A PROTOTYPE OF LOCATION INFORMATION INFRASTRUCTURE USING IBEACON FOR THE BICYCLE TOURING

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Abstract: In recent years, there is much application that uses GPS and it utilizes the location information on smartphones. However, it is difficult to use for a long time because the GPS uses the amount of the battery power. "iBeacon" is one of the devices to get the location information by Bluetooth LE. It can get the location information passively and it can reduce to use amount of the battery power. In this paper, we describe the application for City guide or Bicycle touring using the iBeacon. We developed three types of application for different situations. In addition, we set up the iBeacon for location information infrastructure in the Mino City. Mino City has the traditional streetscape and it is difficult to build a lot of sign of the City. And the City recommends the bicycle touring. So we develop the city guide application and trial running it.

Keywords: iBeacon; Location information infrastructure; Bicycle Touring

INTRODUCTION

In recent years, there is much application on smartphones that uses GPS and it utilizes the location information. By using the location information, we can get the sightseeing information near the current place, or navigate ourselves. However, an application that uses the amount of the battery power to activate the GPS device at any time. In this reason, it is difficult to use these kinds of application for a long time.

The "iBeacon" is one of the devices to resolve this problem. This device gets the location information with the Bluetooth LE. And the operating system of the smartphones supports this device, we can reduce to use amount of the battery power [1].

In this paper, we describe the application for City guide or Bicycle touring. At first, we developed an application for orientation of our college. Next, we developed an application of city guide for the festival ground. We adjust the radio wave strength and detecting methods fit in the way. Finally, we set up the iBeacon for location information infrastructure in the Mino City. And now we try to running this infrastructure and developing an application for the Mino City guide.

TRIAL PRODUCTION OF IBEACON

College Orientation System

At first, we develop the college guide system for orientation for a student for a day. We set up 10 beacons as figure 1. All beacons put the characteristic place or rooms of the each department of our collage. After that, we develop the application to collect the digital stamps from beacons. And this application shows the information of the department and the next place of beacons. Additionally, we need to run this application without internet connection. We add the function to download all text data from the web and keep it to the local memory.

Figure 2 shows the application of collage guide system. The main view (Fig2. A) shows the power level of detected beacons. When the user detected strongest signal of the beacon, it shows the information of the place (Fig2. B).

In this trial, we have the problem to detect the beacons from long distance. We setup the detection range of beacons to “Immediate”. It can only detects the beacons within 5~10cm from the smartphone. And we sometimes cannot to detect the beacons on this range.

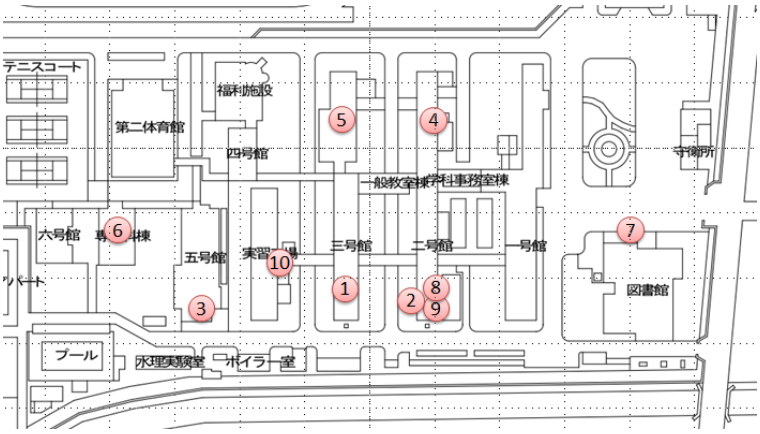


Figure 1. The Place of iBeacon in Our Collage

(A) Main View (B) Information View

Figure 2. The Collge Guide System

Festival Guide System

For the second trial, we develop the city guide application for the festival ground. Figure 3 shows the application of we developed. This application made for the festival to introduce the locally produced foods[2]. We set up the 10 beacons to the festival grounds. And we lend the iPad2 to the guest of the festival to try to our application.

In this trial, we adjust the radio wave strength to the location of the beacon. In the application, we programmed to detect the beacons from about 10 meters distance. But the radio wave of the beacons depends on the fields and the directions of the device. We need to set up few beacons at the same place and put them for different directions to react to the exact position of the tourist spot.

