M-041

A Proposal on SIP Based Navigation System for Hospital

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1. Introduction

Navigation system is highly recommended in any hospitals where there are different departments situated in different areas such as x-ray, laboratory, MRI, emergency department, surgery, reception and pathology etc. that the patients or the hospital visitors can not find easily. This paper gives a new approach for hospital navigation system based on SIP protocol and we use a micro power ID card which ensures the context awareness computing. From the definition, the context awareness means the awareness of the user's surroundings. For example: a context aware mobile phone may know that the user is currently busy in a meeting room and reject any unimportant calls. Thus our research interest has been initiated to build a context aware navigation system for hospital where the users are hospital patients and guests.

In our application we use Session Initiation Protocol which is a new signaling, presence and instant messaging protocol developed to create, maintain and terminate multimedia sessions, request, deliver presence and instant messages over the Internet [1]. Session Initiation Protocol is widely used nowadays for VoIP communication. But our purpose to use SIP is to session control and management.

In this paper, we first introduce the micro power ID card and the base unit (together MTC module) and then describe the proposal on how to build the context aware navigation system for hospital using micro power ID card and Session Initiation Protocol.

2. Literature Reviews

Most of the available navigation applications are based on Global Positioning System (GPS). From the paper [5] where NaviP2P was introduced, we have found that the NaviP2P system uses GPS service to retrieve the map from the map server to the user's mobile phone where the mobile network bandwidth and the local memory of mobile phones is a big issue to satisfy the latency to show the map on the phone. In our case, we propose the system where bandwidth and local memory is not a problem because of broadband network and sufficient memory in the local workstation where the base unit is installed.

The NaviP2P is a peer-to-peer application where as our system is client-server based. The advantages of using a client-server based system is that application server can record the session log and can reuse the same session when necessary. Moreover, this system can be deployed indoor and outdoor where GPS based NaviP2P available mostly outdoor environment because GPS is not suitable for indoor areas [5].

According to the paper [6], we see that they build the location tracking and location based services using IEEE 802.11 WLAN infrastructure. In this system, the WLAN user sends the signal strength of the wireless access points to the WLAN tracker server, and the WLAN tracker server which has the collection of map corresponding to the various signal strength for various places will detect the user's location and can send text message to the user. This kind of system is very complicated and time consuming to implement in the data collection phase. You have to measure the signal strength of every places corresponding to the floor map and record it to the database. Even in some places you may not find the signal at all. In our application, it is very easy to implement and actually we can provide the user to find the way for his/her choices of destinations.

3. Multi-Task Communication (MTC) Module

In our proposed system, we use a micro power ID card which is called a portable unit (key module) introduced by the Murata Manufacturing Co Ltd in their multi-task communication (MTC) module together with the target module (base unit) which needs to be equipped with the workstation. This MTC module is a bi-directional wireless continuous authentication system which we use for the patient detection. When two modules (key module and target module) are further apart than two meters, the target module will trigger user restriction to the workstation it is equipped with, and when it is in the range in two meters, use restriction is disabled and the available application will start. These key modules and target modules can be combined as 1 by 1, 1 by n, n by 1 or n by n. This MTC module is the key feature for our proposed application to act as a context aware system [2].

4. Proposed Navigation System Architecture

SIP communications apply the client-server architecture [3]. During a SIP session, the caller is the client, i.e., the user agent client (UAC) which is

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in our application the base unit (BU) to send the session request. The destination SIP UA acts as a UAS (User Agent Server) that receives the request and is our application server in our architecture.
SIP application uses SIP URL (Uniform Resource Locator), e.g., sip:bob@there.com, which is the address of record (AOR) to identify the destination of the requested session [3].

In our proposed architecture shown in Figure 1, the user with the micro power ID card first reaches the base unit (BU) range, and then BU checks the user with its ID number which is pre-registered to the BU. After successful checking (if BU finds the ID number is registered), the navigation application starts. The navigation application gives the query building options to the user. After the user choose

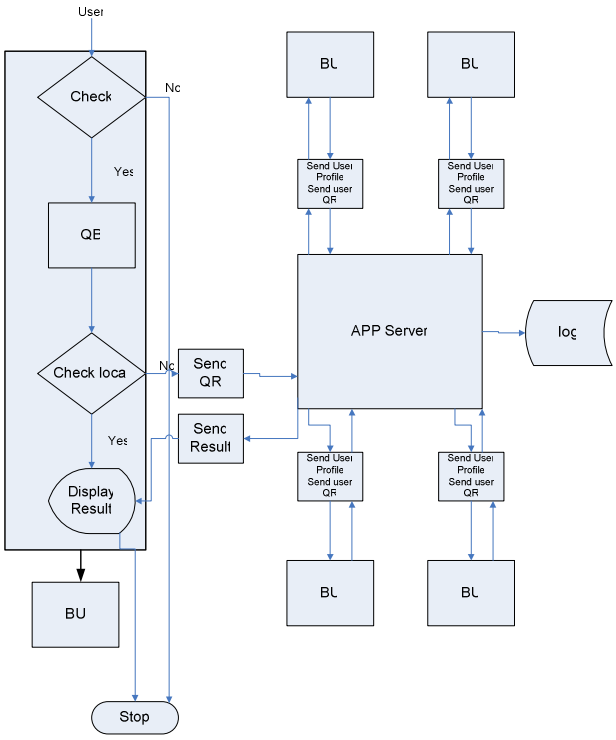

Figure 1: Proposed Navigation System Architecture for Hospital

the destination from the query options, the BU checks the destination locally and if it founds then display the result map. When the destination does not found locally, the BU sends the query request (QR) as a SIP message to the application server which forwards the query request to other BU located in different area in hospital floor and waits for the reply. When the reply is received in the application server, it sends the result to the BU which has been initiated by the QR, and then the BU displays the requested map result. All the messaging here is based on the SIP request and response model. When a user may lost his/her way on the way to the destination and when he/she is in the range of another BU which is on his way, the same session can be retrieved again which user started in the first BU by the query which the application server records and his current BU displays result showing the map from his/her current BU to the destination.
For our application, we are going to use JAIN SIP API which is a Java based programming language and it supports the SIP protocol functionality described in RFC 3261 [4].

4. Conclusions and Future works

In this paper, we present a new approach for a navigation system of any hospitals based on SIP. The advantage of using SIP for this application is for controlling the session where we can check the session has created in one BU and can continue the same session in another BU while the user is moving in the hospital and somehow he/she loses his way. Until now most of the navigation system is based on GPS (Global Positioning System) and that are build for outdoor events with GPS signal. In most indoor cases, GPS is a problem. So, our proposed navigation system can be implemented indoor where navigation service is needed and can provide useful information to the users by showing them a map from their current location to the destination. Right now we are working on to implement JAIN SIP in our navigation system and to make a prototype system.

5. References

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