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## **Electronic Student Attendance Management System Based on ID-Card**

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### **Abstract**

During the previous years in educational sectors, attendance is so related to the successful academic road. One of the most existing problems is when the students got absent intentionally in each class and they miss much rich information. In the traditional way followed by most universities, the attendance is based on the traditional paper's record method by declaring the student's names one by one which consumes a lot of time and could be an easy way of fraud. To overcome the problem of manual attendance, the present paper aims to propose an automatic student attendance system based on ID-Card for the student. The major functions of the proposed work Present a new modern technology in JavaFX programming language by using the photo recognition using the web camera and convert the image into a numeric data instead of buying a costly barcode reader which is better in such cases when we have no one available so this aims to provide a flexible and audited system for a complete attendance report generation in each different case like the student's list, their attendance, and incoming warning letters whenever it needed by the lecturers so it made in a more efficient way and automatically.

**Keywords:** QR-Code, Attendance Report, SMS, Database Management System.

### **1. Introduction**

The student's attendance recording is an urgent task in each day of the student's classes and it measures the success percentage of the students besides their studying efforts in each course, but the main problem is when using the basic traditional way for this matter which consumes the time and could be cheated easily by anyone as it happening by using a list of names provided by the university the attendance [1][2]. With a manual system, there are some problems faced by the invigilator because they have to find their names and sign the attendance of students in the list of names that have been given by them. This can cause, they will be overlooked due to the size of the paper that is printed quite small. Invigilators will also face the problem of error checking student attendance if no name or id is almost the same student. So as an invigilator, they should be careful when signing the attendance of students. For that reason, a system may be needed in order to records the attendance of all attendees in the class to get more accurate data without the need of taking it manually [3-5].

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The student attended system based on student ID-Card which could be used on a personal computer or laptop. this software is being programmed to guarantee an easy way of tracking the information from the database in real-time.

The software looking for all the details of attendance report from beginning till the end of course. Moreover, the system will replace the manual traditional work with a get rid of duplicated data happened from the old way which can't give us more efficient reports. The attendance will be controlled by a database it can give a full access data for the admin, instructors and staffs to maintain the task for a long period of time and could be retrieved whenever it needed. The system is so important to the lecturers to help them in tracking the daily attendance of the students in class or lab as well as the hundred percentage of student's attendance of all students. Previously lecturers need to use paper to obtain the attendance of students. There are many problems when using paper as the paper include student attendance will be damaged and lost. This project can help lecturers to reduce such problems by using a web camera and student card. The system has been running with student card and get a code the camera will detect the QR-Code number on the student card. Graphic User Interface (GUI) has been developed using Java FX to create a database that is easier to access. In this system there is an admin who will control the overall in the system in which he will update all the data contained in this system. While lecturers only assigned to take student attendance and may view the data. Both actors in the system need to use the password and username that has been set by the admin. This shows the level of system security that cannot be accessed by others if they do not know the password and username.

