

INDOOR TRACKING SYSTEM WITHOUT GPS

Sneha Pandey¹, Nirav Patel²

¹Student, Dept. of Computer Engineering, Grow More Faculty of Diploma Engineering, Gujarat, India

² Professor, Dept. of Electrical & Electronics Engineering, Grow More Faculty of Engineering, Gujarat, India

Abstract - Indoor Tracking System without GPS is one type of tracking application which is used to locate people or objects inside an Indoor Buildings or Locations using BLE Signals. Through this tracking is possible in difficult places tunnels, parking garages, under a cloud cover, forest, inside buildings where GPS is unreachable. The main goal of this project, we provide a mechanism that track an object without use of GPS which can be track many places where GPS is not applicable likes tunnels, parking garages, under a cloud cover, in the forest, in urban canyons, inside buildings. This application can track the position of the object at approximation.

Key Words: Indoor Tracking System, GPS, BLE Signal, Beacons, Track, Receiver

1. INTRODUCTION

Indoor Tracking System without GPS is one type of tracking application which is used to locate people or objects inside an Indoor Buildings or Locations using BLE Signals. Through this tracking is possible in difficult places tunnels, parking garages, under a cloud cover, forest, inside buildings where GPS is unreachable. The main goal of this project, we provide a mechanism that track an object without use of GPS which can be track many places where GPS is not applicable likes tunnels, parking garages, under a cloud cover, in the forest,

1.1 Problem Statement

In today's smarter world, technology advances day by day. We came up with a vision that can bring a huge change in routine lives, something which can ease your life. Track the things you care about and even save lives such as (Assets, Pets, and kids). GPS reception quickly reaches its limits, for example in tunnels, parking garages, under a cloud cover, GPS satellite not worked properly because low mobile signals. So one question raised how it possible without GPS?

1.2 Problem Solution

Indoor Tracking System without GPS is one type of tracking application which is used to locate people or objects inside an Indoor Buildings or Locations using BLE Signals. Through this tracking is possible in difficult places tunnels, parking garages, under a cloud cover, forest, inside buildings where GPS is unreachable. The main goal of this project, we provide a mechanism that track an object without use of GPS which can be track many places where GPS is not applicable likes tunnels, parking garages, under a cloud cover, in the forest, in urban canyons, inside buildings. This application can track the position of the object at approximation.

1.3 Purpose

Positioning or find location using smart phones are very beneficial in today's fast lifestyle. With GPS system we reaches level of tracking system. But GPS satellite have some limits. The main goal behind of Indoor Tracking Systems (ITS) is to locate people or objects inside an Indoor Buildings or Locations using BLE Signals.

2. TECHNIQUES FOR INDOOR POSITIONING WITHOUT USING GPS

Positioning and navigation using smartphones are very beneficial in everyday life. Where would we be without the friendly voice of Google maps which shows us the way wherever we are? But, wait a moment, everywhere is not quite correct. GPS reception quickly reaches its limits, for example in tunnels, parking garages, under a cloud cover, in the forest, in urban canyons, inside buildings – in brief: GPS driven navigation does not work where there is no visual contact to several GPS satellites. And there is another problem: With GPS it is not possible to determine the floor level a device is located on. But there are some possibilities to put such an “indoor GPS” into practice.

Navigation is necessary after you entered a building, too. In complex facilities with several floors such as airports, exhibition halls, railway stations, hospitals, shopping malls, office and industry buildings and many more accurate navigation like we know it from road traffic navigation is desirable. Regarding asset tracking, staff tracking, location based services and geofencing, an accurate location determination is essential.

Indoor positioning and indoor navigation are therefore a big issue in many industries. In soft uses several positioning technologies in order to implement indoor navigation and indoor positioning. We are happy to introduce the following techniques to you in the next couple of weeks - including information about accuracy.

1. Wi-Fi
2. Bluetooth (BLE, Beacons)

With the use of Bluetooth low energy (BLE) Beacons and Wi-Fi the device is detected without GPS. There are 2 types Beacons.

- 1) Track
- 2) Receiver

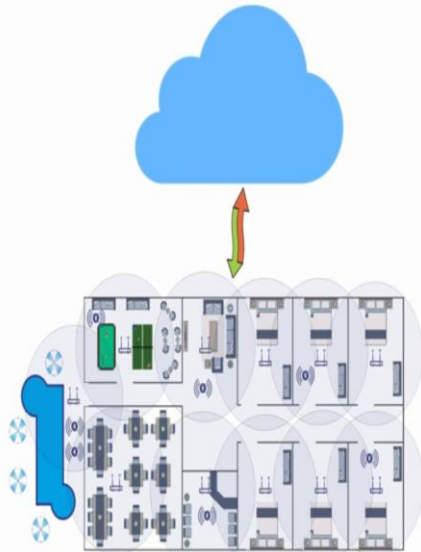


Fig -1: Indoor Tracking System

Track Beacons is used for particular object and Receiver Beacons is used for receive the location of object. Bluetooth beacons will have a transformative impact on the way we interact with the physical world. They enable proximity-based contextual awareness using technology that most of the world's population own carry in their pocket –a smartphone with applications. In general terms, a beacon is a small, battery-powered, wireless device that uses Bluetooth low energy technology (Bluetooth Smart) to advertise its presence and services. It does this by repeatedly broadcasting or advertising a beacon identifier to compatible smartphones or tablets within its proximity. The smartphone or tablet can then use the beacon's information to determine its location and services, and act accordingly.

