# Location Based Services using iBeacon in Museum

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## Abstract

*Bluetooth Low Energy (BLE) is a newly emerged technology targeting low-power, low-cost wireless communications within medium or short range. BLE has extended the already wide acceptance of Bluetooth and is an ideal choice for a variety of sensor-based products, as well as ubiquitous mobile devices. Recently, it has been proposed that indoor positioning can be achieved when scattering BLE sensor devices, called iBeacon, in various locations of a particular venue. In this work, we present an Android-based application for analyzing iBeacon networks and determining the best signal map. iBeacon is a built-in, cross-platform technology for Android and iOS devices, which utilizes Bluetooth Low Energy (BLE) for long-last services. This technology has significant advantages compared to other types of indoor positioning technologies, such as less expensive hardware, less energy consumption, needless to internet connection, and being capable of receiving notifications in background. This technology will provide huge benefits for future location awareness applications. It will change the way retailers, event organizers, and educational institutions communicate with people indoors. It aims to provide a more accurate, cost efficient approach to indoor positioning of mobile devices using iBeacon. In this project we are going to developed a mobile application which uses iBeacon technology installed at the museum to let visitors know about locations of specific pieces/areas of the art collection, sends notification to visitors with fun facts and beautiful graphics and broadcasting relevant information and offers that are up for sale to the visitors on the go.*

## Keywords

*Bluetooth Low Energy (BLE), iBeacon, Indoor Positioning, Location Awareness Applications.*

## I. Introduction

Location Based Services have been broadly applied in different areas, applications and mobile devices and their location awareness has become an important part of our lives. Generally speaking, we can divide positioning into outdoor positioning and indoor positioning. Recently, the indoor Location Based Services have gained more attention in mobile applications market, as people spend more time in indoor places because of the growth in the number of buildings and towers in public places such as shopping malls, schools, universities, and hospitals.

According to a research people spend more than 70% of their time indoors, which indicates the importance of indoor Location Based Services. Although outdoor positioning has been extensively studied and applied, indoor positioning is still facing big challenges and some of its techniques and methods have deficiencies. For example, GPS does not work properly inside buildings. This directs us to exploit other techniques for indoor Location Based Services to achieve desired goals. The indoor positioning techniques mostly utilize Wi-Fi, Architecture ZigBee, RFID, and Bluetooth Low Energy (BLE). Location Based Services using iBeacon uses iBeacon, a newly introduced technology, which utilizes BLE for indoor positioning. The most important advantage of iBeacon is that it is very energy efficient. This translates to possible quick deployment of small size beacons that only need to be powered by battery and eliminates the necessity to rely on any existing infrastructure such as a Wi-Fi network. With the effective range in the order of tens of meters in indoor environments, it provides a very suitable "discriminating power" for accurate positioning with little training efforts.

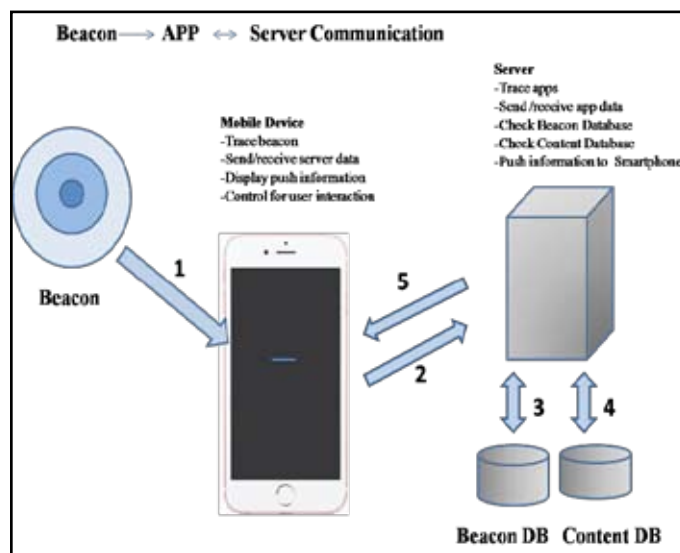## II. Proposed System

### A. Architecture



Fig.2.1 : Proposed Architecture

In System Architecture it basically consists of four components Beacon, Mobile Device, Server, And Database. Database is divided in to two parts beacons database and Content database. First Beacon Bluetooth 4.0 device which will broadcast a notification or a signals. That signals will be received by a mobile device where the application is installed on the mobile.

The mobile device is responsible for tracing beacon, send and receive data, display push information and control for user interaction. Mobile will request particular Beacon information about related Beacon to a server then server check in a beacons database, if that information about the beacon id is found then it will check the content related to that beacon in the content database. If the information is found, then it will push the information to Mobile.

### B. iBeacon

The iBeacon is a piece of equipment for indoor positioning issued by Apple Corp in September 2013. Its working mechanism is that a communication device equipped with low power Bluetooth (BLE)

sends, by using BLE technology, its own ID, and after receiving that ID, a mobile Internet device will take some actions according to it. SIG formulate standards for Bluetooth technology. It put forward low power Bluetooth technology, referred to as BLE, when the standard 4.0 began to be used. This low power Bluetooth technology, compared with the traditional one, has advantages of lower cost and lower power consumption, as can be evidenced by an example that a button cell can allow low power Bluetooth devices to operate for up to a year to two years. The Bluetooth LE protocol is significantly more power efficient than Bluetooth Classic. Several chipsets makers, including Texas Instruments and Nordic Semiconductor now supply chipsets optimized for iBeacon use. Power consumption depends on iBeacon configuration parameters of advertising interval and transmits power.

## III. Design Goals
As beacons become main stream, they are proposed to be used at various indoor systems for:

**Provide Information**: Visitor can able to see detailed information about particular object kept in the museum.

**Content annotation**: Where beacons (in combination with a wireless / cellular network) can allow visitors to leave comments for exhibits, browse able by other visitors in the vicinity. Digital "like" or "tweet": Beacons enable users to

**digitally "like" or "tweet"** something that they liked in a museum, right then and there.

**Bookmark to view later:** If there's an exhibit that a visitor found really interesting, he/she could bookmark it and read it later.

## IV. Conclusion
We have proposed an approach for making an android application to make the visit to a museum an interactive one constructing an android application which will fulfil user's requirement based on the user behaviour and knowledge. It uses various methodologies which consist of LBS Location Based system to represent museum objects and help navigating the museum as per the need of visitor.

With the help of iBeacon, it becomes easy to deliver information to the visitor. Visitor can retrieve the information on their cell phones on the go. Adding the capability of saving the information for reading it to later purpose helps visitor to read the same thing again with the help of this application, visitor who choose to use this application on their personal mobiles and will be able spend less time and effort searching what they want.

Beacons and other BLE-responsive devices, although a recent phenomenon, are quickly gaining momentum across a variety of industries. This beacon thus helps in getting desired information on the go.

To conclude, our main motto is to make an intuitive application for a Museum. It will help visitor to make their tour an interactive one with help of their mobile and ease of use. So thus while using this application will help assisting museum staff and visitors at the museum to have an unbiased and smooth experience.

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