Mobile user Position System for Indoor Technologies using Application of RADAR

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Abstract
Objectives: Position tracking system is completely based on mobile user position for indoor technologies using RADAR System. The RADAR system is very useful to track an object; its work on the radio frequency. Methods/Analysis: This system carries a number of base stations in the indoor areas (research center, organization and buildings). These measures the time of transmission or received signal and also estimated the distance of the mobile user. Findings: To measure the actual and estimated range of the mobile user inside the indoor using RADAR after getting the position of the mobile user for continuous tracking user locations, store the information of the user in the database. Novelty/Improvement: This database contains ten entries of the mobile user. This complete system is very effective and future used system done on the Matlab programming and Simulink.

Keywords: Infra Red (IR), Indoor Technology, Mobile User Position System, RADAR System, Radio Frequency

1. Introduction
Positioning, tracking system area unit deciding the placement of a user or associate object which ever relative to a noted position or inside an arrangement. Within the previous few analysis, kinds of positioning systems are aggravated by demand and are developed. A number of applications of positioning systems employ enforcement, security, road safety, tracking vehicles, personnel and in various mobile ad hoc networks. Some a lot of analysis area unit exhibited World Health Organization (WHO) who has targeting making administration architectures for space conscious system less thought has been paid to the essential and testing issue of finding and following transportable shoppers, notably in-building things. The few endeavors that have attended this issue have commonly done within the affiliation of Infra-Red (IR) wireless network systems. The restricted scope of the associate IR system, which inspires shopper space, is an associate impediment in giving universal scope. To boot, the IR system is usually sent for the only real motivation behind finding people and doesn’t provide custom data concerning system administration. To evade these impediments, we tend to target RF remote systems in our exploration. The issue is the mobile user location tracking based on a generally accessible radio frequency on the wireless system in an indoor building environment. RF systems offer a noteworthy point of preference over IR arranges regarding reach, versatility, organization, and upkeep. With rates of up to 11 Mbps, these systems have increased fast acknowledgement and generally sent in workplaces, schools, homes, and so forth, although their work and our own are comparable in a few ways, which is likewise varied in huge ways. These systems are clarifying in quickly (1) it is subject to concentrated equipment of the system, (2) it cannot use any spread, demonstrating to fabricate a radio guide of any building, (3) it could not an component of the user body introduction (4) it is obliged infrastructural sending more than a neighborhood system.

