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Barcode Hadir Mobile Application

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KEYWORDS

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Google Sheets

ABSTRACT

The Class Attendance mobile app using barcodes introduces a modern, efficient, and fast method for recording attendance. This project aims to minimize paper usage and help students maintain focus during class by eliminating the need to manually sign attendance sheets. With this system, lecturers no longer need to carry physical attendance records. Instead, the barcode system enables the collection of attendance data using a smartphone, such as an Android device. All user and student information are securely stored within the app, managed by the administration. Lecturers simply scan barcodes on student matric cards to mark attendance, either at the beginning or end of class. The project successfully achieves its primary goal: to record student attendance through barcode scanning. Scanned attendance data is automatically stored in Google Sheets for easy access and tracking. Each student's matric card features a unique barcode, serving as verifiable proof of their class attendance.

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1.0 INTRODUCTION

In this era of technology smartphones play a significant role in our day to life. Nowadays smartphones can solve most of the problems very quickly and easily. It has made life of every person simple and easier with the different social apps, commercial apps, problem solving apps, apps for education and marketing etc. The usage of mobile attendance devices helps colleges waste less time and effort when taking attendance. To save paperwork and safeguard data, our research focuses on developing a mobile attendance system using MIT App Inventor 2 and a database [1]. Followed by technology, the project proposed a mobile app that will handle a problem for recording the attendance. It also focused on reducing fake attendance and avoid using any sheet of paper as an attendance record. The purpose system is a couple of two applications: one for scanning the barcode by entering the student details and second application for taking the attendance and generate into CSV or XLS format. Lecturers will need to scan the barcode on the student's matrix card to confirm their attendance [6].

The problem statement is lecturers need to bring manual attendance for students to write down their signature. Before that, they need to print out the list name of students that have already registered for the subject. In case lectures forget to bring the sheet, students were not able to prove their attendance. The system was not efficient and required more time to pass the attendance sheet. Meanwhile in the class, students cannot focus on their study by passing the attendance sheet to make sure they are all marked.

The main objective of this project is to develop barcode class attendance mobile apps. This project will be developed using MIT Application which is the main thing to build the scanner for barcode. It would reduce time for lecturers to manually mark attendance and avoid their headache of maintaining the register since everything would be stored safely in database. Lecturers can download the record of attendance form Google Sheets.

2.0 LITERATURE REVIEW

2.1 Previous work

This part provides a brief overview of related work of class attendance mobile apps. Lengkong, (2019) proposed Implementation of Google Apps and Mit App Inventor on Android Based Real Time Attendance. The method that they use is RFID or NFC card and using barcode scanning techniques. Make an Android operating system application that can be accessed later using a smartphone equipped with the student ID card barcode scanning feature as a measure of attendance for the purpose of generating a report, automatic incorporation into the system. The prototyping method is the research model or methodology used. So that system development takes less time, prototyping design models are created faster. The result of this application was difficult to read the card because it starts to fade or erased. The advantages that we found from this project is the design of matrix card would never give a problem with the barcode that cannot easily erased, and it is suitable for long- term use [2].

Siti et. al, (2019) proposed The Design and Implementation of Student Attendance Tracking System Using QR Code Card prosed. The development of a proposed system's design and execution using Google Drive, Google Form, Google Sheet, Notepad, and Google Sheet's QR Code Generator Add-ons. To verify their attendance during or at the start of each lecture, students must scan the specific QR code given to them with their smartphone. Form the application it will verify the result by the attendance status of each student required a unique QR Code [3].

QR Code Attendance System. In this application, they used QR code and Google sheet [4]. For the results, the attendance status of each student required a unique QR Code proposed by Nor et. al, (2020). Insiya et. al, (2021) develop Quick Response Code Based Smart Attendance System is the tittle for this application and it used method of QR code, MIT App Inventor. Then the result for this application is the attendance status of each student will be analysed and separated [5].

Table 1: Previous study

Author/Year	Title	Method/Technique	Result
Lengkong, 2019	Implementation of Google Apps and Mit App Inventor on Android Based Real Time Attendance	RFID or NFC card, Barcode Scanning	Difficult to read the card because it starts to fade or erased
Siti et.al 2019	The design and implementation of Student attendance tracking system using QR Code Card	QR code, Google Sheet	The attendance status of each student required a unique QR Code
Nor et.al 2020	QR Code Attendance System	QR code, Google Sheet	The attendance status of each student required a unique QR Code
Insiya et.al 2021	Quick Response Code Based Smart Attendance System	QR code, MIT App Inventor	The attendance status of each student will be analysed and separated in the form id “in time and out time”

2.2 Barcode System Comparison

The main components of a barcode system include mobile computers, printers, handheld scanners, infrastructure, and accompanying software. A barcode system is a network of hardware and software. In situations where manual data collecting is neither efficient nor timely, barcode systems are utilised to automate data collection. Barcoding systems are not radio-frequency identification (RFID) systems, although frequently being offered by the same business. Both technologies are widely used by businesses as a part of bigger resource management frameworks.

