STUDENTS EXAMINATION ATTENDANCE MANAGEMENT SYSTEM USING BARCODE

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Abstract

The use of smartphones has transformed many aspects of life, including the educational system, with countless potential advantages already achieved. While the features of smartphones, such as text messaging, multimedia, and Internet connectivity, may seem purely recreational, they can be used in educational institutions to manage students' attendance. This will speed up academic instructors' ability to take attendance, which will cut down on time, human error, and unnecessary work compared to the manual attendance system. In this project, we developed a smartphone application that uses a barcode to track students' attendance during exams. Despite the fact that many current systems (Sudha et al. 2015) have suggested employing smartphones for automatic student attendance, little is known about a system that is expressly intended for recording student examination attendance. Our technology and existing systems differ primarily in that our system uses cellphones, which significantly lowers cost, as opposed to existing systems, which use additional hardware like barcode readers. This paper shows a proposed student examination attendance system for capturing the student attendance information during the examination using barcode as compared to the general student attendance systems.

Keywords*: Barcode, Management System, Student Attendance*

Introduction

It is well known fact that virtually all organizations whether educational or commercial need to properly record the attendance of its students or employees for effective planning, management and functioning of the organization. In most universities in the developing countries, student's attendance is usually taken by old file system approach by calling students name and using paper sheets, this approach is being used for a long time (Saheed et at 2016). It becomes difficult for the administration at the universities to regularly update the attendance record and manually calculate the percentage of classes absented and attended for the purpose of subsequent results processing and examinations (Taxila, 2009). Keeping these issues in mind, this work designed and implemented a system to overcome the problems associated with attendance recording. Many schools are beginning to update their standards by issuing students with identification cards that are equipped with ID chips, radio frequency identification (RFID) tags and barcodes, and this is opens up the way to design and implement a barcode based student attendance system as a management in the classrooms in order to solve many problems faced by lecturers and students such as recoding security and inefficiency of traditional methods of attendance record keeping (Wright, 2011). The technological revolution influenced everything, even the methods of marketing, business and educational applications for the real world business issues. Today, the use of Artificial Intelligence (AI) algorithms is expansive, particularly in providing solutions to challenging problems including image segmentation, analysis of medical image, nurse rostering problem, healthcare monitoring system, patterns recognition and retrieval of information, learning management system, as well as prediction of river flow. Accordingly, utilizing the AI algorithms and web technology, countless scholars have created as well as implemented a smart attendance system to solve the student's attendance problems.

These system based on face recognition, the proposed system can be used to take attendance of the students sitting in a classroom all at once. The proposed system involves four steps. Firstly, face detection. Secondly, face alignment. Thirdly, face encoding. Each face is encoded with unique128 values. Finally, the SVM classifier is trained with these 128 dimension values for each face. The system also makes a report of attendance with the date and then it is automatically mailed to the faculty.

2.0 Literature Review

There are different approaches for managing the attendance system in literature. Most of them use an electronic card, radio frequency identification (RFID), biometric information, Bluetooth technology and barcode technology.

Electronic Card:

Shoewu O.S (2011), have proposed an automatic attendance system using electronic card verification technique. The electronic card is a model of a smart card containing a chip that stores student identity such as student ID, student name, student matriculation number and five pins encrypted code. When the students swipe their respective card through the card reader upon the attendance taking process, the card reader compares the entrance code with the encrypted code. The student is then granted the attendance approval/disapproval based on the result of the comparison by the backend software system running on the computer which is serial-ly connected to the respective card reader. The card reader contains a microcontroller which receives the data and sends data to the computer for the attendance authentication process where the computer contains an interactive Object Oriented Programmed software system that can update, delete and modify the system database. The microcontroller used for the electronic card is the PIC16F84A. The main issue in this proposal is the use of extra hardware devices i.e card reader and a connected computer. Which makes the system costly and difficult to use.

