ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 10, October 2015

Android Application for Beacon Technology

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ABSTRACT:In today's world people are more inclined towards technology. One of the emerging technology is android, also people have started using android phones. Thus the technology is developing rapidly and it has become a need to develop new applications to enrich the mobile experience of users. Beacon technology is one of the best examples that provide the innovative experience to mobile phone users. Beacon is being used to give the users or customers the self-guided tours(routes) and also provide the related information. It is Bluetooth Low Energy (BLE) radio transmitter device and used in closed place where GPS could not work due to various obstacles such as walls or any objects. Beacon device communicates to an iPhone or android phone via Bluetooth and it can stick to walls or ceilings for long duration. Also it works on single battery for 2 years. Using beacon users can view the content on mobile phone via android application. It relies on one to many communication.

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KEYWORDS: Beacons, BLE, Android, Smartphone, Bluetooth 4.0

I. INTRODUCTION

This is an android application developed for interfacing with beacons in shopping malls. It is been developed because due to window shopping mall faces a huge loss. Also customers sometimes find it messy to visit all the outlets for shopping and because of this mess people getting aware of offers in each outlet is is not possible in generic way. Using beacon technology we can give smart shopping experience to the customers and offer the visitors streamlined self-guided tours.Beacon is a small hardware device that can be attached to wall or ceiling. They communicate with Bluetooth 4.0 enabled smart devices such as android phones by sending radio signals. Beacon are BLE devices i.e Bluetooth low energy device that broadcast radio signal every now and then. Hence beacon is a transmitter that transmits radio signals. Beacons are called as Bluetooth low energy devices because they consume less energy for transmitting radio signals and its battery which uses single cell lasts for at least two years. Beacon has huge scope especially in the sector of retail shopping.

II. RELATED WORK

1. Miami International Airport is very first airport in the world to use beacons. The airport has installed beacons at all entrances, including check-in gates, counters, baggage claim carrousels and parking zones. By installing beacons all over the airport airport, travelers will be able to receive preciseinformation of flight arrivals, delayed flights, boarding times and much more.

2. American Airlines has already taken note of beacon's powerful potential by launching test deployments of the technology at Dallas Airport.For example, immediately after checking in their luggage, passengers will automatically get a terminal map on their phone, showing them exactly where their boarding gate is. It will also show them how much time it will take them to get there based on their location.

3.Beacon technology has also been implemented across Hotels, restaurants and bars in USA to Increase their sales by sending personalized suggestions to their customers, and at the same time provide them with a mobile –based Interactive app.

III. PROPOSED TECHNOLOGY

The beacon is the Bluetooth Low Energy Device, it transmits the radio signals for the purpose to find the mobile phones in the range, beacon can detect the mobile phone only if the application is started on the android phone, the

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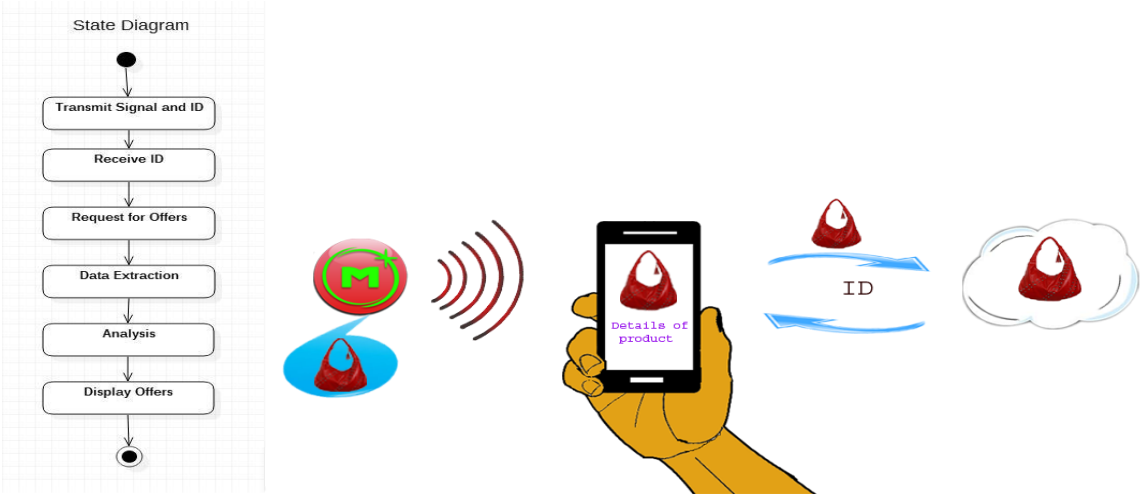
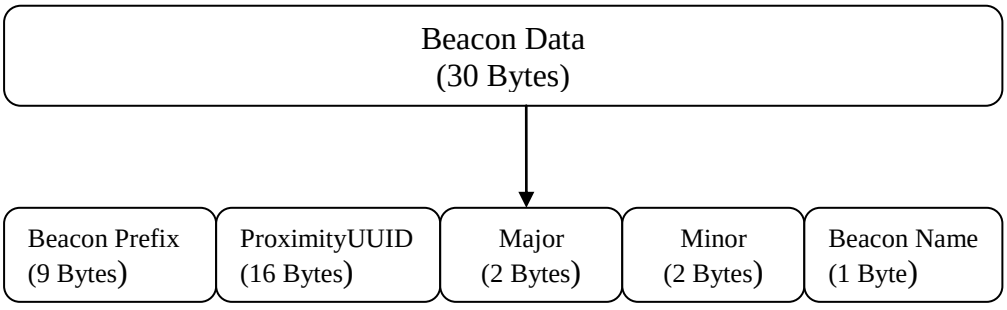
communication between beacon device and mobile phone is done via Bluetooth. The required version of Bluetooth is 4.0.Customers are instructed to install android application on their android mobile phones that support Bluetooth 4.0.When application is started automatically Bluetooth of mobile device gets enabled and whenever customer will come within the range of beacon device it will receive radio signal and Id of that particular beacon device. Using that Id customer will get all the information and offers on their mobile devices. Customer can then read all offers or can share it with their contacts or can save it on their mobile phones.



