

# Smart Museum System Using iBeacon

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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.

This chapter introduces us to our idea of the exploring museum activity through Android Application with the help of emerging Location based proximity technology called as iBeacon. We will be discussing our aims and goals in regard to this idea. With the increase in the smartphone users and booming demand of “Internet of Things”, the world market is shifting towards mobile. And by implementation of this idea we want to bring the museum tour an interactive session to the visitor who visits the museum. Nowadays, Location Based Services (LBS) have been broadly applied in different areas, applications and mobile devices and their location awareness has become an important part of our lives.

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. METHODOLOGY / SYSTEM IMPLEMENTAION

Architecture

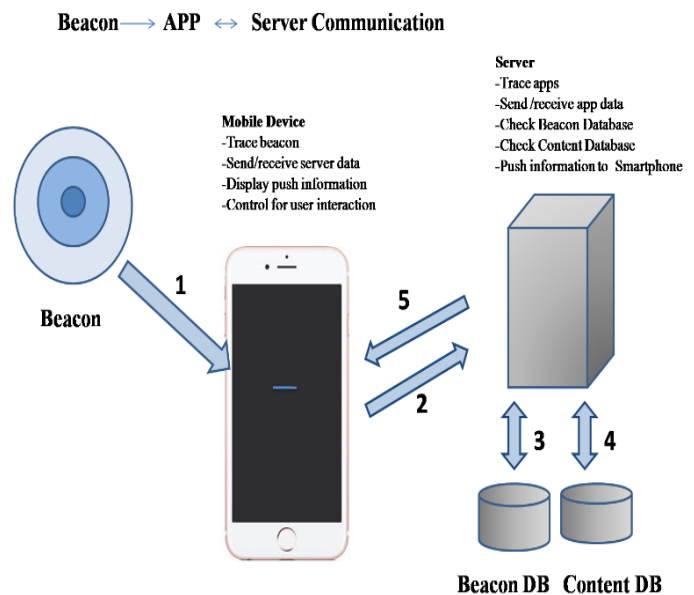


Fig.2.1 Proposed Architecture

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.

Component Diagram

The Component diagram is basically meant for exhibiting the physical Characteristics. Basically there are 5 Main Component: Device, Server, Beacon and the mobile App. The Beacon having Three artifact of component namely Artifact, Painting, and monument. The server having also two Artifact component namely Beacon database and Content database.

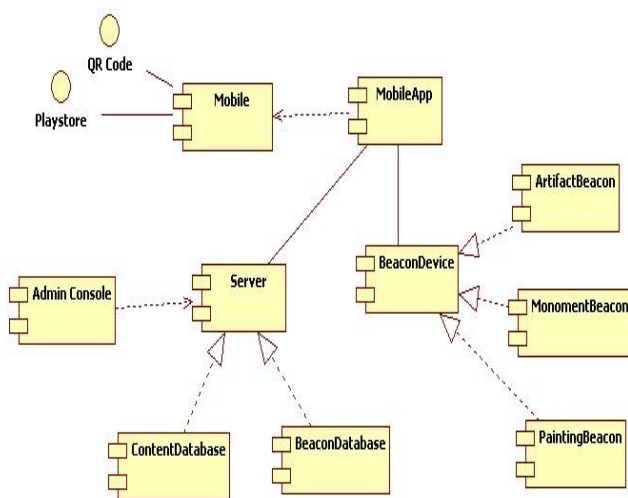


Fig. 2.2 Component Diagram

III. DESIGN GOALS

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. RESULTS AND DISCUSSION

This chapter contains final output of our project. Complete User Interface (UI) through which user interact with the system. Also all modules with their respective screenshot has been added here.

User Application

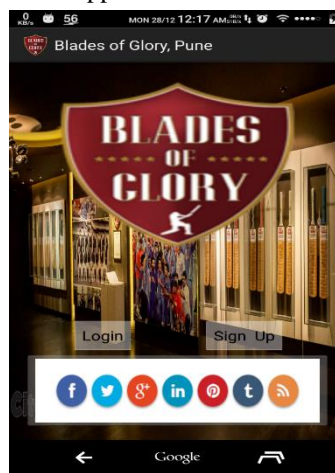


Fig 4.1 Login Screen

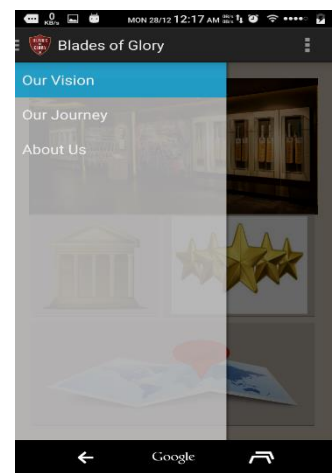


Fig 4.2 Main Screen



Fig 4.3 Home Screen

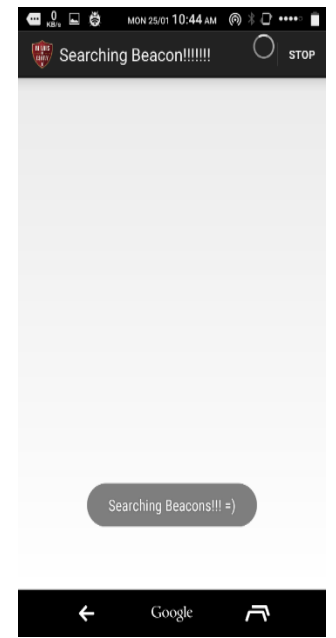


Fig 4.4 Searching Beacons

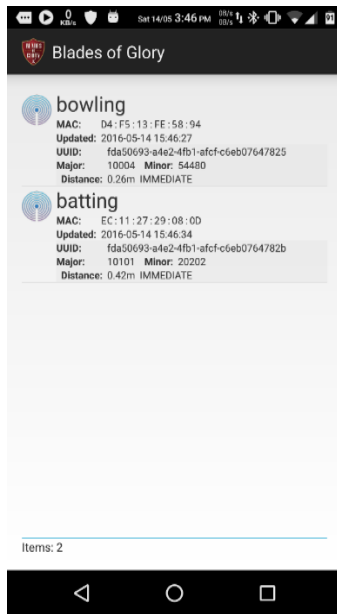


Fig 4.5 Beacons Found

## V. FUTURE SCOPE

- In this application we are only using primary security. But in future we can enhance its security. Besides this we are using SQLite as our database. We can enhance it to cloud.
- For now we have tagged only android, but this can be extended to IOS and windows and other platforms also.
- Adding capability in the application to send information to beacon itself so that to make communication faster.
- Providing navigation in museum with help of beacon-to-beacon connectivity.
- Upgrading the application with better approach with more User Interface graphics and keep updated with latest android versions.
- As the technology is becoming better and more affordable, there are many opportunities to use it in order to add to the visitor experience.
- One route would be to develop, in-house, with a possibility of eventually integrating it. Such an app can be tailored to address both aesthetic aspects and challenges of the actual museum environment.
- Since the physical factors such as temperature changes and human traffic seem to affect the capabilities of the hardware, it is important to investigate this phenomenon more thoroughly by recording the signal strength as a function of temperature changes and human traffic inside each indoor space to determine the most appropriate position for each beacon.

## VI. 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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