

A Smart Quick Response (QR) Based Attendance Management System

¹Alaran, M.A*, ¹Logunleko, A. M, ¹Orunsolu, A.A, ¹Oyelowo, O.R, ²Ma'ruf-Sogeyinbo, A.A, ³Mahmood, Z.A.

¹Department of Computer Science, Moshood Abiola Polytechnic, Abeokuta, Ogun State, Nigeria.

²Department of Computer Science, Federal College of Education, Osiele, Abeokuta, Ogun State, Nigeria.

³Department of Computer Science, Gateway ICT Polytechnic, Saapade, Ogun State, Nigeria.

Correspondence author: *alaran.misturah@mapoly.edu.ng

ABSTRACT

The use of attendance management system is applicable to all realms of life. Organisations, Industries, Educational Institutions use the system to keep track record and maximise the performance of people within the domain. The use of computerised attendance management is quite important to mitigate the limitation of the manual method which include high processing time, high error rate and could not guarantee further analysis and test of time. Therefore, this study proposes an efficient web-based application for attendance management and tracks the availability of student in classes. The proposed system is designed using Model View and Controller (MVC) architecture and Laravel framework. The experiment for the proposed attendance management system was carried out using JavaScript, Hypertext Preprocessor (PHP), Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) and MySQL as the database. In addition, the system utilizes the possession of mobile phone by the attendee to mark their presence. The system was evaluated and the result shows that the proposed attendance management system has higher user acceptability due to ease of use and assurance of future analysis.

Keywords— *Attendance, Laravel Framework, Authentication, Scanner, Web, QR Code, Database*

INTRODUCTION

Attendance is a crucial factor that is utilized for many purposes in educational institutions and organizations. Its goals include maintaining records, evaluating students and encouraging optimal and regular attendance in the classroom. Due to the numerous difficulties, the current system of taking attendance in most institutions especially those with large population across developing countries does not guarantee minimum percentage attendance as required in the policies of these institutions (Pankati *et al.*, 2015). The traditional approach for attendance taking uses books or sheets of paper. The attendance sheet could be taken or misplaced using this manner and impersonation is a real possibility (Hemantkumar *et al.*, 2017). Additionally, the procedure takes a lot of time, and it is challenging to determine how many students have achieved the required percentage and are qualified for the examination. Consequently, a solution that would eradicate all of these issues is required (Jain *et al.*, 2018).

Thus, another proposal of a facial presence monitoring system for information security, Computational Intelligence in Biometrics (Qinghan, 2020), discusses a prototype system that uses facial recognition technology to monitor authenticated user or students. A neural network-based algorithm was implemented to carry out face detection, and an eigenface method was employed to perform facial recognition. The experimental results demonstrate the feasibility of near-real-time continuous user verification for high-level security information systems. It was noticed that most proposals do involve applications being used by the instructor during class. Hence, if the attendance system requires some action from the instructor, then the class time will be disturbed

each time the instructor allows some late students into the class. Based on these shortcomings, this paper proposes a design approach which does require the instructor to do nothing extra beyond distributing printed QR codes of the course to the students. The method is design to eliminate the design limitation of existing approaches with focus on security, speed and efficiency. In this way, students may register their presence at any time they wish during the class, while having in mind that registration times are recorded.

THE PROPOSED APPROACH

The proposed method uses attendance management software that is interfaced to a QR code scanner to address the attendance issues that schools confront. The initial information entered into the database is the student bio-data (Matriculation number, Names, Gender, Courses Taken, etc.). A QR Code Scanner is used to read the QR Code. The student scans the lecturer's course QR Code with a smartphone device to record their attendance, and their matriculation number is entered into the database for that specific lecture. Reports are issued at the conclusion of the semester that list the students who are qualified for examination and the proportion of times each student attended class. The proposed application is a secured application. The system consists of a QR code system which is a type of barcode that can be read easily by a digital device and which stores information as a series of pixels in a square-shaped grid (Fig. 1). QR codes are frequently used to track information about products in a supply chain and because many smartphones have built-in QR readers they are often used in marketing and advertising campaigns. More recently, they have played a key role in helping to trace coronavirus exposure and slow the spread of the virus.



Figure 1: QR code Image

Figure 2 shows the system workflow with the essential information flow approach. The flow begins with login step which enables a student to register and view registration details. A registered student can proceed with class attendance using a dashboard that provide QR code, select course, register course and total attendance obtained for any course. The uniqueness of QR code for every class prevent masquerading attacks from student outside the class location.