2.1 TekT



Fig -2: Tracking Device without GPS

TEKT is a low cost product developed for tracking the location of Indoor areas i.e. corporate offices, hospitals, mines, hotels, Airports, universities etc. specifically where GPS is not very helpful. TekT has brought your imagination to reality! TekT thought a possible way to make use of Bluetooth Low Energy Beacons and Wi-Fi to create an innovative product that you'll love. We have come up with a wonderful product which does not only track or find what's lost but also navigate through indoor/ outdoor/ unknown where GPS may have signal loss.

Not only that, TekT has been a leader in market about making these products affordable with providing best quality and reliability.



Fig -3: TekT

Features of TekT is as follow.

1. Visiting a new place

Having beacons installed at places such as museum, visitor attractions, it's easy to navigate through even if there's no internet connection on your mobile device. This is very useful when you are a visitor to places such as resort, hospital, museum, airports.

2. Good bye to GPS Issues

Indoor places as well as unexplored areas outside where GPS does not help, TEKT can be useful tool to help you find the destination. TEKT utilize Wi-Fi, Bluetooth and Beacon technology in such a way to make it a great and most helpful experience for user.

3. Notification on web app

Once beacon is placed to track some object, user automatically gets notification when this object moves out of defined boundary. An intelligent algorithm works after all these to make user(s) notified.

4. Safe storage

Location data for each of asset having a BLE beacon get stored not just locally but also on cloud database. This makes it very safe storage of data and user is always in loop if there's any unusual behavior observed.

5. Explore unexplored world

TEKT products is efforts of our professional hardware and software teams. Our main aim is to explore and produce an amazing experience with the combination of advance technology, innovative ideas and creating a product that satisfy your business requirements.

6. Economic Solution

TEKT product are very economic than any other location Tracking product out there in market while providing a lot more features. It guarantees the satisfactory experience for user and provides any technical and installation support.

7. Easy and Secure Web App

TEKT offers user friendly application for iOS and android. With few touches, app can help user to navigate to a place, find lost items and track object in real time. It is built in with

considering security concerns to provide authorized control to only to you.

2.2 Technology

PHP (Hypertext Pre-processor)

PHP is a script language and interpreter that is freely available and used primarily on Linux Web servers. PHP, originally derived from Personal Home Page Tools, now stands for PHP: Hypertext Preprocessor, which the PHP FAQ describes as a "recursive acronym." PHP executes on the server, while a comparable alternative, JavaScript, executes on the client. PHP is an alternative to Microsoft's Active Server Page (ASP) technology. As with ASP, the PHP script is embedded within a Web page along with its HTML. Before the page is sent to a user that has requested it, the Web server calls PHP to interpret and perform the operations called for in the PHP script. An HTML page that includes a PHP script is typically given a file name suffix of ".php" ".php7," or ".phtml". Like ASP, PHP can be thought of as "dynamic HTML pages," since content will vary based on the results of interpreting the script.

MYSQL

MySQL is the most popular Open Source Relational SQL Database Management System. MySQL is one of the best RDBMS being used for developing various web-based software applications. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company. This tutorial will give you a quick start to MySQL and make you comfortable with MySQL programming. A database is a separate application that stores a collection of data.

Each database has one or more distinct APIs for creating, accessing, managing, searching and replicating the data it holds. Other kinds of data stores can also be used, such as files on the file system or large hash tables in memory but data fetching and writing would not be so fast and easy with those type of systems. Nowadays, we use relational database management systems (RDBMS) to store and manage huge volume of data. This is called relational database because all the data is stored into different tables and relations are established using primary keys or other keys known as Foreign Keys. A Relational Database Management System (RDBMS) is a software that –

- Enables you to implement a database with tables, columns and indexes. Guarantees the Referential Integrity between rows of various tables.
- Updates the indexes automatically.
- Interprets an SQL query and combines information from various tables.

RDBMS Terminology

- Before we proceed to explain the MySQL database system, let us revise a few definitions related to the database.

