Indoor Location Detection & An Attendance Using Wi-Fi And Smartphone

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***Abstract*- The wireless-LAN positioning system (WPS) is an indoor positioning system, which uses the wireless local area networks infrastructure to determine the position of the user. Here, we are proposing the system to determine the location of the person using the Wi-Fi system and the smart phone. Sometimes we need to know the positioning of an individual due to some security purposes or in the emergency situations or into certain complex areas. Although the Wi-Fi system was not designed for location detection, it regularly scans the signal strength in every second in the interested area. In this system, mainly used technology is the fingerprinting technique which uses the collection of the RSS (Received Signal Strength) points which are present in the area of interest.**

In this system, we have also included an attendance system. This system will require a registration interface to provide the necessary details on the server side. An organization where the system will be placed, once the person entered will take the own photograph and send to the server along with the time and location of the access point used. This application will take the photograph using the face-detection technique so that the fake attendance should not be given. This system will not only be easy and handy but also will save the extra requirement of the thumb impression system which is separately used in certain organization for the attendance purpose.

Keywords: **WPS, RSS, GPS, Fingerprinting, Access point.**

I. INTRODUCTION

The position of person is a very important component of mobile computing to assist them with their desired goals. Knowledge of the location of the users and their profiles significantly help in network planning, in load balancing, caching of information related to the user, radio resource management and designing other methods which will enhance the design performance. Position location is also receiving increased importance for public safety issues.

GPS (Global positioning system) is the system which is available and detects the accurate position but attenuated by the obstacles. The signals get reflected through the walls of the building and fails to cover the indoor areas or simply inside the building. This system is only suitable for the outdoor areas but as the indoor systems contain number of walls

and attenuations, GPS is degraded in the case of an indoor positioning. So, there are some other indoor positioning systems such as RFID, cellular networks, computer vision, infrared, etc but they are also having troubles like short range, less penetrating power, etc. Location tracking can be done very effectively with the help of fingerprinting. It is the technique that matches the fingerprints of some characteristics of the signal which is location dependent. The fingerprints collected from different locations are stored in a database and matched to measured fingerprints of the current location of the main server. Nowadays some companies have used the multipath characteristics of a signal as its fingerprints. Such techniques require specialized hardware in base station (BS) or access point (AP) to correlate the multipath characteristics. In WLANs, the signal characteristic is the received signal strength (RSS). The RSS is a variable parameter and issues related to positioning systems based on RSS fingerprinting are not understood very well. In the malty floor environment there are two or more very different locations could potentially have the same RSS location-fingerprint. Here, we will work for the system to determine location in multistory buildings.

An attendance system is basically the online attendance system which will be given through the smart phone while registration. When the person will be registering for the database server along with all the information he will send the live photo to the server. This will include all data of the person and the attendance with the photograph, time, date and the location in the form of the access point name. The system will detect the face using the face detection technique so that the fake attendance should not be given.

II. LITERATURE REVIEW

A vast study has been done on the positioning system regarding the determination of the location of the objects in indoor as well as in outdoor areas. Some of the previous researches and surveys has the following reviews.

Robin Henniges [1], Wi-Fi positioning is rather suitable than the GPS as it can detect the location either in indoor or in outdoor. Outdoor Wi-Fi has a smaller benefit, mostly because GPS provides better results. However, there are outdoors areas, where GPS cannot work. Then Wi-Fi Positioning is a good alternative. Angle of arrival and time difference of arrival are based on timing hence cannot be realized with Wi-Fi. For indoors positioning, fingerprinting provides the best results. It can also be used outdoors. In this case, the use of directional data will improve the accuracy of the results.

Mohammad A H Lubbad1, Mahmoud Z. Alkurdi, Aima Abu Samra [2], For the determination of position through the Smart phone device, free space propagation techniques are used to determine the position in building of three floors .It can be used also for network administrator to find the position of mobile users who connect to System network.

