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A Location-Based Personal Task Reminder for Mobile Users In Wireless College Campus Environment(Indoor And Outdoor)

Tejaswinee Ugale[1], Nikhil Patil[2],Lohit Lende[3]
Information Technolgy, SavitriBai Phule Pune University(SPPU)/Marathwada Mitra Mandal Institute of Technology, Pune

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Abstract:

This is a system aiming to enable college member with mobile phone to share files with other members with an Android Phone and to share files when the mobile phone user and the PC user are both inside the home environment. Here we perform simulative performance evaluation of a mobile peer-to-peer file-sharing system, instant messaging, and notifications in wireless multi-homed systems. The user of the system can be a Principal, HOD, Staff and students who can share documents and files on the basis of peer to peer communication or one-to-many communication. The system also provides a way to schedule reminders on location basis and receive alerts/notification as per schedule location and time. The system defines a way of sharing files and messages in both indoor and outdoor environment. As a illustration let say that the staff wants to share a assignment sheet to the students. The staff simply needs to login to the system browse the file to share and select the group category and share. The assignments gets dropped in to the students account and the students immediately receives a alert that staff has shared assignment. The student then logins and can view the assignment. The systems also allows user to set reminders based on time and location. Personal task reminders have been indispensable for modern people,in order to remind them of their tasks at specific circumstances. Traditional paper-based reminders are still useful, but they cannot be organized efficiently. Electronic reminders based on the calendar in cell phones are more efficient and gaining popularity, but such reminders are mostly triggered by time. In many situations, tasks are only meaningful to be performed at a specific location, so it would be useful if reminders for those tasks can be triggered only when the person to be reminded is physically near or located at that location. Therefore, in this research, we develop a location-based personal task reminder for Android-based smartphones and tablets for indoor and outdoor environment

Keywords **—Wifi network, GSM Network, GPS network, Android application.**

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I. INTRODUCTION

The system defines a way of sharing files and messages in both indoor and outdoor environment .As a illustration let's say that the staff wants to share a assignment sheet to the students. The staff simply needs to login to the system browse the file to share and select the group category and share. The assignments gets dropped in to the students account and the students immediately receives a alert that staff has shared assignment. The student then logins and can view the assignment. No need to print the physical copy and share it to students hand.

The systems also allows user to set reminders based on time and location. In many situations, tasks are only meaningful to be performed at a specific location, so it would be useful if reminders for those tasks can be triggered only when the person to be reminded is physically near or located at that location. Therefore, in this research, we develop a location-based personal task reminder for Android-based smartphones and tablets for indoor and outdoor environment[4][8][10].

II. REALTED WORKS

Location awareness is a component of presence technology that delivers information about a device's physical location to another user or application. The term is most often used in reference to mobile communication devices and cameras but it can also refer to websites that request a user's zip code to deliver targeted information. A device's location usually determined by one of three methods by GPS satellite tracking, by cellular tower triangulation, or by the device's media access control (MAC) address on a Wi-Fi Network. Location awareness is a growing trend in hardware and software[1]. Here are a few of the current Camera memory cards that automatically tag the

location of a picture. Application programs(apps) on smartphones. Such as GPS systems in vehicles, supply chain management (SCM), Healthcare device management[2][3].

As location awareness becomes more prevalent, so do concerns about privacy and security. The IETF has a working group, Geographic Location/Privacy (geopriv) to explore ways to safeguard users while furthering the technology[5][6].

In these days the social networking is very important for the people, friends, family and other relatives really communicate with each other and want to know about them like chatting, sharing photo's, location and etc. Communicating or knowing their friends and family location is really new and rapidly the technologies are arising in this field. But finding location by various devices is a simple and very small service for people of all ages in all countries. Devices like GPS is needed since it is as simple carrying device as moving from one place to another by using one as device to find the location and direction only[2][4].

