Geo Tracking System Using Xamarin Approach

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Abstract: Secured data transmission in mobile network is most concerned research issue focused by various researchers. Mobile phones are very important in day to day life and it is useful tool for business purpose. “Secured Geo Tracking using xamarin Technology” is the mobile application which is used to trace the employee of an organization during their client based meeting through the GPS. This application is developed using the Xamarin. Forms technology and visual studio 2019 is used as cross platform to develop this application. The current location of the employee was stored in the database of an organization. MySQL is used as back end tool. This dissertation proposes an improved indoor positioning for mobile nodes in the hardware and develops shortest path algorithms in simulation for two assumed cases. The assumptions are network with nearby nodes and two independent adjacent networks. For the first case, Genetic Algorithm and Distance vector method are used and for the second, Edge based three point Steiner tree is used. The results are promising and comparable with other algorithms. The main objectives of this work is, to provide positioning problems, better efficiency and loop free shortest path solutions for static and dynamic nodes.

Index Terms: Global Positioning System, Local Area Network, Single Sign On, iPhone Operating System, Radio Frequency Identification, Shortest Path, Wi-Fi.

1. INTRODUCTION
A group of devices embedded to provide services to the required client is termed as context conscious computing. It’s an important way to getting closer to ubiquitous wireless computing (Weiser, 1993). As the Mobile Stations (MS) location changes with time, the interpretation of meaning and the relevance of the data are also changing with time (Krishnamurthy, 2002). Hence the successful determination of position of Mobile Stations/Nodes (MS/MNs) especially in indoor environments is challenging. The way toward acquiring the position data of a MS from a set of positions of reference inside a predetermined space is known as location revelation. This procedure is called by different ways in literary works like, position location (Rappaport et al., 1996), radio location (Krishnamurthy, 2002), location sensing (Hightower et al., 2001), geo location (Pahlavan et al., 2002) or localization (Ladd et al., 2005). This thesis will mainly utilizes Indoor Positioning System (IPS) however, these stipulations are utilized conversely all through the record. IPS is useful in providing indoor area data to any client/user upon request. A lot of directions or reference focuses inside the predetermined space is commonly used to demonstrate the physical area of the substance. The indoor location information are vital for many applications and are not constrained just to following the location of clients in both crisis and normal circumstances. For instance, attendant services will enable the clients to know about adjacent available services like in an office computerization framework, a mobile user be able to use a nearby printer to take printouts (Kaemarungsi, 2005).

The positioning and related applications are quite successful in outdoor environment with the usage of GPS. It provides incentive for gathering and multipath effects, the GPS framework is not viable for positioning in urban dense areas and indoor environments like locating inside a building (Djuknic and Richton, 2001). RF, Ultra sound and Infrared signals are other existing approach for IPS (Kaemarungsi, 2005). Sensors of distinct types are needed to identify these electromagnetic signals which have attributes relying upon every area. For example, in order to detect the infrared signals, a photodiode based detector is generally used. In these, first convert the sensing signals into an angle or distance then, these can be used for location determination (Pahlavan et al., 2002).

![Fig. 1. Overview of improved location tracking](image_url)

Recently there has been a steady growth in usage of Wireless Local Area Networks (WLANs) among the people and institutions in their houses and in working places. Due to this reputation of WLANs, there are many opportunities for LBS. In these, the capacity to measure RF signals of wireless network interface card can be treated as a sort of sensor gadget. Though the indoor positioning of nodes or devices is a developing innovation, it needs hypothetical and expository back ground. As indicated by Pahlavan et al. (2002), there is a requirement for essential investigation of the portrayal of indoor radio proliferation as well as its effects on accuracy of those frameworks. Krishnamurthy (2002) has identified parameters such as performance matrix and complexity for security and, application as four areas of challenges in successful indoor positioning. The rest of this paper is organized as follows, mobile adhoc related work in section ii, the proposed camerian technology based manet tracking approach explained in section 3, material and method is described in section 4, results comparison are explained in section 5 and lastly the conclusion present in section 6.
2 LITERATURE REVIEW

