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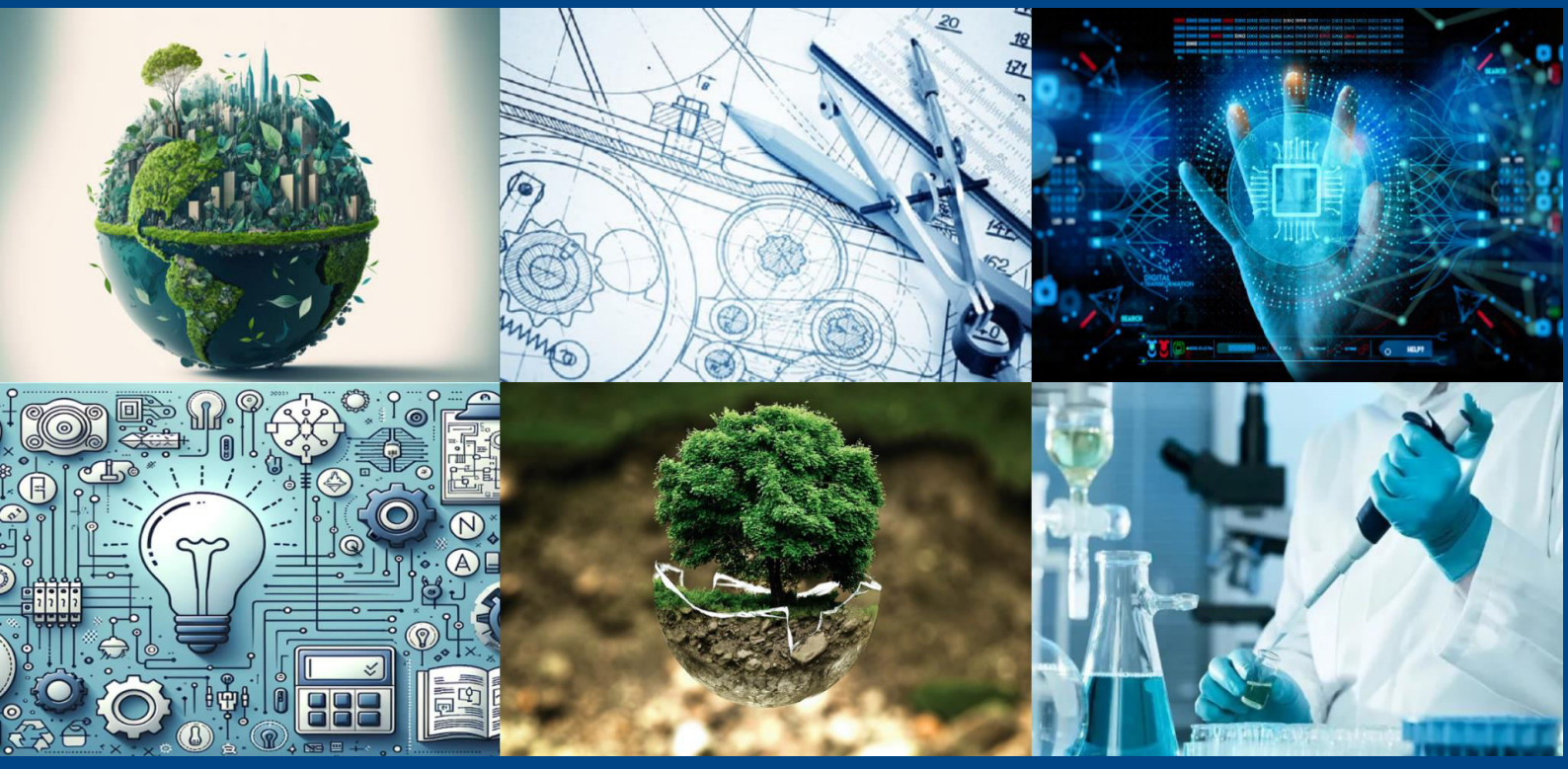

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QR Code Attendance System Android Application Using Kotlin

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ABSTRACT: The objective of this project is to develop a QR Code-based attendance system using an Android application built with Kotlin. Traditional attendance systems are time-consuming, prone to errors, and require manual effort. This system automates attendance marking by scanning QR codes generated for each session or student. The application uses mobile camera integration to scan QR codes and records attendance data in a centralized database in real-time. The system ensures accuracy, reduces proxy attendance, and improves efficiency in educational institutions. The application is user-friendly and designed to support real-time data synchronization, secure authentication, and easy report generation.

KEYWORDS: QR Code, Attendance System, Android Application, Kotlin, Automation, Mobile Application

I. INTRODUCTION

Attendance management is important for academic institutions, as it helps track student participation, discipline, and academic performance. Traditional attendance systems, such as manual registers and roll calls, are popular, but they present several limitations. These methods are time-consuming, prone to human errors, and can easily be manipulated through proxy attendance. Maintaining and analyzing attendance records manually also becomes difficult as the number of students increases.

