

## Prototype Development of an App for Choong-Jang-Ro Activation based on Augmented Reality

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### Abstract

*Choong-Jang-Ro has been a central place for a long time in Gwang-ju, but it was on the decline recently. For activation of Choong-Jang-Ro, an app to let people know it on state-of-the-art devices needs to be developed. To achieve this objective, we propose the prototype design of an app for Choong-Jang-Ro. Our proposed app has 4 services including a story telling service, a service to provide information related to Choong-Jang-Ro, a social network service, and a service to recommend tour course. Our app utilizes a technology of augmented reality. We implement our app based on the design of user interface and database. In the future, we will upgrade our app to launch on a commercial market.*

**Keywords:** *story telling, social network, augmented reality, air-tagging*

### 1. Introduction

Choong-Jang-Ro is one of the most famous places for tourists to go sightseeing, while they visited Gwang-ju. With Geum-Nam-Ro and Mt. Moo-Deung, it is a symbol of Gwang-ju. Until 1990s, it has been the greatest commercial area in Gwang-ju. In recent times, it has been converted to a significant place of culture-centered city by the construction of Asian Culture Complex [1].

As many new residential districts have been formed throughout Gwang-ju since the mid-1990s, Choong-Jang-Ro has been on the decline. Because of the development of several commercial areas in Gwang-ju, people over their 30s has not come by Choong-Jang-Ro well. So, it is full of youngsters in their 10s and 20s. That means that it has been transformed into youngster's road.

For the activation of Choong-Jang-Ro, a service to let people know it should be provided. Furthermore, the service should be executed on state-of-the-art devices such as smart phones and tablet PCs because youngsters find information using those devices. Therefore, the service should involve story telling to recall the memory of Choong-Jang-Ro and the service to provide information with respect to culture events and shopping.

To achieve this objective, we propose an app to let people know Choong-Jang-Ro. This paper presents prototype design of the proposed app. This paper is organized as follows. In Section 2, we show the schematic outline of the proposed app. Then, we describe the technology applied to our app in Section 3. Finally, we conclude our paper and describe future work in Section 4.

## 2. Concept design

### 2.1. Schematic outline

In this section, we show the schematic outline of our app. The objective of our app is to digitalize various memory and information of Choong-Jang-Ro. Our proposed app has 4 services. First, we develop a story telling service for the memory of Choong-Jang-Ro using augmented reality. Augmented Reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data [2]. Secondly, we provide information service based on AR. What our app provides is the information related to famous restaurants, public performance, and shopping. Thirdly, we develop a social network service by using Air tagging. Finally, we provide a service to recommend tour course. Figure 1 shows the schematic outline of our app.

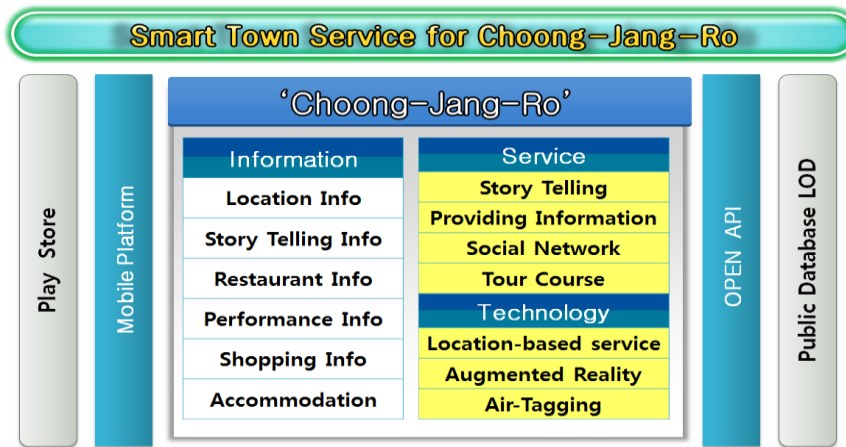


Figure 1. The schematic outline of our proposed app

### 2.2. Technology applied to our app

We develop the proposed app using 3 techniques. They are location-based service, augmented reality, and air-tagging. First, we utilize location-based service module to guide a direction to a certain place according to GPS information. If someone clicks a certain place on a LBS tour map, our app will display a right direction from current position to that place on a smart phone. Secondly, augmented reality is used to show proper information pertaining to memorial places. If someone clicks a memorial place on a Choong-Jang-Ro map, we will make appear its history, picture, and related information. Air-tagging is a kind of augmented reality. If someone takes a picture of a place located on Choong-Jang-Ro after executing our app, several postings which past visitors left are displayed.