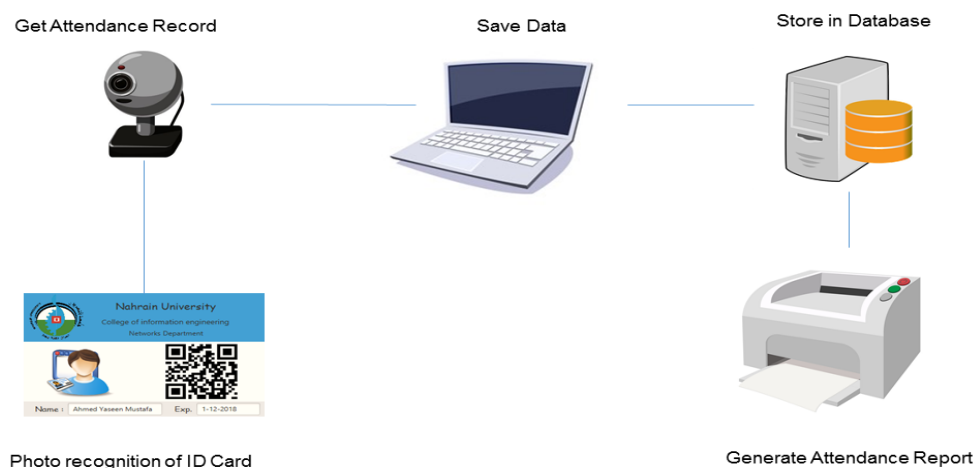
## **II. Related Works**

Today, many researches are trying to develop an efficient electronic students attendance and absence system based on various approaches such as: web-based [6][7], mobile-based [8][9], fingerprint-based [10][11], iris-based [12], face recognition-based [13][14][15], RFID (Radio Frequency Identification) based[16], and others approaches. Barcodes-based are frequently used in most environments that needed electronic information [17][18][19]. Akinduyite et. al.(2013) [10], proposed card-based system that is useful for the lecturer for recording the attendance daily. This work used a single-chip computer based on subsystems interfaced serially to the serial port of the digital computer. The drawback of this work that not all computers can possess serial port and special expensive computer properties are required. Srinidhi and Romil (2015) [6], proposed attendance system using RFID. But this system is not amortized. On the other hand, Saraswat and Kumar (2010) [11], proposed fingerprint-

based that can verify the attended based on scanning finger which it is not safe and take time in processing with high storage. Xue (2009) [5], proposed a face recognition-based that monitor and authenticate user or student for attendance taking based on neural network algorithm. This system iss demonstrate the feasibility of near-real-time continuous user verification for high-level security information systems with slow process and large storage. While Saheed et al. (2016) [9], shows barcode-based that is scan a barcode for each student to get the attendees. This system is secure but not fast in processing because it need to scan each time.

### III. Proposed Student Attendance System

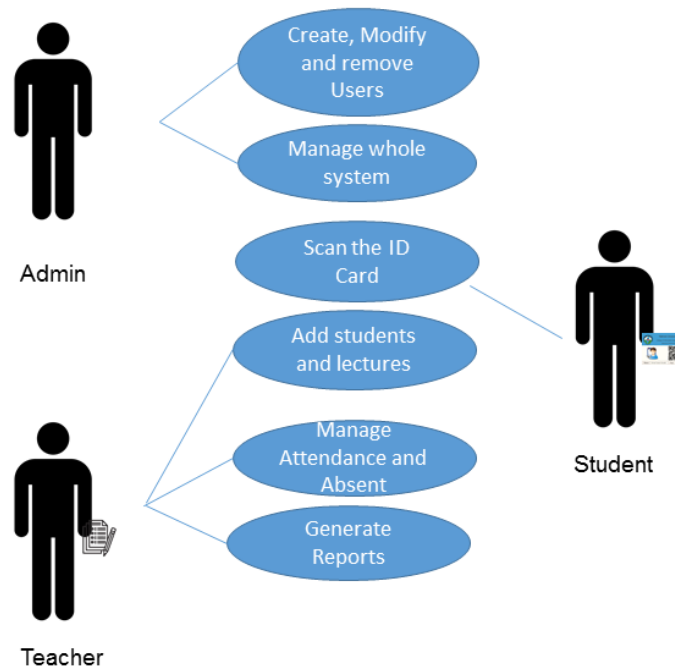
The popular known details of the possible duties for this software as standard idea is to track the attendance of college students in the easiest and flexible fast way. As the student just scan the QR- Code on their ID-Card using an external web camera. The attendance will be updated in a real time recognition of the QR-Code for each student individually. The system is able to generate reports. Lecturers and the admins are able to see the hundred percent of the attendance to decide which one of the students has the most attendance records to considered as unqualified from the course. The software is able to send an e-mail to student's parents or to the lecturers a number of students who may have not enough percentage of attendance, which is less than 80% through the e-mail application or can send a SMS message through the same application as shown in Figure 1.



**Figure 1:** Shows System Structure

#### A. Requirement Analysis:

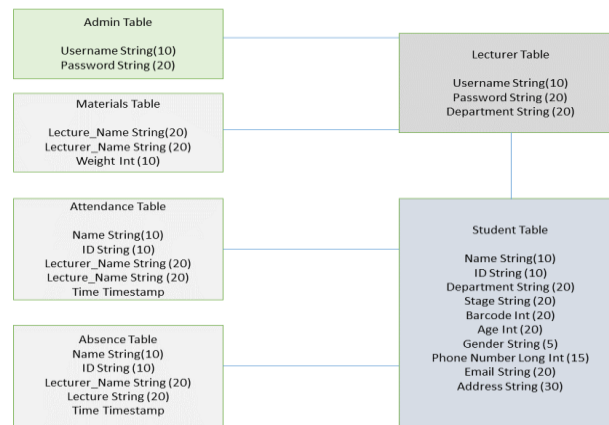
Use cases describes the scenario that identify the task in each interaction process which is described in Figure 2.



