

An Implementation of Coordinating Information between Consumers and Service Providers in Mobile Environment

Yung-Chung Tsao¹, Yin-Te Tsai², Kevin Chihcheng Hsu³, Hsin-Kuang Hsuen⁴

¹Dept. of Information Management, National Central University, Taoyuan, Taiwan

²Professor, ⁴Instructor, Dept. of Computer Science & Communication Engineering, Providence University, Taichung, Taiwan.

³Assistant Professor, Dept. of Information Management, National Central University, Taoyuan, Taiwan

Abstract—People enjoy their holiday usually in Taiwan by driving cars to travel or to meal at restaurant without incomplete planning or making the pre-reservations for their tourist schedules. Therefore, people always waste much time to wait their services or to change their tourist schedules dynamically due to lack of the reservations in advance.

When people travel by cars as leisure time, they make the casual reservations for their tourist schedules, which usually make those commercial enterprises facing the problems of the peak traffic and idle time under those conditions. Those enterprises can't decide easily to accept or to reject those casual reservations with some predictable new-coming customers in the future. So they need an optimal solution to control the service flow and offer the mutual information between services and consumers, even by cell-phone or on-line subscription via Internet.

Although mobile commercial technologies can take over those problems and offer the real-time service quota information to the on-line subscription information system (IS). But those applications may spend much money than most enterprises offer.

The study derives a mechanism based data collectors of replenishment of stocks and queue call-number machines (CNM) to communication between consumers and service providers via GPS Navigating Device, Store Service-Quota (SSQ) and Monitor Server of Shops Service Quota (N3SQ) instead of creating or upgrading a new information system (IS) with high cost additionally.

The study implementations a prototype as the independent service-devices isolated from original IT structures and offered a middleware of data-exchange to original IT structures.

Keywords—GPS Navigating Device, Store Service-Quota (SSQ), Monitor Server of Shops Service Quota (N3SQ), Call-number Machine (CNM)

I. INTRODUCTION

A. Background

With the economic growth in Taiwan, people always drive cars to travel during leisure time and make the casual reservations for their tourist schedules without pre-planning schedule and pre-reservations of commercial travelling services.

In other word, commercial enterprises always encounter the resource-planning problems of peak traffic and idle time under such conditions. If those enterprises have a better solution to control the service quotas and offer the mutual information between services and consumers, the resource waste may reduce more at last.

People can only rest or travel at Saturday & Sunday after working full-week hardly, so they become forgettable to make the pre-reservations for their tourist schedules easily. Therefore, commercial enterprises face the problems of the service quotas planning for their customers.

Although travelers usually use cell-phones to make dinners' or accommodations' reservations during travelling routes. But the restaurants and hotels always have servicing quotas limitation due to resource-planning and material preparations, so exceptional service-orders will torment those managers between extra-revenue and optimal resource-planning. The poor decision-making for managers for those customers' rude and emergent services' requests may break the enterprises' reputations and cause the loss by the cancel of customers' pre-reservations. But it's a very difficult problem to reject the customers' pre-reservations, because it may lost the customers trust and loyalty.

B. Motivation

The study explores the critical factors of the problems listed above including high cost of upgrade enterprises' IT applications, heterogeneous data-exchange, querying methodologies across different information systems (IS), source codes lost, lack support of software development providers, etc. . So the study faces the problems how to use a new way to reduce the complex integration for different commercial services' providers and customers into the querying problems of services' quotas. If customers can get the enough services' quotas before making the pre-reservations during the travel, few customers will not spend extra cell-phones' expense to call the services' number to make an impossible pre-reservation at all. On others word, the extra cell-phones' expense will be saved for the customers to make the pre-reservations to the services providers with the extreme labor-works waste during the travel.

International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 5, May 2013)

The hints trigger the study to find the devices or machines used by car-drivers. So the study finds the literature-survey extensively related to GPS technology as to a location or path finder. If some solutions are not to create a new IS or not to upgrade the enterprises' IT applications for the customers' extra expenses and learning-cost, the GPS Navigators may be a better way in the study.