With the rapid advancement of mobile technology and digital transformation, it has become necessary to adopt automated and efficient attendance management systems. Modern solutions aim to limit manual intervention, improve correctness, and provide real-time data access. Among these solutions, QR (Quick Response) code-based systems have emerged as a simple, cost-effective, and reliable approach for attendance tracking.

A QR code is a machine-readable two-dimensional code used to store data, which can be accessed using a smartphone scanner. camera. In a QR code-based attendance system, a unique QR code is generated for each class or session. Students scan the QR code using a mobile application, and their attendance is recorded instantly in a centralized database. This method significantly reduces the time required for attendance marking and minimizes the chances of proxy attendance.

The development of Android applications using Kotlin has further enhanced the efficiency of such systems. Kotlin is a modern, concise, and secure programming language officially supported by Google for Android development. It offers improved performance, reduced boilerplate code, and better safety features compared to traditional Java-based applications.

II. LITERATURE SURVEY

1.**Title**: QR Code-Based Smart Attendance System (2025)
Authors: Sharma R., Gupta P.
Abstract: This paper presents a QR code-based attendance system to automate student attendance tracking. The system reduces manual effort and minimizes errors by using mobile scanning technology. It also improves efficiency and ensures real-time attendance recording.

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2.**Title**: Mobile-Based Attendance System Using Android Application (2026)
Authors: Kumar S., Reddy V.
Abstract: This study focuses on developing an Android-based attendance system using mobile devices. It highlights how smartphones can be used for real-time attendance marking and data storage. The system improves accessibility and reduces dependency on traditional methods.

3. **Title**: Secure Attendance Management Using QR Code Technology (2025)
Authors: Patel A., Singh K.
Abstract: This research proposes a secure attendance system using QR codes to prevent proxy attendance. The system validates QR codes before marking attendance to ensure authenticity. It enhances data security and reliability in attendance tracking.

4. **Title**: Cloud-Based Smart Attendance System Using Mobile Applications (2024)
Authors: Reddy K., Verma S.
Abstract: This paper discusses a cloud-based attendance system integrated with mobile applications. It enables real-time synchronization of attendance data across platforms. The system supports scalability and easy data access for institutions.

5.**Title**: **Title:** Automated Attendance System Using QR and Firebase (2023)
Authors: Khan M., Ali J.
Abstract: This study demonstrates the use of QR codes and Firebase database for attendance automation. The system allows instant data storage and retrieval using cloud technology. It ensures efficient and accurate attendance management.

III. METHODOLOGY

Existing Problem
Traditional attendance systems rely on manual registers and roll calls, which are time-consuming and prone to human errors. They allow proxy attendance and make record management difficult. Biometric systems are costly and require maintenance. Additionally, lack of real-time data access and limited automation reduces efficiency in managing student attendance.

Proposed Solution
The proposed system is a QR code-based attendance management application implemented in Kotlin for Android devices. In this system, faculty members generate a unique QR code for each class session. Students scan the QR code using the mobile application to mark their attendance. The system verifies the scanned data to ensure authenticity and prevents proxy attendance. Once validated, attendance is automatically recorded and stored in a centralized database in real time. This approach simplifies tasks, reduces inaccuracies, and enhances efficiency. Additionally, the system allows easy report generation and secure data management for better monitoring.

IV. SYSTEM DESIGN

The system layout of the QR code attendance system focuses on creating a clear, efficient, and accessible process for managing attendance. The system begins with user authentication, where both faculty and students log into the Android application developed using Kotlin. After successful login, the faculty generates a unique QR code for each class session. This QR code contains encoded information such as class ID, date, and time. The system further enables viewing attendance records and generating reports, ensuring efficient data management and easy access.

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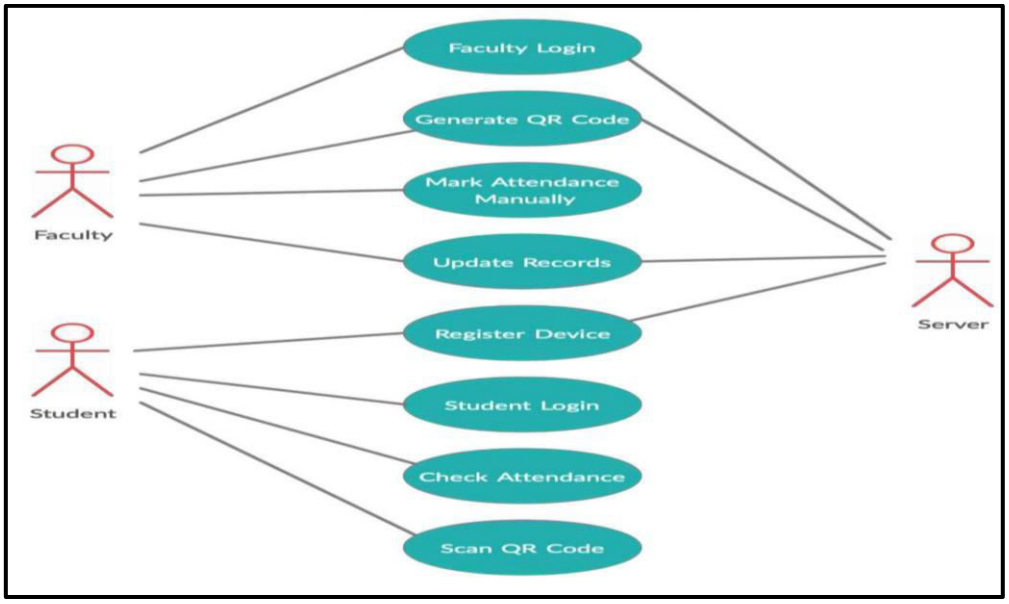