A barcode scanner is used by the Barcode Attendance Mobile Apps software to track and manage student attendance. The primary equipment is the barcode scanner that what will be used. With this barcode reader is applied to scan a barcode. A barcode is a visually appealing, machine readable representation of data. In a barcode, there are several parallel, neighbouring bars and spaces.

A first-generation, "one-dimensional" barcode composed of lines and gaps with different widths to form patterns. Unlike 2D barcodes, which store information in the code, these barcodes, which have a maximum storage capacity of 85 characters, are used to access data that is saved in a database. Although 2D scanners can read both 1 and 2D barcodes, a laser scanner is required to read linear barcodes.

A matrix barcode is a two-dimensional method of representing information. It is also known as a 2D barcode or simply a 2D code. It resembles a linear (1 dimensional) barcode but can store more data in a smaller space. A tool known as a barcode scanner is used to read these barcodes.

3.0 METHODOLOGY

3.1 Materials and equipment

A methodology is usually a guideline system for solving a problem, with specific components such as phases, tasks, methods, techniques and tools. It can be defined also as follows the analysis of the principles of methods, rules, and postulates employed by a discipline. A system of broad principles or rules from which specific methods or procedures may be derived to interpret or solve different problems within the scope of a particular discipline. A methodology, as opposed to an algorithm, is a collection of practices. We planned and managed the system development process using the PPDIOO to implement this Barcode Attendance Mobile Application. There are five steps to developing this project, which are based on the PPDIOO system. The reader will learn how, when, and from whom you gathered the data for your report in this section of the report.

In the preparation phase, the project requirement, objectives and strategy will be decided. It is very important that these are established before going forward to ensure that the project is developed to be as close to the project requirements as possible. The next step is to create a project plan. It entails determining the initial project requirements based on the objectives, resources, user needs, and other factors. To establish whether the existing system infrastructure, creating databases, requirements needed to build the application, and operational environment can support the proposed system, the plan phase encompasses characterization of sites, assessment of an existing method used to record the attendance. In the design phase, the network design specification includes specifications to enable availability, reliability, security, scalability, and performance and is a thorough detailed design that complies with current business and technological needs. The design specification is the basis for the implementation activities.

Next stage is the project that has been tested and documented, and the system has been implemented. This phase is also responsible for ensuring that the project is fully operational. Using this strategy helps implementers to identify potential problems; if problems are discovered, they are fixed within the test bed before full-scale implementation begins. Once any issues have been resolved in the test bad, full-scale implementation can begin. However, depending on the magnitude of the implementation, there may be several logistical issues to resolve at this period.

The operational phase entails running the project daily, including maintaining high availability and cutting costs. The everyday processes of fault detection, rectification, and database management offer the starting data for the optimization phase. The Optimize phase can happen at any time after the project is operational and typically it happens either when there has been a minor or major change in the project or technical requirements. During this phase, the current technology requirements will be compared to those used when the application was first designed. If changes are proposed, the procedures are resumed from the beginning to ensure consistency and good design. This phase was also utilized to optimize the attendance record technique.

3.2 Project Diagram

Based on figure 1, network diagram is a usually schematic description of the arrangement of a project flow. The project was implemented to let lecturers scan the barcode on the student's matrix card to record the attendance. The information of barcode will be stored in Google Sheet that contains student details such as name, matrix number, date and time. The attendance record also can be displayed at any time.

