

Smart Attendance and Location Tracking using IoT

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Abstract—This paper presents a smart attendance and location tracking using IoT. Attendance system is used to track the attendance of particular person. The many systems for taking attendance has drawbacks, such as the traditional way has drawback in the data of attendance that list is hard to reuse, a biometric attendance system has drawback of the existence of human error such as a fingerprint scan are not acceptable, due to the condition of a wet finger, dirty. In this paper, we are using NFC tag with ID card for taking attendance. Also track the location of person. GPS are used to track outdoor and indoor location, but GPS not give high accuracy in indoor location. So, we are using Wi-Fi RTT technology, GPS methods for one-meter location accuracy.

Keywords---NFC Tag, NFC Reader, Wi-Fi RTT, GPS.

1. INTRODUCTION

Attendance system is a system that is used to track the attendance of a particular person and is applied in the industries, schools, universities or working places. The attendance rate is important because students are more likely to succeed in academics when they attend class consistently. It's difficult for the lecturer and the class to build their skill and progress if a large number no students are frequently absent.

The traditional way for taking attendance has drawbacks which is the data of the attendance list hard to reuse.

There are various types of attendance systems that are applied in different fields such as biometric attendance system with fingerprint, RFID, NFC attendance system has a very short transmission distance.

In this research will incorporate NFC technology and Wi-Fi RTT concept. NFC stands for Near Field Communication. NFC is a wireless short-range communication Technology(4cm) Communicate with two enable NFC devices using emitting the Radio waves. NFC device generate radio frequency in 13.56MHz spectrum. The principle of magnetic induction coupling is used to send and receive data within close proximity. It will use Active device and Passive device.

Active device-

Active device means External power supply required.

Passive device-

- does not required any external power supply.
- Powered by electromagnetic field of Active device. GPS are used to track outdoor and indoor location, but

GPS not give high accuracy in indoor location. So we are using Wi-Fi RTT technology for one meter location accuracy.

The Wi-Fi Round Trip Time (RTT) feature in Android 9 enables supporting devices to measure a distance to other supporting devices: whether they are Access Points or Wi-Fi Aware peers. This feature, built upon the IEEE 802.11mc protocol, enables apps to use enhanced location accuracy and awareness

Wi-Fi RTT and the related *Fine-Time Measurement* (FTM) capabilities are specified by the IEEE 802.11mc standard. Wi-Fi RTT requires the precise time measurement provided by FTM because it calculates the distance between two devices by measuring the time a packet takes to make a round trip between the devices and multiplying that time by the speed of light.

2. LITERATURE SURVEY

RFID is used to recognize the tags when its holders entered the place area, however photo-cells will help to determine if there are really person passed through system or not also help to determine direction. RFID system shows the good efficiency and performance and provides and advantageous method of attendance marking compare to the traditional method of attendance system [1]. Mobile attendance system with NFC and face authorization to add security feature using Raspberry Pi and store the data and cloud. Application is integrated with cloud-based web application. Parents can know their children do not skip lectures through the web application, for faculty staff can view student attendance report [10].

The design and experiment of incorporating the GPS and GSM network partitioning technology to deliver a location- based service for tracking and detecting human. In this study, GPS and GSM feature were utilized to emulate the tracking and detection process. The purpose of this study is to share this information with other

researcher and to foresee ways to improve the current processes hence the same study can be initiated and explored by others [3]. In the last 2 decades, tremendous efforts as well as significant progress have been made various aspects of mobility management in a wide variety of wireless networks, such cellular system, wireless internet, wireless LAN, GPS, Wi-Fi, Bluetooth technology, has further led to sophisticated mechanisms for location sensing and location-based services [11].

Access find location is used because GPS providers determine the location of user using satellites. For this, GPS coordinates are obtained and used for positioning. The GPS receiver on the smart phone receives signals forms the satellite. These signals are processed and the exact location is determined. It takes more time for response and causes delays in location determinations. Location accuracy is consistent with the accuracy of google maps, since the app uses the SDK from google maps that provides GPS users with satellite locations work better outdoors-direct sky/satellite view and communication going on as for network providers, network providers determine the location of users using cellular towers [4].