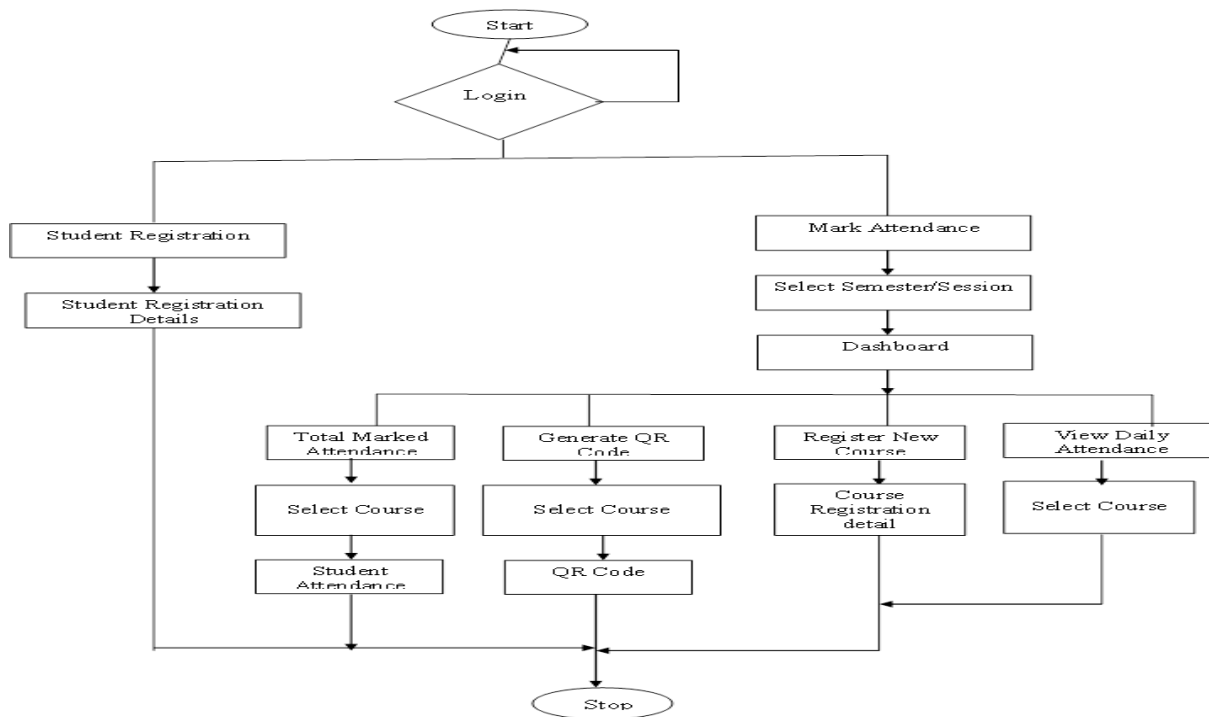


Figure 2: System Flow Chart Design

Figure 3 presents the system architecture showing the core components of the proposed system. The system using a server where appropriate details are stored for retrieval and efficient information flow within the system. The user in the system can login, register, generate QR code, scan code, mark class attendance and log out.