(A) Top view (B) Main view (C) Information view

Figure 3. The City Guide System for the Festival

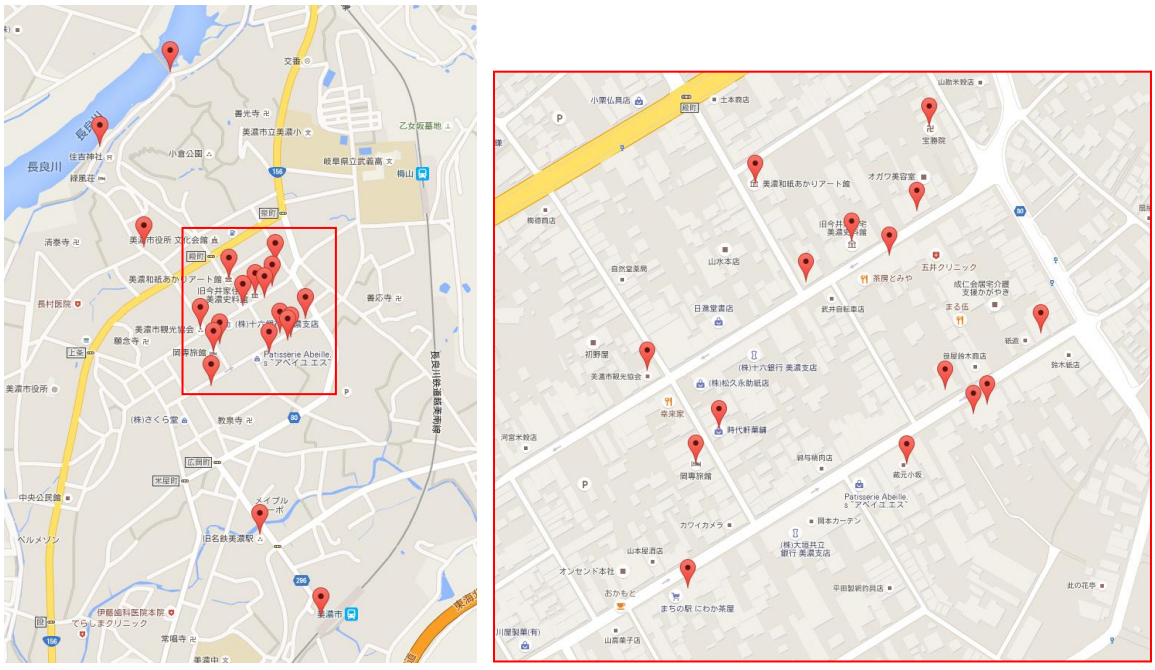
MINO CITY BICYCLE TOURING SYSTEM

About Mino City

Mino city is a city located in the Gifu Prefecture of central Japan. This city is popular for the traditional streetscape. And it is popular place to make the Japanese paper. In recent years, Mino city try to focus on bicycle touring. The traditional streetscape and a lot of nature are important sigh-seeing spot of the city. In these kinds of spot, the big signboard for tourist has bad influence to keep the traditional landscape. So we use the iBeacon as a substitute for the signboard. In addition we open the set up information of beacons to make any program with any programmer. It means we set up the location information infrastructure with the beacons.

Beacon Settings

Figure 4 shows the location of the beacons. We set up 21 beacons on the center of the city. Almost beacons are put on the back of the small sign board. As the results, we can put all beacons without changing the landscape.



(A) Overhead (B) Central of the city

Figure 4. The Location of the iBeacons in the Mino City

Application For Iphone

Figure 5 shows the application for the Mino City Bicycle Touring. This application can download from Apple app store[3]. This application shows the tourist information in response to a beacon that has been installed in the tourist spot. Tourist information page is automatically rise as we approach the tourist spot by launching the application and make the reading of the text by voice. The audio guide

announcements the tourist spot is near here, it is good for the tourist riding. They can find the sport to riding the bicycle in the city. Additionally, the user can see the beacon point on the map screen. And the information pages rises by touching the beacon point.

On the other hand, this application can shows the history of visiting the tourist spot. The beacon point reacted once, the color will change.

Figure 5. The Location of the iBeacons in the Mino City

CONCLUSIONS

In this paper, we describe the application for City guide or Bicycle touring. At first, we developed an application for orientation of our college. It had the problem too difficult to detect the beacons from long distance. It caused by the detecting mode of the beacons. Next, we developed an application of city guide for the festival ground. We adjust the radio wave strength and detecting methods fit in the way. But this way, the length of the detecting is depends on the device directions. We need to set up few beacons at the same place and put them for different directions to react to the exact position of the tourist spot.

Finally, we set up the beacons for location information infrastructure in the Mino City. Mino City has the traditional streetscape and it is difficult to build a lot of sign of the City. So we set up the beacon and develop the application for the sight-seeing by using the bicycle.

In the future, we increase a place of installation and we will develop the other application for example shopping, eating or learning. And we hope a lot of new

application using these beacons.

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