C. Constraints

The study has some constraints due to the limited research-resource. The study has listed constraints following:

- Services' quotas problems support only information.
- IT application instant data limit to services' quotas.
- The services' quotas information is the independent services' indicator.
- The increasing and decreasing of the services' quotas can be abstractive information binding to independent indicator when customers coming and leaving instead of services' processing.

D. Goals

The study goals are listed following:

- Create a independent device for recording the services' requests.
- The device can works independently without the extra IT applications supports, but it can communication the message to IS with standard data exchange format.

II. LITERATURE SURVEY

A. Mobile Service

Mahfuzul discussed the mobile control scheme in their study for using the cell-phones to make reservations[4]. The future wireless network infrastructures such as 3rd generation/4th generation (3G/4G) are evolving towards supporting a broad range of real-time multimedia services (e.g. phone calls, mobile networking) with Internet technologies and enhancing quality-of-service (QoS).

The mobile networking services in Internet rely on the robust infrastructure of IS based on web technology. Internet stage came from 1999 explosively to overcome most legacy IS based on mainframe or PC-based computers.

The previous researches [7] survey some 50 leading web sites, spanning a range of differing groups of intermediaries, travel agent and public tourist for the role of computer reservation technology providers[7]. The researches concluded that the pioneering and novel forms of internet-based tourist organizations are contributing to the evolution of the tourism sectors.

So competitive use of information communication technology (ICT), in particular, Internet provides information and enable financial transactions to be a significant shaper of social and economic life within Europe and North America. Of course, others are engaging into the Internet global village for the future competition[7].

B. Global Position System

People move to everyplace by various kinds of vehicles in their daily lives. One of the most is car-driving[3]. The critical problems for them are that how to plan the optimal routes and to move through space to the destination optimally. Therefore, Global Positioning System (GPS) navigation may be considered, but it involves multilevel cognitive processing and thus has attracted much theoretical and practical interests from researchers in many fields [1, 5].

Importantly, finding the way in the mobile environment and moving freely between places is difficult (at least for some people) [1, 5].

People driving cars firstly need to know where they are (location) and in which direction they are facing (heading for), so successful navigations or way-finding become the critical issues [3]. Then drivers need to plan a better route and which way is best routes (where a destination is located). Finally, drivers execute the planned routes to the destination. During all processes, drivers use not only their experiences but also the dynamic road-information retrieving based on the maps (whatever styles, paper-base, electronic-base). Maps have usually played the major roles in conveying spatial information and guide people to walk around in space. Recently, many kinds of navigational aids have been well developed today [2, 6].

With the advanced information technologies, such devices integrated with Global Positioning System (GPS) navigators are now designed as the tools for providing positional information by the accurate readings of satellite signals[8, 11].

III. CASE STUDY

A. Service-quota Retrieval Problems for Customers in Taiwan

So many shopping stores and restaurants have been jammed at those cities in Taiwan (e.g. Zhiben in TaiTung, CiJin in KaohSiung, Kenting National Park in TaiTung etc.) for many tourists. The tourism at those cities try to attracts many tourists and bring much revenue to enrich all local shopping stores and restaurants.

Many large-scale shopping stores and restaurants have already setup up IS (e.g. room-management system (RMS), service-management system (SMS), etc.) for their businesses. But IS based on website technology seems more expensive for their enterprises. In other word, the middle-small & small enterprises and small stores in Taiwan can't offer extra costs to setup up or to maintain such expensive IS.

Under the cost-consideration, those small shopping stores and restaurants are almost impossible to setup up the new web-based IS for their customers. So many small shopping stores and restaurants use manual writing and brain-memory to keep customers' orders. Of course, those communications between customers and stores become the single way, off-line, slowly, and time-consuming.