According to a new report from the research firm Berg Insight, revenues from mobile location based services (LBS) in the European market will grow by 34 percent annually to reach 622 million in 2010.This figure demonstrates how important location based services (LBS) applications are becoming to mobile users. Within the last few years, mobile phones spread like wild fire. With more than 2 billion phones around the globe and more mobile than fixed line subscribers, mobile phone industry is the most growing industry in the world. The development progressed from unhandy, simple phones to small all-rounder's with high resolution colour display, organizer, integrated camera and Global Position Service (GPS)receiver. There are not many projects that are carried out in the LBS field[5][2]. This is because this type of application was somehow exclusive for mobile service providers because they use mobile cells information to get the location of the mobile and then provide a service to get it. And there are few problems that have identified with the current LBS mobile application are:

1.They can only let the user to view their own location.

2.They can only let the user know other people's location through message/ words.

3.They can only show the location of the other people if they have the permission of that people.

This might be a problem when the other person can't respond due to accident or when the other person doesn't want to be found (like running away from home) and needed to be found.

So by solving the problems with the help of Modern technology, it is an innovative to come out with the Widget Based Position System (WBPS). It's an mobile widget application that is builds to provide the mobile phone users to find the location of friends and family by using Global Position Service (GPS) very specifically[2][3].

The Global Positioning System (GPS) is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver[13][1].

In addition to GPS other systems are in use or under development. The Russian Global Navigation Satellite System (GLONASS) is for use by the Russian military. There are also the planned Chinese Compass navigation system and Galileo positioning system of the European Union (EU). GPS was created and realized by the U.S. Department of Defense (DOD) and was originally run with 24 satellites. It was established in 1973 to overcome the limitations of previous navigation systems[6][7].

GPS consists of three parts: The space segment, the control segment, and The user segment. The U.S. Air Force develops, maintains, and operates the space and control segments. GPS satellites broadcast signals from space, which each GPS receiver uses to calculate its three-dimensional location (latitude, longitude, and altitude) plus the current time.[7]

The space segment is composed of 24 to 32 satellites in medium Earth orbit and also includes the boosters required to launch them into orbit. The control segment is composed of a master control

station, an alternate master control station, and a host of dedicated and shared ground antennas and monitor stations. The user segment is composed of hundreds of thousands of U.S. and allied military users of the secure GPS Precise Positioning Service, and tens of millions of civil, commercial, and scientific users of the Standard Positioning Service (see GPS navigation devices).While originally a military project, GPS is considered a dual-use technology, meaning it has significant military and civilian applications. GPS has become a widely used and useful tool for commerce, scientific uses, tracking and surveillance. GPS's accurate timing facilitates everyday activities such as banking, mobile phone operations, and even the control of power grids. Farmers, surveyors, geologists and countless others perform their work more efficiently, safely, economically, and accurately. Many civilian applications use one or more of GPS's three basic components: absolute location, relative movement, and time transfer.

There are some other application technique used in GPS such as

-Surveying: Surveyors use absolute locations to make maps and determine property boundaries.

-Map making: Both civilian and military cartographers use GPS extensively.

-Navigation: Navigators value digitally precise velocity and orientation measurements.

Cellular telephony: Clock synchronization enables time transfer, which is critical for synchronizing its spreading codes with other base stations to facilitate inter-cell handoff and support hybrid GPS/cellular position detection for mobile emergency calls and other applications. The first handsets with integrated GPS launched in the late 1990s. The U.S.Federal Communications Commission (FCC) mandated the feature in 2002 so emergency services could locate 911 callers. Third-party software developers later gained access to GPS APIs from Nextel upon launch, followed by Sprint in 2006, and Verizon soon thereafter.

-Tectonics: GPS enables direct fault motion measurement in earthquakes.

- Disaster relief/emergency services: Depend upon GPS for location and timing capabilities

-GPS tours: Location determines which content to display; for instance, information about an approaching point of interest is displayed.

