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An Android Application for Attendance Using Geofencing

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1. ABSTRACT

Tracking student attendance is an important part of education. This process can be tiring and time consuming. We believe that automation can be achieved by using the technology available in the learning infrastructure and users' smartphones. Today, smartphones can receive various types of signals from the air using radio frequency technology (Wi-Fi, Bluetooth, mobile phones, etc.). Additionally, the smartphone receives information from the transmitter and can measure the received power. We believe that these signals can be used in most tracking classes because they reveal the location of the user's device. The system is designed to allow students' classroom smartphones to generate "location proof" based on radio frequency fingerprints printed by their devices and used to verify their location. In this paper, we aim to establish robust and privacy-conscious engagement using Wi-Fi access in schools, including teachers and students learning on smartphones. Our system is unique because it requires no effort from the system user. It also protects privacy because the application server has no knowledge of the user's identity or class position. The author's goal is to create an Android application that can be used

to manage and track employee attendance. Research. The author uses UML (Unified Modeling Language) to design the application.
However, the development process is a spiral process that includes customer evaluation, planning, risk assessment, engineering, construction and disposal phases. Kodular framework and Airtable database were used to develop Android based attendance application. The result of the research is an Android attendance app that makes it easy for employees to participate and instantly track employee engagement using Android smartphones.

Key Words: Mobile, Android, Secure Attendance, GPS, Fingerprint, Locationbased service, time and attendance system, sending SMS.

2. INTRODUCTION

Nowadays, technology is advancing very rapidly. Especially the advancement of information technology science. . This can be seen everywhere in daily life, as it is common for Indonesian people to use technology to carry out their daily tasks. But it's still rare for employees to use technology in the workplace to assist with work or meet needs. Although traditional methods are used to study and collect necessary information, there are still many tasks that need to be done using technology. Android smartphones are a technological development that is increasingly used. Google developed the Android operating system, which is based on the Linux kernel and supports touch screens such as tablets and smartphones. Nearly all adults own and use Android phones that use the origin and location sharing system for communication, entertainment, shopping, transportation and location services. Android is open source; This means that the software created and developed is free to use, modify, manage and distribute. Due to the open nature of the technology industry, they are free to use operating systems themselves, without license or free of charge. Employee participation is related to discipline and affects the work of all employees and is very important for the company or institution to achieve its goals. Therefore, certain information needs to be collected to

track time and attendance so that work activities can be recorded accurately and promptly. Using smartphones as engagement and monitoring devices can easily lead to employee participation and other fraud. Record employees who are not on site, record participants, or record employees who leave the office after joining. Fingerprint integration, secure Android ID and GPS-based authentication can be used to secure the onboarding process. this also turns mobile engagement into mobile security engagement. BYOD (Bring Your Own Device) model allows employees to use their mobile phones as a tool in their daily work, while also spending time and participation. It solves the queuing problem when recording employee attendance and reduces the company's cost of purchasing attendance machines. Monitoring employees during working hours can be done by using smartphones as engagement devices.

3. LITERATURE SURVEY

• 1.Paper Name: Multifactor Authentication on Mobile Secure Attendance System Author: Subroto Budhi Utomo,Bayu Hendradjaya
Abstract : — BYOD (Bring Your Own Device) trends allows employees to use the smartphone as a tool in everyday work and also as an attendance device. The security of employee attendance system is important to ensure that employees do not commit fraud in recording attendance and when monitoring activities at working hours. In this paper, we propose a combination of fingerprint, secure android ID, and GPS as authentication factors, also addition of anti emulator and anti fake location module turn Mobile Attendance System into Mobile Secure Attendance System. Testing based on scenarios that have been adapted to various possible frauds is done to prove whether the system can minimize the occurrence of fraud in attendance recording and monitoring of employee activities.