The dynamic and instant information retrieval for customers become the critical issues today. In fact, more and more users use the cell-phones and home-calls to make the casual pre-reservations to those small shopping-stores and restaurants. The bottlenecks of those problems by off-line and single-way communication force more and more customers' to complaints and to lost their loyalty by such bad service-quality. If enterprises will make those shopping stores and restaurants poor services and let their customers to wait for a long time without a good service-quota management systems (SQMS), even such poor services' quality make the customers never come back again.

B. The Current Work-flow for Customers and Enterprises

The current work-flows for most small enterprises in Taiwan use the hand-writing to record the customers' orders and pre-reservations. This way is cheapest for most small enterprises, but the influence from poor service qualities (e.g. long waiting, no response to requests, misunderstanding of customers requirements, service-delay, decreasing loyalty, the loss of market share, etc.) may strike the small enterprises quietly and silently until the final strike from the large customers' loss.

In other way, the tourists by driving cars have used GPS navigators to help their driving and optimal path-planning during their travels. So GPS navigators are very popular and convenient devices in mobile environment. Many tourists by driving cars have used GPS as their necessary equipments undoubtedly today.

The mobile technologies have brought many people into the global mobile stage, many people bring the cell-phones on hand all the year round. So it's very usual to make the calls to the enterprises for their services-requests anytime.

The infrastructure of the mobile business may be constructed under the mobile technology (e.g. cell-phone, notebook, tablet computer, smart-phone, etc.). Because the cell-phones have already been the standard and necessary equipments today in Taiwan.

C. The Simplified Interaction between Customers and Enterprises

The existing business models for the new customers' behaviors will increase the extra cost, but they also bring the new revenues. But the balance of the existing business-models and new changes may strike the existing work-flows for those service-providers. The convenient and rapid evolution for those service-providers is to be avoided to setup up or to upgrade the existing information systems and new work-flows. This way can reduce the most cost and keep the existing service-qualities efficiency and effect at all.

For the sake of extra cost spent due to the new workflows implementation, new solutions for those business-models will not only change the current work-flows but also create a new mechanism to enhance the service-qualities without the extra cost & resource-reallocations. In other word, the better solutions for those problems need a moderate methodology to adapt the service-providers and customers into a collaborative model. So the study surveys the commercial products which were use to record and to count the amount of customers at first. The study explores the handy-counter (HC) used everywhere (which are divided into two types), (a). one is manual handy-counter as shown in

Figure 1 and (b). other is electronic handy-counter as shown in Figure 2. The forms, colors and styles are no different for their usages and functions.

Those products are very simple and easy for users everywhere. The functions are only to click or to press the button to increase the amounts of the counters. The increasing & decreasing amounts can be used as the service-quotas recorder as to service-management systems (SMS). Those products give this study a new approach. So the service-quotas recorder should be as simple as those products.



Figure 1 Manual handy-counter



Figure 2 Electronic handy-counter



Figure 3 Number Calling Machine

D. The Simplified Notification between Customers and Enterprises

The business-models mentioned above need a notification-mechanism to inform their service-requests for the customers. The study needs the functions of querying and notification to communication the both.

The study applies the approaches of train-ticket sellers and patients queue at hospital, (which are entitled number calling machine (NCM) as shown in Figure 3), they are used to notify the waiting people whom are served now and whom are next ready. That's a very simple way as to service-management system (SMS) in the study.

The study applies the simple approaches used in the current operations of commercial businesses. But the new mechanism must be proposed in form of digitalized and offer the functions of mobile transmission. The mechanism will be discussed following.

