

An Audio Guidance and Navigation Application System for Smartphones in Miyoshi City

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ABSTRACT

We have developed an audio guidance and navigation application system suited for smart phones, specially designed for Miyoshi City, a well known sightseeing spot in Shikoku Island, Japan.

The purpose of introducing AGNAS is to promote the city's tourism industry through the use of smart phones. This system prepared in five languages has made it possible to travel in the city easily and more conveniently not only for Japanese but also foreigners. We describe the process of its implementation, the way of making a good use of it and the merits. A few related problems are also discussed.

KEYWORDS

Smartphone application, Audio guidance and navigation, Native speech, System evaluation by practical application.

1 INTRODUCTION

In recent years Japan has seen a conspicuous increase in the number of foreign tourists. They come and visit not only big cities like Tokyo, Osaka and Kyoto but nowadays also small cities where the information related infrastructure is relatively poorly furnished. Miyoshi City was a case in point. It is located deep in the mountains of Shikoku Island where one could rarely find signs written in foreign languages. On the other hand the foreign visitors have been increasing who heard or saw the wonderful views on internet or other means and have faced an inconvenience in moving around in the region because of the lack of convenient information acquisition means. The information about the city given on pamphlets, homepage etc.

was all in Japanese and only partially in English, which was far short of meeting the foreigners' need. To resolve the problem and by so doing to attract more foreign and Japanese tourists the city decided to introduce AGNAS with the use of smart phones in prospect. The present paper is concerned with the implementation of AGNAS to Miyoshi City with smart phone as its terminal device.

In section 2 we refer to two papers related to the present work. In section 3 we present the characteristics, functions and merits of our system for instance the usefulness of audio guidance downloaded into smart phones in five languages. In section 4 we first numerate the likely cases where the system may be profitably utilized. Then we show how the system accompanied by the use of smart phones works in the actual case of Miyoshi City. The section closes with the evaluation of the system and the presentation of a few associated problems.

2 RELATED WORKS

Among the works related to our work we would like to briefly mention two of them [2], [3] concerning the terminal device and interface to be incorporated in the system.

In the work by Lane et al. [2] they study the results of the use of mobile and non-mobile guides in an Islamic art museum, and conclude that with mobile guide one is able to obtain more information and also learns more effectively. This result suggests the choice of smart phone or tablet for instance as a terminal device.

A work by Wacker et al. [3] provides us with an important knowledge with respect to the choice of interface for our system. They

compare the keypad-based and the map-based interfaces used in a museum. It so turns out that users favor the map-based interface over the keypad-based interface. The result suggests us that it is desirable to incorporate the map-based interface in our system.

3 SYSTEM CONFIGURATION

This section describes the system configuration of our AGNAS for smartphone.

3.1 Characteristics of our system

. There are three characteristics we like to achieve in our application program.

- 1) By downloading the information once into a smart phone no further manipulation is necessary.
- 2) A map is incorporated and GPS information can be reflected on the map.
- 3) Information is provided in voice in five different languages.

In the places like Miyoshi City where WiFi is not available in most parts of the city, it is very useful and important to satisfy the first characteristic. As stated in the last section the map-based interface is useful, in particular in remote places where the chance is high to get lost. GPS information reflected on the map will tell the users their whereabouts and save them from getting lost and also indicate how to get to the destination. Further, if one takes into account the recent trend of increasing foreign tourists, one would find that it is desirable to be able to provide information not only in Japanese but also in foreign languages for the convenience of foreign visitors. In the case of Miyoshi City, Chinese (Taiwan), Cantonese, English and also French have been chosen as foreign languages. They have been found to be the four major foreign languages spoken by the foreigners visiting the city, according to the result of a study carried out by a voluntary group of Miyoshi City.

Figure 1 below is a pictorial expression of the characteristic 1).



Figure 1. Advantage of smart phone

3.2 Functionality of our system

In order to realize the above mentioned characteristics, we have developed our system by means of Swift language for iPhone (iOS) and Java language for Android-based smartphones. Both systems are realized as approximately 100MB size of codes and it takes about 1 minute and 40 seconds for the full downloading. With this process completed, our system can work all by itself without the need of WiFi connectivity.

We have developed the functions described below in 1) and 2) and customized them as so-called built-in type modules into the codes of our system. To the editorial office: Here, our functions · · as follows; has been erased.

- 1) Downloadable codes include user interface and necessary data sets, so they do not need additional information in order to provide voice guidance and navigation..
- 2) All information has been constructed for each language. Users can select their favorite language out of five and enjoy guidance and navigation written and spoken in the selected language.

- 3) Voice guidance allows the users to obtain information they need and simultaneously engage with other activities. While listening one can read, walk or drive a car.

Figure 2 illustrates a typical use of our system, where the built-in GPS can provide users with position information. With these facilities, users of our system can accomplish their tasks of their needs easily and smoothly [3].