2. Paper Name:Privacy-Preserving Zeroeffort Class Attendance Tracking System Author:Aidan Shene,Jake Aldridge
Abstract : : — Student attendance tracking is a vital process in education. This process can be tiring and time-consuming. We believe it is possible to automate it using technologies available in the educational infrastructure and user smartphones. Today smartphones can sense several types of signals over the air using radio frequency technologies (e.g., Wi-Fi, Bluetooth, cellular signals, etc.). Furthermore, smartphones receive broadcast messages from transmitting entities and can measure the received signal strength. We believe that these signals can be utilized in the context of classroom attendance tracking, primarily because they can indicate the location of a user's device. The proposed system aims to have student smartphones in the classroom generate "location proofs" based on the radio frequency fingerprints scanned by their devices, which are later used to verify their locations. In this paper, we propose the utilization of Wi-Fi access points in buildings on school campuses in conjunction with the instructor and student smartphones to build a zero effort and privacy-preserving attendance tracking system. Our system is unique as it does not require any effort from users in the system. Moreover, it is privacy preserving, as the App server has no information about user identities nor class locations.

3.Paper Name: Smart Multiple Attendance System through Single Image Author:1st Maria Ali,2nd Hafiz Usman Zahoor Description : —Attendance marking is a common activity to keep track of the presence of students daily in all academic institutions at all grades. Traditional approaches for marking attendance were manual. These approaches are accurate without a chance of marking fake attendance but these are time-consuming and laborsome for a large number of students. To overcome the drawbacks of manual systems, automated systems are developed using radio frequency identification-based scanning, fingerprint scanning, Face-recognition, and Iris scanning based biometric systems. Each system has its pros and cons. Besides, all of these systems suffer from the limitation of human intervention to mark the attendance one by one at a time. To overcome the limitations of existing manual and automated attendance systems, in this work, we propose a robust and efficient attendance marking system from a single group image using face detection and recognition algorithms. In this system, a group image is captured from a highresolution camera mounted at a fixed location to capture the group image for all the students sitting in a classroom. Next, the face images are extracted from the group image using a popular Viola-Jones algorithm followed by recognition using a convolutional neural network trained on the face database of students. We tested our system for different types of group images and types of databases. Our experimental results show that the proposed framework outperforms other attendance marking systems in terms of efficiency and ease of use and

implementation. The proposed system is an autonomous attendance system that requires less human-machine interaction, making it possible to easily incorporate in a smart classroom.

4.Paper Name:Student Absenteeism Monitoring System Using Bluetooth Smart Location-Based Technique Author: : Siti Khadijah Baharin,Zalikha Zulkifli Description :Conventional method of recording students' attendance is still being used in Universiti Teknologi Perak Tapah Campus. The method used is by recording students' attendance in attendance sheets which is an inefficient way to monitoring students' attendance. The absenteeism of students without valid excuses during lectures appears to be a serious problem as it falls under the term of truancy. Once the absenteeism percentage reaches the students will receive a notification letter issued by the Academic Affairs Division as the first warning. The last warning will be issued when the absenteeism percentage reaches where the students might be barred from sitting the final examination. Therefore, the "Student Absenteeism Monitoring System Using Bluetooth Smart Location-Based Technique" is developed specifically for lecturers and students of the Tapah Campus to automatically monitor students' attendance. The objective of this project is to determine the percentage of students' absenteeism to prevent students from getting a status. status is a situation where a student is being barred from sitting the final examination. The system was evaluated based on functionality, usability efficiency, and user acceptance test. The result from evaluations indicates that most of the users have good experience in using the system.

4. AIM & OBJECTIVES

This prevents employees from working regularly because they are perceived as having time. Attendance tracking ensures employees are paid accurately. Employee engagement data also provides valuable information about productivity levels and overall business performance. Attendance management prevents employee time theft by tracking employees' working hours, check-in and check-out times, holidays, and holidays. There are a variety of ways to monitor employee attendance, from 15 hand-printed cards to biometric devices to time and attendance management.

