

Development of QR Code-Based Attendance System for Ajayi Crowther University

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Abstract: Attendance taking is one of the relevant events during lectures in reputable academic institutions as it can be used for important decision making. The method of taking attendance can make the exercise to become boring and waste of time. The use of manual method and biometrics attendance system has negative impacts. In this study, the use of Quick Response code for attendance taking has been developed for Ajayi Crowther University. The system is designed to supply necessary information about the attendance taking as may be required by students and lecturers involved.

Keywords: Attendance, lectures, biometrics, manual, Quick Response code.

I. INTRODUCTION

Attendance system is simply the concept of people, individual or group appearing at agreed location for a previously scheduled event. Checking attendance is of great concern in many establishments that need to use it to evaluate the effectiveness of their efforts, assess commitments of participants and need to plan for future efforts among other reasons [2]. In certain environments such as academics, organizations, political gatherings, attendance may be compulsory. In most establishments where workers resume to offices on regular basis, attendance can be used to assess workers performance and important decisions might be reached on the basis of attendance [4]. Attendance can further be applied for tracking and monitoring of workers where late arrivals, early departures break time, absenteeism etc are quantifiable before wages or salary may be paid. There are many methods of taking attendance such as manual, biometrics, etc.

The use of attendance is one of the ways of measuring student's commitment. There can be correlation between attendance and performance of students in examination. Attendance can be used to determine performance of students, analyze the student's personal situation and many more. In many universities, attendance systems are used. At Ajayi Crowther University, a student is expected to have a minimum of 75% attendance as prerequisite to write examination. In every lecture, course lecturer is expected to take a list of students that attended the lectures as a measure of attendance and before the examination, student's attendance rate is communicated to him/her. Attendance checking by lecturers and students is part of regular classroom exercise that

consumes time. If a manual method is used, keeping attendance from the beginning of semester to the end may be tedious. Another challenge is in the accuracy of the recorded attendance that may be error prone which therefore defeats its original purpose as such erroneous computation may mislead. Attendance taking via manual method may be boring and eventually discourage lecturers and frustrate students' interest to study. Another approach to the use of attendance is the use of biometric scanner approach for attendance. Initially, it was a welcome development because of authenticity involved. However, sharing of biometric device for the purpose of attendance is injurious as it could aid the spread of certain diseases such as Covid-19 [8]. To overcome these challenges, the use of quick response code for attendance system has been proposed.

II. LITERATURE REVIEW

Quick response (QR) is an innovation that is widely extending its tentacles to print medium, industry, education and other useful areas. QR can be described as a 2-dimensional barcode invented by the Toyota Motors subsidiary Denso Wave in 1994 purposefully to track vehicles and their parts in the manufacturing process. There are numerous organizations that have adopted QR code in a very strategic way and are reaping the benefits [5]. New ways of using the QR code is being discovered on daily basis especially with new technology. QR code is a form of matrix barcode or 2-dimensional barcode with higher capacity to encode data. A barcode is a machine-readable optical label that has information about the item attached to it. Sample QR code is shown in Figure1 QR code consists of black and white pixels arranged in a squared matrix. QR code can store alphanumeric, alphabets, binary, symbols, audio/video content, hiragana and control codes [1]. [6] Stated that QR codes have different areas that may be used for various purposes such as finder, separator, timing patterns, alignment patterns and functional patterns. The finder patterns for instance are located at three corners of the symbols and are intended to be used for easy location of its position, size and inclination.

A QR code has data on specific purposes that may be used for locator, separator, timing patterns, functional patterns etc. QR codes have several useful features such as capability to allow/store information both horizontal and vertical positions.

It can be used to encode Chinese character. QR code is easily correctable as about 30% of codeword can be restored. It can be read from any side [3].

[9] stated that the use of Smart Attendance System by Applying QR Code can speed up the process of taking attendance and would save valuable teaching time. It can further be used to enrich classroom management due to simplicity, efficiency with combine speed, ease, novelty, with the capacity to hold a large amount of data. The use of QR codes in education for taking attendance is an application of the use of internet and android phone. There are other areas in education where QR codes can also be used appropriately such areas include using 2-dimensional bar code as hyperlink in lecture notes in such a way that it can point to audio, video and other websites etc. [7]. As part of easy way to facilitate the use of QR code there is need to place the QR code in a spot that complements the action triggered by the QR code. The code needs to be placed in locations that will be easy to scan. A difficult place to scan can discourage users from scanning the QR code. It should also be in locations with network access coverage for easy submission by students after scanning.

Figure 1: QR Code sample



III. METHODOLOGY

The methodology used in the development of this application is the software development life cycle (SDLC). The SDLC is a reliable approach to high quality software development that can meet user's expectation. The SDLC framework represents the series of activities to be carried out in the development of the software. The model of the SDLC in use is the V-model. The V-model QR based attendance system covers the life cycle of the software. The phases of the SDLC are requirement gathering, designing, coding/implementation, testing and maintenance.