We obtain GPS information through GPS sensor, gyro sensor, and camera. Then, this information is delivered to LBS module. LBS module consists of G-Info receive function and G-Info matching function. LBS module shows proper direction on LBS tour map using Open API module. We match currently read data to stored data at GPS DB. Augmented reality module consists of LBS module call function and vision-info receive function. According to the vision received from a camera of user's smart phone, AR module displays data related to the vision. Air-tagging module consists of tag location matching function and air tag

coordinate function. Air-tagging module searches past-written tags from SNS-Tag DB and shows them on a screen. Figure 2 shows technical components and flow diagram.

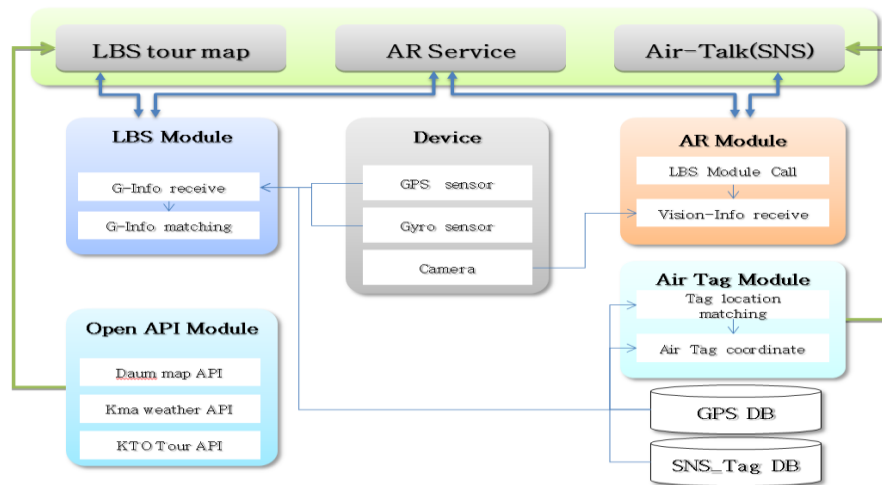


Figure 2. The technical components and flow diagram of our proposed app

### 3. The design of user interface

Figure 3 shows the intro page of our app. If a user press “Start” button, he will enter the start page of our app. Otherwise, if a user press “Finish” button, our app ends. When a user leave his message within our app, he should be logged in. For such a case, it is necessary to register himself as a user in our app.



Figure 3. The intro page of our app

Our app will begin the process of registering a user, when a user press “User Registration” button in intro page. Figure 4 shows the user registration page of our app. A user should fill in his information on the blank of a user registration page. Basically, a user should enter name, ID, SSN, password. To confirm the password you enter, a user has to enter password once again. If two passwords are different, a user will see an error page on popup window. To authenticate a user, our app needs the phone number of a user and telecommunication service company which a user join.



Figure 4. The user registration page of our app

Our app will enter a start page when a user press “Start” button in intro page. Figure 5 shows the start page of our app. If a user press “Log-in” button, our app will begin the process of logging in. In case that a user forget your password and are going to find it, he should press “Find PW” button.