IV. THE DEVICE DESIGN

A. Device Design with the Collecting Functions of Mobile Dynamic Quota Control & Notification

The study applies a new device entitles "Design of collectors of mobile dynamic quota control & reserved mechanism" [9] as shown in Figure 4. The device follows the simplified operations to integrate the all functions from the handy-counter (HC) and the number calling machine (NCM). So the operators just press the "Increase" & "Decrease" icons (i.e. "+" & "-" symbol). The all pre-reservations from the calling just press "+" button to increase the amounts of used service. Therefore, the cancel pre-reservations from the calling just press "-" button to decrease the amounts of used service.. So "+" & "-" buttons are also used to record any customer coming or leaving the stores or the services similarly. The operations like handy-counter (HC) are easily applied to record the interactions for the customers who are making the pre-reservation by calling or new customers coming.

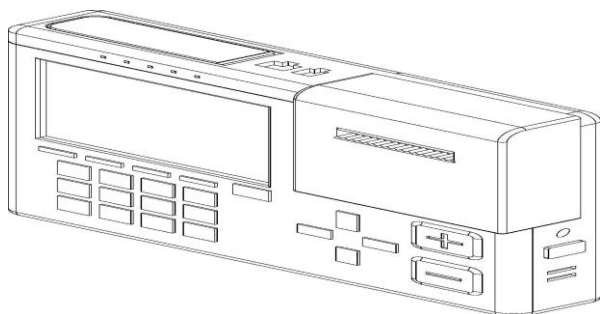


Figure 4 Designed Device with the Collecting Functions of Mobile Dynamic Quota Control & Notification

B. Functions of Designed Device

The detail descriptions of device functions as shown in Figure 4 list following:

(a). Pre-reservations recording: The staffs can press the menu button and enter the pre-reservations recording processing. The staffs only enters the phone number by number panels and press the recording button to save the pre-reservations.

(b). The printing from the pre-reservations recording: The result of step (a) will print out the pre-reservations queue number on paper and answer the queue number to the customers by calling.

(c). The live customer coming to the shopping restores or the restaurants: If the new customers come to the shopping restores or the restaurants, the staffs just press the "+" button to increase the services requestes(which mean to decrease the service-quotas). This machine will control and record the service-quotas and inform the service-quotas number and all cell-phone number of the pre-reservations in LCD display. The staffs cans easily understand the service-quotas and manage the operation-flows without extra labor works.

(d). The live customer leaving the shopping restores or the restaurants: In other word, the customers leave the shopping restores or the restaurants, the staffs just press the "-" button to decrease the services requestes(which mean to increase the service-quotas). This machine will control and record the service-quotas and inform the service-quotas number and all cell-phone number of the pre-reservations in LCD display.. The staffs cans easily understand the service-quotas and manage the operation-flows without extra labor works.

(e). The customers of pre-reservations coming to the shopping stores or the restaurants: When the customers of pre-reservations come to the shopping restores or the restaurants, the customers will tell the staffs their number queue of pre-reservations for the service first, then the staffs will check the number queue of pre-reservations by checking waing-services list. If the correct queue number of pre-reservations checked, the machine will erase the queue number of pre-reservations and decrease the pre-reservations quotas and service-quotas at the same time.

(f). The live customer waiting and calling: If the new customers come to the shopping restores or the restaurants, but it's out of service-quota. The staffs can press the menu button and enter the pre-reservations recording processing. The staffs only enters the cell-phone number or name of the customer by keypad and press the recording button to save the pre-reservations requests.

(g). The printing from the living pre-reservations recording: The results of step (f) will print out the queue number of pre-reservations on paper and give the printed-paper to the customers for their reservation.

(h). The automatic service-call: If the some customers leave the shopping restores or the restaurants, the designed device will call the queue number automatically. The staffs can know who will be the next served customers. If the waiting customer hears the queue number and come to the shopping restores or the restaurants, the customers can hand out the printed paper to the staffs. So the staffs can repeat the step (d).

(i). New services-quota acquired: When the served customers leaving, the shopping restores or the restaurants have the new services quota to serve the new customers, (who are waiting customers or new-coming customers), the staffs can repeat the step (d).

V. THE FUNCTIONS DESIGN

The machine designed in the study automated monitoring and data-transaction management will be described this session.