Barcode

There are also a number of related works that exist on the application of barcode technology; most of them are using an extra device for barcode reading. Which increases the cost and is not freely mobile like a smartphone. Raymundo has proposed a system for QR codes as mobile learning tools to assist nurses in the learning. He has explored the usefulness, acceptability and feasibility of QR codes in the learn-ing process. A notable work has been done by Sudha et al. (2015) in Sies Graduate School Technology Navi Mumbai, India. They proposed a barcode-based attendance system which involves a bar-code scanner, database server, and a graphical user interface in a computer to take attendance of students entering the lab. Each student in the respective college has a barcode number on the backside of his/her ID Card. The barcode contains unique data of the student such as roll number, faculty and year of study. Each student will scan their barcode at the end of the lab session and the display screen on the computer will display feedback upon the attendance confirmation. Teachers and administrators will access the attendance record by logging in into the system with their respective login IDs. According to Sudha et al. the attendance system is developed to improve the efficiency and effectiveness of the attendance information management system. They believe that computerized software systems and hardware interaction can facilitate the attendance management system as well as the accuracy of the attendance information. The proposed system aims to reduce the amount of professor's work such as the need to create a defaulters list manually whose attendance falls below 75%, the tedious attendance marking process in every lab session and the manual generation of attendance report. This system is also using an extra barcode scanner which is not freely moveable like a smartphone and is an extra cost. Liyana has also proposed barcode technology to be incorpo-rated into the attendance management system in University Col-lege of Engineering and Technology, Malaysia. She suggested a barcode reader be placed in front of every classroom where the students only need to scan their Matric Card which contains the respective student's barcode number at the barcode reader. The barcode reader will compare the student information in the data-base and update the student's attendance. The system also records the time when the card is scanned to detect late comers in the class. The lecturers then can access the attendance record from the faculty server. Administrators of the system are the general office staff who have the authority to register, modify and control the lecturer's profile, student's profile and attendance information. Both lecturer and administrator have respective login information to access the database server of the system. Still, the constraint of this system is that it is a risk where students cheat their attendance by asking their friends to scan their matric card. It is also costly because the university needs to buy a barcode reader for each classroom. In Universiti Teknologi Mara, Malaysia, a similar technology has also been proposed by Mohamad and Azlena to apply bar-code technology in class attendance signing systems. The protocol of taking attendance in Azlena's system is also like the system proposed by Liyana. The barcode reader scans the barcode number of a student's smart card and communicates the information to the database server. However, the slight difference between the two systems is that Azlena does not involve administrator roles in her system. Her system only involves the developer (herself), the lecturers and the students. Sidi et al. also used barcode technology complemented with interactive inputs and graphical user interface to improve the ef-fectiveness of faculty-student attendance management in Faculty of Computer Science and Technology, Universiti Sarawak Malay-sia. The proposed system allows students to take their attendance using the configured computer in every lecture hall or tutorial room. The attendance report will be generated automatically and sent to the respective lecturer. A student who is always absent (at-tend less than 80% of the classes) will be put on a special list and may be disqualified for the final examination. These students will also receive a warning email from the system during the mid-semester break. The system also has limitations in cost and mobility. In the medical field, QR codes can be used in health information; radiographic records; medical records and information management; patient recognition; creation of

patient resources; medical presentations; and the recognition of medications, pharmaceutical products, equipment and devices.

Attendance Management System Using Barcode Identification

There are numerous proposals for Automatic Attendance Management Systems in the literature and in the market. Nowadays, barcodes are frequently used in most industries, supermarkets, and wherever information needs to be read automatically. (Shou Wu et al, 2011) proposed an electronic card-based solution to the lecture attendance problem in higher institutions in developing countries. This system used a single-chip computer based on subsystems interface serially to the serial port of the digital computer. Some of the limitations of this system are that not all computer systems possess serial port. Mahyidin (2008) also proposed student attendance management system using Radio Frequency Identification (RFID). The system makes use of student cards in order to grant or deny the student from taking attendance. This Technique also did not identify individual based on who he/she is which therefore, can lead to impersonation. Victor, Jonathan, Reece, and Lemire (2003), presented a system that is based on student wolfpack club tracking system to improve the process of student wolfpack club ticket distribution for athletic events. This system did not, however,integrate any aspect of student attendance monitoring. On the other hand, Saraswat and Kumar (2010), proposed fingerprint verification technique in taking attendance. Their proposed system makes use of fingerprint verification by using extraction of minutiae technique and a system that automates the whole process of taking attendance. (Xue, 2009), discusses a prototype system that uses facial recognition technology to monitor and authenticate users or students for attendance taking. A neural network-based algorithm was implemented to carry out face detection, and an anzeigen face method was employed to perform facial recognition. Sidi, J., S & LING A.J (2007) the experimental results demonstrate the feasibility of near-real-time continuous user verification for high-level security information systems.

Student Attendance System using QR Codes

Student attendance system is needed to measure student participation in a classroom, especially in Institut Teknologi Telkom Surabaya. Several attendance systems have been proposed based on manual presence. This is a highly important problem. The administration requires careful follow-up, taking care of it and not being lenient. The previous systems are inefficient in terms of processing time and low in accuracy. This paper aims to propose a student attendance system using QR code based on mobile application. To ensure the student attends in the classroom, QR code contains the time information was generated and displayed at the lecturer presentation. The student only needed to scan the displayed QR code using his/her android or IOS smartphone. The code was then sent to the server for the attendance process. The proposed work was designed and implemented using Android Studio, Objective C, and UML (Unified Modelling Language). The experimental result shows that the proposed attendance system only needed 0.000030s to recognize a QR Codes in the server.