Many recent types of research are focused on secure network communication due to the vastly rising development of internet usage throughout the information world. (Haebrelen et al., 2004). In the wired or wireless network, the need for security is increasing day by day to protect valuable data. Against different types of attacks or intrusion, the network should keep its stability on handling data communication. This section analysis the various research works related applications. Location tracking of a device can be accomplished for both in indoor as well as in open air conditions. The accuracy of the tracking is the principle dispute especially when the mobile device is moving (Paul and Wan, 2009). Diverse dimensions of accuracy are acquired for various applications. The extensively accessible procedure is GPS where, it offer solutions with exceptional accuracy for open air/outdoor applications. But for indoor conditions, yet it isn’t appropriate (Haebrelen et al., 2004). Techniques like Wi-Fi have gained increased popularity though it has some challenges. The physical place of the gadgets are determined in Lateration / Trilateration / Multi lateration by estimating their separations from various reference focuses. Hence these are all also referred as distance or ranging method. In tri-indicates at least three fixed reference points are required for estimation (Zahid et al., 2013). In lateration, tracking techniques are based on TOA, TDOA, RSSE and received signal phase techniques (Ismail et al., 2008; Zhang et al., 2010). The time arrival calculation from transmitter to the receiver used in TOAE/Time of Flight (TOOF) technique. In this methodology, numerous transmitters transmit signals to the recipient as appeared in Fig 2. Upon receiving, at the receiver, the time of arrival of all the signals are calculated and compared. Then the distance between the mobile targets measurement system related to propagation time. But the main requirement of method is it requires all the transmitters are to be precisely synchronized with the receiver system. An improved version of TOA is TDOA where, it does not require synchronized time source of transmission and also it is free from packet loss problems (Najar and Vidal, 2001). Here the sender should send two distinct signals with various proliferation speeds and at the reception, the contrasts between the arrival time are estimated and it is actually coordinating with the spread time of a signal. TDOA based location tracking is an example of multi lateration (Zahid et al., 2013).

If two base stations, the distinctions separation from mobile phone to the base station as a known value of rd at that point, the phone stay on the hyperbolic bend characterized by this separation as portrayed in Fig 2. This chapter surveys the recent advances IPS approaches. Each of these systems/techniques has their own characteristics in terms of scalability, availability and measurable performance when applied in real time environments. It clear that, the choice of approach system plays important role on. Other than different techniques accessible for IPS, the present arrangements can't adapt to the execution level prerequisite of various usages. By and large, the greater part of the applications necessities are improved precision, accessibility and coverage with minimal effort usage. A decent measure of research both from industry and the scholarly community are needed to accomplish these requests.

3 SECURED GEO TRACKING SYSTEM

Mobile ad hoc Wireless Sensor Networks (WSNs) is a set of limited nodes used to gather data from the environmental objects. Each sensor node computes collected inputs as a formatted data. Then, the node transfers it to the destination path through a wireless region. MANET is a collection of numerous sensor nodes which performs environmental object sensing, data gathering, processing and data delivering tasks. The sensor node continuously senses the environmental objects in the analog form and then analog data is converted into digital format. The sensor node contains the hardware components like power unit, microcontroller unit with inbuilt memory or external flash memory, analog to digital converter unit, communication unit and one or many sensors with interfaces. Moreover, sensor nodes in network may be deployed in a fashion of hierarchical or ad-hoc. In hierarchical fashion, wireless sensor nodes are located statically or dynamically. These nodes can sense and transmit the data under the coverage of one or many centralized nodes. These centralized nodes are fixed at suitable locations and they are called base stations. Here, the wireless sensor nodes can act as clusters or individuals. In mobile ad-hoc fashion, wireless sensor nodes are self-configured without the need of the base station or any centralized nodes. The self-configured sensor link/MAC layer move around the geographical area based on their own mobility patterns. Based on the types of sensors used in the wireless sensor nodes and the deployment strategies of wireless sensor nodes, a lot of issues arise in WSN. Optimal energy utilization, communication overhead reduction, computation overhead reduction, security, etc are critical issues in WSN. This proposed work deals with the security issues of WSN in dynamic nature. In addition to these units, the node holds...
The sensor nodes are developed using either active or passive sensors. Active sensors continuously probe the surrounding environmental objects in analog format. The sensed analog information is converted into digital format and manipulated by controller and logic units of the sensor node. The chosen rooms are equal in size but it is not a mandatory requirement. The walls of the rooms and student working tables (30 working tables in each hall) are considered as barriers. During the experiment, the halls were students free. To create a data index, to calculate the location of the rooms and student working tables (30 working tables in each hall) equal in size but it is not a mandatory requirement. The wall environmental objects in analog format. The sensed analog sensors. Active sensors continuously probe the surrounding environment. The integration of GPS technology into smartphones enables it for better positioning in outdoor environments. The Visual Studio 2019 with the help of Xamarin tools is used to develop the Geo Tracking System for different platforms like Android, iOS, and Windows. Single Sign On (SSO) authentication method used login the application. MySQL used back end tool to store the data in the database of an organize. The location of the employee of an organization is tracked by using the Google Maps application. The application will display the employee details. Swagger and postman tools are used for testing process.