Trung-Kien Dao, Thanh-Thuy Pham, Eric Castelli [3],in this paper probabilistic propagation model is used and the location is determined on the basis of geometric calculation and fingerprinting techniques. Various parameters are calculated and process is evaluated on the basis of genetic algorithm. Location is determined is most probably correct. It can be for the multistory buildings.

Zahid Farid, Rosdiadee Nordin, andMahamod Ismail [4], proposed an indoor positioning algorithm as Wi-Fi-based indoor (WBI) positioning algorithm. It's is based on received signal strength (RSS) technology along with the trilateration techniques. This algorithm estimates the location using RSS values. The non-lining effects on positioning errors using Kalman filtering method, and uses least square methods for location estimation. The proposed WBI algorithm achieves an average accuracy of 2.6m.

Hui Liu, *Student Member*, *IEEE*, Houshang Darabi, *Member*, *IEEE*, Pat Banerjee, and Jing Liu [5] ,various indoor positioning systems are compared on the basis of precision, complexity, costs, etc and concluded that location fingerprinting scheme is better for open areas while Active RFID is suitable for dense environments. In terms of scalability and availability, these positioning techniques and systems have their own important characteristics when applied in real environments.

Yunhao Liu, Senior Member, IEEE, and Wei Xi, Student Member, IEEE [6], proposed an indoor wireless indoor localization system called WILL based on off-the-shelf Wi-Fi infrastructure and mobile phones. It is deployed in a building covering over 1600 m^2, and its deployment is easy and rapid since site survey is no longer needed. The experiment results show that it achieves better performance in comparison with traditional systems.

III. PROPOSED MODEL

The model proposed here is the localization system determining the location of the target person with the help of smart phone. An android smart phone will be working as the key requirement for the system. As the system is working on the Wi-Fi system, the android smart phones will be enabled with Wi-Fi in order to connect with the access points. This access points will be set at the proper distance based on its range in the area of interest. All the access points will be connected and controlled by the database on the server side. It will be maintained by the administrator through the map of the premises. Administrator will have to go through the validation module first.

A. *Validation*

Here, only the administrator can access the data by using the username and the password as an authorized user. It will provide the security to the database. It will perform validation only if the administrator will fill the block of the password. It will check the password with the one it has on the server side and if it gets matched then only it will be considered as the valid to use the database.

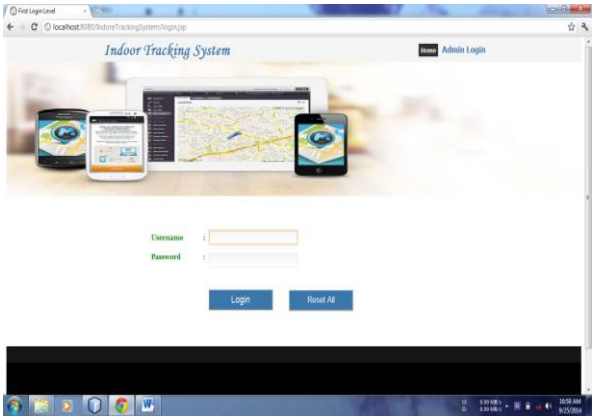
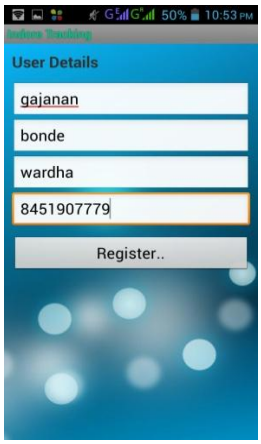


Figure 1 Administrator log-in

The administrator has authority to reset the password if required. For this purpose he will require the current password. In above snapshot, selecting the 'Reset All' button will allow doing these changes. For this thing, the system will ask for the complete data of the administrator to grant the authority.

B. *Registration*

First the user will have to install the registration application on his smart phone to be the part of the system. The registration mode will allow the user to connect to the database through the access point or the router. Once we enter into the network, this will be the registration interface where we will enter the IP address of the server so as to connect with the database and upload the necessary information. All this data will be collected in the database along with the IMEA number and IMSI number which is the 15 digit code number.