-Geofencing: Vehicle tracking systems, person tracking systems, and pet tracking systems use GPS to locate a vehicle, person, or pet. These devices attach to the vehicle, person, or the pet collar. The application provides 24/7 tracking and mobile or Internet updates should the trackee leave a designated area. Recreation: For example, geocaching, geodashing, GPS drawing and way marking GPS Aircraft Tracking Geotagging: Applying location coordinates to digital objects such as photographs and other documents for purposes such as creating map overlays[6][5][7].

III. SYTEM DESIGN AND ARCHITECTURE

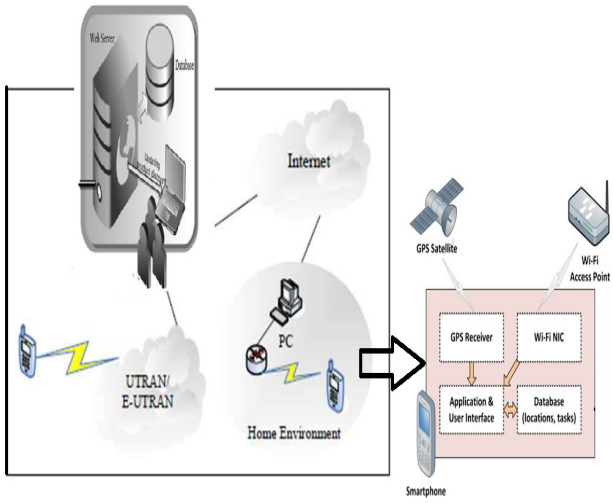

Figure 1:System Architecture

Sharing Server is responsible for controlling and managing the system, receiving users registration, managing users registration information and status information, handling users request, helping users setup sessions with each other, etc.

A. STORAGE SERVER

Storage Server is another essential part of the designed system. When the PC inside\ home environment is offline, the Storage Server will receive the sharing files on the behalf of the PC and store them temporarily until it pushes the sharing files to the PC when the PC comes online[1]. After it forwards the sharing files to the PC, the Storage Server will delete the files for other sessions.

B. SOFTWARE

The client software for mobile phone and the client software for PC should have the same functions. Both of them should act as SIP clients. Users use them to complete the registration at first time accessing to the system and after that users use them to log in/out the system. Users should use the client software to fill in necessary information, such as account name, password, and then the client software initiates registration and coordinates with Sharing Server to accomplish the registration.

The client software shields the diversity of operating systems. They transmit and receive files. They keep a family member list which stores the family members account names.

In the second part of the system, the family member with mobile phone connects to the home PC over Wi-Fi. This part of system consists of client software for mobile phone, client software for PC and wireless router. The router connects PC with twisted pair, connects mobile phone by radio. This way not only has high data rate, but also is free. In this situation, we use FTP to transmit sharing files[11]. The client software for mobile phone and the client software for PC have the same functions. They are both FTP server and FTP client, thus they both can initiate a session and transmit sharing files.

C. PERSONAL TASK REMINDER AND SCHEDULER

The schematic diagram of our location-based personal task reminder application is shown in the above Fig 1. This application employs four hardware/software components in the smartphone, described as follows. The smartphone is built-in with both a GPS receiver and a Wi-Fi network interface card, which can receive radio signals from GPS satellites and Wi-Fi APs, respectively. Based on the GPS readings and the information from the Wi-Fi APs, the application can perform geolocationing to estimate the current location of the user. The database is designed to store personal-meaningful locations and location-based tasks, which are stored in separate tables. If a location-based task exists in the database, then the application will compare the currently sensed location with the location associated with the task. When the user is physically close to the predefined location, the reminder then will be triggered to remind the user of his/ her task[3][4].

For outdoor locationing, we also utilize the most popular locationing technology—GPS. To ease adding a personalmeaningful location into the database, we use Google Maps as the user interface in our application. That is, by clicking at a specific location on the Google Maps, users can add that location into the database and then use it in locationbased reminders. As noted in the location database, indoor locations are associated with the discovered MAC addresses of the Wi-Fi APs, so the indoor locations should be pre-visited by the users. However, outdoor locations are treated differently. We associate outdoor locations with their GPS coordinates. Most importantly, since the GPS coordinates of the outdoor personal-meaningful locations can be obtained from the Google Maps API, the users are not required to be physically located at those locations before using them in the reminders[8][4].