A. The System Design of Designed Device

The system design of the machine in the study as shown in Figure 5 describe how it works for the customers and the services providers.

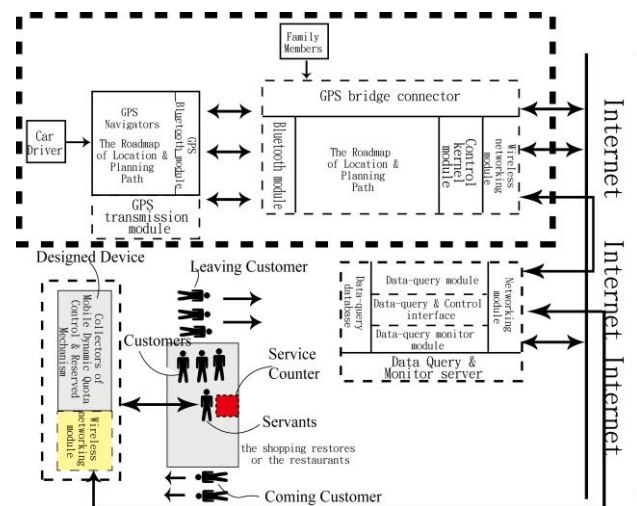


Figure 5 The System Flows of Device

The study proposes a “Data Query & Monitor Server” as the server of the data-monitor & repository on Internet based on the web-based technology as shown in Figure 5. The cost for the servers will be large enough than no enterprise can offer individually.

But the server can be used by thousands enterprises. Because the connections between the devices and the server are built when the services are requested. So the networking loading are averaged and distributed from the different shopping restores or the restaurants.

The data-transmissions are few and distributed for the server of the data-monitor & repository on Internet as shown in Figure 5, because the services of data-transmissions are only requested for the staffs when the customers leave or come. So The mechanism keeps the server more powerful enough to support thousands enterprises workable.

The services requested from the mobile customers use the pre-planning methodology or the batch querying to the job-queues as shown in Figure 5. So the load-balance of the multi-tasking technologies can support the server up to the thousands mobile users.

B. New System Flows Instead of Enterprises' Work-Flows

The service-power of staffs in middle-samll enterprises is not so powerfil than those global or international enterprises. If the new system flows of those middle-samll enterprises with designed devices can be implementation ed appropriately, maybe the service-qualities will exceed those global or international enterprises finally. In other word, the simple way may decrease the extra work-flows from the complex information systems implementation as the new demand. In advance, it makes the service-qualities into a easy way to make the revenue in the future at all.

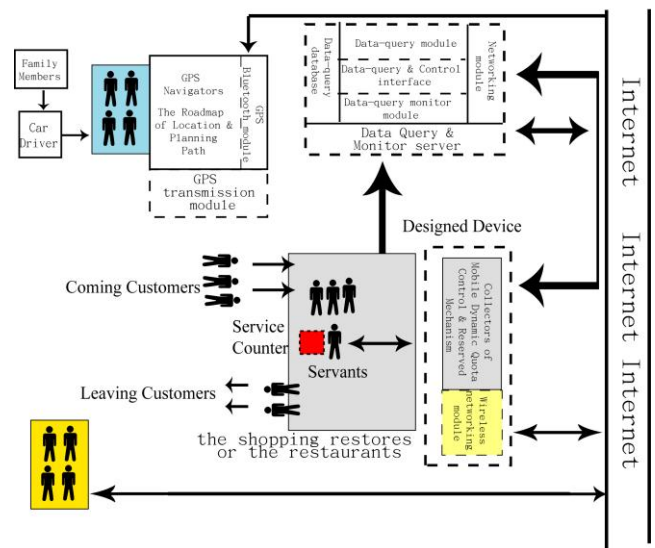


Figure 6 New System Flow Made by Designed Device

So the staffs need the sally methodologies to reduce the complex operations of the information systems, the hand-writing are so intuitional and easy for their jobs. The number calling machine (NCM) combines the handy-counter (NC) and hand-writing functions together. The designed devices in the study follow the same approach. So the staffs only need to key in the phone number when new pre-reservations by calling as shown in Figure 6.