**Fig 3:** Flow Chart for Secured Geo Tracking System Using Xamarin Technology

The proposed research tracking phase the App sends the RSSI values to the server. In this also, the values are selected based on the best available RSSI. The server then using the database and by applying the Bayesian Inference the location of the node is predicted within the considerable area. The information is then printed out both in App as well as in the server. figure 3 shows the proposed Xamarin Technology approach secured geo tracking. Figure 4 describe the pseudocode for is proposed tracking approach.

**Step 1:** Start the application
**Step 2:** SSO Authentication will display. If the employee already signed in, then it will directly enter into application. Otherwise it will ask to sign in the application using Microsoft login. If the employee was not an author, he/she will not able to enter into the application.
**Step 3:** After Signing in the profile page will display the details of the employee by the Http Request message: HttpMethod.
**Step 4:** If you click the Location in the master page, then it will display and ask to click the button to navigate native Google Maps application. It will launch the Google Maps application by awaitLauncher.OpenAsync("geo:+lat+","+lon");
**Step 5:** If you click the Address in master page, then it will display the current location of the employee by getting the location value Var location=await.GeoLocation.GetLastKnownLocationAsync();
**Step 6:** If you click the update button in the address page then it will display the location details of the employee will be stored in the cloud database of the organization.
**Step 7:** If you click the dashboard in master page it will display the location details of the employee by retrieving from database and it will display by Var, content=await.client.GetStringAsync("http client url"+convert.ToString(application.current. Properties["user_id"])"");
**Step 8:** Stop the application.

**Fig 4:** pseudocode for Secured Geo Tracking System Using Xamarin Technology

The exponential growth of usage of mobile phones in unprecedented ways. Photographic manipulation. Photographic is discussed earlier, the HP laptop with Linux OS was used as a server. A Lenovo K3 note smartphone was used as a mobile node for tracking. Passive GPS sensors don’t need continuous energy. These types of sensors just sense the information and amplify the analog signal without manipulation. Photographic sensor, thermal, electric field sensor are the examples for passive type sensors.

4 Result and Discussion
As discussed earlier, the HP laptop with Linux OS was used as Server and visual studio scripts were used at the server to locate MN within the Indoor environment. The tracking was based on RSSI value sent from Mobile app and where here we have used dotnet was used for App development. The algorithm was tested with different factors defaults are highlighted.
In IPS, accuracy/precision is the primary criterion from which one could assess the algorithm’s performance. The proposed work, error space utilized the execution metric and it distances shown in Fig 5 and figure 6 shows the proposed system login credential display.

Before updating the employee location we have to login the application by SSO. When the data packets are transmitted through multipath, reliability in the number of paths available in the networks would be increased, but insignificant paths are forwarding data packets which would manipulate the other applications. If every hop chooses the next node within the lifetime, then it will be compared to the shortest path routing.