Principle Of Functionality:

Technically , Beacon is a super microcomputer. It has a powerful 32bit ARM Cortex M0 CPU with a 256kB flash memory, temperature sensor, accelerometer and 2.4 GHz Bluetooth 4.0 (also known as BLE or Bluetooth low energy) bidirectional radio.

You can think beacon of small lighthouse tower installed on a fixed location and broadcasts its presence to all ships(Smartphones) around. They could be as little as 2 inches or as far as 230ft(approx. 70metres)away. The precise maximum range depends on environment of course.Bluetooth is using same type of radio eaves as Wi-Fi(2.4GHz).The signal can be diffracted ,interfered or absorbed by water(human body).Phones or other smart devices in the range can capture the Bluetooth radio signal (without earlier pairing) and estimate their distance from the beacon by measuring the strength of received signal .Signal strength depends on the distance from the beacon.). The more often it is done, the more stable signal and application becomes more responsive, and the better customer experience can be achieved.



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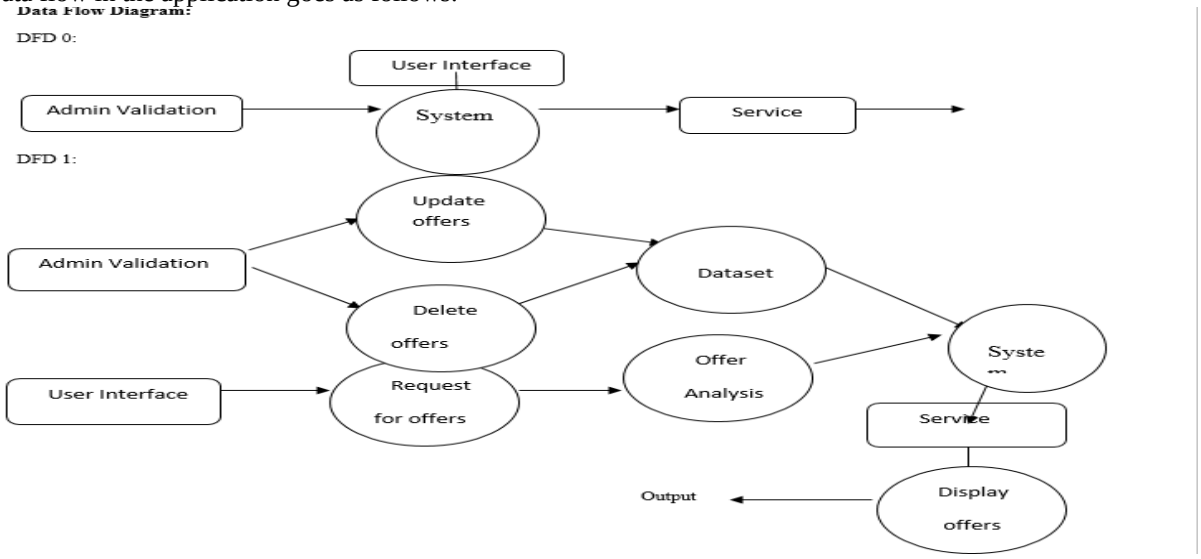
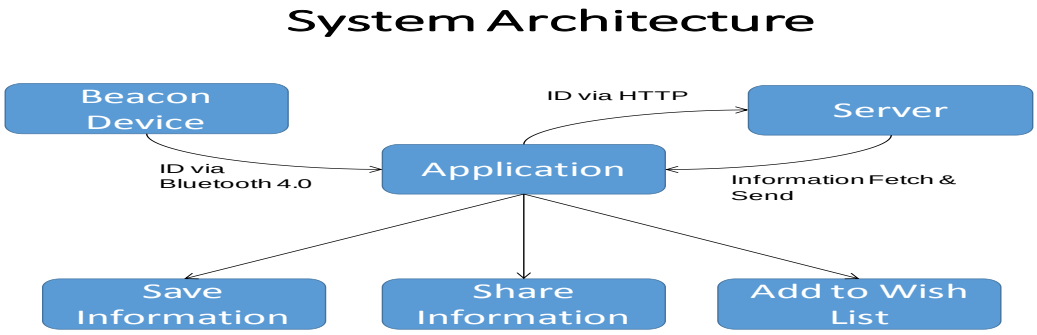
Unique identifier: Smartphone can capture signal from more than one beacon at the same time. If there are three or more than that beacons in range, your phone can estimate distance to each beacon and use this data to estimate its relative location. This technique is something that sailors had used for ages. Beacons can be uniquely identified as well since each beacon broadcasts its own ID.Every ID is 30 bytes long and is divided into different sections: **proximity UUID (16 bytes) + major number (2 bytes) + minor number (2 bytes)**+Beacon Prefix(9 bytes)+Beacon Name(1byte).

IV. SIMULATION AND RESULTS

Data flow in the application goes as follows:





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The expected outcome of application is receiving data whenever smartphone is in the range of beacon device. The received data is offers present in the outlets of mall. The received data can be saved and shared with contacts and we can also add those items to wish list.

V. CONCLUSION

We have successfully implemented android application for interfacing with beacon device. Our application can now connect android smartphones with beacon device and we can now use this technology in shopping malls.

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