D. FLOW OF OPERATIONS

Using the location-based reminder application is straightforward. Basically, the flow of operation follows three steps:

1. Users establish personal-meaningful locations
2. Users create location-based reminders
3. The application triggers the reminder when user is at the predefined location

The detailed flows of the three steps are shown in Figs. 2, 3, and 4, respectively.

Figure 2 depicts the flow of establishing personal-meaningful locations. First, the user manually selects to establish an indoor or outdoor location. We can see that establishing indoor and

outdoor locations follows different procedures. As described indoor locations can be associated with the discovered Wi-Fi APs. However, in our implementation, we chose to associate each indoor location not only with the Wi-Fi AP (MAC address), but also with the GPS coordinates of the indoor location. We can see from Fig. 2 that once the user decides to establish an indoor location, our application will first get the current GPS coordinates and then scan for Wi-Fi APs. After the Wi-Fi APs scanning is completed, we may select some of the discovered Wi-Fi AP(s) to be associated with the indoor location and then input the location name for this indoor location. Each saved Wi-Fi AP in the AP table will be assigned a unique AP Identifier (AP_ID), and each pair of the saved GPS coordinates in the OUTDOOR table will also be assigned a unique Outdoor Identifier (OUTDOOR_ID). The location name along with AP_ID and OUTDOOR_ID is then saved in the INDOOR table of the location database, which ends the process of establishing an indoor location. It is simpler to establish an outdoor location—as long as the user manually pinpoints a location on the Google Maps UI, the GPS coordinates of this location along with the user-supplied location name can be saved in the OUTDOOR table in the location database. After a location is established, it can be used in setting up a location-based reminder. As shown in Fig. 3, creating a location-based reminder is fairly straightforward: choose a location, edit the event name and details, done. During the process, the Location Identifier (LOC_ID) of the location along with the event name and details, and the Location Type (LOC_Type, i.e., Indoor or Outdoor) are saved in the EVENT table[1]. After reminders are created, the application follows the process shown in Fig. 4 to trigger the reminders. First of all, the application keeps reading the GPS signal and comparing the current GPS coordinates with those in the OUTDOOR table. Once a match is found and the LOC_Type of the matched record is ‘‘Indoor’’, then the application scans for Wi-Fi APs and tries to find a match in the INDOOR table[6]. If a match is found and there is at least one event (i.e., reminder) associated with the matched indoor location, then the application triggers the reminder immediately. If the above-mentioned LOC_Type of the matched record is ‘‘Outdoor’’, then the application checks the EVENT table directly to determine whether to trigger a reminder. The design of OUTDOOR table, INDOOR table, AP table, and EVENT table is shown in Fig. 5. Now we would like to elaborate on our design of associating indoor locations with both the Wi-Fi APs and the corresponding GPS coordinates. From the INDOOR table, we can see that there is an ‘‘Outdoor’’ field, which corresponds to one of the entries in the OUTDOOR table, where the LOC_Type is Indoor. That is, if an entry in the OUTDOOR table has the LOC_Type of Indoor, this entry keeps the record of the GPS coordinates of an indoor location. This kind of entries will be established automatically at the end of establishing an indoor location. Specifically, when establishing an indoor location, the latest obtained GPS coordinates serve as the outdoor location for this indoor location[9]. Although the GPS coordinates may not reflect the accurate indoor location, it normally will be around the indoor location, such as the entrance to a building[1][11][9][10].

Therefore, associating an indoor location to both the Wi-Fi APs and the corresponding GPS coordinates brings a twofold benefit. First, indoor locations with the GPS coordinates can be pinpointed on the Google Maps UI, from which users can visualize the locations and events they have already created. It also gives users a unified user experience, no matter the event is associated with an indoor or an outdoor location. Second, if an indoor location is only associated with the Wi-Fi AP information, the application needs to scan the APs all the time for indoor location sensing, which may incur considerable power consumption to smartphones and tablets. With the GPS coordinates of the indoor locations, only the GPS receiver needs to be always on, because the function of Wi-Fi scanning will not be enabled until a location match in the OUTDOOR table is found[1][9].