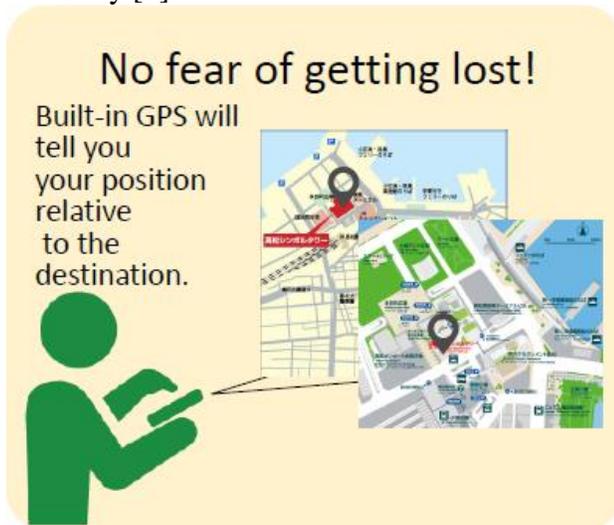


Figure 2. Useful built-in GPS service

3.3 Merits of our system

We have described the features and the implementation of our system, the result of which may be summarized below as merits of the system.

- 1) The user does not have to repeat the downloading. Once is enough to obtain almost all information. After that the user can pull out necessary information whenever and wherever. (Of course our input information is not 100 percent complete. There can be information accessible only by asking local people.)
- 2) Providing information in five different languages is very helpful. With this service almost all foreign visitors can get information in their native language. This is

a great improvement if one compares today's service with that of a year ago and before then when there was practically no service in foreign languages.

Figure 3 explains how to make an effective use of our system in the actual situations. The smart phone filled with relevant information will make one's visit easier and richer even in the totally unfamiliar places without WiFi.



Figure 3. The ways to use our system

4 APPLICATION OF OUR SYSTEM

This section illustrates some applications of our system. In the first half of this section ways of using the system are described. In the latter half we demonstrate how the system works.

4.1 Proposed uses of the system

One can think of many ways of using the system. We describe five of them in the following.

- 1) Not only visitors but also professional guides can utilize our system as an assisting tool for guidance and navigation for their customers. By the use of the system a guide may be saved from the sheer lack of memory about the things to explain to the

customers and can safely accomplish the job.

- 2) Taxi drivers can make a really good use of the system. With our system they can communicate with foreign visitors and correctly understand their request and respond to it.
- 3) It would be possible and probably turn out to be profitable to both visitors without smart phones and local governments, like Miyoshi City, to establish a rental system of smart phones at low cost. It will save the labor of finding and downloading the relevant information on the part of visitors. And the local government may raise profit on it.
- 4) Our system can serve as a good means of teaching. It contains detailed information about the region. It can be considered as an educational material for young people to learn the history, geography, culture, forms of human life and so on in the region.
- 5) Users can utilize our system while they are engaged with other activities such as walking, riding or driving, because it provides a voice-based explanation and guidance navigation.



Figure 4. The ways to use audio guide application



Figure 5. Guidance menu (L) / Panoramic contents (R)

Figure 4 shows how to use the audio guide application. It certainly helps make comfortable and convenient any visits to anywhere.

With these practices, it can be confirmed that our system will be able to achieve user's satisfaction and reliance.

4.2 System demonstration in real situation

The demonstration of our system has been carried out in collaboration with Miyoshi City. As an example, we have chosen an environment difficult for demonstration where there is no WiFi, and no suitable power supply either. Figure 5 and Figure 6 show the screenshots of demonstration.

In Figure 5, the left display shows a menu of the guidance service for this region. By clicking



Figure 6. Sub-menu (L) / Navigating map (R)

"photo" of the menu one finds the corresponding picture on the right hand side which contains thumbnail views. The user selects one of them, the place where he wants to go. After selection is done, as in Figure 5, our system offers more detailed information about the destination, as shown in Figure 6.

By going through such demonstrations we have had a good impression about our system. We are confident that our system can satisfy even foreign visitors under almost all circumstances. At the same time, however, we have noticed some problems which we think we must cope with in the future, as described below.

a) Some of users had asked us to improve GUI of system, for example, how to provide contents and some manipulation more effectively.

b) All information has been stored in the previously defined way, but there are cases where system may be requested to generate some particular information in an alternative manner and/or style. So the system flexibility must be enhanced and surpass the present one.

5 CONCLUSION

We have shown that our application program for voice guidance and navigation which can be executed in smart phones can provide Japanese as well as foreign visitors with appropriate guidance and navigation, even in unfavourable circumstances, such as in places without WiFi. It is expected and hoped that this type of system will find wider diffusion and popularity..

We have also noted several problems to be resolved in the future so that we can make our type of system more convenient and more powerful and widen the scope of its use to the customer's satisfaction.

Acknowledgement:

The authors would like to express their sincere thanks to Mr. T. Yamato of the municipal office of Miyoshi City in Tokushima prefecture and to

Dr. Akihiro Itakura, Professor of Kagawa University for their kind contribution to this project.

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