- Database – A database is a collection of tables, with related data.
- Table – A table is a matrix with data. A table in a database looks like a simple spreadsheet.
- Column – One column (data element) contains data of one and the same kind, for example the column postcode.
- Row – A row (= tuple, entry or record) is a group of related data, for example the data of one subscription.
- Redundancy – Storing data twice, redundantly to make the system faster.
- Primary Key – A primary key is unique. A key value cannot occur twice in one table. With a key, you can only find one row.
- Foreign Key – A foreign key is the linking pin between two tables.
- Compound Key – A compound key (composite key) is a key that consists of multiple columns, because one column is not sufficiently unique.
- Index – an index in a database resembles an index at the back of a book.
- Referential Integrity – Referential Integrity makes sure that a foreign key value always points to an existing row.

MySQL Database

MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company. MySQL is becoming so popular because of many good reasons –

- MySQL is released under an open-source license. So you have nothing to pay to use it.
- MySQL is a very powerful program in its own right. It handles a large subset of the functionality of the most expensive and powerful database packages.
- MySQL uses a standard form of the well-known SQL data language.
- MySQL works on many operating systems and with many languages including PHP, PERL, C, C++, JAVA, etc.
- MySQL works very quickly and works well even with large data sets.
- MySQL is very friendly to PHP, the most appreciated language for web development.
- MySQL supports large databases, up to 50 million rows or more in a table. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes (TB).
- MySQL is customizable. The open-source GPL license allows programmers to modify the MySQL software to fit their own specific environments.

3. SYSTEM FLOWCHART

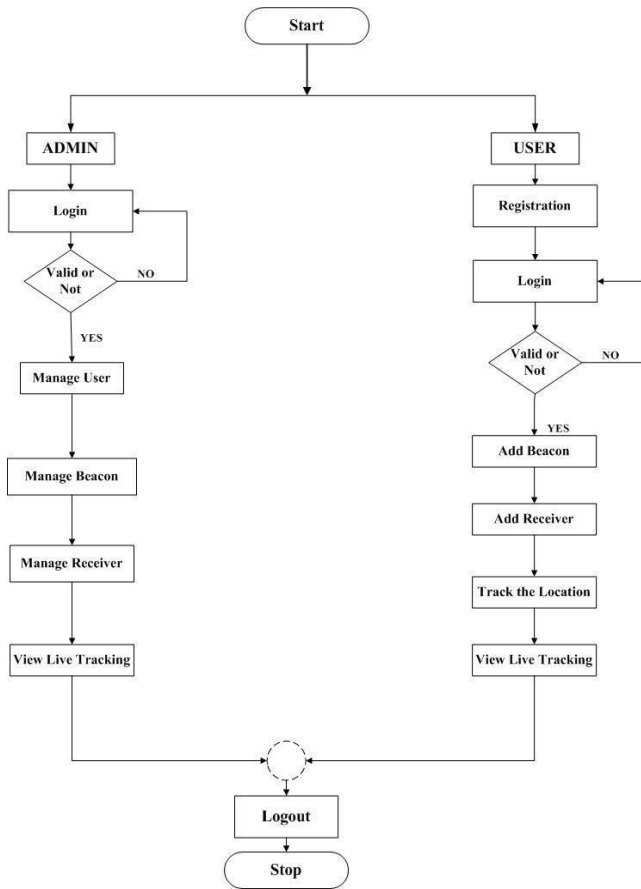


Chart -1: system flow chart

System flowcharts are a way of displaying how data flows in a system and how decisions are made to control events. To illustrate this, symbols and lines are used. They are connected together to show what happens to data and where it goes.

4. DATA DICTIONARY

Table -1: Admin Registration

Column	Type (Size)	NULL	Key	Description
adm_id	int(11)	No	Primary Key	To add the admin id
name	varchar (50)	No	Null	To store the admin name
email id	varchar (30)	No	Unique Key	To store the admin email id
password	varchar (30)	No	Null	To store the admin password

Table -2: User Registration

Column	Type (Size)	NULL	Key	Description
user_id	int(11)	No	Primary Key	To add the user id
name	varchar(50)	No	Null	To store the user name
address	varchar(50)	No	Null	To store the user address
email id	varchar(30)	No	Unique Key	To store the user email id
password	varchar(30)	No	Null	To store the user password

Table -3: Object Details

Column	Type (Size)	NULL	Key	Description
obj_id	int(11)	No	Primary Key	To add the object id
name	varchar(50)	No	Null	To store the object name
obj_mac	varchar(50)	No	Unique Key	To store the object mac
type	varchar(30)	No	Null	To store the object type
user_id	int(30)	No	Foreign key	To store the user_id

Table -4: Beacon Details

Column	Type (Size)	NULL	Key	Description
bea_id	int(11)	No	Primary Key	To add the beacon id
name	varchar (50)	No	Null	To store the beacon name
mac	varchar (50)	No	Unique Key	To store the beacon mac
user_id	varchar (30)	No	Null	To store the user_id
bea_id	int(11)	No	Primary Key	To add the beacon id

5. CONCLUSION

The main goal of this project, we provide a mechanism that track an object without use of GPS which can be track many places where GPS is not applicable likes tunnels, parking garages, under a cloud cover, in the forest, in urban canyons, inside buildings.

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