
CONTACTLESS E-ATTENDANCE FOR ORGANIZATION

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ABSTRACT

Most institutions use sheets with student's ID numbers, names, surnames, and signs to track attendance in lectures, however this system has several drawbacks. e.g., Students can sign a proxy for their friends who do not attend the lectures and if the lecturers do not take the headcount and recheck the number of signatures with the number of students present in the class, then students who do not attend the lectures may be counted as they are in class. Furthermore, if the attendance sheet is misplaced, the lecturer may have difficulty determining which students do not properly attend the sessions. Because of these factors, as well as COVID-19, now is an excellent opportunity to implement a new solution. Our system is designed to track attendance using Bluetooth Low Energy (BLE) signals embedded in the BLE Beacon device and a BLE Scanner developed that catches the BLE signals and processes them to help determine whether the student is in the lecture or not.

Keywords: BLE, Ibeacon, Attendance, Database.

I. INTRODUCTION

The ability to track the location of people, vehicles, or goods is critical in any organized institution or event. Providing services based on location results in both improved services and financial gains. However, in applications where fine-grained location tracking is required, such as during organized events or buildings, standard location tracking services are insufficient. Such applications include student attendance tracking, employee arrival and departure tracking, and guest movement during various events. Collecting and managing such data can be a difficult and time-consuming task. For example, a significant number of universities still track student attendance manually, despite the fact that a plethora of systems propose to do so automatically. The problem of automatic student attendance tracking/recording is addressed in this paper. Several contrasting technologies, such as radio-frequency identification (RFID), BLE fingerprint matching, face recognition, and even speech recognition, have been widely used to automate the attendance management process. Although all the approaches are aimed at the same goal, their utility and complexity vary greatly. RFID-enabled attendance management systems identify individuals based on their RFID tag type ID card to automatically record attendance status. However, because they require specialized software, such systems are expensive. Furthermore, such a system would be unable to handle "loaned" or stolen identification cards. Significant research efforts have recently been devoted to the development of biometric data-based attendance management systems. Fingerprint matching, facial recognition, and speech recognition are some of the methods used to identify people. Due to the nature of the data obtained, such attendance systems, however, cause privacy problems. In addition, compared to other types of systems, the cost and inaccuracy rates are higher. The spread of digital technologies and Bluetooth technologies have rapidly increased with the emergence of mobile phones. We used BLE technology in our project for a variety of reasons, including their flexibility, popularity, etc. There has been a surge in interest in (smart) attendance management systems that use BLE beacons in recent years. Beacons can be used for proximity detection, which allows nearby objects to be tracked. This has been shown to be particularly beneficial indoors. Beacons are placed in rooms to emit a Bluetooth signal, which is subsequently picked up by a Bluetooth compatible device to record presence in attendance management systems based on BLE technology.

II. METHODOLOGY

Bluetooth Low Energy is the intelligent, cheap, and power-friendly version of Bluetooth wireless technology, to create wireless personal area networks. This system is designed keeping in mind that many BLE IDs can be scanned in an extremely low amount of time. So BLE pairing is removed from the system, and only the advertisement mechanism of BLE is used. Process for Automated Logging System esp32(As a Beacon) only advertises the data, this data is then read by the BLE Scanner, and it processes it for validation of the data and to acquire Universally Unique Identification (UUID) code embedded in the advertising data. The UUID in the

advertising data is used to identify the user of that BLE ID hence identifying the person found nearby. Then the BLE Scanner will send the acquired UUID along with the Time stamp, Date, Roll Number and Name of the Student to the server for performing necessary actions like marking attendance, entry log or exit log, etc.