3.0 Methodology

This project makes use of barcode technology to achieve attendance management systems for students. A barcode is like a technology that encrypts information and can only be read with a barcode scanner either external device or mobile Apps.

Data Collection

Observation and research methods were taken through the process of interacting with students of Federal Polytechnic of Ilaro, with a random personal interview with the students and a few lecturers.

Analysis of the Existing System.

The existing system is a manual way of marking attendance during examinations, whereby an invigilator comes to the examination hall with attendance sheet and student marks attendance with pen and sign on the attendance sheet.

Overview of the New System Design

Specifications of the New System

The new system will be designed to capture data as input from the user, process it and generate meaningful output as attendances.

The objective of the new system is listed below:

- To enables the student to generate barcode for his/her ID Card
- To enables the admin to scan student barcode and mark as attendee
- To enables the admin to add examination paper
- To enables the admin to print examination attendance sheet

Output Specification and Design

The expected output was designed to provide an attendance report sheet, the barcode code ID Card. It has been designed to allow administrators to view all attendance report sheets of the student ID card that was scanned based on course.

Input Specification

The input to the new system is designed to capture data of students, courses and examination the required input data for the entities are below:

Student (Name & Matric Number)

Course (Course Title & Course Code)

Database Design

The most important step in information processing is the input process and output process, between both is the storage. Data can be stored to be processed later on the output from processes of input data can be stored for later use. Invariably, it is necessary at this stage to design various files that will be used by programs for data storage.

The design of file‘s include:

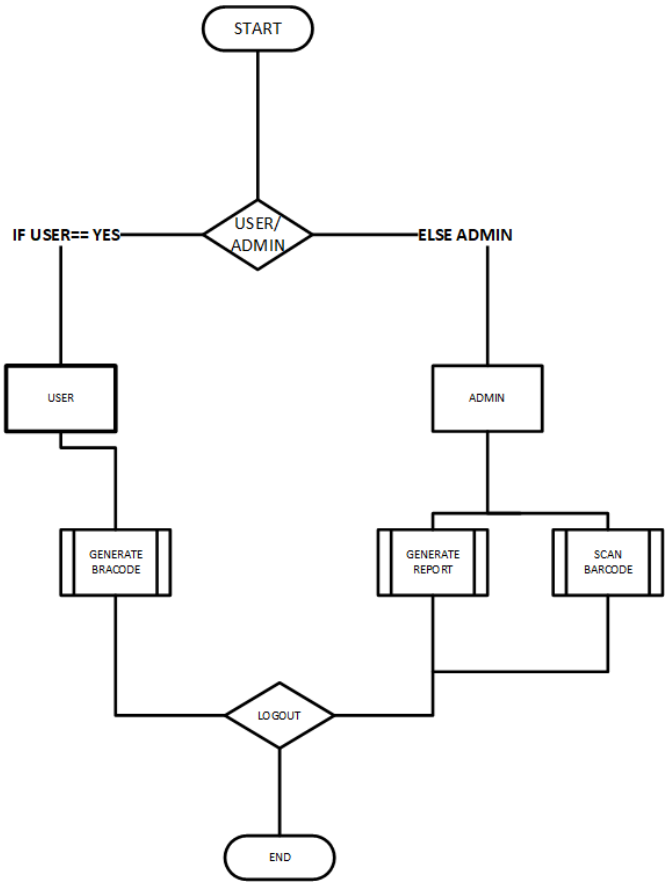
Table 3.1 Student Schema

ATTRIBUTES	DATA TYPES	LENGTH
ID	INT	10
MATRIC NUMBER	VARCHAR	20
NAME	VARCHAR	20

Table 3.2 Examination Schema

ATTRIBUTES	DATA TYPES	LENGTH
ID	INT	10
COURSE TITLE	VARCHAR	20
COURSE CODE	VARCHAR	20

Flowchart



System Architecture

Architecture of the system represents the overall design of a computing system and the logical and physical interrelationships between its components. The architecture specifies the hardware, software, access methods and protocols used throughout the system.

