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QR Code Attendance System

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ABSTRACT: In today's educational environment, taking attendance using traditional methods like calling names or using paper registers is slow, difficult to manage, and can lead to mistakes such as proxy attendance. In order to address these issues, this study presents a QR Code-Based Smart Attendance System, developed as an Android application using Kotlin. In this system, teachers generate a unique QR code for each class session. This QR code is valid only for a short time. Students can use their phones to scan the QR code to mark their attendance instantly. This makes the process quick, easy, and more reliable. The application is designed using modern Android development techniques such as MVVM architecture, Room Database for storing data, and QR code technology for attendance marking. Additionally, it has security measures such like time limits and duplicate checks, which help prevent fake or repeated attendance entries.

KEYWORDS: Android Application, Kotlin, Attendance Management, QR Code Generation, MVVM Architecture, Room Database, Automation, Anti-Proxy Attendance, Offline Data Storage, Educational Technology, Mobile App Development.

I. INTRODUCTION

Attendance management plays a very important role in educational institutions because it helps track student participation, discipline, and academic performance. Teachers use attendance records to monitor student regularity and ensure proper classroom engagement. However, traditional methods such as calling out names or maintaining paper registers are not efficient. These methods take a lot of time, especially in large classrooms, and can interrupt teaching time. In addition, manual attendance systems are prone to several problems. Human mistake might happen when attendance, and records can be misplaced or damaged. One of the major issues is proxy attendance, in which a single student attendance for another, reducing the reliability of the system. These limitations highlight the need for a more advanced and automated solution.

With the rapid development of smartphones and mobile applications, digital solutions are now practical and accessible. Almost every student today has access to a smartphone, making it easier to implement mobile-based systems. Using this advantage, a smart attendance system can be developed that is faster, more accurate, and secure compared to traditional methods. This paper presents a QR Code-Based Attendance System, developed as an Android application using Kotlin. In this system, teachers generate a unique QR code for each class session. This QR code is displayed to students, and they scan it using their mobile devices to record their attendance instantly. This eliminates the need for manual entry and significantly reduces time consumption.

The system includes important validation features to ensure security and reliability. Each QR code is valid only for a limited time, which prevents misuse of old codes. The system also checks for duplicate entries, that each student can mark attendance only once per session. These features effectively reduce the chances of proxy attendance and improve the accuracy of records.

II. SYSTEM MODEL AND ASSUMPTIONS

The QR Code Attendance System is a simple mobile application that helps teachers and students manage attendance easily. In this system, the teacher opens the app and creates a QR code for each class. This QR code is shown to all students and is valid only for a few minutes. Students open the app on their phones and scan the QR code using the camera. After scanning, the system checks whether the QR code is still valid and also makes sure that the student has not already marked attendance for the same class. If everything is correct, the student's attendance is recorded and saved in the app. The system is designed in a clear and organized way so that it works smoothly without confusion. All attendance data is stored safely inside the mobile device using a local database, so there is no need for an internet connection. This makes the system fast and reliable.

It is assumed that both teachers and students have Android smartphones with a working camera and the application installed. It is also assumed that students scan the QR code within the given time and do not try to misuse the system. The system also assumes that the device is functioning properly . the system provides a simple, fast, and secure way to take attendance without using paper or manual methods.

III. EFFICIENT COMMUNICATION

The QR Code Attendance System makes communication between teachers and students very smooth and simple. In the traditional method, attendance takes a long time because the teacher has to call each student's name, and students must respond one by one. This can create noise, confusion, and sometimes mistakes. In contrast, this system uses a QR code, which allows all students to mark their attendance at the same time by simply scanning it with their phones.

This method reduces communication gaps because everything happens quickly and clearly. Students get immediate confirmation on their screen after scanning, so they know their attendance is successfully recorded. There's no need to ask the teacher again or worry about whether their name was marked or not. This builds trust and clarity in the process. For teachers, the system provides real-time updates. They can instantly see number of students who have marked their attendance, which helps them manage the class better and save valuable teaching time. There is no need to manually count or verify attendance later. Another important point is that the system works offline, so there are no communication delays due to poor internet connection. The app is designed to be simple and user-friendly, so both teachers and students can use it easily without special training. The QR Code Attendance System improves communication by making it faster, clearer, and more reliable. It reduces confusion, saves time, and ensures that both teachers and students have a smooth and efficient attendance experience.

IV. SECURITY

Security is very important in any attendance system to make sure the records are correct and no one can cheat. The QR Code Attendance System includes several simple but effective security features to prevent misuse like proxy attendance. Each QR code generated by the teacher is unique for every class session and is valid only for a short time . This means students cannot use an old QR code later to mark attendance.

1. Time-Limited QR Code :

Each QR code generated by the teacher is valid only for a short time . After that, the code expires and cannot be used again.

