Design of a Rotary Ring APP Information Capturer for Sightseeing Place --

Specialized Tourism Services for Sun-Moon Lake

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Abstract: The APP store at the Android market is very popular and attractive for most of current smart phone users. A rotary ring type of APP named as Loving Sun-Moon Lake (Loving SML—‘愛上日月潭’) is an instant information capturer to capture the instant traffic tourism information (info) services and serve as an interactive device for user to know the instant traffic information of SML area where you may want to go. The tourism service is specialized on i³ travel, which is identified as innovation, intelligent, and interesting for all of the visitors coming from all over the world. The captured instant information is provided by the sightseeing cloud from SML-NSA with the integration of infrastructure of vehicle detector (VD), changeable (or variable) message sign (CMS, or VMS), closed circuit television (CCTV), Automatic Vehicle Identification (AVI), etc. The technique of augmented Reality (AR) is also used to identify how many sparkling places in front of you that you may visit. One can easily know the road performance ahead from you before you plan a trip.

Key words: AR; VD; CCTV; NFC; QR code (key words).

1. Introduction

The instant traffic information (info) at the hottest sightseeing place is always an important issue for all of the visitors from all over the world. Some of sightseeing places are a sparkling ‘MUST’ visit place like Sun-Moon Lake (SML), Ali-mountain, and Ken-Ding area in Taiwan. Most of visitors including both car drivers and vehicle takers like to spend their times due to its beautiful scenery and convenient traffic transportation. The sightseeing places enlighten by Sightseeing Bureau (SB), Ministry of Transportation and Communications (SB-MOTC) and initialized by Institute of Transportation (IOT-MOTC) Tsao (2010) [1] and Chen (2011) [2], (2012) [3] are the examples of to help visitors to own instant information before journey. Thus, the design of i³ Travel website [4] and information capturer APP include three major parts: which are website manager; information exchange; and major interactive events for users and local governmental administrator. The instant traffic information capture named as HTTP Analyzer [5] is a useful tool for this design. It is a utility that allows you to capture HTTP/HTTPS traffic in real-time. It displays a wide range of information, including Header, Content, Cookies, Query Strings, Post data, Request and Response Stream, redirection URLs and more. It also provides

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cache information and session clearing, as well as HTTP status code information and several filtering options. A useful developer tool for performance analysis, debugging and diagnostics. HTTPS is available if the application uses the Microsoft WININET API. Basir and Shen (1992) [6] proposed a Team Consensus Approach (TCA) to lower the conflicts of the observer’s values from sensors. The interface of information exchange includes a) sightseeing info interface module, traffic info interface module, front-end program interface module; and common objects, etc. All of the information formats shall follow the proposed communication protocol; called sightseeing protocol v1.0; traffic exchange info protocol 1.1; and defacto back-end protocol; respectively.

Those common components will include database access; member management; Ajax API; and log; respectively. The built-in member management from PHP, XOOPS, JQuery, and Subversion (SVN) for Apache Website Platform framework as shown in Figure 1 is used to illustrate the design architecture for rotary ring APP from XOOPS tool. The design requirements of i3 Travel website for information capturing and exchanging modules is shown in Figure 2 to execute the following tasks: the newest news interface; sightseeing info interface; traffic info interface; front-end program interface; and common component interface. The sightseeing info of i3 Travel system architecture as shown in Figure 3 comes from the user’s enquiry of SML National Scenic Area (NSA) (‘SML-NSA’-‘日管處’).

This paper is organized as following: introduction, design architecture for rotary ring APP, major contents of APP, and some partial outputs results of rotary ring APP are given as a service package for SML-NSA.

2. Design Architecture for Rotary RING APP

This section contains two folds. Mainly the 1st fold is the design requirements of major stakeholders, which come from IOT-MOTC and SML-NSA. The 2nd part is the design strategy of information platform.
2.1 Design Requirement of \( i^3 \) Travel Project

Fig. 4 Traffic Service Center Infrastructure

Fig. 5 CHT hicloud CaaS structure
Source: [4]

The design architecture for rotary ring information capturer APP comes from the main enquiry of SML-NSA & IOT-MOTC and built-in the traffic service center infrastructure at the CHT hicloud of sightseeing CaaS structure as shown in Figure 4, and 5, respectively. The detail design strategy of sightseeing IaaS service architecture coming from Figure 4 is shown in Figure 6, which are customer, service, and resource layers. Each layer contains different compositions of resourcing efforts from different departments of bureau needed to be exchanging, processing, and publication according to the customer’s needs.

Fig. 6 Sightseeing IaaS Service Architecture

The Mobile Tour Guide APP from Xuite tool for sightseeing cloud service is built in Chung Hwa Telecom (CHT) hicloud with virtualization as shown in Figure 7. The validating system architecture of Vehicle Detector (VD), CCTV, CMS and AVI given in Figure 2.5 is updated differently at selected node with 1, 2, 3, and 5 per minute, respectively. They give the instant traffic info at important road intersection for the whole island and serve as the basic info for the rotary ring information capturer APP.

