International Journal of Computer and Communication Technology

Volume 7 | Issue 1 Article 11

January 2016

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Abstract- In the past few years, a number of ideas have been proposed for indoor navigation systems. These ideas were not as widely implemented as outdoor positioning systems like GPS(Global Positioning Systems). We propose an indoor navigation assistance system using Bluetooth which is low cost and feasible to use in daily life. Our system enables users with handheld mobile devices to steer with ease through the indoor premises using the short range radio frequencies of Bluetooth. It also establishes user's current location and the various paths leading to the destination. Dijkstra's algorithm is used to determine the shortest path from the source to the required destination.

Keywords- *Bluetooth, Indoor Navigation, Mobile module.*

I. INTRODUCTION

The expedience and comfort provided by the existing outdoor navigation systems has facilitated the development of indoor navigation and location tracking.GPS positioning provided by mobile telephone operators are suitable for *outside* environments where clear line-of-sight with respect to the satellites or base stations is available. However, they suffer from multi-path effects within buildings, and therefore, in indoor they show poor performances [1].

In recent times there has been a growth in huge infrastructures like shopping malls, industrial complexes along with existing structureslike hospitals and college campuses. Moving around in such premises can be difficult and finding the path to the desired location can be time consuming and tiresome. The ideal indoor navigation system should provide easy guidance to navigate through such areas.
We decided to use Bluetooth technology to estimate the location because of its main hardware features: low power consumption, low cost and low interference with devices that work on the same frequency range and its widespread use in typical mobile devices [2].Desktop software built on Java platform would use Dijkstra's algorithm to determine the shortest path to the desired destination.

II. RELATED WORK

- **3D indoor location and navigation system based on Bluetooth:** This paper presents the design and implementation on mobile device, of a 3D positioning and navigation system for indoor, based on the use of Bluetooth (BT) radio technology and implemented using Java and J2ME. This implementation is adaptable to many indoor environment (commercial centers, offices, museums, etc.) previously modeled and loaded. J2ME and Bluetooth technology are the main features used.[2]
- **Low cost Bluetooth mobile positioning for location based application:** This system has 2 main components namely the Bluetooth sensor system and Central Navigation System. The Bluetooth Sensor System allows mobile devices whose Bluetooth mode is set to discoverable, to be scanned and detected, and they receive customizable text message and other relevant files (maps, sound files, video clips) of their positioning information, e.g. room identity. The positioning information is also sent to the Central Navigation System which in turn displays and updates the navigation map. The system is also used to track the movement of different BT mobile devices within the implemented environment. [3]

- **Research of Indoor Local Positioning Based on Bluetooth Technology**: Bluetooth is a technology with low-power, short-distance, wireless systems, can be used to construction a wireless services of indoor. The development of local positioning services based on the Bluetooth technology is discussed in this paper. An approach based on the positioning information exchanged between the master and slave devices within the Bluetooth network.[4]

- **Indoor Navigation Performance Analysis EPFL:** The computation of the best route is based on a Dijkstra's algorithm which is specifically designed for a continuous and oriented graph. The algorithm has to estimate the shortest path between a start node and an end node given by a user who has a specific profile. The best route computed by the system is used as input for the navigation process and for providing guidance information to the user [5].

- **Navizon I.T.S:** This system locates Wi-Fi enabled devices. No application is required on the tracking device but the Wi-Fi radios should be on and within the coverage area of the network of nodes. The I.T.S(Indoor Triangulation system) site periodically reports the details about the Wi-Fi enabled devices. This system basically uses Wi-Fi to track devices using Navizon's proprietary algorithm with the help information collected by the nodes [6].

III. PROPOSED SYSTEM

Our proposed system works in 2 main modules: desktop module and mobile module.

a. Desktop module: The desktop module that will be used by administrator ideally be doing the following:

- Set map information
- Save/Load map information to/from files
- Set Bluetooth device information
- Set paths
- Find optimum paths
- Auto compile mobile application.
- Upload mobile application to dedicated website for public download access.

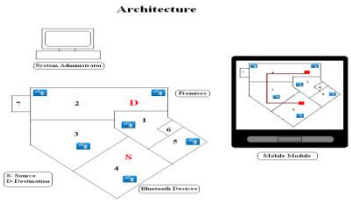
It will be developed on JDK platform.

b. Mobile module: The mobile application that can be downloaded from internet by any user on his phone will show the user overall map of the premise. Apart from this the application will allow the user to

- See his current location
- Select source point
- Select destination point
- Show all paths from source to destination
- Show shortest path from source to destination
- Update current location at regular intervals
- Graphically show the path overlay on premise map
- Navigate through premise map for additional information.

A set of Bluetooth devices placed at the various locations in the premises assist in determining the current location of the user.

IV. WORKING



1) Firstly all the application work i.e. the creation of the maps, managing all the paths, scaling of the maps, adding the Bluetooth devices, and managing the database is done by the administrator on the desktop module.
2) This whole J2ME application is compiled and a jar file is created and ready to transfer to the user
3) Whenever a user enters a premise with this system it is necessary that his mobile's Bluetooth is enabled. The server i.e. the desktop module will prompt the user a message through Bluetooth whether the latter wants the application or not, if yes the compiled J2ME application is sent to the user through Bluetooth.
4) Now the user has the jar file of the application. He has to run this application. The application helps the user to easily navigate through the premises. It shows the user his current position. The user can also find all possible paths from any source place to destination and out of all this he can also find the shortest path to the destination.
5) The Bluetooth devices help the application to find the users current position and also the position is continuously updated as the user moves.

V. CONCLUSION

There is a growing need for assistance while traversing complex establishments. Our proposed system presents an uncomplicated and cost effective approach for its users to navigate through indoor infrastructures. We also determine the shortest path using Dijkstra's algorithm from source to destination and use Bluetooth for navigating and determining the user's current location.

REFERENCES

[1] Miguel Rodriguez , Juan P. Pece , Carlos J. Escudero "In-building location using Bluetooth" Proceedings of the International Workshop on Wireless Ad Hoc Networks,2005.

[2] Omar Cruz, Erik Ramos, MoisésRamírez "3D indoor location and navigation system based on Bluetooth" 21st International Conference on Electrical Communications and Computers, 2011.

[3] M. ZaafirBarahim,M. RazviDoomun,NazranaJoomun," Low cost Bluetooth mobile positioning for location based application",in 3rd IEEE/IFIP International Conference in central Asia on Internet, 2007,ICI 2007,pp.1 – 4,Sept.26-28,2007.

[4] Research of Indoor Local Positioning Based on Bluetooth Technology: 5th International Conference on Wireless Communications, Networking and Mobile Computing, WiCom '09, pp.1-4, Sept. 24-26, 2009.

[5] Pierre-Yves Gilliéron, Daniela Büchel, Ivan Spassov, Bertrand Merminod "Indoor Navigation Performance Analysis"ENC GNSS, 2004.

[6] Navizon,"Navizon I.T.S."[white paper], 2011.