It explores past research on the mobile user location tracking based on the indoor technologies have large dependent on particular equipment and advancements that experience the worst effects of huge restrictions and
require the broad arrangement of infrastructure singularly for finding users. It is used as the infrared with wireless technology⁶,⁷. The constrained scope of an IR system, which encourages user location, is an impediment in giving universal scope. To conquer this issue, a couple of scientists have also created RF-tag based location system. In many location systems are planned for wide-region cell system⁸. The scientific decisions for locating cell phones embody activity the signal modification, the Angle of Angle (AoA) and therefore the Time Distinction of Arrival (TDOA). Whereas these systems are discovered to be shown attainable in outside and indoor things, there's restricted by the various reflections endured by the RF signal, and therefore, the failure of ready-to-wear and low-cost instrumentality to grant fine-grain time synchronization⁹,¹⁰. Another system is predicated on the Global Positioning System (GPS)¹¹,¹², whereas extraordinarily useful outside and square measure ineffectual indoor on the grounds that structures block of the GPS transmissions. The indoor positioning and tracking systems are specifically designed to supply data of various persons and devices. The positioned data allows location-based protocols for different user applications. The networks are designed to fulfill the users' desires and interconnect users' devices equipped with totally different communications technologies in numerous places to create one network. Location-aware services got to be developed in Personal Networks to supply versatile and adaptation services to improve the standard of lives. This paper provides a comprehensive survey of diverse IP Ss, which embrace each industrial product and research-oriented solutions. Analysis had been planned for diagnosing these systems, particularly privacy, security, cost, performance, complexity, user preferences, industrial avails and limitations. It tends to compare the present IPSs and description the trade-offs among these systems from the perspective of a user in a very PN. Wireless indoor positioning systems became very fashionable in years. These systems are with success employed in several applications like plus following and inventory management. This paper provided summary of the present wireless indoor positioning systems and tried to classify the totally different techniques and systems. A different location estimation technique which is based on triangulation, scene analysis and proximity are analyzed. It tends to additionally discuss location procedure well since it's employed in most current system or solutions. Then we tend to examine a group of properties by which location systems are examined and apply this analysis methodology to survey a variety of existing techniques. The Comprehensive performance comparisons analysis as well as accuracy, precision, complexity, quantify ability robustness, and price is bestowed¹³. Despite extraordinary advances in GPS technology, countless sq. meters of indoor house square measure out of reach of Navistar satellites. These signals, originating high on top of the planet, don't seem to be designed to penetrate the construction materials with no quantity of technical creativity is probably going to assist. That's the larger part of the universe commerce, being conducted inside but cannot be determined by GPS satellites. The authors describe, however tracking the people and assets inside has currently touched from the realm of fantasy to reality, because of a radio frequency identification technique currently being introduced to the market¹⁴. A bi-static measuring device system for police investigation the presence of a slowly moving target by the employment of a rendezvous that provides a discount within the frequency spread of the mirrored muddles energy. A transmitter and a radar receiver square measure settled aboard separate mobile that fly with a planned speed and direction concerning the topographic point. The speed and direction of the two mobile squares measure such the angular velocities of the mobile concerning are considerably equal and opposite. This arrangement reduces the spread of the mirrored muddles energy caused by motion of the measuring device transmitter and receiver relative to the topographic point. The measuring device incoming signals square is measured filtered and processed to work out once a sign is a gift that has been shifted in frequency thanks to the motion of the moving target. In one embodiment, the two mobile fly directly toward one another at identical speed. In another embodiment, the two mobile fly directly far away from one another at identical speeds. Equipment is enclosed that determines the position of the moving target each with regard to the two mobile and with regard to the bottom¹⁵. The growing quality and use of the RF in numerous applications, preponderantly within the space of identification and placement aware system, has shown several researchers. Different qualities, straightforward handiness and ease of using to have LED as spate of development of various systems and technologies supported Radio Frequency Identification (RFID). This paper is an effort to survey the present analysis work and also the commercially offered indoor location known or aware
systems exploitation frequency. It compares the existing researches during this space and analyzed them on the various basic criteria\(^1\). The GPS is calculated the mobile user position and actually range. The Active Badge networks\(^7,18\) were an early and critical commitment to the field of location aware systems. In this an identification worn by a person emanates a special IR signal each 10 seconds. Sensors put at known positions inside of a building get the interesting identifiers and hand-off software for managing the mobile user location. Although these systems give exact location data, it experiences a few downsides: (a) it scales inadequately because of the restricted scope of IR, (b) it acquires huge establishment and support expenses, and (c) it performs ineffectively in the vicinity of direct daylight, which is liable to be an issue in rooms. Another system, taking into account IR technology is depicted in\(^19\).

2. Proposed Methodology

The complete methodologies are depending on the RADAR operation and working mathematical equations are implemented. It implements a radar locator in using MATLAB Simulation model. In which, It has the calculated antenna area, the noise of the antenna, antenna gain, calculated SNR, the estimated range of mobile signal and checked SNR values.

The basic thought in RADAR is that in an RF system and the energy level of the RADAR or signal quality of a package is an element of the receiver location. Thus, it gives a mean to deriving the mobile user positioning and tracking. There is a reasonable pattern in signal strength as a user strolls about the building. As anyone might expect, the sign got at the portable is most grounded when the receiver is near to the access point and weakest while it is extreme away. This solid pattern, watched for every neighboring access point in the competition, which is demoralized by the given system to approximation the mobile user location.

The significant portion of the exertion in sending RADAR goes into making the Radio Map of the building. It is assessed two methodologies for this reason. The principal system for making a road map of the building includes a mobile strolling to distinctive locations inside the building, ideally near to each other, and expressly measuring and recording at every area, both the physical directions and the signal quality of the guide bundles from each of the access points inside of the extent. The second system to build a road map includes processing and recording the signal quality from every single neighbouring access point using a scientific model of the indoor RF signal spread. It has built up a basic yet authentically exact model that obliges diverse building formats while considering both free-space path loss and decreasing due to obstruction between transmitter and receiver of mobile signal. To find the location of the versatile user continuously, the mobile measures the signal quality of each of the access points inside of the extent. Then it inquiries through the Radio Map database to focus the best signal qualities are measured. The system assesses the area connected with the best-coordinating signal quality, to be the position of the mobile users.