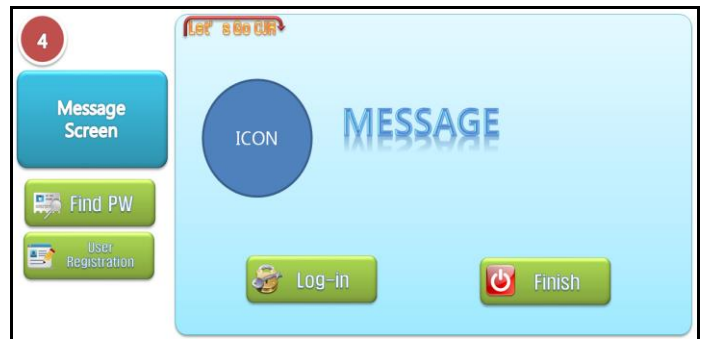


Figure 5. The start page of our app

Our app will enter a log-in page when a user press “Log-in” button in start page. Figure 6 shows the log-in page of our app. If user’s input is correct when he enter user name and password, he will enter a main page. Otherwise, he will see an error page.

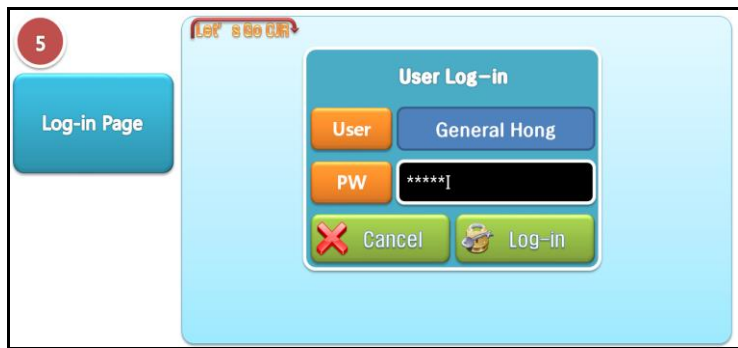
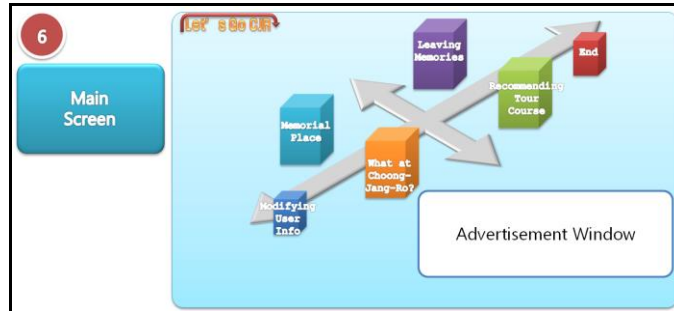


Figure 6. The log-in page of our app

A user will see a main page when he succeed in log-in. Figure 7 shows the main page of our app. The main page has several menus including “Memorial Place”, “Leaving Memories”, “Recommending Tour Course”, “What at Choong-Jang-Ro?”, “Modifying User Info”. First,

“Memorial Place” is the menu for remembering places where we often went in the past. Second, “Leaving Memories” is the menu for leaving traces of visitors. So, tourists visit famous places on Choong-Jang-Ro, and can write postscripts on the log of our app. Third, “What at Choong-Jang-Ro?” is the menu for providing information of places related to shopping, performance, famous restaurant. Finally, “Recommending Tour Course” is the menu for visitors who don’t know Choong-Jang-Ro well.



**Figure 7. The main page of our app**

A user will see a part 1 page of memorial place if he clicks “Memorial Place” menu on main page. Figure 8 shows outline of the part 1 page. In the first, our app mark user’s position using GPS on the map. The list of picture in the below includes the places where a user can go on the current map, and is scrolled left and right. If a user clicks a certain picture in the list, he will enter a part 2 page.



**Figure 8. The part 1 page of memorial place**

A user will see a part 2 page of memorial place if he clicks a certain picture on the upper page. Figure 9 shows outline of the part 2 page. This page explains the place related to that picture in detail and provides information. Map window displays map near the place. The arrow mark indicates the direction from a user’s position to the place.



Figure 9. The part 2 page of memorial place

A user will see a part 1 page of “What at Choong-Jang-Ro?” menu if he clicks it on the main page in Figure 7. The outline of the page is shown in Figure 10. This page includes various information which a user can enjoy himself at Choong-Jang-Ro such as performance, shopping, food, and accommodation. If a user wants to know specific information list, he just need to click the appropriate button in the left. After that, the information list related to the button is displayed in the right window. If a user clicks one record in the list, our app move into the part 2 page which he have seen in Figure 9.