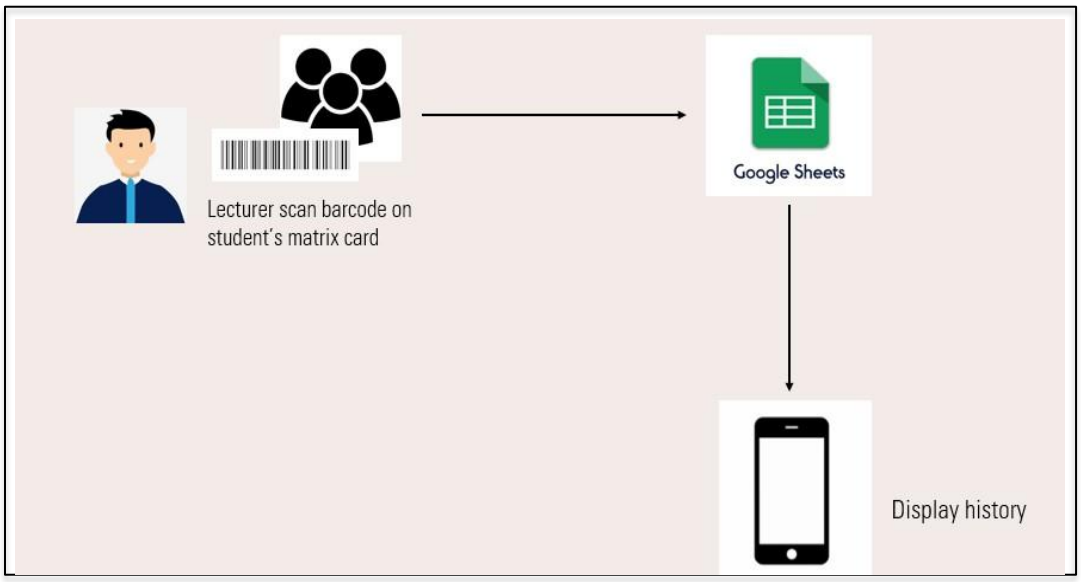

Figure 1: Project diagram

Figure 2 shows the flowchart of this project. Before that they open the application that will display login screen to let user register and login. After that they will be able to move the next screen called dashboard start to use it. The lecturer should click on the Scan Barcode to open barcode scanner. After that click on Add Attendance to add record in Google Sheet. Lecturers can check history on View History.

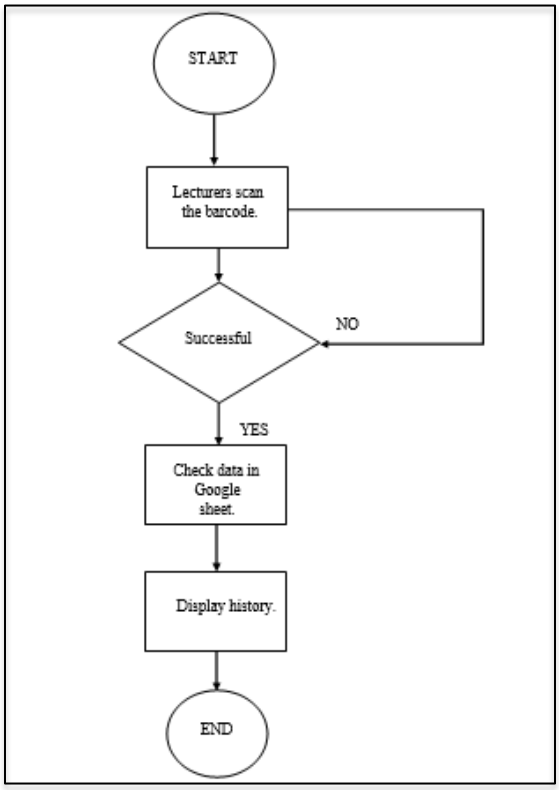

Figure 2: Flowchart

3.2 Project Implementation

Project implementation will describe how the application was created until it can be used followed by the requirement needed. This explanation was the application was fully finished with the blocks setting and setup. The design was also already created, and all the screens are functionable as followed by the requirement of the project. Figure 3 shows the first screen called the Login page that play role as a register and login screen. Users need to register an account before logging in. Use any username and password users wanted, then click register. After that click login to go next screen. If the application is close and the user opens it again, they do not need to put their username password anymore to login even just click login to move to next screen.