5. SYSTEM ARCHITECTURE

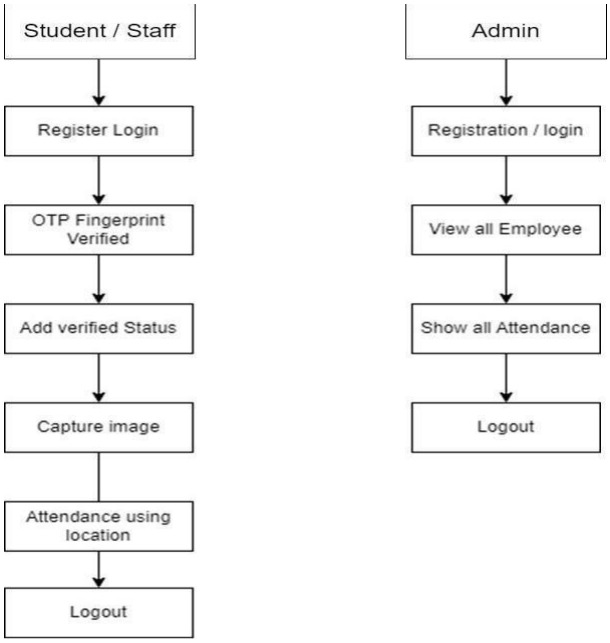


Fig : system architechure of attendance using geofencing

6. LIBRARIES AND SERVICES USED

1. Android API 34, extension level 7 Platform: This external library provides the core functionality and features necessary for developing Android applications. API level 34 corresponds to the Android version (e.g., Android 12), and extension level 7 represents additional updates and enhancements. It includes essential components such as UI frameworks, system services, and APIs for accessing device hardware and software features.

2. jbr-17: The "jbr-17" library likely refers to JetBrains Runtime 17, which is a Java Runtime Environment (JRE) maintained and distributed by JetBrains. It provides a runtime environment for running Javabased applications on Android devices. This library ensures compatibility and performance optimizations for Java applications running on Android Studio.

3. Gradle: Gradle is a build automation tool used for managing dependencies, building, and packaging Android applications. It simplifies the process of integrating external libraries, managing project configurations, and automating tasks such as compilation and packaging. Gradle scripts define how the project is built and specify dependencies on external libraries.

4. Script: This term is generic and could refer to various scripts used within the project. Scripts in Android Studio projects can perform various tasks such as automating build processes, configuring project settings, or executing custom actions. These scripts can be written in languages like Groovy or Kotlin and are often used to automate repetitive tasks or customize the build process to suit project requirements.

5. Firebase: Firebase is a comprehensive platform provided by Google for mobile and web app development. It includes several libraries for features like Realtime Database, Authentication, Cloud Firestore, Cloud Messaging, and more.

7. RESULTS

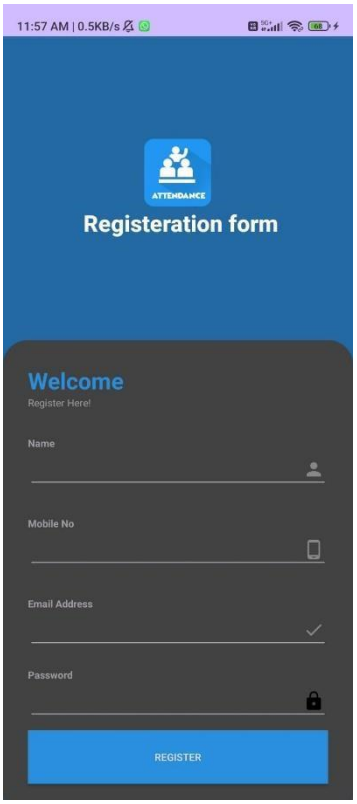
I. Student Attendance App Logo

The logo prominently features the word **"Attendance"** written in a clear and easily readable font. This highlights the primary function of the app, which is to manage attendance. The central element of the logo is the depiction of three persons, symbolizing the involvement of multiple individuals, such as employees or students, in the attendance tracking process. The inclusion of three persons may also suggest collaboration and teamwork. Surrounding the three persons is a blue color square icon. The square shape adds a sense of stability and structure to the logo, while the blue color conveys qualities such as trust, professionalism, and reliability.