Fig. 7 Mobile Tour Guide APP from Xuite tool for Sightseeing Cloud Service
For rotary ring APP information capture, first, we need to confirm that the total information capture comes from four major resources, which are the national highway bureau (NHB), the Directory General of Highway (DGH) 2nd Engineering Bureau, the DGH 5th Engineering Bureau; with CCTV and VD, respectively [1]-[4]. The integration of transportation and tourism services with exchange mechanism are given in Fig. 2.7. Figure 2.8 is the simplified receiving module of SML-NSA’s website. It contains three major functions: (1) info center interface extension, (2) instant traffic info extension, and (3) mobile travel package extension.

We can get the instant traffic info based on the XML standard format from all of the local residential...
RSU devices. The infrastructure of sensor resources CMS, VD, CCTV, and AVI at surrounding SML area is given in Figure 12. Major events from all of RSUs will be feed in the resources to SML-NSA’s websites. However, there are two major supervised bureaus called IOT-MOTC and SML-NSA need to supervise all of the equipments follow the standard formats called version 1.1 for instant traffic format and info communication format version 1.0 as shown in Figure 2.10.

![Fig. 12 The infrastructure of sensor resources CMS, VD, CCTV, and TSS at surrounding SML area](image)

The integration of \(i^3\) push content exposed from \(i^{236}\) project output from ITRI, Ministry of Economy (MOE) is given in Figure 14 where their information can be feed in, receive and exchange to each other. The \(i^3\) push-info gathering service points and CMS info gathering at the surrounding SML area was selected by the \(i^{236}\) Project from MOE as shown in Figure 15 and 16, respectively.

![Fig. 13 The XML standard format for all of RSUs Source: [3].](image)
2.2 Design Strategy of Information Platform

The design strategy of information platform is designed according to the instant standard traffic information collection and publication of version 1.1 from IOT-MOTC given by Figure 17 and owns six major icons of rotary ring capturer. It will be illustrated at Section 3 later. Therefore, SML-NSA’s website can publish the instant traffic information to public customers immediately.

![Fig. 17 Instant Traffic Publication Protocol v1.1 under Information Collection from VD, CMS, CCTV, and AVI, etc.](image1)

The service exchange mechanism of SML-NSA’s website contain parking-lot vacancy service from the video image of Wen-Woo Temple and deliver it to the smart phone as shown in Figure 18. This service is specially designed for this project only. It can show the exchange mechanism of information platform for its instant vacancy of parking-lot at Wen-Woo Temple due to its special historical scenic position. The sustainable maintenance and operation system given in Figure 19 is designed to own the capability to have stable operation mechanism through the validating system of info exchange and validating module via email/SMS to operators.

![Fig. 18 The vacancy service of parking-lot at Wen-Woo Temple](image2)

Fig. 19 Sustainable maintenance and operation system

3. Major Contents of Rotary Ring APP

The major contents of rotary ring APP at Android platform are designed with one ion -- "Loving Sun-Moon Lake", published at Android ‘Market’ and called the service package of ‘Loving Sun-Moon Lake’. The extension of icon shown in Figure 20 (a) is identified by SML service package, where you can identify current location by Google Map with activity info in Figure 20 (b).
There are six major icons of rotary ring information capturers to be chosen to get the special instant info around SML area as shown in Figure 21. The 1st rotary ring information capturer is called Traffic info. Then, the next one is public transportation, deals guaranteed, Tourism info, Role setting, and concerning, respectively. Each icon can be extended to do the information capturing services.

The 2nd rotary ring information capturer is called public transportation as shown in Figure 22 (b). It contains four major icons, which are Taiwan good travel, bus schedule, transport ship schedule, and cable tram info.

The 3rd icon of 2nd rotary ring information capturer is called good deals guaranteed as shown in the left one of Figure 23 (a). It contains two major icons. The 1st icon is the newest info of good deals and 2nd one is guaranteed deals as shown in the right one of Figure 23 (a). It served as the connection link between shops and visiting customers.

The 4th icon of 2nd rotary ring information capturer is called tourism info. At tourism info icon, we can find six icons ready for serving instant info, which are listed as following: scenic info, AR tour guide, restaurant info, lodge info, trail info, and bike info as shown in Figure 24.

The 5th icon of 2nd rotary ring information capturer is called ‘role setting’ as shown in Figure 24. Users can select his/her role at the first beginning of the trip. Then, the info will be different. As a vehicle drier in Figure 24 (a), one must know his/her starting point of the tour. This map can guide you to reach SML area with the fastest way to reach destination. If you want to be a vehicle taker, then a lot of public transportation info will be given for you to have a good choice to reach destination. Figure 23(b) tells you about this kind of information for selection. Those provided information is useful for road user to make the best decision no matter he/she is a vehicle driver or vehicle taker. Thus, the 1st selection is that he/she must decide where he/she wants to go destination by driving a vehicle or taking public transportation.