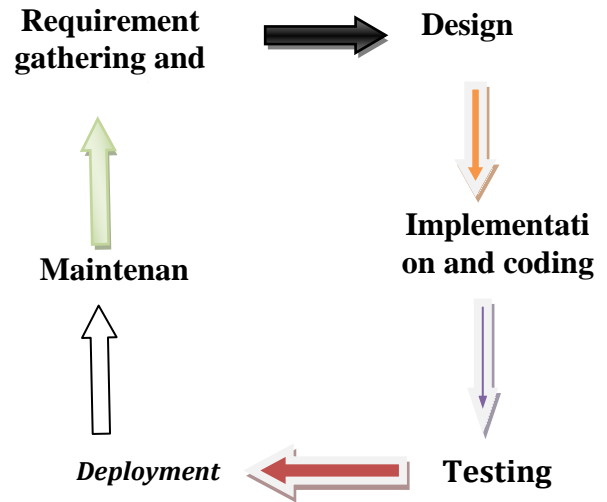


Figure 2: SDLC life cycle

Figure 2 shows the SDLC cycle.

Requirement gathering and analysis: All necessary information were collected. In this study, identities of each user, both lecturers and students including date and time were considered.

Design: The design phase used the necessary inputs of the requirement gathering to model the design of the attendance system. Table schema for the database was also designed.

The table schema was designed for STUDENT, COURSE, LECTURER and COURSE ATTENDANCE. Appropriate interface for each of the design stage was also defined.

Implementation/coding: The language use for the design is php.

Testing: The testing was done using android phone from different makers. A course lecturer whose identities has been registered can initiate the attendance system using its android phone. The Algorithm 1 below shows the steps that runs the application

Algorithm 1

Input: Valid names of lecturers, Registered Courses

Output: QRcode for Course

- 1 Start App by clicking
- 2 Accept Lecturers' identities
- 3 Accept Course Code
- 4 Verify identity from Lecturer database table
- 5 Generate QR code
- 6 Store QR code
- 7 Store Date and Time
- 8 Close app

Maintenance: Routines for system maintenance to keep the server safe is expected to be in place.

The proposed system uses QR code method for authenticating students with a unique QR code generated for each course. The proposed system requires that every student must login and register their details including name, matriculation number, department etc. At the backend, courses and schedule for lecturers are created for every class, the QR code is generated and made available via slide display by the lecturer. It is expected that every student will scan and submit via their android phone. The student registration interface is shown in Figure 3

Figure 3: Login page for registration

Each student will register using the interface and must supply the basic information for enrolment so as to be able to use the system. Each field is validated against null, or any form of scam to avoid error or any form of abuse. A verification module is invoked upon the click of submit button. The sequence of steps involved in taking attendance by the students using the system is shown in algorithm 2.

Algorithm 2

Input: Student Id, Registered Courses, captured QR code

Output: Attendance for Student

- 1 Start App by clicking
- 2 Accept Student identity
- 3 Accept Course Code
- 4 Verify student identity from Student database table
- 5 Verify QR code
- 6 If QR code == True
- 7 Compute attendance()
- 8 Else
- 9 Exit

- 10 end
- 11 Store Date and Time
- 12 Close app

The design interface for the student is shown in Figure 4.

Each student can later visit the system through log in and select appropriate option to view their attendance rating over a period of time. The course lecturer can also view and obtain collective attendance rating for each class. System can then store all the students' attendance records. Querying the database can give answers to various questions such as list of absentee over a period, the percentage attendance of each student. How many students fall below expected minimum attendance of 75%.

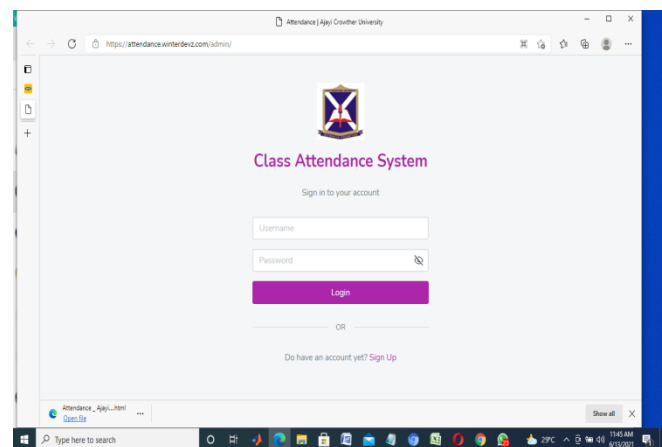


Figure 4: Login interface for checking attendance rate

D. Conclusion

The use of QR-based attendance system has been demonstrated. The stages involved in the design include analysis, design and testing. It is trustworthy, overcome computational error and help to achieve timely report of attendance of students during lecture. The system can be extended to include the attendance of teachers and non-teaching staff of the university.

E. Suggestion for improvement: The developed system has not integrated location as part of the system. The system can be further enhanced using location information when implemented.

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