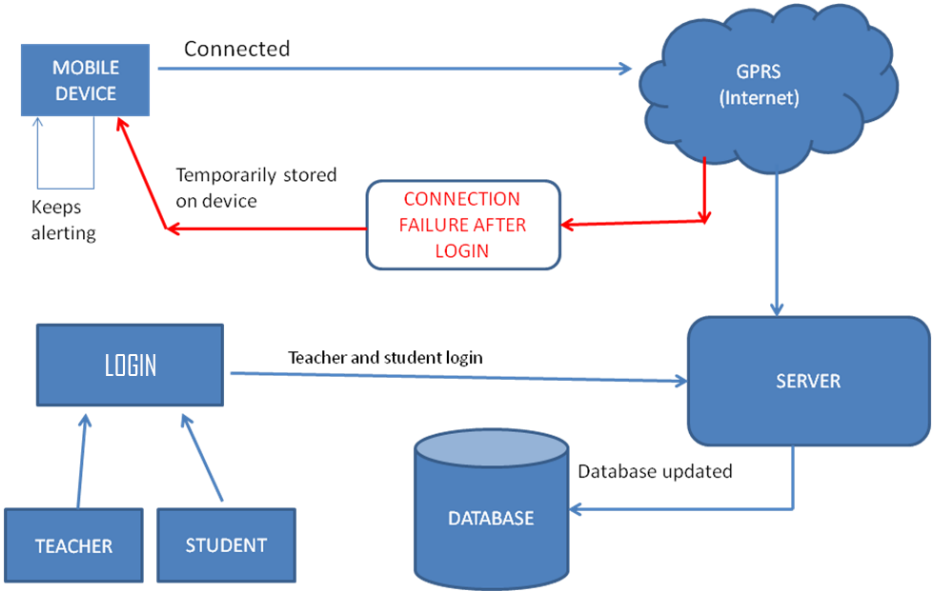


figure 1. System Architecture

Graphical User Interface

Students Examination Attendance Management System basically has two main modules for proper functioning:

1. Admin module it has the rights for creating any new entry of faculty and student details.

2. User has a right of making daily attendance, generating report. Attendance report can be taken by given details of student details such as date, class etc.

Module Description

The system is designed in such a way that only authorized people are allowed to access some particular modules. The records can only be modified by administrators and no one else. The user should always be in control of the application and not the vice versa. The user interface should be consistent so that the user can handle the application with ease and speed. The application should be visually, conceptually clear.

Administrator Module

Student Details: This module deals with the allocation of roll no and personal details for new batch. It will generate personal details of student and academic details of the students with the passport photos.

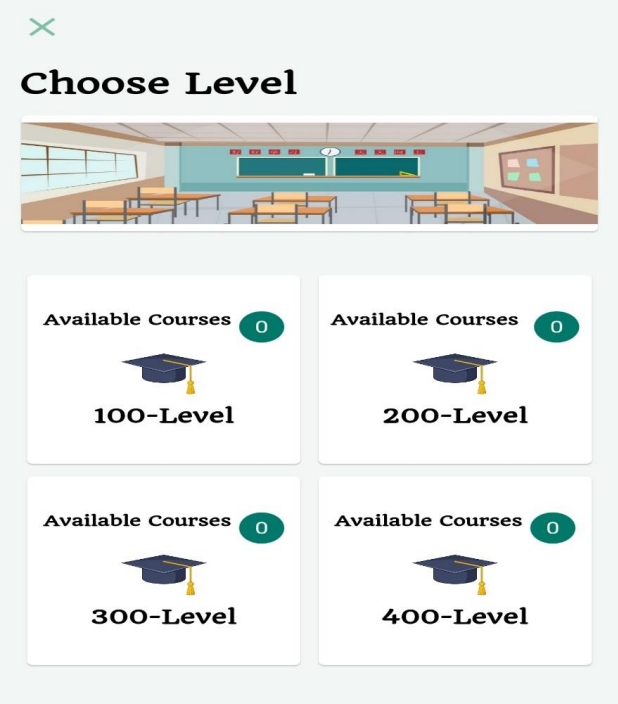


Figure 2: the admin backend

Attendance Details: It will help to get the report of weekly and consolidate of the attendance. Report Details: Report can be taken by daily, weekly and consolidate. Weekly reports get all hour details of attendance starting date to ending date and displays the status. The consolidated report presents all student attendance details starting date to ending date. **Staffs Module**

Attendance Details: It assists the staff to mark attendance for their subject. This will authenticate the staff before making the entry. Student Attendance Record