Figure 10. The part 1 page of “What at Choong-Jang-Ro” menu

A user will see a tag input page of “Leaving Memories” menu if he clicks it on the main page in Figure 7 and selects a specific location. The outline of the page is shown in Figure 11. A user just need to take a picture of a specific location and write a log related to the picture. So, if other people visit this place on our app, they can see the tag contents which the upper user made before.



Figure 11. The tag input page of “Leaving Memories” menu

A user will see a part 1 page of “Recommending Tour Course” menu if he clicks it on the main page in Figure 7. The outline of the page is shown in Figure 12. Each course has its information list. If a user clicks a place on the information list, our app move into a detailed page for the selected place.

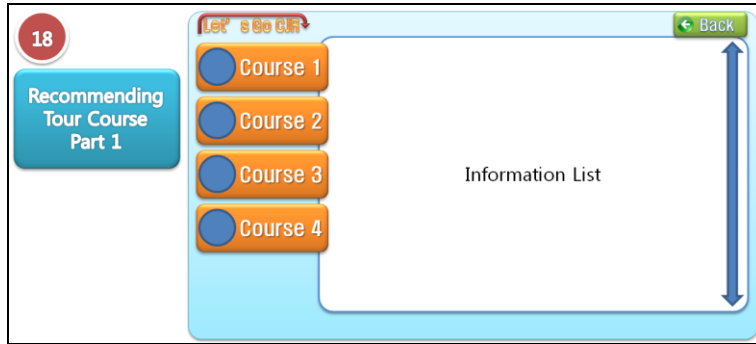


Figure 12. The part 1 page of “Recommending Tour Course” menu

#### 4. Database design

The database of our app has six tables. The tables are LC\_USER\_INFO, LC\_DATA\_INFO, LC\_IMG\_INFO, LC\_TAG, LC\_COMMON\_CODE, UC\_LC\_INFO. We explain each table in detail.

First, LC\_USER\_INFO is the table on which our app stores several data related to a user. Table 1 shows the attributes of that table.

Table 1. Design of LC\_USER\_INFO

NO	Attribute Name	Type	Description
1	User_id	Varchar(20)	User’s identifier
2	User_nm	Varchar(20)	User’s name
3	User_nicnm	Varchar(20)	User’s nickname
4	User_type	Varchar(03)	User’s type
5	User_pw	Varchar(255)	User’s password
6	Jm_bh	Varchar(255)	Social security number
7	User_pno	Varchar(255)	User’s phone number
8	Device_id	Varchar(255)	Unique identifier of user’s phone
9	User_ttype	Varchar(03)	Telecommunication company
10	Cr_date	Date	Registration date of a user
11	End_edit_date	Date	The most recent update date
12	End_edit_id	Varchar(20)	The most recent update person

Second, LC\_DATA\_INFO is the table on which our app stores text information related to Choong-Jang-Ro. Table 2 shows the attributes of that table.

Table 2. Design of LC\_DATA\_INFO

NO	Attribute Name	Type	Description
1	Lc_dtype	Varchar(03)	Type of text information
2	Lc_dcode	Varchar(10)	Code of text information
3	D_title	Varchar(255)	Title of text information
4	D_text	Text(5000)	Main text information
5	Gps_lat	Float(10,6)	Latitude position of text information
6	Gps_lon	Float(10,6)	Longitude position of text information

Third, LC\_IMG\_INFO is the table on which our app stores image information related to Choong-Jang-Ro. Table 3 shows the attributes of that table.

**Table 3. Design of LC\_IMG\_INFO**

NO	Attribute Name	Type	Description
1	Lc_dtype	Varchar(03)	Type of image information
2	Lc_dcode	Varchar(10)	Code of image information
3	Sno	Int(3)	Sequence number of image information
4	Img_folder	Varchar(255)	Folder of an image file
5	Img_filename	Varchar(255)	Name of an image file
6	Img_comment	Varchar(255)	Comment about an image

Fourth, LC\_TAG is the table on which our app stores tag information for a user to write. Table 4 shows the attributes of that table.