Anaother one is the registration interface thrugh which the user can provide the data to the database. This are the applications created in an

C. *User location*

Once the data is uploaded in the server side after the registration by the person, the database creates the profile of the person with all the necessary details. The server stores the environmental maps (in XML format) which includes information about the walls, floors, zone boundaries, location MAC address of each Wi-Fi AP placed in the environment. The signals are operated in the area according to the distance between the routers and the smart phone device based on the signal strength only. The application installed on his smart device regularly scans the signal for every minute from neighbor IP's and send the collected data to the main server through the WLAN. Based on the RSS information the server will scan the smart device and try to estimate the location of the user. It searches on the basis of the data it has. It finds the device by detecting the features it has received using the feature detection technique.

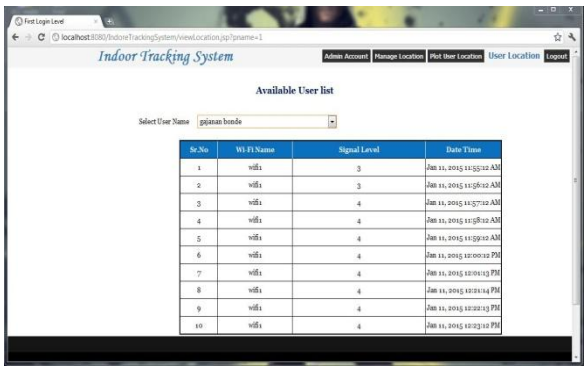


Figure 4 user location

One thing that needs to be considered is that the signal strength depends on the distance from the access points. As the person moves far from the access points the signal strength goes on decreasing. For this, we need to plot the routers at the proper distance in such a way that if the person is not coming in range of router 1 then it should be in the range of the router 2. The person shold always be in the range of any one AP. In this way, we can cover the whole campus.

D. *Attendance system*

The attendance system is like an online system of the attendance. Here, when the person will be registering to the system server, at same time he will click the photo of him or her and send it to the database server. The server will receive the photo of the person at the given time and the current position with the details of access points to which it is connected; it will be included in the database of the server in his profile. This will keep the record that from where the attendance is given or whether the person is in the office or not. If the person gives the attendance from outside area then also we will get the location details through the GPS automatically by his smart device.

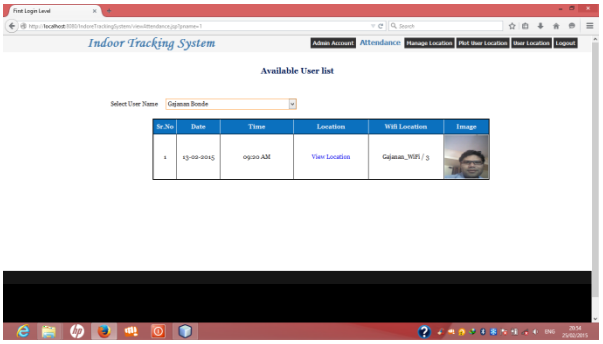


Figure 5 Attendance Page

This will also help in preventing the fake attendance. Sometimes people give the proxy attendance. But in this scenario, the system will only allow to take photo only if the person's face is completely visible. It uses the face detection technique which will capture the real face only. It can save our cost for the extra infrastructure to the attendance system. If any person gives attendance from anywhere else through the internet then he will need the GPS system to get the location which will be automatically will be send with the photograph which will tell us that the person is giving attendance from outside.

IV. CONCLUSION

The system is providing us with the facility to keep track of the person entering into the organization. The routers are scanning the information of every minute with the help of the Received Signal Strength (RSS). This will maintain the complete log of his positioning throughout his presence. The attendance system will allow us the online attendance scheme which will help us to reduce the cost of the extra infrastructure cast of another attendance system. It is not only an affordable but also effective in calculating the maximal proba-

ble position using fingerprinting technique which is better enough to find the localization of the target.

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