**Figure 2:** Shows Use Case Diagram

## B. System Database

Database of the proposed system have six tables: Lecturer, students, Absence, materials attendance and Admin. Figure 3 shows the algorithm of these logical database relation.

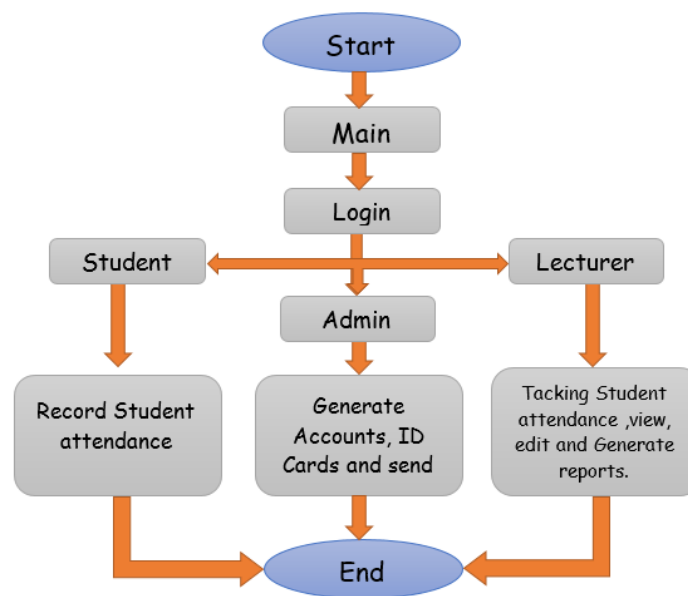


**Figure 3:** Shows Entity Relationship Diagram (ERD)

## C. Proposed system

The system has three major parts; admin and lecturer's login to their control panels and students have an attendance ID-Card with a unique QR-Code. The system consists of three main phases: Registration, Attendance, and Administrator. Firstly, the admin is responsible

about creation, editing and removing of an account belongs to all lecturers. Also he is responsible about the generation of an ID-Card with all QR-Codes belongs to them. Secondly, the lecturers have the authority to take, view and editing of all students' attendance. Moreover, the students have an ID-Cards pass it in the front of a web camera that detect their QR-Code and recording them as attended to a specific lecture. This process is repeated in all class days at the end of the lecture class time. Finally, generating a report and managing the system by administer. Figure 4 shows the system methodology.



**Figure 4:** Shows System Framework

The developed application based on QR-Code in Identity Card is one of the best way that let the instructor get rid of using the daily written papers where he can insure that all the students exist each time. This software provides with laptop's camera in the front of each class and all the students must pass their Identity printed card to be scanned within a few seconds. The web camera acts as a code scanner as the main function is to scan then make sure about each Student LD with the stored data and if the student existed the record will be stored into the local storage. When the student passes his identity card, all the tables related are entered into the local store directly. so, the Instructor can know all the latecomers and absent students which also could be viewed on the application. After the class is finished, the Instructor can view the student's attendance software which has been stored previously in the department's server. The attendance system can be accessed online by the administrator and the faculty

staff. The software is fully controlled by the admin about the staff's profile, student information, and student attendance. The admin can do several action such as:

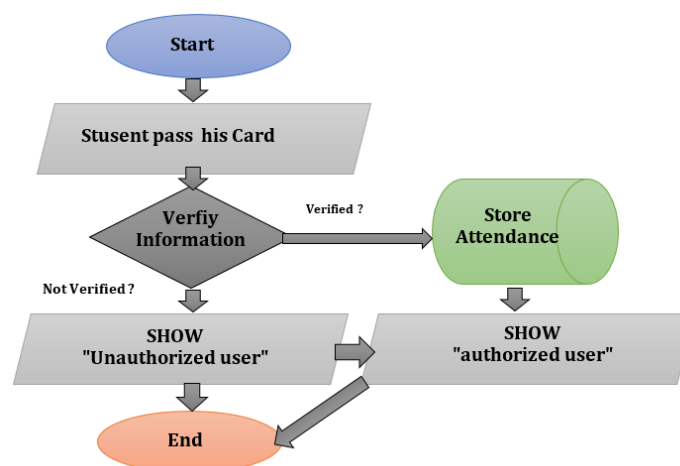
Add new student's profiles, Add new staff members, View staff and student profiles, and

View the student attendance report. While, the data of the students and staff in the system can be added, edited, or deleted. The student attendance software is protected by a password. Therefore, the main and the staff should key in their username and password to log in to the system