2. Unique QR Code for Each Session

A new and unique QR code is created for every class session. This ensures that attendance is recorded only for that specific class and avoids confusion or misuse.

3. Duplicate Entry Prevention

The system checks if a student has already marked attendance. If the student tries to scan the QR code again, the system will not allow it. This prevents multiple attendance entries for the same session.

4. Prevention of Proxy Attendance

Since students must physically scan the QR coding with their own gadget within a limited time, it becomes difficult for one student to mark attendance for another. This reduces proxy attendance.

5. Secure Data Storage

All attendance data is stored safely in the mobile device using a local database (Room Database). This keeps the data protected and lowers the danger of data loss or unauthorized access.

6. App-Based Access Control

Only users who have the application installed can mark attendance. This guarantees that unapproved users cannot access or modify attendance records.

V. RESULT AND DISCUSSION

The QR Code Attendance System was tested on both Android emulator and real mobile devices, and the results show that it works smoothly, quickly, and accurately in real classroom conditions. The teacher can generate a QR code instantly, and students are able to scan it within a few seconds, which makes the attendance process much faster compared to traditional methods like roll calls. The system successfully records attendance in the local database and ensures that each student can mark attendance only once by preventing duplicate entries. It also checks whether the QR code is still valid and blocks expired codes, which helps in avoiding misuse. Teachers can see the students in total present in real time, making it easier to manage the class and save valuable teaching time. The system reduces human

errors and eliminates proxy attendance by using time-based validation and secure scanning. Since the application works offline, it performs reliably even without internet connection.

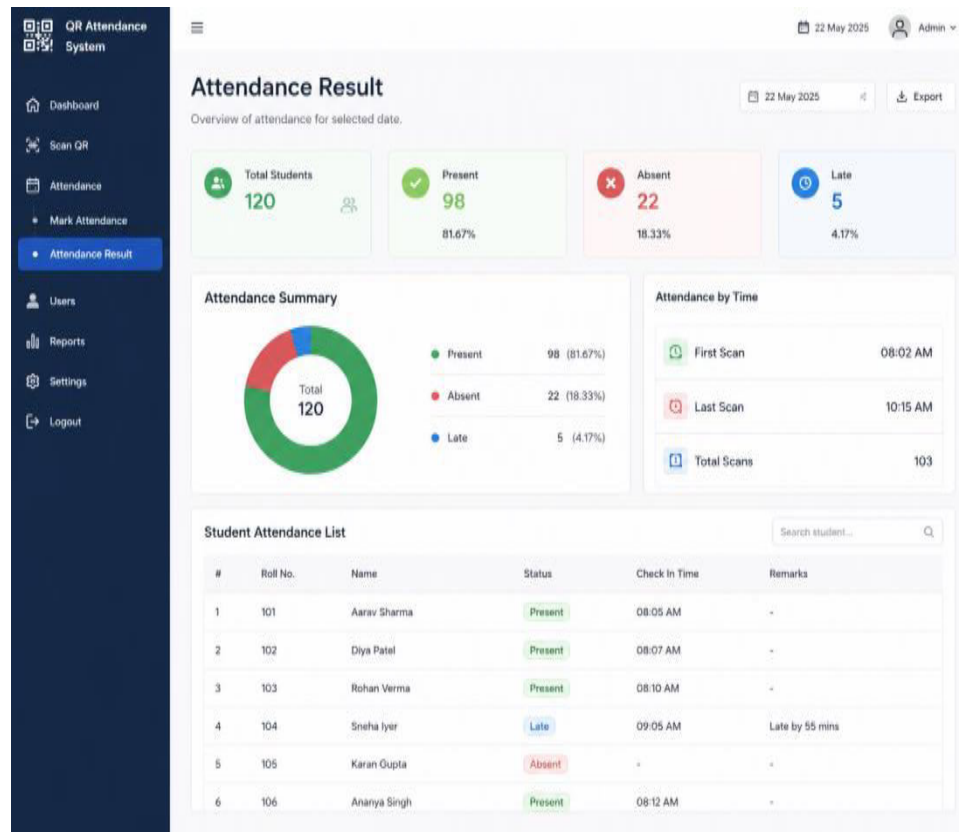


Fig. 1: Dashbord

VI. CONCLUSION

The QR Code Attendance System provides a smart and effective solution to replace traditional attendance methods. It makes the attendance process faster, easier, and more accurate by using QR code technology. Teachers can generate QR codes quickly, and Students are able to record their attendance in seconds by scanning them. The system reduces manual work, saves classroom time, and prevents common problems like proxy attendance and human errors. With features like time-limited QR codes and duplicate prevention, the system ensures secure and reliable attendance records. Since it works offline, it is useful even in areas without internet connectivity

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