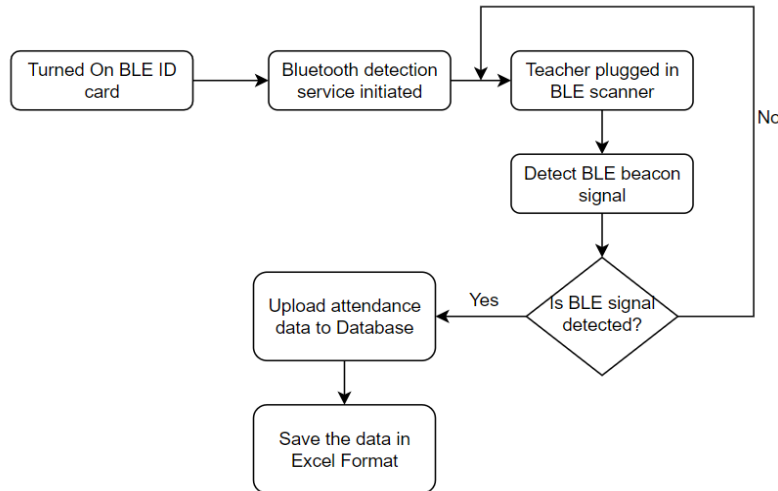


Figure 1: Flow Chart

III. MODELING AND ANALYSIS

- BLE ID Card

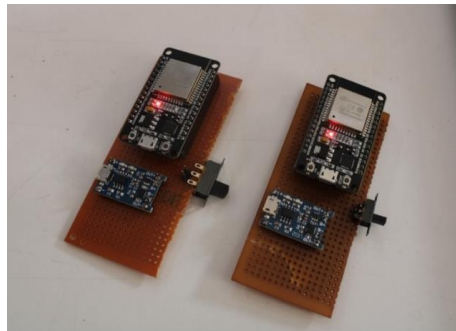


Figure 2: BLE ID

BLE ID Card is an electronic ID card that contains BLE. Each BLE ID Card has the capacity to hold an employee's or student's UUID (Universally Unique Identifier). This saved UUID will be wirelessly sent in the region to notify the BLE Scanner of its presence.

Every student will be required to carry a BLE ID card. Faculty will request that the student turn on their BLE ID so that they can track the student's attendance. As soon as their attendance is registered, students will switch off their IDs.

BLE ID Card is a BLE embedded ID Card, using ESP32 as BLE signal transmitter. It is battery powered with a push button to activate and deactivate its transmission. It also has a battery charging module, it can be charged with an adapter of 1Amps at 5Volts.

- BLE Scanner



Figure 3: BLE ID and Scanner

The BLE Scanner searches for any BLE ID Card within a specified radius. If a BLE ID Card is discovered, the BLE Scanner logs the ID Card user's location and time of detection. Its log marking process will be determined by its use of the capabilities that this system has to offer. BLE Scanner will be placed in a permanent location or provided to a class faculty member (handheld version). It can be engaged or always active depending on its usage for scanning adjacent BLE ID Cards and completing log marking processes. For example, in the event of a portable version, it may be used to track class attendance. The lecturer will have the option of activating the BLE Scanner to begin scanning in order to mark the attendance of the pupils in the class.

- **Database**

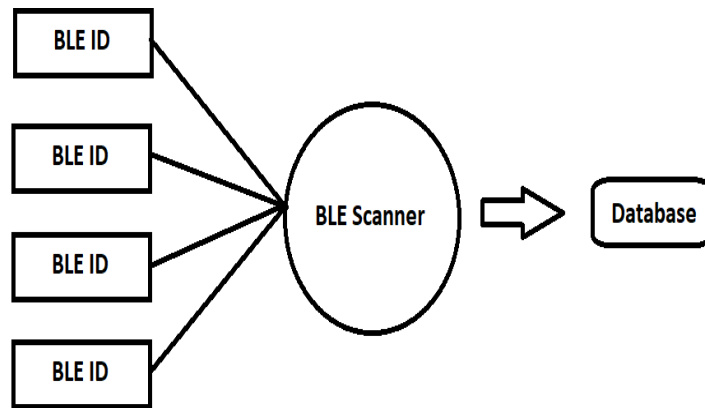


Figure 4: BLE ID and Scanner

We created a database to upload data, such as a student's attendance, to the server. The log time and date, as well as the student's name and roll number, will be posted. On the server, each class will have its own database.

IV. RESULTS AND DISCUSSION

We successfully created a BLE id using esp32, and these BLE ids will act as a transmitter. The name of the student is assigned to each an ID, and the student's Roll number is linked to the UUID (universally unique identifier). This BLE id will send the name as well as the UUID. We've also created a BLE scanner with eps32 that will serve as a receiver. It will look for a BLE id that is close by. The major goal of the BLE scanner will be to recognize the BLE id, extract the student's name and roll number, and send that information to the database. We have also taken care of the range i.e.; students must be inside the classroom to mark their attendance. If a student is absent from class, his or her attendance will not be recorded.

