

# Design and Implementation of Group Tour Management System using GPS and Bluetooth

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*Abstract:* - Recently, citizens traveling overseas have been exponentially increased thanks to the increased interest in foreign countries from globalization and the raised income level. Individual traveling is the case but there are many cases to choose group tours due to convenience and saving cost. However, it is hard for group leaders to control the members in the group tours, causing the tourists to lose the way or exposing many accidents and crimes such as negligent accidents, disappearances, and so on. In this paper, the system is suggested to control the tourist groups easily using the functions of GPS and Bluetooth. Using this system, the group leaders can know the number of members and their locations real time basis. As a result, this system will secure the easiness of control to be able to prevent the negligent accidents. Also, it will minimize time consuming by quickly calling the roll with the system using the characteristics of Bluetooth.

*Key-Words:* - Group tour, Attendance check system, Global Positioning System, Tour application, Bluetooth

## 1 Introduction

Recently, citizens traveling overseas have been exponentially increased thanks to the increased interest in foreign countries from globalization and the raised income level. Individual traveling is the case but there are many cases to choose group tours due to convenience and saving cost. Recent trend showed the preference of package tours that travel overseas as a group collected by the tour agencies. Package tours have the advantages to be less costly and travel more places within the limited time period than individual tours. Also, it is convenient because tour agencies provide all the itineraries including accommodations, transportation, and so on. Especially, tourists from East Asian countries including Korea, China, and Japan, prefer group tours and the size of groups varies from 20 to 40.

As the size of group is higher, it is more likely to lose the way and to be exposed to the crimes and accidents such as negligent accidents, disappearances, and so on due to difficulty in controlling the members of the tour groups. In this paper, the system is suggested to control the tourist groups easily using the functions of GPS and Bluetooth. Using this system, the group leaders can know the tourists' locations real time basis. The leaders can quickly acknowledge the cases that members get out of the certain boundary so as to control them more easily and to prevent negligent

accidents. In addition, it could minimize the time to check the members because it uses Bluetooth.

The organization of this paper is as follows. In chapter 2, previous studies related to this are described. In chapter 3, design and implementation process of this system are explained and in chapter 4, conclusion and further studies are discussed.

## 2 Related Works

### 2.1 GPS and Bluetooth

Global Positioning System(GPS) is a system to find the positions of planes, ships, cars, as well as individuals using the satellites wherever in the world. GPS is used mainly for the navigation systems in the planes, ships, cars together with Geographic Information System(GIS). It is also used to find the position of individual, cars, and so on upon embedding GPS receiver in the smartphones. The advantages of GPS are strong resistance against interference and jamming signals and using the common coordinate system globally. However, it has the disadvantage not to be used where the satellite signals are not detected, or signal attenuations are significant[1].

Bluetooth, one of the short-range wireless networking technologies and short-range mobile communication standards co-developed by Bluetooth Special Interest Group that was organized

in 1998 by 5 parties including Ericson, Nokia, IBM, Intel and Toshiba, is the technology standard to connect and control multiple electronic and telecommunication devices within 10 to 100 meter diameter[2].

## 2.2 Automated attendance check system

Recently, due to the development of auto recognition technology such as RFID[3], NFC card, etc., and the biometric technology such as fingerprint recognition, face recognition an automated attendance management system that automatically manages the attendance and absence of students utilizing such technologies are widely studied and developed.

RFID based automated attendance check system [4] is a system that automatically aggregates the attendance and absence status when smart card attached with RFID tag is recognized by the reader.

Fingerprint recognition-based automatic attendance check system[5] is a system that counts attendances by recognizing fingerprints. This is not a problem such as loss, rental and theft, but there is a disadvantage that takes a lot of cost to build the system.

In the attendance and absence management system using the self-organized type of facial recognition, a client-server system that automatically manages the attendance status of the corresponding course by recognizing the person's facial information using the self-organization neural network was developed [6, 7].

The clicker[8] is a two-way wireless lecturing system consisting of portable responder and receiver attached to the computer. It is a useful lecturing support system that enables effective questions and answers between teachers and students as well as automatically checking the attendance and absence[9].

Such automated attendance check system reduces the time of checking the attendance and absence due to unmanned operation. However, in order to construct the system, additional equipment such as an RFID reader and a fingerprint reader is required, which is not suitable for a group travel personnel check system.

## 3 Design and Implementation of Group Tour Management System

The system structure in this paper is designed as Fig. 1. First, four core functions can be used upon membership joining and login by users.

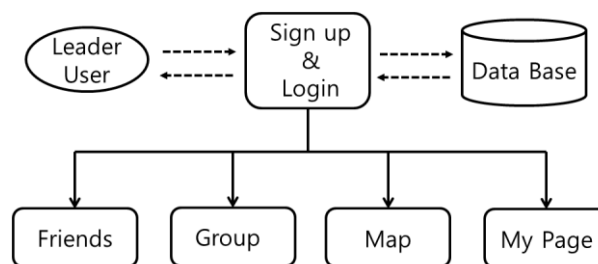


Fig. 1. Structure of group tour management system

### 3.1 Friends

Upon synchronization of contact list stored in the smartphone, other users who use this system can be registered as friends. Registered friends are listed in the list of friends to be searched whenever needed, and they can be deleted and blocked later.

### 3.2 Group

Invite the users registered as friends to the group. The user who invites group becomes a host automatically and invited users become members. Host becomes a leader to control the tour members. The leader has the authorities to receive the information on the positions of members and to check, manage and control them. Also, it can share or delegate the authority of host with other members. Leader can perform the call roll for the members as being a subject of call roll in Bluetooth which is one of the important functions in this system.

The call roll function is operated as follows. First, if host who is a group leader pushes the button for call roll in the smartphone application, alarm of call roll is delivered to each member. Once the members receive the alarm of call roll, push the reply button, immediately. Then, the position information of the members who do not reply is demonstrated in the smartphone of the leader. In case of abnormality or in danger of the members, urgent alarming function can be performed. This is performed upon pushing the button to be shared with the members on the position information immediately as well as to be delivered with emergency alarming. To prepare the environment where emergency alarming function cannot be used, emergency alarming function is operated automatically by the smartphone dropped down or impacted.

Leader informs the members that they watch the cultural heritages freely and come back when and where. Then, leader needs to check whether all his or her group members are gathered. In this case, automatic checking is possible using the Bluetooth function.

### 3.3 Map

Map function includes GPS navigating system which is a core function of this system. Once it is performed, the map is appeared based on the position information of the users. If the user is a group leader, the position information of group members is displayed as the Fig. 2. Also, leader can set the restricted territory as a circle in the map and alarming is alerted if the position of any members is out of the restricted territory.



Fig. 2. Screen shot of map menu

### 4 Conclusion

In this paper, convenient and practical management system of group tours was designed and realized. The outcomes from the proposed system using GPS navigation and Bluetooth call the roll for the management of group tours are as follows. By quick call the roll with convenient operation of smartphone application, the time and effort could be saved to provide the tourists with more convenience. GPS was used to find and control the positions of members. Setting the restricted areas by host, alarm is delivered to host in case that members get out of the area so as to be well controlled. Also, emergency alarm function can respond to the crimes and call the roll by Bluetooth makes the efficient tours. However, further studies are required to solve the problems like difficulty in finding the position of members in the locations where the data transmission is difficult such as indoor areas.

#### Acknowledgement:

This research was supported by the MISP(Ministry of Science, ICT & Future Planning), Korea, under the National Program for Excellence in SW(2019-0-01113) supervised by the IITP(Institute of

Information & communications Technology Planning & Evaluation).

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