II. Login Page

The main components of the login page are the input fields for email address and password. Users are required to enter their registered email address and password to log in to their accounts. Users have the option to mark the "Remember Me" checkbox, allowing the app to remember their login credentials for future sessions. This feature enhances user convenience by automatically filling in the login information during subsequent visits. In case users forget their passwords, there is a **"Forgot Password"** link provided on the login page. Clicking on this link redirects users to a password recovery page where they can reset their passwords through a secure verification process. Users who do not have an existing account can access the registration page by selecting the "Register" option. This directs them to a registration form where they can sign up for a new account by providing necessary details such as name, email address, and password.

III. Registration Page



The registration form starts with a welcoming message, such as "Welcome" or **"Register Here,"** to greet users and guide them through the registration process. The registration form includes several input fields where users can enter their personal information:

Name: Users provide their full name.

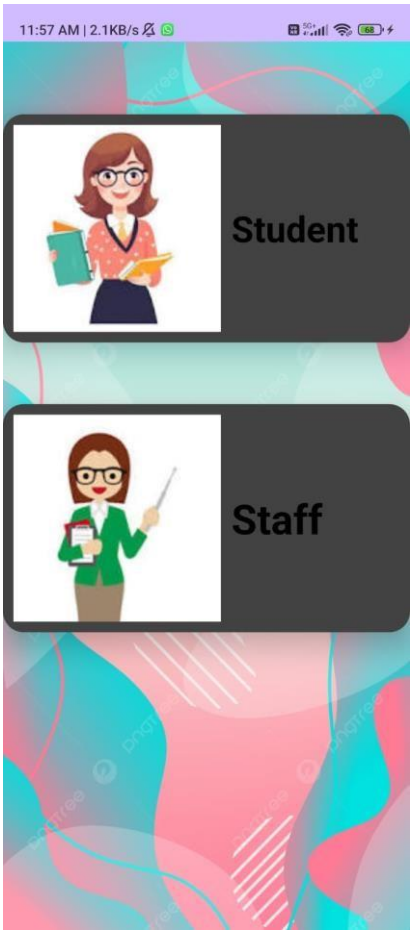
Mobile Number: Users enter their mobile **phone number**.

Email Address: Users input their email address, which serves as their unique identifier for the account.

Password: Users create a password to secure their account.

A prominent **"Register"** button is displayed at the bottom of the form. Users click this button to submit their registration details and create their account. After successfully submitting the registration form, users receive a confirmation message indicating that their registration was successful. This message may display on the same page or redirect users to a confirmation page.