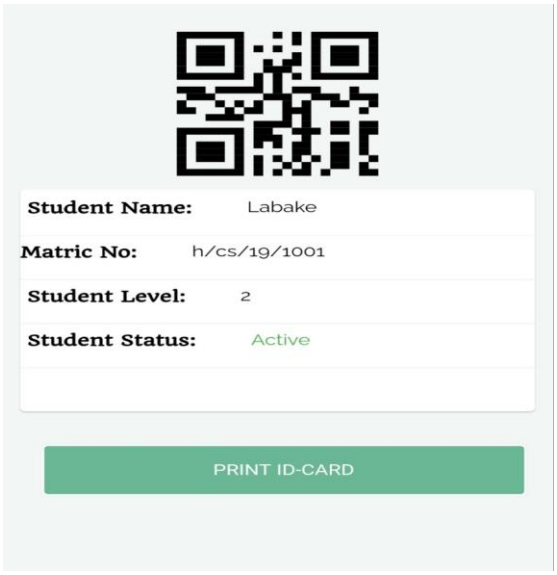


Figure 3: Students id-card confirmation

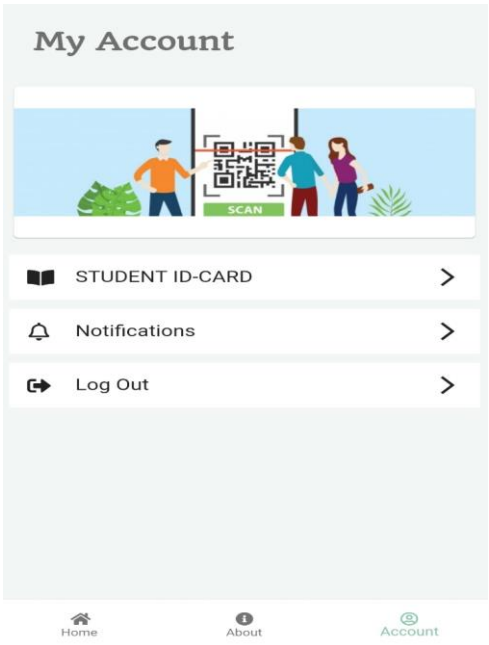


Figure 4: students interface

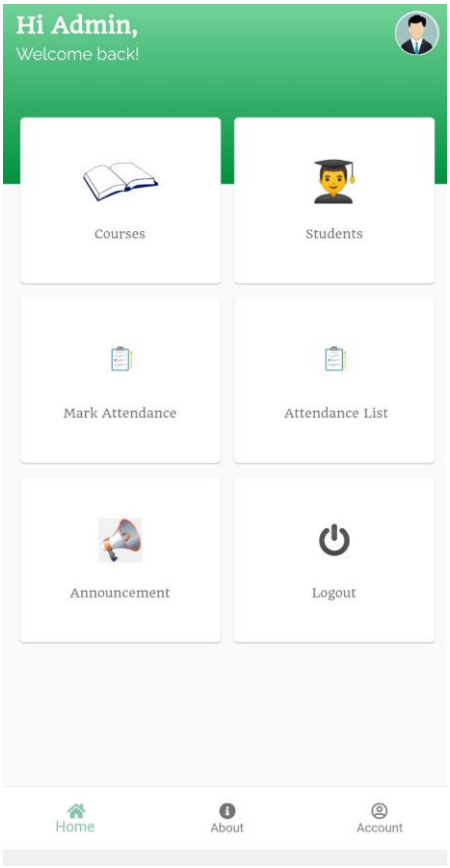


Figure 5: admin interface

Analysis of Output

Output design for this application "Student Examination Attendance Management System" generally refers to the reports and information that are generated by the system from many end-users; output is the main reason for developing the system and the basis on which they evaluate the usefulness of the application. The output is designed in such a way that it is attractive, convenient, and informative. Forms are designed with various features, which make the console output more pleasing. As the outputs are the most important sources of information to the users, better design should improve the system's relationships with user and also help in decision making. Form design elaborates the way output is presented and the layout available for capturing information.

Conclusion

Computerizing examination attendance tracking (a student examination attendance management system using barcodes on identification cards) has many advantages over the old system. Data from exam room can easily be transformed into databases for possible later analyses or usages. This may help in improving the design of timetables and exam room reservation decisions. A major disadvantage, however, is maintaining the software program of the system. The goal of this work was to test and evaluate a real-time, system using barcode on students ID card. The results from the tests that were conducted on the system collectively show that the system design is suitable for technological challenges that require real-time solutions. Furthermore, the success of these tests left no doubt that barcode solutions are easy to implement, inexpensive in terms of cost, and effective in terms of reliability and efficiency. A minor concern, however, might be in the area of maintenance. Finally, the student examination attendance management system using barcodes on identification cards will help the invigilator to mark student's attendance during examinations and eradicate the manual way of doing it.

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