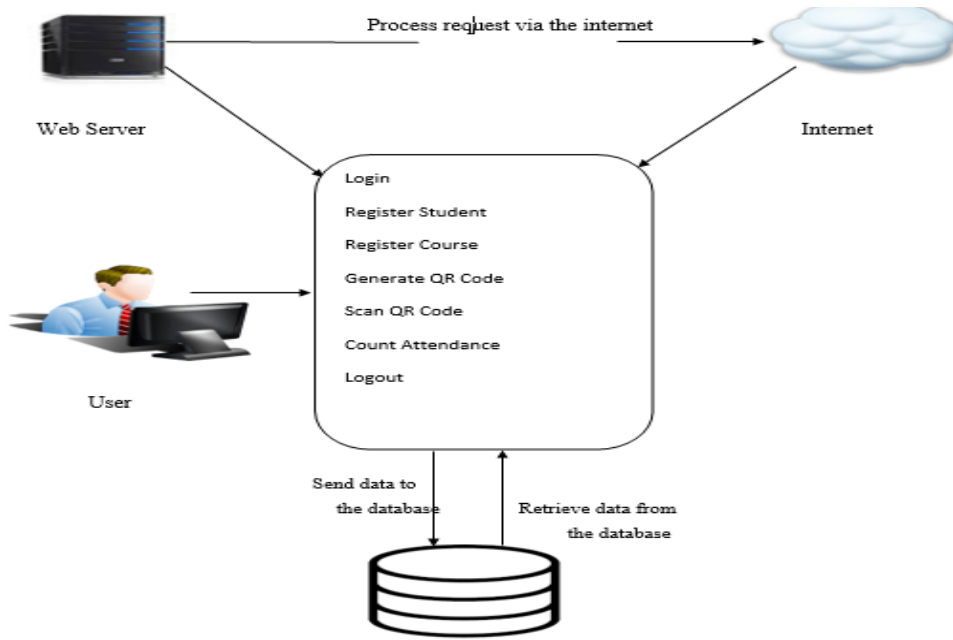


Figure 3: System Architecture

The proposed system will be evaluated using a number of metrics such as speed, layer of security, masking property and reliance of internet.

IMPLEMENTATION AND RESULT

The proposed system was integrated using DART, FLUTTER and JAVA as the front-end application while the backend was implemented using NODEJS and MYSQL. This system configuration was used to test the proposed application:

Model Name: TECNO LA6
Android Type/Version: 8.1
Device Name: TECNO Pouvoir 2
Processor Type: ARM Cortex-A53, 2.3 GHz
RAM Size: 2.00GB
Phone storage Size: 16.00GB

Figure 4 depicts the first page of the app as a login and signup page with username and password entry fields next to a text link to create a new account.

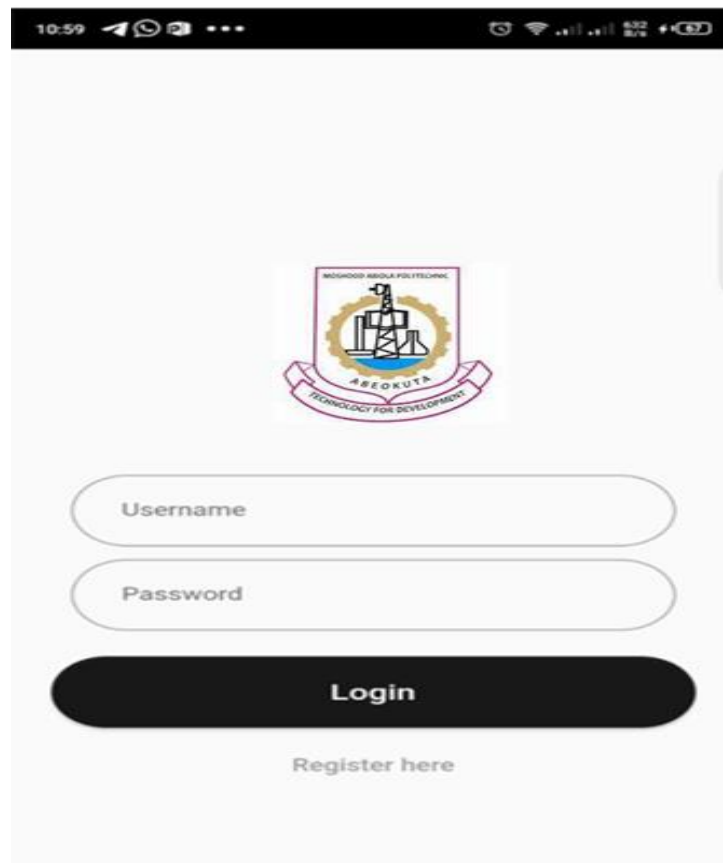


Figure 4: Login Page

After a successful login, users will be redirected to dashboard showing in figure where the users access, manage and control other links of the system.

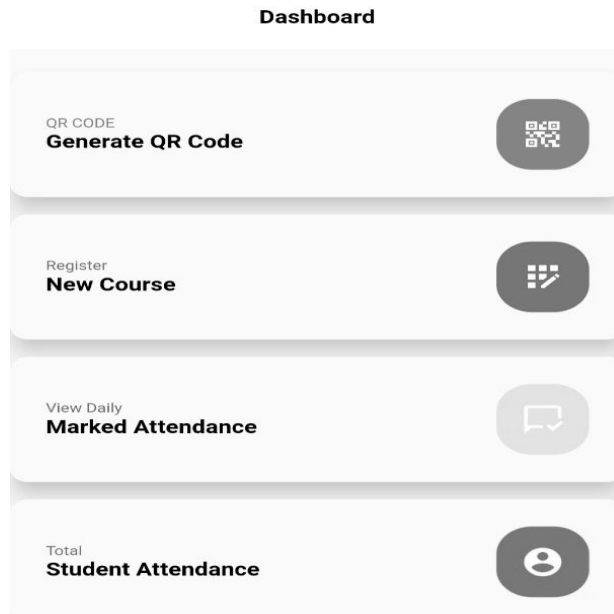


Figure 5: Login Page/Dashboard

On the dashboard page, there are four series of modules which are discussed as follows:

Add Course Page

As shown in figure, Add Course page is page where the Lecturers add courses, course title, course code, level, session, class type for students to mark attendance.