Fig 1: System Design of QR Code Attendance System

V. SYSTEM ARCHITECTURE DESIGN

The system architecture of the QR code attendance system is designed to maintain effective communication among various components of the application. It consists of the user interface, QR code module, backend server, and database. The user interface is an Android application developed using Kotlin, which allows both faculty and students to engage with the system through login and dashboard features. The QR code module executes generating unique QR codes for each session and scanning them using the mobile camera. Once scanned, the data is sent to the backend server, where it is processed and validated to ensure authenticity and prevent duplicate entries. After validation, the attendance data is securely stored inside the database. The application also allows retrieval of attendance records and report generation, providing efficient and reliable attendance management for institutions. Additionally, the system includes an authentication module to ensure that only authorized users can access the application. A timestamp mechanism is used to restrict QR code usage within a specific time frame. The backend can be interfaced with cloud services such as Firebase for real-time synchronization. Error control strategies are integrated to manage invalid scans or network issues.

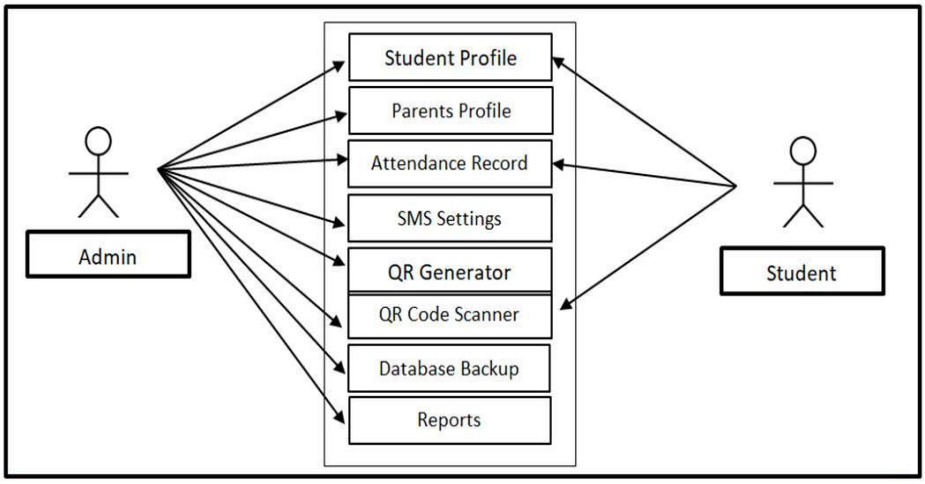

Fig 2: QR Code Attendance System Architecture

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VI. IMPLEMENTATION

The QR Code Attendance System is implemented as an Android application using Kotlin in Android Studio. The application provides a simple and user-friendly interface for both students and faculty members. It begins with a secure login system that grants access exclusively to authorized users can access the application. Faculty members generate a unique QR code for each class session, which includes details such as class ID, date, and time. Students use the mobile application to scan the QR code through the device camera. The scanning functionality is implemented using QR code libraries integrated into the app. Once scanned, the data is sent to the backend for validation. The system verifies whether the QR code is valid and checks for duplicate or unauthorized entries to prevent misuse. After successful validation, attendance is automatically recorded.

VII. RESULTS AND DISCUSSION

The results show that the system significantly reduces the time required for attendance compared to traditional methods such as roll calls or manual registers. It also minimizes human errors and ensures accurate data recording. One of the key advantages observed is the prevention of proxy attendance, as the system validates each scan based on session details and timestamps. The integration with a real-time database such as Firebase allows immediate data storage and retrieval, making it easy for faculty to access attendance records and generate reports. The system performed reliably under normal network conditions, while slight delays were detected during poor connectivity.

Overall, the discussion highlights that the QR code-based system is a fast, reliable, and cost-effective solution. It improves efficiency, enhances transparency, and provides a modern approach to attendance management in educational institutions.

VIII. CONCLUSION

The QR Code Attendance System developed using Kotlin provides an efficient and and a computerized method for maintaining student attendance. The application eliminates manual errors, reduces time consumption, and prevents proxy attendance through secure QR code validation. Integration with a real-time database ensures accurate and instant data storage and retrieval. The application is user-friendly, cost-effective, and suitable for modern educational institutions. Overall, the project demonstrates the way mobile technology improves traditional processes. Future enhancements such as GPS tracking, facial recognition, and cloud analytics can further enhance system performance and scalability.

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