![Figure 1. Function and parameter of the RADAR system.](image-url)
ognizable. It shows a Simulated block of radar locator in which all parameters are shown clearly, every block has own mathematical equation and different functionality as shown in Figure 1.

When measuring the performance of RADAR several parameters are influenced, all parameters are interrelated to each other. There are all blocks of radar locator are given a specific outcome and have a characteristic. The “Radar Equation” significant echo signal power $P_r$ based on the given parameters:

$$P_r = \frac{P_t G^2 \lambda^2 \sigma}{(4\pi)^3 R^4}$$

Here, it is used as an antenna inside the RADAR and the antenna gain of RADAR system is depends on the transmitter and receiver power of the antenna squared inside the RADAR equation. The implementation of the RADAR gain equation in the Simulink, the gain of RADAR system has the antenna area, antenna efficiency, squared of the wavelength and one constant $(4\pi)$, the implementation is exactly as shown in the figure. All these parameters give the then value of the antenna gain for the example 12-dB are taking for biquadrate antenna and 70-dB are used in the extremely focusing on the parabolic antenna.

### 3. Result and Discussion

In the proposed work, it is discussed about the RADAR application for mobile user location tracking system that would help to know the user position and the range. We have examined how mobile users can supplement signal quality data for location and tracking users. In this report, it is showing an actually tracked range and estimated returned signal to the mobile user. It is also investigating how a mobile user tracked data will save in the radar database. In this model it can use a database to save a tracked location data as well as information about the mobile user as a future use. In this paper all RADAR functions and parameter are shown with proper working value for mobile user.

In this report, additionally see an exploring station-based to build RADAR strong in the features of extensive scale varieties in the radio frequency signal engendering atmosphere on the grounds that the changing number of individuals in building and the working time. As opposed to recording only one arrangement of signal quality estimations, it records numerous sets at distinctive times of the day. The stations test the channels intermittently to focus the present scenario, and as needs to gather the information set which is most proper for these present conditions. The Mobile user location tracking systems have a signal tracker with the complete functioning of the radar, which is directly connected to the mobile device. With the help of the tracking process, measuring the actual and estimated range of the mobile the mobile user.

One block the name is Data storage, which is making storage the database of the mobile user. According to the time its storage the ten user identity in the database through the ID like 1 to 10, When the eleventh entry comes in the database, then it automatically deletes one storage database and make eleventh as a first entry in the database.

The weather block is considered the function of the precipitation and rainfall. According to the dependency of the function its measure the power return of a signal through the weather conditions, all these functions included in the range equations as shown in Figure 2.

When it simulated the designed model in Simulink 8.1 then it got two ranges of mobile signal such as actual and estimated range. The actual range (Yellow Shade) and estimated range (Magenta Shade) are showing the magnitude of vertical with respect to different different time slot as shown in Figure 3.

Figure 2. Location management system.
It is shown the regular time interval; when the proposed model run is running at infinite time than the output of mobile signal for actual range. The estimate is changing magnitude and position is changing with respect to time as shown in Figure 4.

4. Conclusion

In this paper, it works on RADAR principle and methodology, which are used location identification and tracking of mobile users inside an organization or building. This work presents the RADAR application for mobile user location tracking system that would help to know the user position and the range. RADAR system is based on the observed signal strength estimation in addition to a simple successful signal dissemination model on the simulated model. While the observed method is greater in the provisions of accuracy and signal propagation technique was made deployment easier. This application is very useful for indoor process for tracking the user position and the range and save in the database. The Results have shown that the insensitive nature of radio channels. It could be able to locate and track mobile users with a high degree of signal accuracy. The middle resolutions of the RADAR system have the range 2 to 3 meters, in relation to the size of characteristic office room.

In future this work is beneficial to the campus, building and the multipurpose company. It tracks the user position and makes a database for user history.

5. References

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