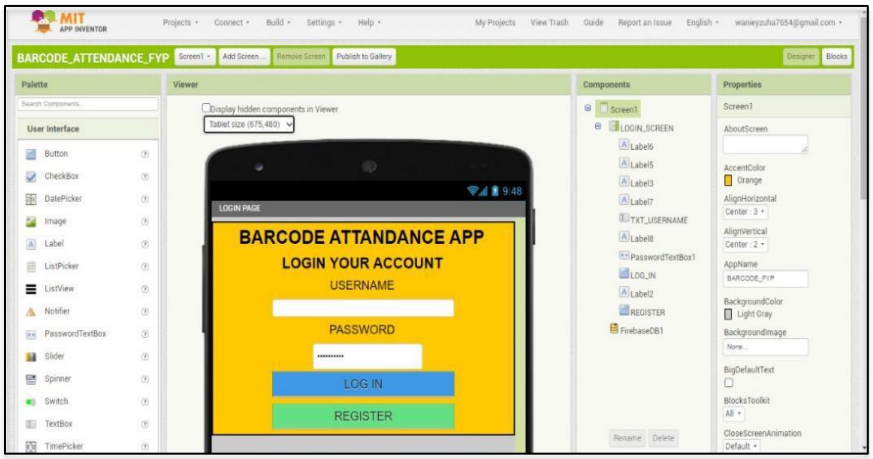

Figure 3: Login screen

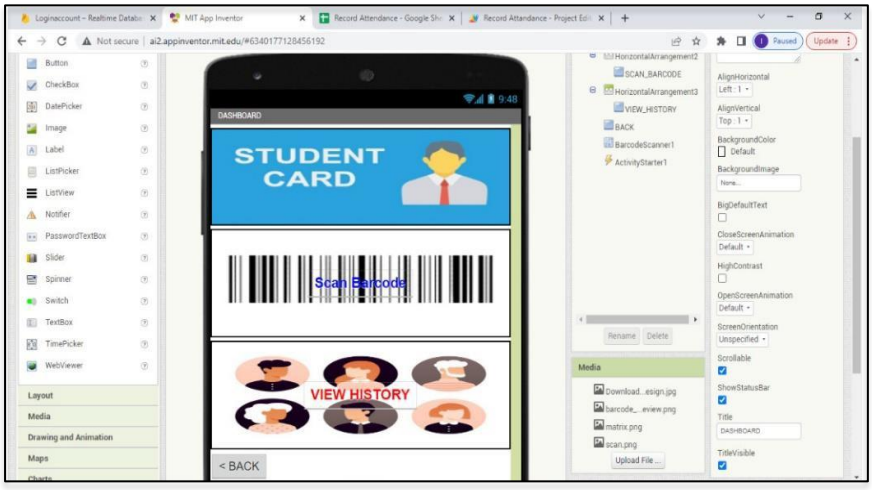

Figure 4: Dashboard

Figure 4 is the second screen that is called Dashboard. This screen will not appear if the user is not registered. Any new user is not able to reach to this screen, they need to create account first. As the figure show, this screen will bring users to use the barcode and view the history of attendance records. Figure 5 below show screen called Result Scanner. This screen is used to scan the barcode on a student's matrix card. Click on "Scan" button to get the barcode scanner and after scan do click "Add Attendance" and it will add to sheet. After scan, result appear, and status will appear as "ATTEND".

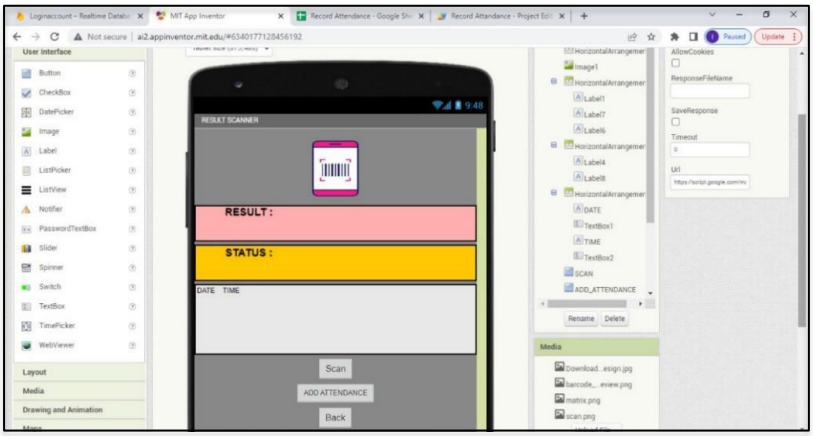

Figure 5: Result scanner

4.0 RESULTS AND DISCUSSION

This part will elaborate more on the findings gathered of this project. Besides, this phase will perform all the mechanism involved with the result refers to the database used Google Sheet. Based on the result occurred, we would discuss about the attendance record and anything that related with the project. Besides, the overall result of this project will be display and discuss in this chapter. To demonstrate that this project was successful and yielded a result, the discussion of how we arrived at the outcome will also be included in this chapter. This project's findings will be summarised and presented with results and analyses. The discussion will include the limitations and implications of the findings. This project has

successfully operated as planned. Users (lecturer) can login correctly and the system can also display related information about student. The user can take the attendance at classroom using smartphone. Before this, lecturer need to print out the manual attendance record to let their student mark the attendance. But after this project done, lecturers just need to ready with the smartphone and application opened. Meanwhile student just ready to show their matrix card and let lecturer scan when they come into the class as figure 6 below.