#### IV. Software Users

##### A. System Authorization

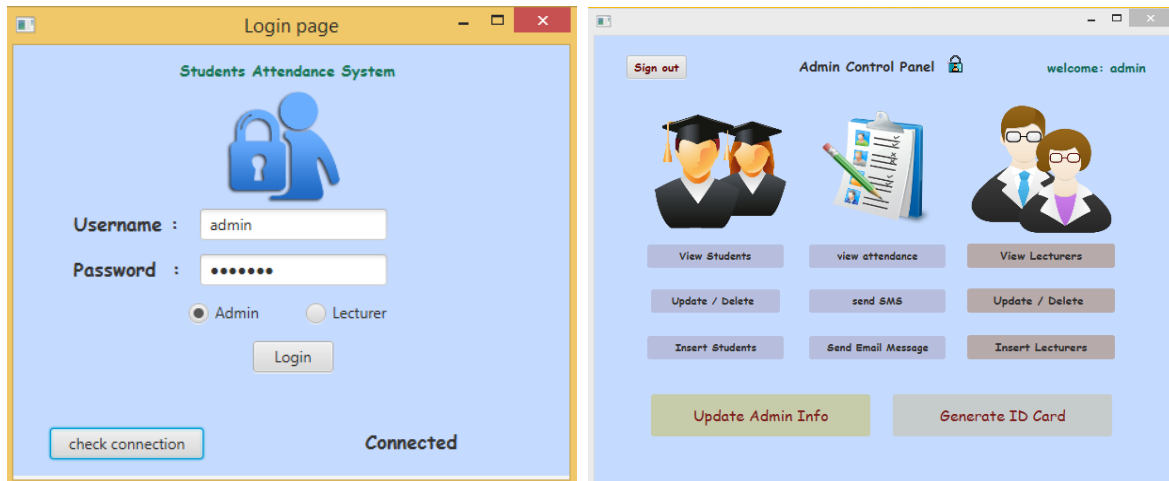
The flow of the system data is at the time when students pass their own ID-card in front of the web camera, the camera will detect the QR-Code of the Student card from the student ID-Card. Then, a signal will be transferred to the database to compare and make sure about the information. If the information is correct, the attendance will be saved automatically and an "Authorized User" label will be shown. If the information is wrong, the "Unauthorized User" label will be shown as well. In reality, the QR code that exists on the ID-Card is fetched first using a QR Code Scanner algorithm by web camera. When the student scans his ID-Card, the QR code scanner gives a sound notifying that the ID-Card has been scanned. Then the scanned information is encoded, which is in the binary form will be sent to the server through some processes. The database will be updated by recording the student's attendance. Here the ID will represent the main key for distinguish the attendance.



**Figure 5:** Shows Authorization

## B. Administration Session

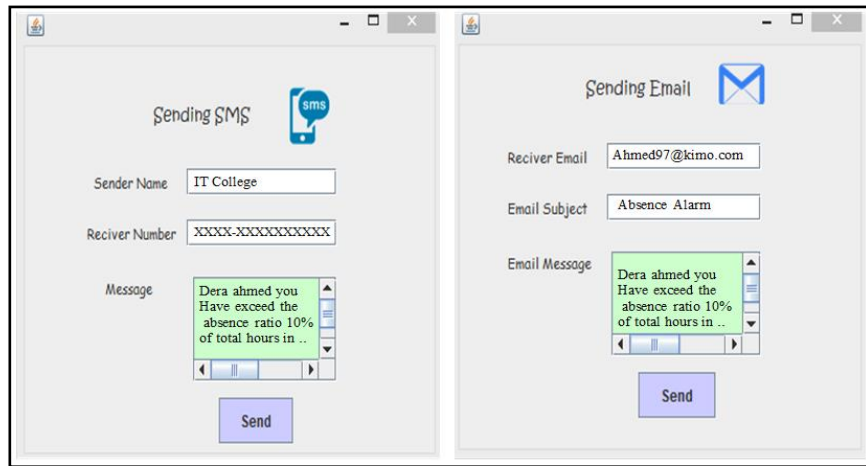
The login page where the system admin and all lecturers can access their control panel. This can be done, only after writing the username and password associated with each user in the database. Furthermore, the student status can be checked her when the admin press the "Check Connection" button. A user can login after determine his authority whether he/she was "admin" or "lecturer" as shown in Figure 6.



