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Smart College System using IoT BLE Beacons

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Abstract: The traditional systems does marking of attendance, handling lectures by paper signing pattern which disturbs the concentration of students but on research, proposedidea does task like automated marking attendance by use of BLE (Bluetooth Low Energy) Eddystone beacons and the involves usage of automated tools like Selenium which will be reducing the paper work and error like proxy, missing attendance. The system also gives the idea about many events and programs by advertising their details and providing details of examinations in the college campus on reaching the place so system alerts the students if the lecture starts and they are outside the classroom. For making better decisions and keeping eye on everyone and to save students time and reduce their disturbance in lectures. It is using "concept of proximity analysis solution using BLE 4.0Technology" which results to digitizing college activities and reduction of disturbance in concentration and also reduction in workload of staff for attendance manipulation and other activities, we can make use of this proposed technology using BLE 4.0 beacons. This system solves all the problem occurred in college indoor area. The previous system uses more hardware device for college activities like marking attendance, managing events and instructing for exam location which takes a long time for all the students to do that type of work.

Keywords: BLE4.0, Eddystone, IOT, beacon, proximityanalysis, Indoor Navigation.

I. INTRODUCTION

Rapid technical progresses in mobile industry have elevated new challenges for researchers and scientists by allowing low-end devices in the last period. In this project improved machine learning algorithms and methods are used for minimizing efforts of staff for handling information. The proposed system does the task like marking attendance more precisely and decreasing paper work and errors like proxy, missing attendance by use of BLE (Bluetooth Low Energy) beacon [1]. For making superior decisions and keeping eye on everyperson we can make use of this proposed technique.

The project also gives the idea about many events happening in college on reaching that place. Also it provides the information about that particular event in the application and direction to reach that event and it also tells the overall response to all events. All this data of student and others will be stored on cloud this project presents the efficient machine learning algorithm used in extracting current data related to College students and analysis on this data which can be used by principal to take further decision and lead to growth of the college more rapidly and accurately with less efforts [2] [12]. This project uses ML that can be used for forming the logic for accurate changes or decisions on certain conditions. Our research focus on the analysis of the data and this project can reduce the large workload of college. The output is in the form of virtualization of the data in the forms of graphs and the future prediction from the data and is a real time in the form of sheets.

II. PROJECT OBJECTIVE

The project objective is to develop the application system that will connect within the IOT beacon device and connect to cloud to that various operations such as Indoor positioning system. Marking attendance and event management can be performed.

Performing analysis of the collected data from this device will help the student and staff in the growth and improvement of result.

III.LITERATURE SURVEY

A. RELATED WORK DONE

Beacons, in the structure of wireless technology, are used to convey a minor amount of data. The conveyed BLE beacon data can be a string of text such as an email address, unique ID, or heat. The beacon technology discussed in this paper operates on BLE. A BLE beacon is run by a coin cell battery, which gives it the advantage of having a lifetime of up to two years. Also, BLE beacons have a transmission range of about 70 meters [3].

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BLE Beacons operate in four starring role. The main two roles are the Marginal device, and the Dominant device; both are connection-based. The slave Peripheral device performances as a connectable promoter (for example, a smart home device) [4]. The main Central device initiates connections and scans for advertisers (for example, a smart phone). Bluetooth Low Energy (BLE, Bluetooth 4.0) beacon technology has developed additional ubiquitous since the release of Apple's iBeacon protocol in 2013. BLE beacons have been used to be responsible for forms to smartphone users who are in the vicinity of a stock. Moreover, BLE beacons have been used for possession detection indoors buildings.
iBeacon technology has been used for manyLocation- Based Services (LBS). Scientists studied how iBeacons can provide low-priced and energy efficient methods for indoor positioning for mobile users [3]. Similarly, a group magnificently developed an indoor course direction application using iBeacons as waypoints. Elsewhere indoor localization, researchers have studied additional use cases for BLE beacons. For instance, a group in Germany studied luggage tracing with iBeacon at an airport [3]. The group was capable to effectively track the luggage. The application alerted the researchers that the bag was 40 meters away. Then, the bag was in sight of the researchers and the application read 11 meters, then the reality of group visually saying that it was just 3 meters away. The group revealed that accurateness problems happened due to iBeacon signal power being dulled by walls, humans, and other obstacles. Android devices are used for many applications and also quality can be measured as mentioned by Bangare et al [7] [8] [9]. Some work was studied regarding the Wireless mobile communication given by Varade et al and Shinde et al [10] [11].

