

A Survey on Indoor Emplacement Guider

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Abstract— This paper is dedicated towards the designing and developing of indoor positioning tracking application system with most optimum characteristics. This is because the Global Positioning System (GPS) is not suitable to be used indoor due to signals lost within the building walls. The indoor positioning system is based on the application of Wi-Fi access points found abundantly in smart phones, malls and buildings. The main goal of this project is maintaining both the budget and power consumption the lowest value possible while completing the project within the stipulated time. The system has functions such as provide localisation and navigation services and also reminder of user and develop the IPS for parking system and showing the offers in the mall specific applications.

Key words: Indoor Positioning, Ble Beacon, Received Signal Strength

I. INTRODUCTION

Indoor positioning system has been popular from many decades. Many popular methods have been developed like Wi-Fi, RFID and so on. But there are many disadvantages of developed system like Wi-Fi doesn't work in indoor due to environment and power supply while RFID is restricted due to need of special equipment. Bluetooth low energy beacon is new technology with low energy consumption and low cost. Beacon stays active for six months to one year as it contains button battery. The important concept for indoor positioning is that beacon can keep the signal power in stable level. The cost of beacon with one button is reasonable. A Ble beacon can range up to 60 meters. Ble Beacons help sets an easy network for an indoor positioning system. A new method for indoor positioning system is proposed in our paper. Ble Beacon is small Bluetooth radio transmitter. It continuously transmits the signal that other device can see. It broadcasts the radio signal 1/10th of seconds. The Beacons are placed at convenient places so that users can receive good quality of signal at most places. Users scan for the signal by using smart phones. Smart phone than forward that signal to server. Server handles the data and compares it with the database which is stored on it. According to algorithm it will calculate the position of smart phone. Smart phone, Server and beacon cooperate cohesively and finally the position of user, information and offers will be displayed on smart phone screen.

II. SYSTEM COMPONENTS

The whole systems consist of three components: Server, Smart phones and Ble beacons.

A. Server

Server is use to record the data and calculates the position using specific algorithm.

B. Smart Phone

Smart phone is use to collect Received Signal Strength (RSS) data for the system and upload that data to server to do the positioning and navigation. Smart phone must be equipped with Bluetooth 4.0 adaptor so that it will be compatible with the protocol.

C. Ble Beacon

Beacon is use for broad casting the signal and offers which are stored on server.

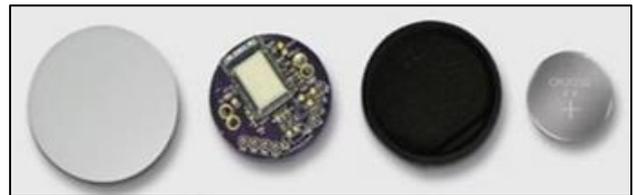


Fig. 1: Composition of Bluetooth Beacon

III. RELATED WORK

- 1) The author in this paper demonstrated the Wi-Fi estimation technique that was using data for calculation. There is brief information about the application of Gaussian Mixture Model (GMM) to represent the large Wi-Fi database and reduce it to lower number. Also, they applied the Practical Filter for calculation of location estimation technique. The system was composition of web and mobile terminal. The author named the system as indoor locky which was adopting the crowdsourcing to reduce the labour cost.
- 2) The author proposed Wi-Fi indoor positioning system that improved the localization performance from bottle neck in TOA or AOA. The system needed the wide signal bandwidth and number of antennas for transmitting large number of messages. Also the author demonstrated the system performance where it can support localisation by single Wi-Fi AP. He also stated that the performance of system can be improved by AOA joint positioning where there are more than two Wi-Fi APs.
- 3) The author demonstrated in this paper the improved indoor positioning algorithm based on RSSI-Trilateration technique for internet of things. Trilateration is the technique to determine the location of object. The system also contained a reference point which needed to be chosen carefully for localisation for the user. The system also contributed towards the reference point and distance from access point by using trilateration algorithm.
- 4) The author proposed a system which used beacons for indoor positioning in small areas. The beacons are scan and information is stored on database. The Euclidean distance correction (ECKP) which was developed from KNN that K-Nearest nodes algorithm.

Sr.no	Name of paper	Advantage	Disadvantage
1	Design and Implementation of Wi-Fi Indoor Localization based on	Using Gaussian Mixture Model (GMM) and Particle Filter data	Enter building information from web browser can be inaccurate.

	Gaussian Mixture Model and Particle Filter.[1]	volume got reduce with more accuracy.	
2	Wi-Fi based Indoor Positioning. [2]	Approach to overcome bandwidth limits and multipath. Reduces need of multiple antennas.	The time shift property which refers to the time difference to time messages is not precise and performance is degraded.
3	Improved Indoor positioning algorithm based on RSSI-Trilateration technique for IOT.[3]	Improved positioning model. Error rates are reduced by using some reference points as proposed in the model.	Surrounding signals and obstacles can cause a little big difference in positioning results. The result also depends on no. of obstacles, which degrade the performance.
4	IPS using Euclidean Distance correction algorithm with beacon.[4]	Improved Algorithm for position calculation.	During offline data collection it was found that same smart phones when they start scanning some beacons failed to scan.

Table 1:

IV. COMPARATIVE STUDY

A. Problem with GPS

- Geometric dilution of precision
- Visibility
- GPS movement
- High Temperature
- Unmarked roads
- It is two dimensional
- Signals cannot pass through walls, roof and other objects.

B. Disadvantages Associated with Existing System

- GPS requires continue internet connection for obtaining locations.
- Error in accuracy of locations of higher altitude and mountain.
- Technology is expensive with infrastructure.
- High false alarm rate.
- Easy to be disabled.
- Complexity of hardware components.

C. The advantages of our Proposed System to Overcome the Drawbacks of GPS are

- It uses Ble Beacon which need very small amount of energy and do not need internet.
- Ble Beacon is quite inexpensive.
- Accuracy of locations is more than GPS.
- This can be implemented in smart cities and many more functionalities can be added to it.
- Indoor Positioning using beacon is helps us in wireless marketing and is also time reliable.

V. CONCLUSION

On the basis of comparative study of systems used for Indoor positioning system, our system is efficient in terms of accuracy, feasibility and cost.

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