3. EXISTING SYSTEM

In current system attendance taken by manually data of attendance that list is hard to reuse, a biometric attendance system has limitations of the existence of human error such as a fingerprint scan are not acceptable, due to the condition of a wet finger, dirty, Also RFID are used for attendance. Currently, GPS and GSM technologies are used for location tracking which has certain limitation.

Limitation-

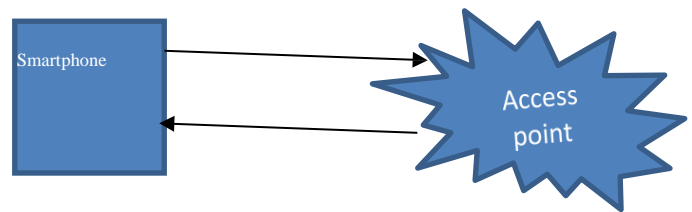
- Need to carry a backup map & direction.
- Sometimes you may Need a external power supply.
- GPS signals are not accurate due to some obstacles.
- Misuse of RFID card.
- Inaccuracy GPS devices rely upon receiving signals from at least 4 satellites.

4. PROPOSED SYSTEM

In the proposed system, we can take attendance using NFC so reduce paper usage and time efficiency. we use a NFC tag inbuilt in Identity-Card for students. By using this we will mark attendance of students. Attendance record of each student with the lecture is stored on server. The steps in the proposed system are as follows: -

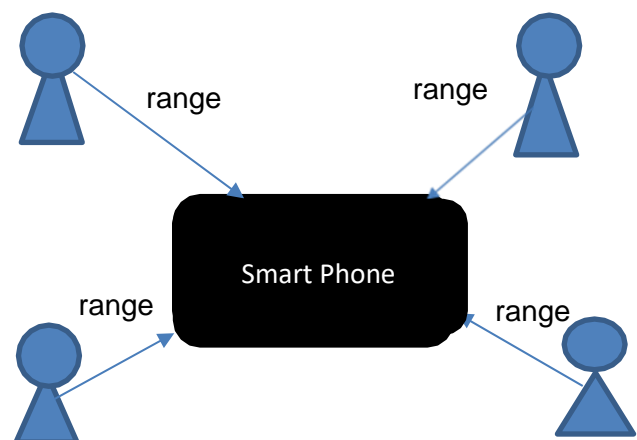
- Lecturer will login in the application using his/her username and password. After successful login lecturer will set class time and duration for the attendance record and lecturer can activates present student roll no.
- After that a student scans card then attendance is stored in database.
- As lecture ends the lecturer will close the application.

Wi-Fi RF Packet

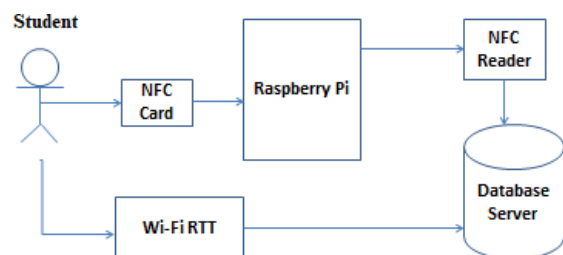


If student is not present in classroom, we can track the location of student in campus. we are use Wi-Fi RTT technology for 1-meter accuracy can be possible.

We can use the Wi-Fi location functionality provided by the Wi-Fi RTTAPI to measure the distance to nearby RTT capable Wi-Fi access points and peer Wi-Fi aware devices. **We required at least four ranges for better accuracy in WIFI RTT.**



If you measure the distance to three or more access points, you can use a multilateration algorithm to estimate the device position. The result is accurate within 1-2 meters.



System Architecture

5. ALGORITHM

- Step 1: Start.
- Step 2: Search standard Wi-Fi scan & discover bits which are RTT capable.
- Step 3: Start making request to a access point from mobile one of the range.
- Step 4: Access point Uses Ping-Pong protocol. (using FTM packet)
- Step 5: Calculate the total RTT of the phone & own Turnaround time basis on the timestamp of the access point.
- Step 6: $Distance = \frac{\text{turnaround time} \times \text{speed of light}}{2}$
- Step 7: End.

6. CONCLUSION

Here we conclude our system which is developed in IOT is presented. The system uses the NFC technology for attendance so reduce the amount of paper usage, eliminate the time and effort wasted in taking attendance and We can track the high accuracy indoor location up to the one-meter accuracy.

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