IV. PROPOSED SYSTEM

A.Idea

In the existing system student use NFC (Near Field Communication) card reader for attendance and scan there card one after another,which takes much more time until all student recorded. The focus of the proposed system is to decrease time and cost of hardware device. We may use android device owned by student. At the time of examination of student finds difficult to locate exam hall, proposed system can provide all details about exam and also provide direction to locate exam hall. Likewise, event handling module also developed in this project.

B.System Overview

This system provides all function of teacher and student in one single android application. But in existing system has two parts, which are an Android application for the students and a web-based management system for the teachers. The students and teacher are supposed to have installed the application in their android devices. The teacher and student use this application functionality. Likewise, any user can use the application and do any type of activity (for example: tap for attendance, event management system and examination system).
Stepwise procedure-working:
1) Authorized user arranges a set of ID and name of the user.
2) The authorized user turn on BLE (Bluetooth Low Energy) beacon to spread a message to the Android devices.
3) Next, the students run the application and scan the beacon device, this device provides message to the application.
4) The Android devices within the range receive the message transmitted from the BLE beacon.
5) Finally, the Android devices send the scanned received message and input data together to the cloud.
6) Then cloud processes data and send proper information to corresponding android devices.
7)For this the RESTful web services are used to communicate with the server and client(android device) and accessing the information stored on server which helps in validation of user as well as connecting android devices with the appropriate nearby Estimote Eddystone beacons of interest.

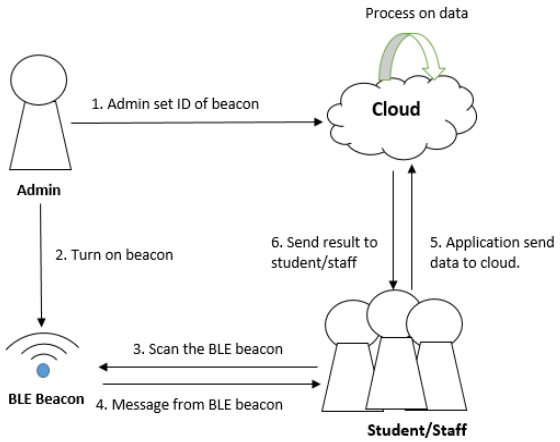

Fig. 1 System Overview

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C. Android device

The system work on android application which is main operating system for smartphone. In this application student do the task like mark attendance, search event, search exam hall and get overall details of the examination and event system.

When the scan button is pressed, then application startslooking for a BLE beacon device. On finding of a beacon device, the application sends the unique identifier of the detected BLE beacon device to the cloud. Then the matching set of beacon ID and name is viewed up by the beacon identifier and is sent back from the cloud. As shown in Fig.1, a list of near beacon device is displayed in your android application. The students select the appropriate beacon device and do the task like marking attendance and other work.

D.BLE Beacon Device

Give your users well location and proximity involvements by provided that a strong context signal for their devices in the form of Bluetooth low energy (BLE) beacons with Eddystone. Just like iBeacon is a Bluetooth 4.0 communication protocol designed by Apple, Eddystone is an open Bluetooth 4.0 protocol from Google.

Packet types:

- Eddystone-UID

Eddystone-UID contains an identifier of a beacon. Eddystone-UID is 16 bytes long and split into two parts:

1. Namespace (10byte): identifies a set of beacons
2.Instance (6 bytes): identifies a certain beacon with NID

- Eddystone-URL

The size of the field depends on the length of the URL. The URL could be a regular web page providing relevant information—e.g., a beacon next to a movie poster could broadcast a link to a YouTube trailer. It also could be a dynamic web application, with contextual parameters. Eddystone-URL the data is encoded directly in the beacon's advertising packet

- Eddystone-TLM

Eddystone-TLM packet is designed to be broadcast by the beacon alongside the "data" packets (i.e., UID and/or URL) for the purposes of fleet management.