The staffs only need to press “+” button or “-“ button easily when customers come or leave as shown in Figure 6. The designed device will increase and decrease the service-quotas automatically and update the new service-quotas into the server of the data-monitor & repository on Internet via networking module automatically. The extra-cost for new information systems or extra computers equipments will be saved with the designed device.

C. System Flow for Mobile Customers

The characteristics of the mobile customers use the digital equipments (e.g. cell-phones, GPS navigators, smart-phone, notebook, tablet computer, etc.). So the GPS navigators are the best equipments for their route-planning or way-finding. So the shopping restores or the restaurants can be queried by mobile equipments (e.g. cell-phones, GPS navigators, smart-phone, notebook, tablet computer, etc.). But the critical issues are that how to notify the users when the locations of the users are near the targets during the planning routes. So the mechanisms of the planning routes are critical and important.

The system design for the mobile user must keep the efficient way with their existing equipments, so the middleware between the existing GPS navigators and Internet are proposed with the small devices like the PDA, so the communication for GPS navigators can use blue-tooth or mobile-networking.

The middleware use the embed-system like PDA for the future migration or integration into the other system as shown in Figure 7. So the study creates a GPS bridge connector on PDA as the middleware combined with the GPS software. The middleware are responsible for the routes-querying, the shopping restores or the restaurants querying, service-quotas querying, making pre-reservations, message communications, etc. .

The middleware will be easily adapted to the other device like the existing mobile devices (e.g. GPS navigators, i Phone, Smart-phone, etc.) without any existing hardware changed.

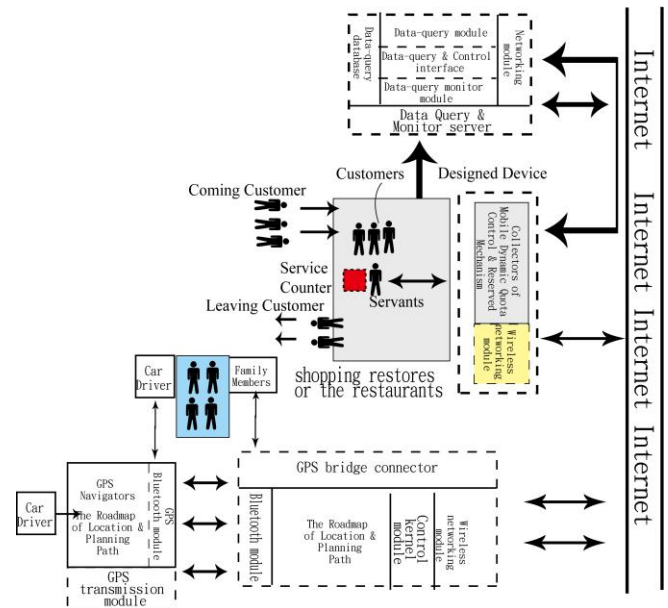


Figure 7 System Flow of the Mobile Customers Pre-reservations

The mobile users use the middleware as the querying modules via the mobile networking like 3G/3.5G as shown in Figure 7. The map-data, road-data, route-planning algorithm and favorite sightseeing use the existing GPS navigators as before. The middleware transmits the requests to the shopping stores or the restaurants and their location-data into the server of the data-monitor & repository on Internet for their pre-reservations without the information offered by users. It’s better solution for the mobile users.

Because the pre-reservations made by the mobile users are new incoming possibly for any enterprise, so the transactions motivated from the server of the data-monitor & repository on Internet need the extra fee for the services providers. The charged mechanisms supports the cost of the development and maintain of the server of the data-monitor & repository on Internet (entitled “Data Query & Monitor Server”) as shown in Figure 7.