The image displays a mobile application form titled "Add New Course". At the top, there is a grey header bar with a back arrow on the left and the title "Add New Course" in the center. Below the header, there are seven vertically stacked input fields. The first two are text boxes labeled "Enter Course Title" and "Enter Course Code". The remaining five are dropdown menus labeled "Select Level", "Select Class Type", "Select Class Mode", "Select Session", and "Select Semester", each with a small downward-pointing chevron icon on the right side.

Figure 6: Add Course Page

Generate QR Code Page

This page displays all registered courses to allow the lecturer generate QR code for each course.

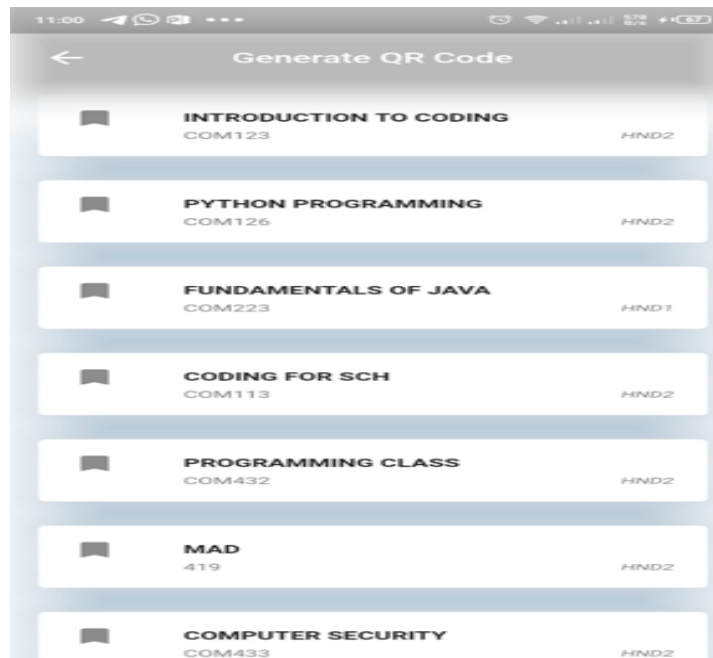


Figure 7: Generate QR Code Page

Generated QR Code page

This shows the generated QR code for a particular page with a print icon on it where the lecturer will printout the QR code.

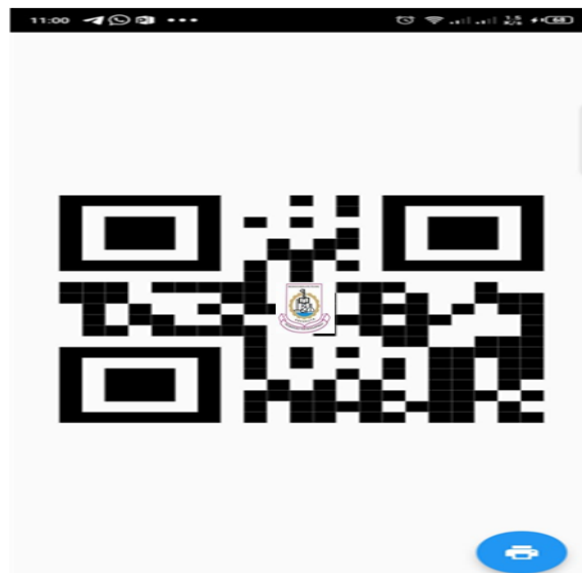


Figure 8: Generated QR Code Page

Student's QR Code scanning page

This shows a camera display that allows students to scan the generated QR code with their mobile phones.