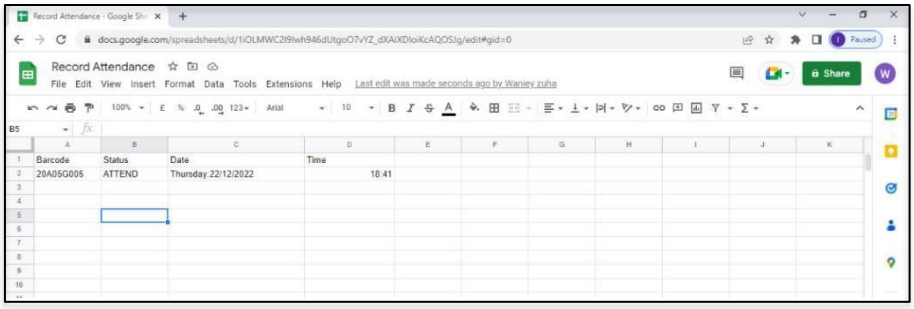

Figure 6: Attendance result

Besides, students will be able to download the app from google play store. After user install the app, the first screen that will be appeared is login screen. Lecturer must login to their account to get into the class as figure 7 shows. Then can scan the students ID card as an attendance. Based on Figure 8, the dashboard that use to display two functions. The function that uses to scan barcode and view history. The result will be displayed as figure 9.