The 6th icon of 2nd rotary ring information capturer is called ‘concerning’ as shown in Figure 25. This part will tell you the resources of info coming from different bureau and the version control of the software. The rotary ring information capturer design is well designed for customer to flip their fingers to
choose what they want and make a good judgment before you plan the journey at the first beginning.

Fig. 22 (a) The rotary ring selection is designed for the 1st icon of Traffic info and (b) 2nd icon of Public Transportation in Figure 21.

Fig. 23 (a) The rotary ring selection is designed for 3rd icon of preferential benefit and (b) 4th icon of Travel Info in Figure 21.

Fig 24 (a) The rotary ring selection is designed for the 5th icon of role of setting for vehicle driver and (b) vehicle taker

Fig 25 the 6th icon of concerning in Fig 21

4. Partial outputs of rotary ring APP

The user can obtain the instant info according to the Location-Based Service (LBS) at rotary ring information capturer APP when he/she enters into the 1st icon of Traffic info. He/she will obtain four icons of selection. The results are listed as following:

(a) The whole national road condition as shown in Figure 23 (b); and the instant road condition of surrounding SML area in Figure 21 (a). The result will come out as shown in Figure 26 - 27.

(b) If user selects 6th icon and selects the wanted highway between major intersections, he/she can see the real traffic road speed and the image of driving vehicles as shown in Figure 28.

(c) The selected 2nd icon of public transportation in Fig. 26 to show instant traffic condition with info from CCTV, CMS, event, road performance, alternative road, and VD is shown in Figure 29.

(d) In journey, you can select 3rd push icon, then select total visitors estimate icon, and get the total visitors number around SML area with about 15400 inside this region as shown in Figure 30.

(e) The selected two interesting CCTVs will show their instant traffic conditions for smart phone as shown in Figure 31. The instant traffic condition with info from CCTV, CMS, event, road performance, alternative road, and VD. One can avoid this traffic jam and choose the alternative roads reach destination.
(f) The whole national disaster condition report can show the whole driving conditions around the SML area as shown in Figure 32 and 33.

(g) The vacancy info of parking-lot at Wen-Wu temple at SML area as shown in Figure 34. The road condition of surrounding area of SML is selected by 2nd icon in Figure 27. Next, he/she can find the instant info of parking-lot vacancy condition at Wen-Woo temple as shown in Figure 35 only, real-time traffic condition, and how many people inside the SML area and the quality of service level. One can go another place first instead of directly getting inside of crowded place.

(h) In Journey, he/she identifies 3rd push icon, waits for LBS info, and shows the CMS info along travel trajectory as shown in Figure 36.

(i) In journey, you select AR icon, identify wanted visit place like ‘玄奘寺’, and show the distance and direction in front of current position as shown in Figure 37.

(j) In journey, you can select bus schedule, use QR code/NFC touch tag, and show sparkling place as shown in Figure 38.

Due to the space limit, we will omit the other icons. The interested user should try any icon to find out what happened will be from its results.
Fig. 30 In journey, select \( i^3 \) push icon, then select total visitors estimate icon, and get the total visitors number around SML area with 15400.

Fig. 31 The selected two interesting CCTVs will show their instant traffic conditions for smartphone from CCTV.

Fig. 32 The whole national disaster report at the 3rd icon.

Fig. 33 The detail output of whole national disaster report at the 3rd icon.

Fig. 34 The selected 4th icon of parking-lot vacancy info.

Fig. 35 The output of 4th icon with driving direction guidance for vehicle driver.

Fig. 36 In journey, you identify \( i^3 \) push, wait for LBS info, and show the CMS info along travel trajectory.
Fig. 37 In journey, you select AR icon, identify wanted visit place, and show the distance and direction in front of current position.

Fig. 38 In journey, select bus schedule, use QR code/NFC touch tag, and show sparkling place

5. Conclusions

This paper has proposed a demo result for specialized tourism services for SML area and targets it with 3 ‘i’ project with ‘innovative, interesting, and intelligent’ idea to expect to have a good performance results for improving the quality of sightseeing places. A rotary ring type of APP named as Loving Sun-Moon Lake is designed to capture the instant traffic tourism services data from official website of SML-NSA. The instant information is provided by the sightseeing cloud service with the integration of the management of traffic infrastructure. Thus, the information is used for road user to make his/her best decision no matter how they are approaching sparkling sightseeing place with a vehicle or vehicle taker. Then, the first issue for user is that before traveling tour planning must decide where they want to go by driving vehicle or taking vehicle from public transportation. He/she can find the instant parking-lot vacancy condition, real-time traffic condition, and how many people inside the sparkling sightseeing region. However, he/she still needs to estimate the total traveling time to reach destination. There still has some events happened during this period. Then, you can decide to go another place first instead of directly getting into the crowded area.

Acknowledges

The authors would appreciate for the financial support from the IOT, Ministry of Transportation and Communications (MOTC). The results of this paper is contributed from all of the cooperative teams: the Department of Transportation at Tamkang University, THI Consultant, Chung Hwa Telecom (CHT) Company, and who may concerned.

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