In the figure 8 dashboard page the location of the employee will be display after updating their location through the GPS. This information also stored in the organization database.

### Table 1: Secured Geo Tracking System performance analysis

<table>
<thead>
<tr>
<th>Performance matrix</th>
<th>CBDS</th>
<th>IDF-CBDS</th>
<th>Secured Geo Tracking System</th>
</tr>
</thead>
<tbody>
<tr>
<td>False alarm rate (FAR)</td>
<td>84</td>
<td>75</td>
<td>65</td>
</tr>
<tr>
<td>PDR</td>
<td>75</td>
<td>78</td>
<td>91</td>
</tr>
<tr>
<td>Tracking Time (ms)</td>
<td>658</td>
<td>498</td>
<td>216</td>
</tr>
</tbody>
</table>

Table 1 explains false positive rate (FAR), PDR, and Tracking Time.
(ms) of three different techniques, Cooperative Attack Detection Approach, Identity Forage based Cooperative Bait Detection Approach and proposed Secured Geo Tracking mechanism. At the end of this process, only primary level cluster heads are chosen.

From selected authorized primary level cluster heads, watchdogs are selected to monitor the nodes in the local cluster. To find secure watchdogs from primary level cluster heads, three key management approaches are implemented in addition to Secured Geo Tracking mechanism. In figure 7, comparison evaluation of the false alarm rate for the proposed and existing methodologies are given. From this comparison it can be proved that the proposed method geo secured Tracking System Using Xamarin Technology tends to have better performance than the previous methodologies with lesser wrong detection of attacker nodes. From the analysis it is confirmed that the proposed geo secured Tracking System Using Xamarin Technology shows 4% lesser false alarm rate than IDF-CBDS and 9.3% lesser false alarm rate than the CBDS.

The tracking time geo secured Tracking System Using Xamarin Technology shows 216 msec, comparatively the same location IDF-CBDS method tracked 498 msec duration, and CBDS method tracked by their location 658 msec. proposed approach 282 Msec advanced in IDF-CBDS, and 442 Msec advanced in CBDS method. The proposed method achieve the shortest period to location tracking.

The pocket delivery ratio of geo secured Tracking System Using Xamarin Technology shows 91 bits per seconds, comparatively the same location IDF-CBDS method delivered in pockets 78 bits per seconds, and CBDS method delivered by their pockets 78 bits per seconds. proposed approach 13 bits per seconds advanced in IDF-CBDS, and 16 bits per seconds advanced in CBDS method. The proposed method achieves the highest packet delivery ratio. A wireless link is easily breakable because topology can be dynamically changed in wireless network. The mobile node will neither receive any message from the adjacent node nor send any packet to the next hop. In the route maintenance, all the entries are made in the routing table. Moreover, the information or entry about the broken node is deleted initiating a new route. The performance metrics of detection rate, tracking time, and pocket delivery ratio were found to be better than other methods. The overall flow of this research work ensures tracking node detection. Based on the conditions and dynamic situations of the network, watchdogs are selected by executing selection routines. The main contribution of this research work is to select sufficient rate (per unit time) of multiple tracking points in the secure way.

6 Conclusion
The presence of proposed research the new system is introduced to trace the employee's current location when they are in outside client based meetings and it is updated to organization database. This application is developed with the help of Xamarin Forms technology. tables and walls of rooms were considered as barriers. When a barrier was created by covering one of the Wi-Fi node with multiple students working tables, as the signal strength of that Wi-Fi node was weak, it was verified that the algorithm records the RSSI value of the uncovered AP. Based on the algorithm, it is possible to locate more nodes in a given environment. Once the MNs are identified/tracked then a network of MNs MANET constructed among the neighbour nodes. In future the admin side application will be created to monitor the employee location in the cloud database instead of opening a database. the proposed Secured Geo Tracking System Using Xamarin Technology achieve better mobile location tracking comparatively other conventional approach. The further scope of research is to study various size reduction strategies and classification methods for different datasets to further improve the detection rate with a shortened timeframe.

References