In other way, the server of the data-monitor & repository on Internet is the independent platform beside any enterprise belonged to its developing software house. So fake transactions doesn't happen for the users and enterprises.

The shopping stores or the restaurants will retrieve the transactions of the pre-reservations activated by them-selves automatically.

In advanced, the server of the data-monitor & repository on Internet reduces the transmission-loading based the approaches mentioned above.

The pre-reservations under the enough service-quota for the shopping stores or the restaurants by designed device automatically will make their QoS better than before. The unlimited services requests of the pre-reservations will be avoided and keep the better customers' service-qualities by reducing the customers-waiting and waste-time as shown in Figure 7.

VI. CONCLUSION

A. Conclusion

The study proposes a middleware to reduce the extra cost for the mobile customers with their existing GPS navigators, in other way, the designed device adapted from the handy-counter (HC) & the number calling machines (NCM) bring few changes & extra operation-cost to the services providers. The designed device transforms the hand-writing into the digitalized data & digitalized information by simple way and integrates the server of the data-monitor & repository on Internet (entitled "Data Query & Monitor Server") as shown in Figure 7. and they are easily connected by using mobile equipments and browsers.

The shopping restores or the restaurants can save a lot of money to setup or to upgrade their existing information systems (IS) and maintain the web-based information systems with the extra & heavy cost. The server of the data-monitor & repository on Internet can get the trial fee from the shopping restores or the restaurants when the services request and offer the mobile users any query-information until the pre-reservations made. The new pre-reservations for the mobile customers make the shopping restores or the restaurants to pay the extra fee to transmission the transactions, because it's worthy for new revenues.

The shopping restores or the restaurants will be glad to pay the extra cost to purchase the reports of the customers' behaviors analyzed by the server of the data-monitor & repository on Internet (entitled "Data Query & Monitor Server") as shown in Figure 7. So the shopping restores or the restaurants can improve the better customer relationship and the better service qualities for the better reputation.

The more services & devices are used by the shopping restores or the restaurants, the cheaper & better information are offered to them with the server of the data-monitor & repository on Internet (entitled "Data Query & Monitor Server") as shown in Figure 7. So the middle-small & small enterprises have the new information technologies to challenge the global or international enterprises on Internet.

B. Future Work

The study proposes a new device limited to the constraints listed above. But the cars parking are important factors for those mobile users, who use the cars to travel mostly. So the parking issues become the critical problems for the shopping restores or the restaurants. Therefore, a large scale of parking space offered by the shopping restores or the restaurants are not available in Taiwan. If the study can integrate the device invented by some researchers [10] to offer the mobile user and car-drivers a better route-planning to road-parking when they near targets. It will enhance the designed device in the study for mobile users.

Acknowledgment

The study was partially sponsored by NSC 101-2218-E-126-001-, NSC100-2218-E126-001, NSC100-2410-H-008-051-, NSC99-2218-E-126 -001, NSC99-2632-E-126 -001 -MY3, NSC98-2511-S-008-003-MY2, NSC97-2410-H-008-039

The designed devices in the study had granted patent entitled 'Design of Collectors of Mobile Dynamic Quota Control & Reserved Mechanism' Patent NO: M 358365 and 'Dynamic Car-Parking Navigating Device Based on Integration GPS Navigating and Parking-Ticket Printing Device' Patent NO: M 346880 in Taiwan