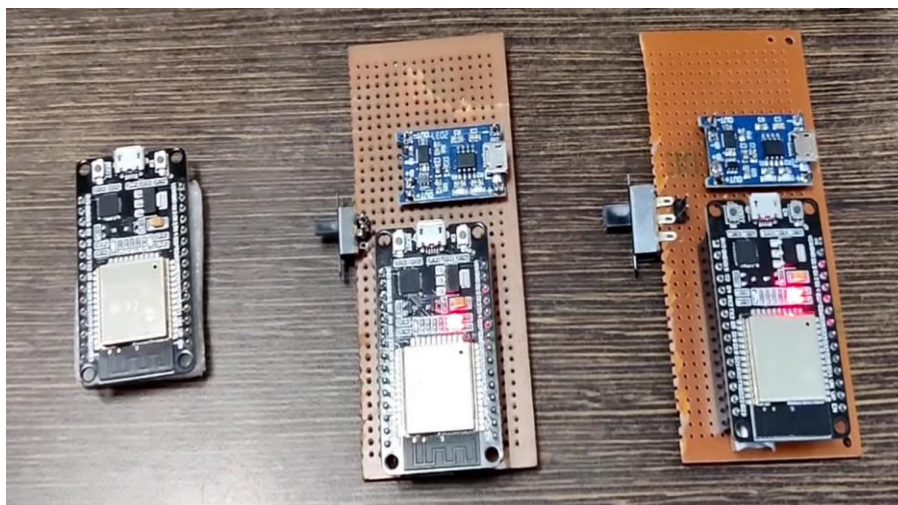


Figure 5: BLE ID and Scanner

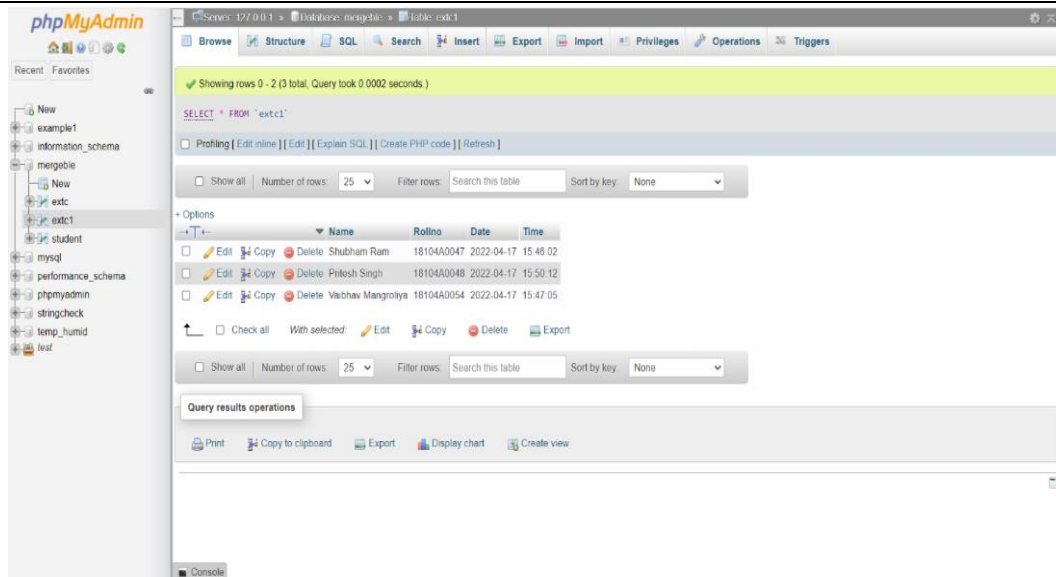


Figure 6: phpMyAdmin

The working of our project goes like this:

- The professor will instruct the student to activate the BLE ID.
- Students will activate their BLE ID
- The student will notify the professor to scan the BLE ID.
- Attendance will be recorded in the database automatically.
- The lecture will now begin in an orderly manner, without further ado.

V. CONCLUSION

World is changing into a network of devices and people, with BLE ID Card each individual will be able to connect to this network in a more unique and identical way. This system design is user friendly and overcomes almost every problem of a traditional logging system. In this project, we have aimed to create a new solution to the problem that we named as "Tracking the attendances in the courses". To be able to do that, we plan to use Bluetooth Low Energy (BLE) Beacon device. Main purpose of selecting the BLE Beacon device is that BLE Beacon device provides the most beneficial indoor positioning estimation across all the indoor positioning devices. The designed cards can log attendance in very less time and requires minimal or no human interaction for its operation. This system can be improved to not only track an employee or a student in an institution to a general area but with help of better antenna a localized positioning system can be created which would provide features that already exists in a more precise manner.

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