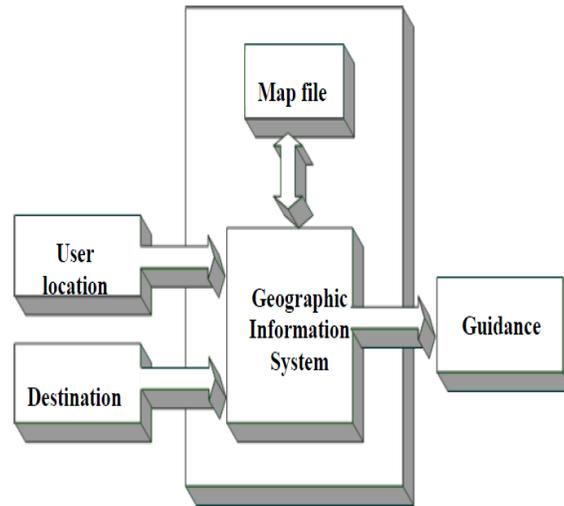
Advantages of Proposed system

- 1) Better perception of security because patrons do not walk to and from their space
- 2) Feasible for very small sites that cannot accommodate a conventional ramped parking structure.
- 3) High parking efficiency
- 4) No driving while searching for an available space
- 5) Patrons wait for their car in a controlled environment.
- 6) Less potential for vehicle vandalism.
- 7) Minimal staff needed if used by familiar parkers.
- 8) Retrieval time can be less than the combined driving/parking/walking time in conventional ramped parking structures.
- 9) Easier facade integration without ramping floors or openings in exterior walls.

SYSTEM DESIGN

The Parking Guidance and Information System proposed in this study consists of Parking Lot Host, Parking Guidance and Information Server as well as Internet Browser. Fig. 2 shows an integrated architecture of three modules, where Parking Lot Host takes responsibility to acquire the real-time availability information at that parking lot. According to Communication Protocol

of Taipei City Parking Lot Information Guidance System [7], it will transmit to the database of Parking Guidance and Information Server via Internet after encoded. A Study of Geographic Information System Combining with GPS and 3G for Parking Guidance and Information System Internet Browser is not only used for user interface, but also acquires GPS coordinate. A user can connect Parking Guidance and Information Server via 3G/GPRS to browse the availability information and guidance map of parking lot near the destination.



APPLICATIONS

By virtue of their relatively smaller volume and mechanized parking systems, GIS combined with GPS and 3G are often used in locations where a multi-story parking garage would be too large, too costly or impractical. Examples of such applications include, under or inside existing or new structures, between existing structures and in irregularly shaped areas.

GIS combining with GPS and 3G can also be applied in situations similar to multi-story parking garages such as freestanding above ground, under buildings above grade and under buildings below grade.

CONCLUSION

This study has successfully integrated with Geographic Information System as map information. A parking guidance and information system is developed with 3G mobile network and GPS. The whole system includes Parking Lot Host, Parking Guidance and Information Server as well as Internet Browser. From the experimental results, it is indeed practical for the parking information on traveler path provided via 3G network and the guidance path of parking lot for travelers transmitted to Internet Browser. Parking Guidance and Information System, which integrates GPS and 3G networks, not only solves the insufficient number of roadside display unit, but also increases the applications after the parking information is collected. Integrating GPS and 3G technologies proposed in this study with the Parking Guidance and Information System shows the high application value for providing the information on parking lot, reducing the parking time or enhancing the utilization efficiency of parking lot. After the system suggests optimal parking lot by driver preference, the parking space can be appointed. So the traveler information can be more enriched and show no more worry in a trip.

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