**Table 4. Design of LC\_TAG**

NO	Attribute Name	Type	Description
1	Lc_dcode	Varchar(10)	Code of tag
2	Tag_sn	Int(8)	Tag sequence number
3	Lc_dtype	Varchar(03)	Tag type
4	D_title	Varchar(100)	Tag title
5	D_text	Varchar(255)	Main text of tag
6	Cr_id	Varchar(20)	Writer's id
7	Cr_nicnm	Varchar(20)	Writer's nickname
8	State_icon	Varchar(03)	Tag state
9	Cr_date	Date	Date to write tag at

Fifth, UC\_LC\_INFO is the table on which our app stores simple user information. Unlike the other tables, this table exists at user's phone. Table 5 shows the attributes of that table.

**Table 5. Design of UC\_LC\_INFO**

NO	Attribute Name	Type	Description
1	User_id	Varchar(20)	User's identifier
2	User_nicnm	Varchar(20)	User's nickname

Sixth, LC\_COMMON\_CODE is the table on which our app stores the data about common code. Table 6 shows the attributes of that table.

**Table 6. Design of LC\_COMMON\_CODE**

NO	Attribute Name	Type	Description
1	Lc_type	Varchar(10)	Type of common code
2	Lc_code	Varchar(03)	Identifier of common code
3	Lc_name	Varchar(30)	Name of common code
4	Lc_svalue	Varchar(256)	Character value of common code
5	Lc_nvalue	Number(10)	Numeric value of common code
6	Lc_note	Varchar(256)	Comment for common code



## 5. Implementation

We implement our app on PhoneGap which is a leading hybrid platform. PhoneGap supports various smart phone platform including iOS, Android. So, our app is executed on any smart phone.

Figure 13 shows an example page for memorial places of Choong-Jang-Ro based on augmented reality. In the first, memorial places of Choong-Jang-Ro is marked on the map. Then, if a user points out one of marker places, related explanation and picture appears.

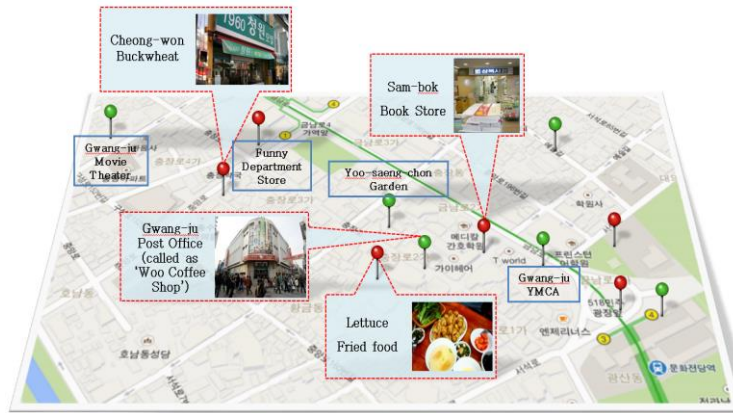


Figure 13. An example page for memorial places of Choong-Jang-Ro

## 6. Conclusion and Future work

Choong-Jang-Ro has been a central place for a long time in Gwang-ju, but it was on the decline recently. For activation of Choong-Jang-Ro, an app to let people know it on state-of-the-art devices needed to be developed. To achieve this objective, we proposed the prototype design of an app for Choong-Jang-Ro. Our proposed app had 4 services including a story telling service, a service to provide information related to Choong-Jang-Ro, a social network service, and a service to recommend tour course. Our app utilized a technology of augmented reality. We implemented our app based on the design of user interface and database. In the future, we will upgrade our app to launch on a commercial market.

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- [1] [http://utour.gwangju.go.kr/utour/culture.do?S=S01&M=060600000000&b\\_code=CULTURE\\_KOR&tour\\_cg=TOUR022&act=view&list\\_no=322](http://utour.gwangju.go.kr/utour/culture.do?S=S01&M=060600000000&b_code=CULTURE_KOR&tour_cg=TOUR022&act=view&list_no=322).
- [2] [http://en.wikipedia.org/wiki/Augmented\\_reality](http://en.wikipedia.org/wiki/Augmented_reality).

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