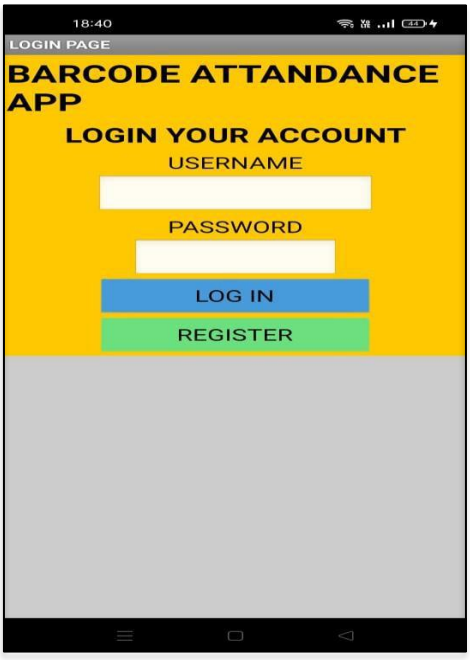

Figure 7: Login screen

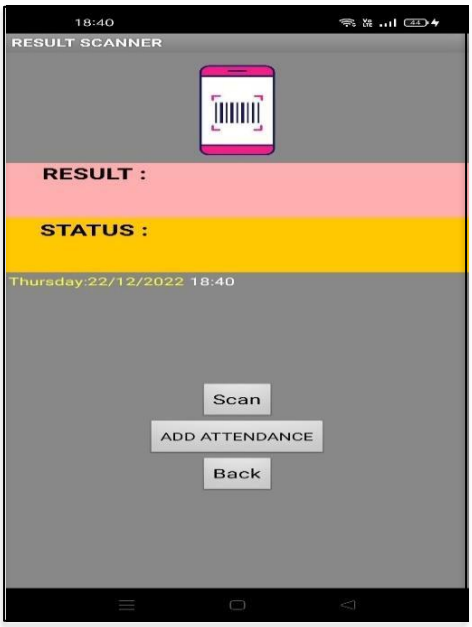

Figure 8: Scanner

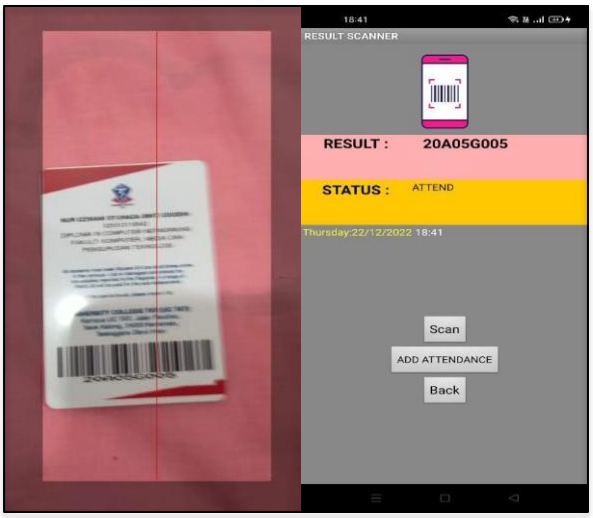

Figure 9: Result

5.0 CONCLUSIONS

The Barcode Attendance Mobile Application offers a practical and innovative solution for lecturers and students to streamline attendance tracking. This project unfolds across four crucial phases, each contributing to its success. The first phase focuses on reviewing and analyzing relevant literature, drawing insights from previous research and similar projects to establish a strong foundation. Next, the planning, design, and methodology phase involves the meticulous integration of hardware and software components, including process modeling, database setup, and coding, ensuring a robust and scalable system.

In the third phase, results and discussions are thoroughly analysed to validate the functionality and effectiveness of the application, ensuring it meets the intended objectives. This phase serves as a critical checkpoint for identifying improvements and fine-tuning the system. Finally, the project concludes with a comprehensive evaluation, offering recommendations for future enhancements and summarizing key takeaways. Together, these phases demonstrate a systematic approach to delivering a reliable and efficient attendance tracking solution, paving the way for broader adoption and further technological advancements.

Author Contribution

S. Norwahidayah: Conceptualization, methodology, development. Noraniah: Investigation, supervision and writing. Ts. Dr. Noor Suhana: Methodology, writing and editing. W. Ainul Alyani: development, writing and editing. W. Nur Idayu: Methodology, development and writing.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.9

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6.0 REFERENCES

[1] Abdelhafez.H et al. (2019), Mobile Based Attendance System Using QR Code, World of Computer Science and Information Technology Journal (WCSIT) ISSN: 2221-0741, Vol. 9, No. 4, 17-21, 2019.
[2] Proc. Int. Int. Sch. Conf, 2019, Implementation of Google Apps and Mit App Inventor On Android Based Real Time Attendance Report Application OH Lengkong.
[3] Siti Nazleen ABDUL RABU (2018). The Design and Implementation of Student Attendance Tracking System Using QR Code Card.
[4] Nor Zailani, Faizah. (2020). QR Code Attendance System. 10.5281/zenodo.4310523.
[5] Insiya Saher et. Al (2021), Quick Response Code Based Smart Attendance System, International Journal of Mechanical Engineering, Vol. 6 No. 3 December 2021.
[6] IEEE. (2023). A novel QR code-based smart attendance tracking system. IEEE Conference Publication.
[7] Mustafa, S. M. (2023). Enhancing attendance tracking using animated QR codes: A case study. Indonesian Journal of Electrical Engineering and Computer Science, 31(3), 1716-1723.
[8] IEEE. (2023). Smart attendance system using QR code. IEEE Conference Publication.
[9] Hirzallah, N., Abaza, M., & Hudaib, A. (2014). A Students Attendance System Using QR Code. International Journal of Advanced Computer Science and Applications, 5(3), 77-85.
[10] Mohan, S., & Kumar, P. (2023). Enhancing Attendance Tracking Using Animated QR Codes: A Case Study. Indonesian Journal of Electrical Engineering and Computer Science, 31(3), 1716–1723.
[11] Ali, S. A., & Khan, M. (2024). Smart Attendance Management System Using Encrypted QR Codes and Load Balancing. IEEE Xplore.
[12] Shukla, S., & Ramesh, R. (2024). An Efficient Student Attendance Scheme Based on QR Code and Device Identifier. IEEE Xplore.
[13] Varma, D., & Malik, R. (2023). Advanced QR Code-Based Attendance Management System. IEEE Xplore.
[14] Joshi, P., & Sharma, A. (2023). QR Code and NFC-Based Student Attendance Tracking. International Research Journal of Modernization in Engineering Technology and Science, 5(6), 198-206.
[15] Gupta, R., & Ahmed, F. (2023). Automated QR Code Attendance Systems for Large Institutions. International Journal of Emerging Trends in Engineering Research, 11(8), 890–897.

[16] Das, M., & Chakraborty, D. (2023). Integration of IoT and QR Codes for Enhanced Attendance Tracking. Journal of IoT Applications and Engineering, 4(3), 102–113.
[17] Singh, A., & Kaur, P. (2023). Real-Time QR Code Attendance Management Using Flutter. International Journal of Applied Computer Science and Engineering, 6(2), 145–153.

