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Bluetooth beacon based Attendance System with Android Application

Samarth R. Gohel, Ashvini M. Padavi, Mohit M. Asija, Purnanand A. Vasave
Computer Engineering Department
K. K.W. I. E. E. R
Nashik, Maharashtra, India
Email: Samarthg786@gmail.com, Ashvinipadavi2107@gmail.com, mohitmasija@gmail.com, purnanandvasave@gmail.com

Abstract

Beacons are the devices which are connected with any android devices using Bluetooth. This can be used to mark presence of a user within premises. In most schools and universities, the teacher manually records the attendance of the students present in the class. There are various ways to automate the process of taking attendance such as fingerprint recognition, identity card scanner and so on, which consumes equally the same time as manual attendance. In this paper, we are aiming at implementing a Bluetooth low energy based attendance management system. When the student reaches into within the range of beacon, the android app will detect the previously paired beacon devices and it establishes connection. The application is used to collect the data from the Bluetooth and store it accordingly. This provides a way for the teacher to instantly record the attendance of all the students. To ensure the credibility of the system we are using people counting system through video surveillance.

Keywords—*Network architecture and design, Network monitoring, Computer vision*

INTRODUCTION

The idea of Bluetooth based attendance provides the batter use of Bluetooth technology and enhances the use of Bluetooth. The web admin panel consist the UI in HTML, mediator is in Angular JS and the server is done in python flask. The whole database is created in Mongo dB. The Android application uses volley as a mediator. The UI of Android application is depicted below.

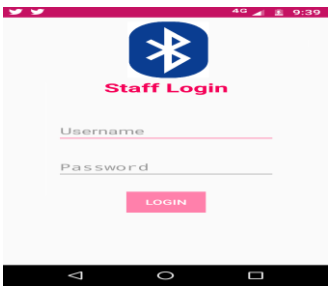

Fig. 1. *UI representation of Android application from the perspective of staff*

The staff will enter its credentials and then the staff will fill the details regarding the lectures for which the staff is assigned. After the filling all the details another activity pops up that shows to enable the Bluetooth of the phone, after enabling the Bluetooth there are options of registering the devices and then mark attendance. After the staff clicks the option of mark attendance, the attendance log will automatically generated and it will be saved in the MongoDB database. For the verification of this technique we are using the head count method through the camera. The camera generates the log and total amount of counted heads. The log generated from Bluetooth application and log from camera output should be same.

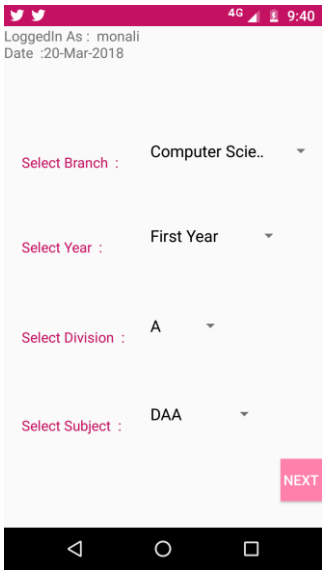

Fig. 2. *UI representation of Android application from the perspective of staff while filling the details*

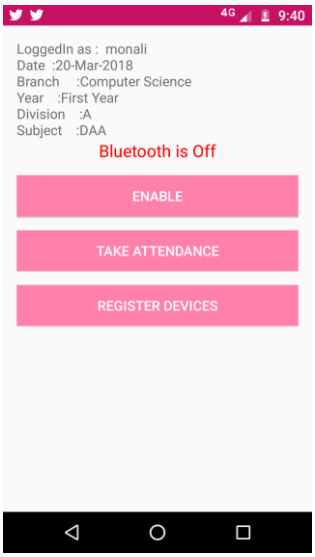

Fig. 3. *UI representation of Android application for enabling Bluetooth*

RELATED WORK

The way toward gathering participation is a lumbering and tedious one. It is, nonetheless, required in schools and colleges in India. Ordinarily, the educator or teacher takes participation physically on a sheet of paper which is then submitted to the office month to month to keep a track. On the off chance that an understudy has participation underneath 75%, he or she might be kept from sitting for the examinations. In such a situation, there must be quicker and more effective method for recording it. One well known technique is biometric scanner. It is a precise technique yet it can be similarly tedious as manual participation as the understudies can just enter the information one by one. Different procedures, for example, a personality card scanner likewise represents a similar issue. The arrangement displayed in the paper is a keen and quick participation observing framework through Bluetooth low vitality sensors. These sensors can be joined to every personality card. They contain a one of a kind string which can be related with the ID card they are appended to. This is combined with an android application on the educator's cell phone which is utilized to gather the information. At the point when the understudies enter the class, the educator switches on the Bluetooth on the telephone and opens the application. The application detects any guide stickers that are around 200m of the Bluetooth sensor of the telephone and in this way inputs the information of the understudies into the application. Along these lines, the participation of the understudies is taken quickly. The application gives diverse methods of picturing the information such as a rundown mode and a pie graph mode for simple investigations of the information. To maintain a strategic distance from any sort of mistake or false participation, sensors are utilized to include the quantity of individuals the classroom. This is cross-referenced with the information on the application and in the event that it isn't coordinating, flashes a blunder to the educator. The instructor additionally has a choice to physically change the information in the event that a few sensors quit working. This participation based framework can be adjusted for different situations likewise, for example, workplaces too. It is taken a toll proficient also, must be kept up just more than once in a year low vitality

including Android. BLE has tight security in the business with128-bit AES information encryption. It creates a fleeting key which is coordinated to the gadget and the sensor, after which it produces a three 128-piece keys for promote correspondence between the gadgets. Furthermore, BLE underpins a system called security include, which enables a gadget to utilize private locations.