- Eddystone-EID

Eddystone-EID packet is designed for security. EID protects you against two kinds of attacks:

1. Hijacking/Piggybacking.
2. Spoofing

V. RESULTS

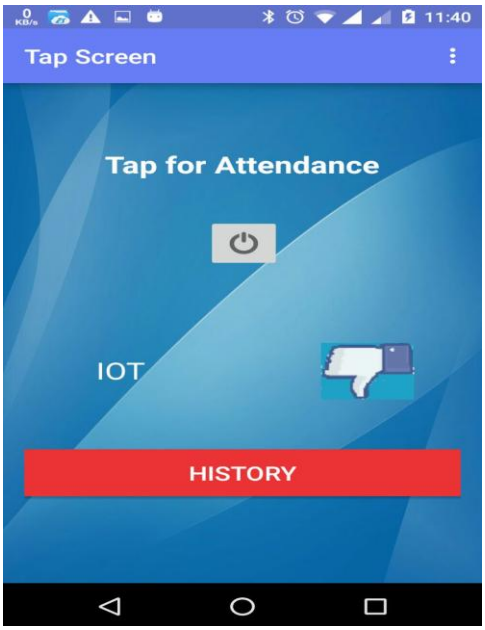

Fig 2.Attendance Tap Screen

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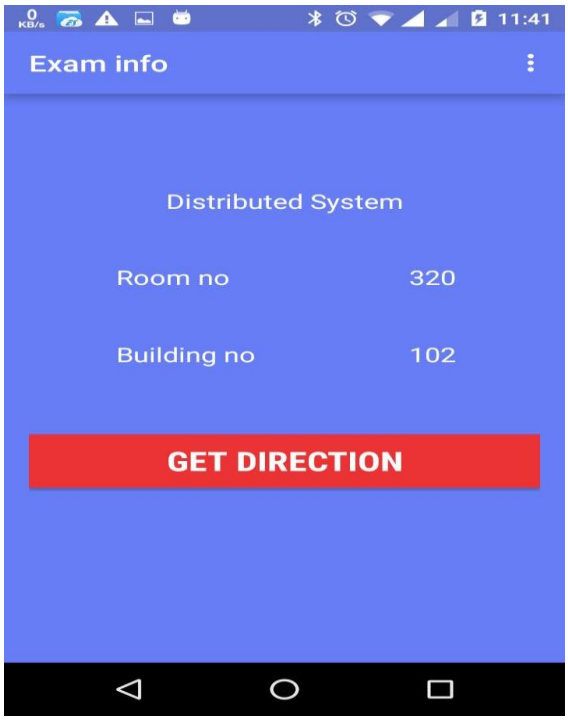

Fig 3.Exam Info

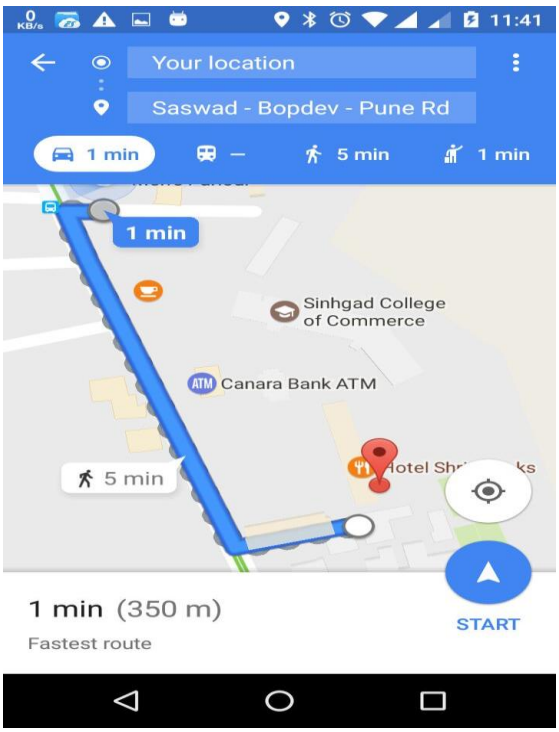

Fig 4.Direction For Exam Hall

VI. CONCLUSION

In this paper, we defined a smart college management system which gives the students the ability to mark their attendance automatically, searching event and exam hall through their Android devices. Implementation of indoor positioning using BLE beacon signals gives major results and enhancement in location estimation using error minimization which further improves the correctness.The application offers reliability, time savings and easy control. It can be used as a base for creating similar applications for tracking attendance, event, and location in colleges and in offices or any workplace.

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