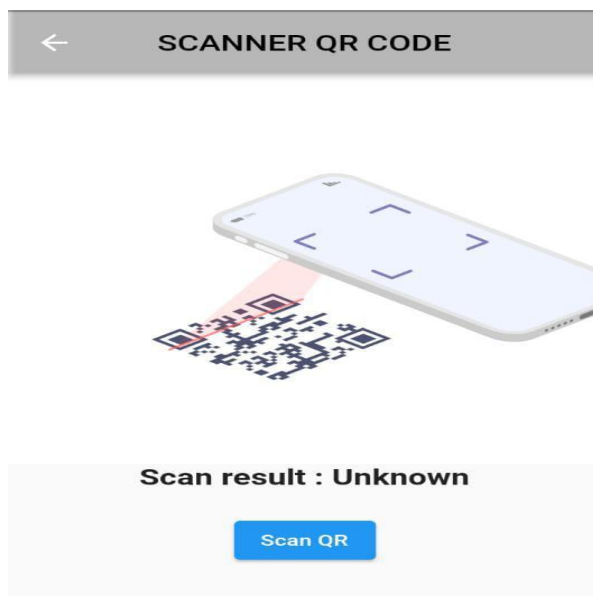
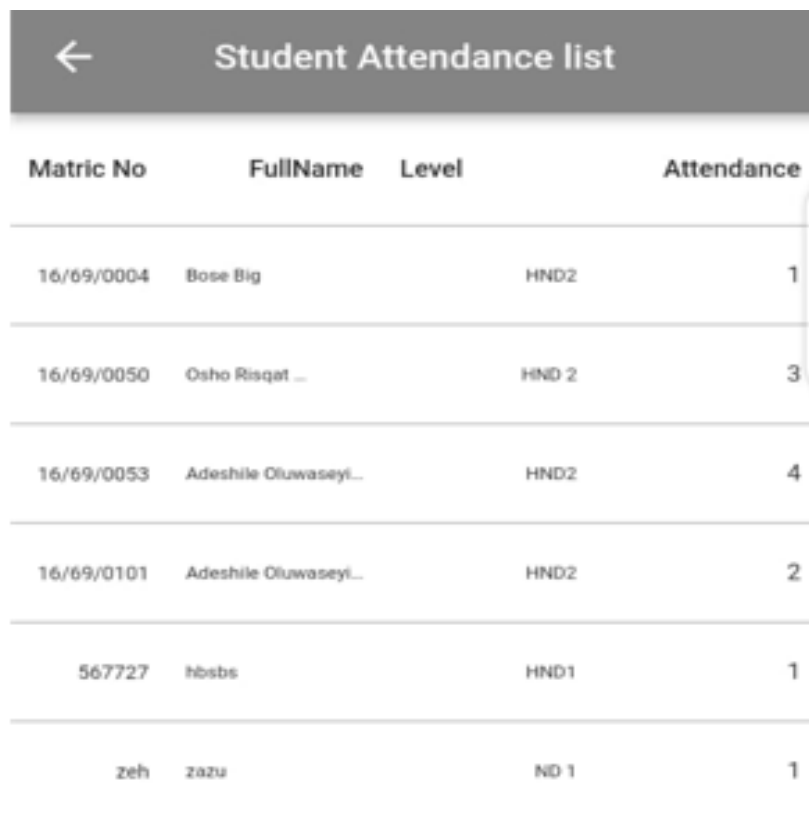


Figure 9: Student's QR Code Scanning Page

Attendance List Page

This page displays all students' attendance with the number of times attended.



Matric No	FullName	Level	Attendance
16/69/0004	Bose Big	HND2	1
16/69/0050	Osho Risqat ...	HND 2	3
16/69/0053	Adeshile Oluwaseyi...	HND2	4
16/69/0101	Adeshile Oluwaseyi...	HND2	2
567727	hbsbs	HND1	1
zefh	zazu	ND 1	1

Figure 10: Attendance List Page

Comparison

The following factors are used in Table 1 to compare the Existing System (ES) and the Proposed System (PS) based on the review of the previous studies and the attributes of the proposed system:

Table 1: Comparison between Existing System (ES) and Proposed System (PS)

Factors	Existing System (ES)	Proposed System (PS)
Speed	Slow	Fast
Layer of Security	Not Applicable	Two
Security	Not Secure	Adequately Secure
Mask	Not Applicable	Applicable
Internet	Not Required	Required

CONCLUSION AND FUTURE WORK

The paper presented the use of a computerised attendance management system. The study proposed an efficient mobile based application for attendance management and tracks the availability of student in classes. The proposed system is designed using Model View and Controller (MVC) architecture and Laravel framework. The experiment for the proposed attendance management system was carried out using JavaScript, Hypertext Preprocessor (PHP), Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) and MySQL as the database. In addition, the system utilises the possession of mobile phone by the attendee to mark their presence. The system was evaluated and the result shows that the proposed attendance management system has higher user acceptability due to ease of use and assurance of future analysis. This approach can be enhanced in future by using a location-based application that will enhance the security and integrity of this system. In addition, the security of the system will be evaluated against a number of known evading techniques such as replay attacks, spoofing attacks etc.

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