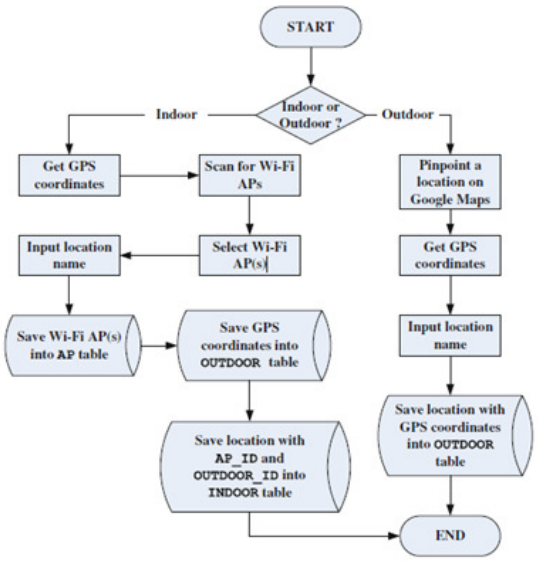

Figure 2:Flow Chart for Establishing Personal Meaningful Loaction

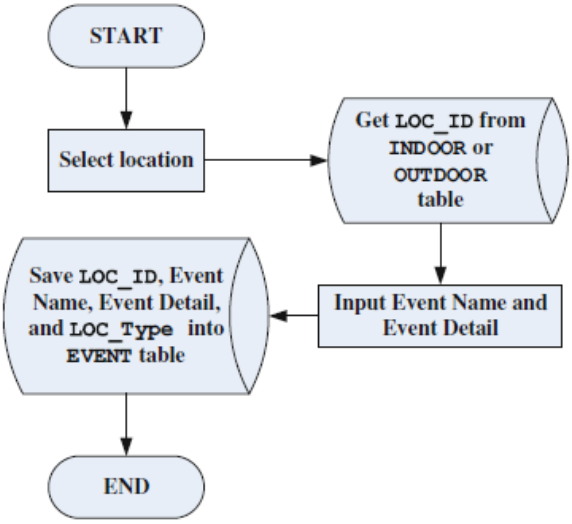

Figure 3:Flow Chart for Creating Location Based Reminders

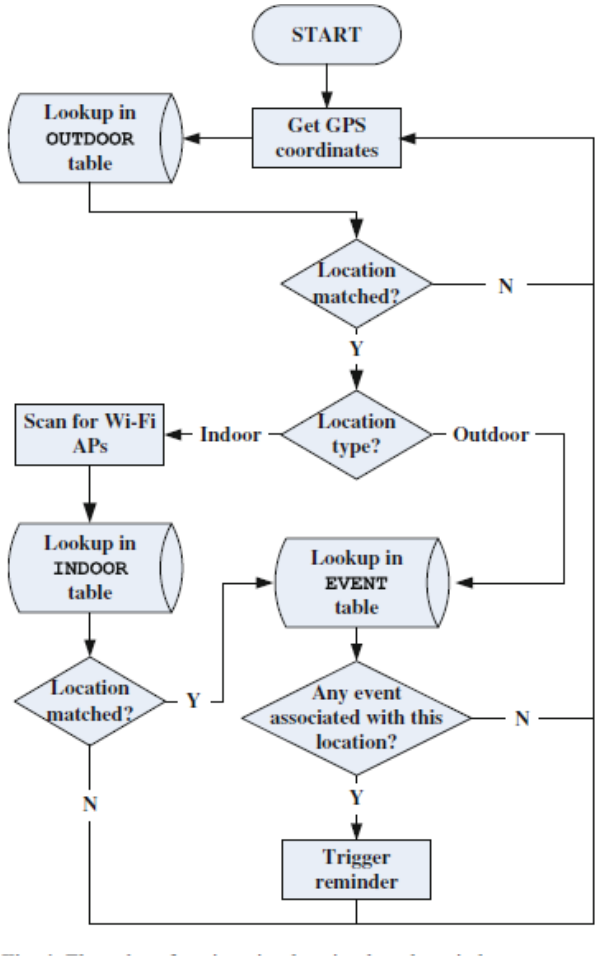

Figure 4:Flow Chart for Triggering Location Based Reminders

IV. CONCLUSIONS

In this research, we implemented a location-based task reminder application for Android-based smart phones and tablets. Compared with the existing works, our application takes full advantage of the ubiquitous WLAN infrastructure to achieve better accuracy in indoor locationing. Furthermore, our application gives users a unified user experience because all the established personal-meaningful locations can be displayed on the Google Maps UI, regardless of the location types. Although the current version requires that indoor locations should be pre-visited by the users, this restriction can be easily lifted by incorporating the proposed operating models—telecom-assisted locationing and social-assisted locationing. With the telecom-assisted locationing operating model, the

locationing service can become a value-added service for telecom operators with WLAN infrastructure. Furthermore, our work as a foundation of location-based services can be further extended to be used in many other scenarios which comprise both indoor and outdoor environments. We believe that the reminder application we developed can contribute to the promotion of individual well-being. Currently, we are developing a new software version by incorporating the social-assisted operating model to boost the usability of our reminder application. At the same time, we will try to lower the power consumption of executing the reminder application. As described it is a viable solution to use the built-in accelerometer of the mobile device to detect the movement of users, so the application will do location sensing only when the user is moving. Finally, after the new version is completed, we will evaluate the usability of our system through the questionnaire on the users.