REFERENCES

- [1] Gary L Allen, "Spatial abilities, cognitive maps, and wayfinding," *Wayfinding behavior: Cognitive mapping and other spatial processes*, pp. 46-80, 1999.
- [2] Jeffrey Hightower and Gaetano Borriello, "Location systems for ubiquitous computing," *Computer*, vol. 34, pp. 57-66, 2001.
- [3] Toru Ishikawa, Hiromichi Fujiwara, Osamu Imai, and Atsuyuki Okabe, "Wayfinding with a GPS-based mobile navigation system: A comparison with maps and direct experience," *Journal of Environmental Psychology*, vol. 28, pp. 74-82, 2008.
- [4] M Mahfuzul Islam and Manzur Murshed, "Parametric mobility support dynamic resource reservation and call admission control scheme for cellular multimedia communications," *Computer communications*, vol. 30, pp. 233-248, 2007.
- [5] Alexander Klippel, Heike Tappe, Lars Kulik, and Paul U Lee, "Wayfinding choremes—a language for modeling conceptual route knowledge," *Journal of Visual Languages & Computing*, vol. 16, pp. 311-329, 2005.
- [6] Jack M Loomis, Reginald D Golledge, and Roberta L Klatzky, "GPS-based navigation systems for the visually impaired," 2001.
- [7] L Rayman-Bacchus and A Molina, "Internet-based tourism services: business issues and trends," *Futures*, vol. 33, pp. 589-605, 2001.
- [8] Noam Shoval and Michal Isaacson, "Application of Tracking Technologies to the Study of Pedestrian Spatial Behavior*," *The Professional Geographer*, vol. 58, pp. 172-183, 2006.



International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 5, May 2013)

- [9] Yung-Chung Tsao and Hsin-Kuang Hsueh. (2008). Design of collectors of mobile dynamic quota control & reserved mechanism. Available: <http://twpat5.tipo.gov.tw/tipotwoc/tipotwekm?0020EE7300030201000000000200A000000001000000000^>
- [10] Yung-Chung Tsao and Hsin-Kuang Hsueh. (2008). Dynamic car-parking navigating device based on integration GPS navigating and parking-ticket printing device. Available: <http://twpat5.tipo.gov.tw/tipotwoc/tipotwekm?0020EE7300060301000000000200A000000001000000000^>
- [11] Jeroen Van Schaick and Stefan Van der Spek, "Application of tracking technologies in spatial planning processes: an exploration of possibilities," 2007.

International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 5, May 2013)

AUTHOR'S PROFILE



Yung-Chung Tsao received his Bachelor of Business Administrator from Chung Yuan Christian University, a Master of Computer Science and Information Management from Providence University and a Ph.D. of Information Management from National Central University. His

current research interests include the design and analysis of algorithms, software engineering and product development management.

Email: tyc6095@ms1.hinet.net



Yin-Te Tsai is a professor of Dep. of Computer Science and Communication Engineering at Providence University. He received his B.S. degree in computer engineering from National Chiao Tung University, M.S. degree in

computer science and information engineering from National Chiao Tung University, and Ph.D. degree in computer science from National Tsing Hua University, in 1987, 1989 and 1994, respectively. From July 1994 to May 1996, he was a computer instructor at Army Electronics and Communication School for the military service. His current research interests include the design and analysis of algorithms, bioinformatics and software development.

Email: ytttai@pu.edu.tw



Kevin Chihcheng Hsu is an Assistant Professor in Dep. of Information Management at National Central University, Taiwan. He received his Bachelor of Computer Science from National Taiwan University, a Master of Computer Science from State University of New York at Stony Brook, and a Ph.D. of Computer

Science from University of California, Los Angeles. He has extensive industry experience in distributed systems, workflow, B2B, multi-tier web application, and system integration. His current research interests include e-learning system integration, workflow learning in enterprise, business process management, IT support for Product Lifecycle Management, and multi-tier web applications within supply chain.

Email: khsu@mgt.ncu.edu.tw



Hsin-Kuang Hsuen received his B.S. degree in Commerce Design Dep. of Chung Yuan Christian University, Master of Design in Industry Design Dep. of DaYeh University, and be Instructor in Dep. of Computer Science and

Communication Engineering at Providence University. His current research interests include the Product Design, RAD Design, Commerce Design

Email: hkhsueh@pu.edu.tw