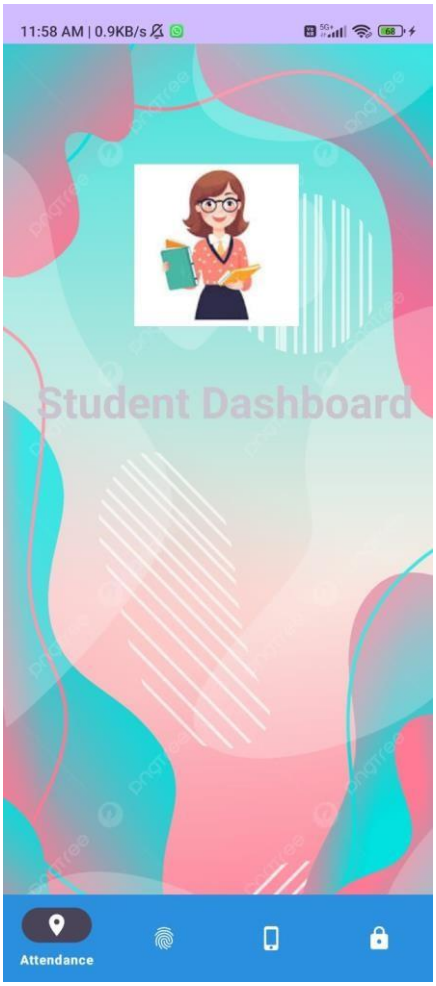
IV. Main Interface



The main interface prominently displays a button labeled **"Student"** accompanied by an image representing a student or a school-related icon. Students click this button to access features and functionalities tailored to their needs, such as viewing attendance records, submitting attendance, or accessing educational resources.

Similarly, the main interface features a button labeled **"Staff"** accompanied by an image representing a staff member, such as a teacher or an administrative professional. Staff members click this button to access features and functionalities specific to their role, such as managing attendance records, creating attendance reports, or accessing administrative tools.

V. Student Dashboard



Location Attendance Button:
This button allows students to mark their attendance based on their current location. Upon clicking this button, the app retrieves the student's current location using GPS technology and records their attendance accordingly. This feature ensures accurate attendance tracking based on the student's physical presence. Fingerprint Verification Button: The fingerprint verification button provides an alternative method for students to mark their attendance securely. By clicking this button, students can use their registered fingerprints to verify their identity and record their attendance. This feature adds an extra layer of security and prevents unauthorized attendance marking.

Mobile Number OTP Verification Button:

This button enables students to verify their attendance using their mobile phone numbers and a one-time password (OTP). Upon clicking this button, students receive an OTP via SMS to their registered mobile numbers. They then enter the OTP in the app to confirm their attendance. This method ensures secure and reliable attendance verification, particularly for remote or off-campus attendance.

Log Out Button:

The log out button allows students to securely log out of their accounts when they have finished using the app. Clicking this button terminates the current session and returns the user to the login screen, ensuring the privacy and security of the student's account information.

VI. Teacher Dashboard

Show Attendance:

This button allows teachers to view attendance records for their classes. Upon clicking this button, the app displays a list or summary of attendance records, showing details such as date, time, and student names. Teachers can use this information to monitor attendance trends, identify patterns, and track student participation.

Show Verification:

The **"Show Verification"** button enables teachers to access verification data related to attendance marking. This feature may include information about the methods used for attendance verification, such as location-based attendance, fingerprint verification, or OTP verification. Teachers can review verification logs to ensure the integrity and accuracy of attendance records.

Logout:

The logout button allows teachers to securely log out of their accounts when they have finished using the app. Clicking this button terminates the current session and returns the user to the login screen, ensuring the privacy and security of the teacher's account information.

12. SYSTEM REQUIREMENTS

Software

- **IDE : Spyder**
- **Coding Language : Kotlin**
- **Operating System : Windows 10**

Hardware

- **Processor : Pentium-IV**
- **Speed : 1.1 GHz**
- **RAM :512 MB(min)**
- **Hard Disk : 40 GB**
- **Key Board : Standard Windows Keyboard**
- **Mouse : Two or Three Button Mouse**
- **Monitor : LCD/LED**

13. CONCLUSION

We developed an intelligent single output, multioutput algorithm based on the facial recognition algorithm. This system eliminates the problems encountered when using traditional methods. Since this process takes a long time and requires everyone to have access to the system to mark their participation. In this project, we demonstrate an automatic face polling system that can be attended using a camera in front of the room, eliminating the above challenges, taking photos of entire classes in real time and learning to detect faces in photos. and crop the image, then compare it with the database. When a student is recognized, their award is marked. In order to improve the performance of the system, this process is repeated several times and the final results are saved in the Excel archive. This auto engagement saves students valuable learning time because it runs in the background and does not require teacher or student interaction. The system also reduces manual work and verification burden on teachers and increases security.

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