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REFERENCES

[1] Chi-Yi Lin • Ming-Tze Hung," A location-based personal task reminder for mobile users," Springer-Verlag London 2013.

[2] VASILEIOS ZEIMPEKIS, GEORGE M. GIAGLIS and GEORGE LEKAKOS ,"A Taxonomy of Indoor and Outdoor PositioningTechniques for Mobile Location Services," Athens University of Economics and Business, Department of Management Science & Technology,Athens 2003.

[3] BHARAT RAO AND LOUIS MINAKAKIS, "EVOLUTION of Mobile Location-based Services," COMMUNICATIONS OF THE ACM December 2003/Vol. 46, No. 12.

[4] Ananya S, Venkatalakshmi B, "Location Based Intelligent Mobile Organizer," 978-1-4244-9763-8/11/ ©2011 IEEE.

[5] Mohammod Sazid Zaman Khan, Chen-Wei Tan, Thilek Silvadorai, Sureswaran Ramadass," Novel Algorithms to Ensure Smooth and Unobtrusive Handover among Positioning Systems," 978-1-4673-1090-1/12/ ©2012 IEEE.

[6] Yongguang Chen and Hisashi Kobayashi," Signal Strength Based Indoor Geolocation," 0-7803-7400-2/02/ © 2002 IEEE.

[7] Paramvir Bahl and Venkata N. Padmanabhan, Anand Balachandran," Enhancements to the RADAR User Location and Tracking System," February 2000.

[8] Prof. Nitin R.Chopde, Mr. Mangesh K. Nichat," Landmark Based Shortest Path Detection by Using A* and Haversine Formula," International Journal of Innovative Research in Computer and Communication Engineering Vol. 1, Issue 2, April 2013.

[9] Frank Ivis, Canadian Institute for Health Information, Toronto, Ontario, Canada,"Calculating Geographic Distance: Concepts and Methods,"Nesug 2006.

[10] "A Location-based Personal Task Management Application," 2012 15th International Conference on Network-Based Information Systems.

[11] "A Location-based Mobile Advertisement Publishing System for Vendors,"IEEE 2011.

[12] http://searchmobilecomputing.techtarget.com/definition/location-awareness.

[13] http://en.wikipedia.org/wiki/Location-based-service.