TECHNOLOGIES USED FOR TAKING BLUETOOH ATTENDANCE

A. BLUETOOTH LOW ENERGY TECHNOLOGY

Bluetooth low vitality (BLE) is another innovation to make remote individual zone systems. It is the best decision for this application in light of the fact that when contrasted with great Bluetooth it extensively lessens control utilization and cost. Most portable working frameworks locally bolster Bluetooth. The whole Bluetooth organize, which incorporates every one of the slaves furthermore, the ace is known as a piconet. The most extreme size is additionally needy upon a parameter known as the Conn Interval parameter which is characterized as the time between the beginnings of two back to back association occasions between the slave and the ace. For this application, gauge sticker signals have been utilized. The Estimote signal is microcontroller comprising of a CPU, accelerometer, temperature sensor and a 2.4GHz radio. The radio uses Bluetooth 4.0 otherwise called Bluetooth.

B. ANDROID APPLICATION

We developed the application for taking Attendance and storing Records on an open source mobile operating system and College ERP Website Android since is used widely in Smartphones. The Android currently has 84% of the world's share in the mobile industry. Android is based on Linux Kernels and designed mainly for hand held touchscreen devices such as smartphones and tablets.

TOOLS REQUIRED FOR DEVELOPMEN

UI in HTML, mediator is in Angular JS and the server is done in python flask. The whole database is created in Mongodb. The Android application uses volley as a mediator.

Sensing Bluetooth Low Energy Devices

Android platform includes support for Bluetooth Network stack, which allows device to wirelessly communicate with Bluetooth devices through Android Bluetooth APIs. Using these APIs the user can communicate with other Bluetooth devices, scan other Bluetooth devices, connect to other devices, and manage multiple connections. To access Bluetooth or Bluetooth Low Energy functionality in the application android Bluetooth permissions are to be granted in the manifest file of the application to use the Bluetooth hardware.

Bluetooth Setup

For any Bluetooth activity in an application we need to create a Bluetooth Adapter. We create an object of the Bluetooth Adapter class. The application needs to check whether the Bluetooth is enabled or not. If the Bluetooth is not enabled Bluetooth Adapter sends an Intent to request to enable the Bluetooth of the device. Next, to search for BLE devices, Android has a method to scan Bluetooth enabled devices. The call-back method will return the scan results.

APPLICATION

1) It is very useful in ERP attendance system in school, colleges, where can eliminate so many efforts while taking attendance.
2) Similarly, it is useful in employee’s attendance to avoid queuing.

MEASURES TO AVOID PROXY

After the participation has been recorded utilizing BLE innovation, there must be a technique to maintain a strategic distance from 'intermediaries', on the off chance that one understudy is conveying in excess of one personality cards or in the event that an understudy is standing ideal outside the classroom. Such circumstances can be maintained a strategic distance from by including the quantity of understudies the class by utilizing entryway tallying systems and coordinating it to the quantity of stickers distinguished. There are a few distinctive entryway considering systems such laser shaft innovation, warm, video preparing, utilizing Wi-Fi and some more. The strategy to be embraced relies upon components, for example,

- Accuracy
- Transmission capability
- Cost
- Security
- Speed and many more.

For this venture we measured the advantages and disadvantages of each strategy. For bar tallying strategy, it is shoddy and has low power utilization yet is anything but difficult to mess with as it can be hindered by clients remaining in the passage. In the video preparing strategy, a CCTV camera is introduced in the room and different handling calculations are actualized to tally the quantity of individuals. The foundation of the picture is identified and subtracted after which a basic leadership calculation is connected to the picture. This method is precise, be that as it may it can be expensive as a camera must be introduced in each room of the college. The strategy most reasonable for the undertaking would be the infrared movement analyser strategy (IRMA). The IRMA framework has been effectively operational in North America travel vehicles since 1997. It uses infrared sensors to distinguish and enrol the warm picture of the general population moving through the entryway. It just identifies temperature radiation when changes happen. In this manner it gets initiated when individuals are moving. It can effectively decide if a man is moving in or out of the entryway, therefore can monitor the number of individuals inside the room. This should be possible utilizing as it were one sensor mounted at the right point. The whole individuals tallying gear can be mounted inside a divider and is in this manner impenetrable to altering. It is a cost proficient and precise technique. Once the signs have been exchanged to checks in the analyser unit, they can be identified by the android application utilizing a basic Bluetooth transmission gadget such as Estimote signal.

CHALLENGES IN BLUETOOTH ATTENDANCE SYSTEM

The major challenges are enlisted below.

1. Reliability
2. Proxy attendance
3. Availability of mobile devices with Bluetooth facility
4. Institutional policies

CONCLUSION

The entire process saves a lot of time, precious resources like paper and saves the teacher's headache of maintaining all the records and submitting them to the concerned authorities.

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