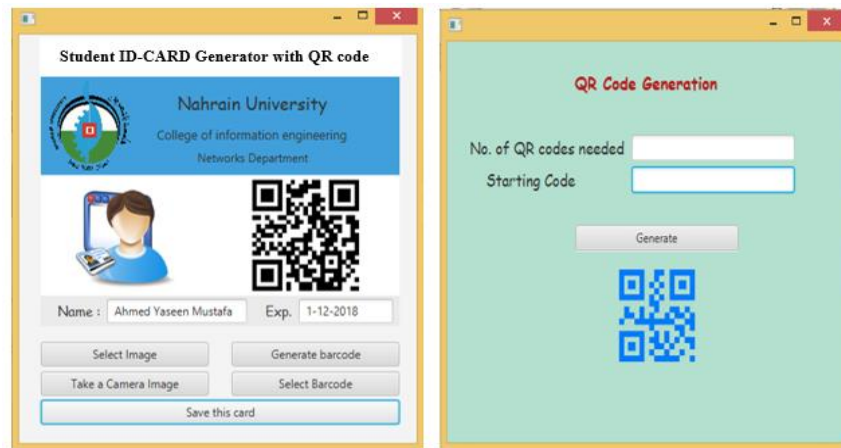
**Figure 6:** The Application login and control pages

After the admin logged to his account, an admin control panel will appear with a welcome message say " welcome: admin". This panel has the tools he need to create, edit or delete all accounts and data stored in the database. On the other side he has the authority to send an emails or SMS to the students' parents. Furthermore, the admin is responsible about generating the ID-Cards as shown in Figure 6. Furthermore, generation ID-Cards and QR-Codes are the two core functions to design and print ID-Cards for all students registered in the system. The student ID-Cards consist of student name, picture, stage and QR-Code that are printed to all students to be used with a web camera each day the lecturer take the attendance in the class as shown in Figure 8. Finally, printed ID-Card that is shown in Figure 9. Sending SMS and Email. Furthermore, the admin can check the absence percentage and Sending SMS and Email to the student parent as shown in Figure 7.





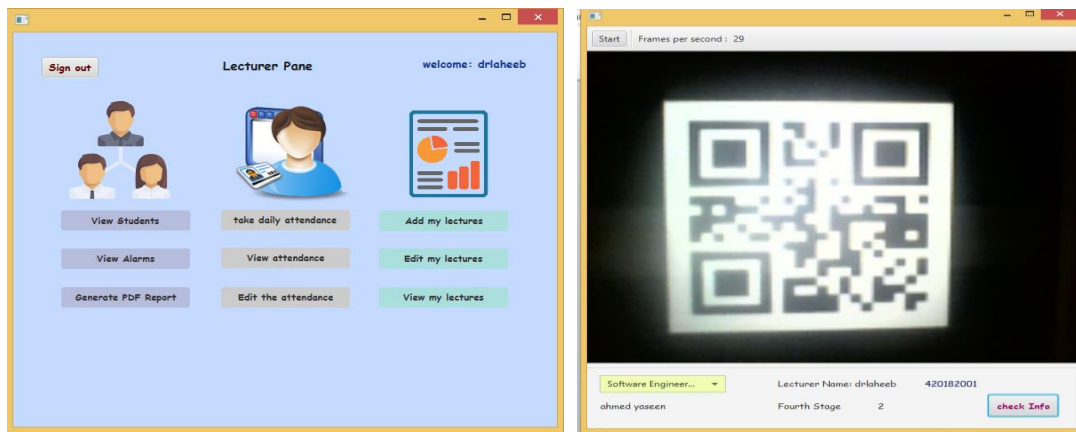
**Figure 7:** Shows SMS and Email Sender



**Figure 8:** Shows ID-Card and QR Codes generator

### C. Instructor Session

Each class the Lecturer log in his account and a lecturer control panel will appear with a welcome message say " welcome: <lecturer name>". This panel has the tools he need to take, view and edit the attendance stored in the database in the other side, the lecturer can add, edit and view his lectures of the current course with the ability to take daily attendance of students at the end of lecture class as shown in Figure 9.



**Figure 9:** Shows Lecturer Control Panel and Attendance Tracking

## VI. Conclusion

The student attendance system is a software for taking the attendance of the student in the form of presence in each class. All the companies, schools, universities begin by engaging students and making sure that they will come regularly so the attendance records become very important. The system is consisting of three parts. The first one is the process, where students need to scan the ID-Card in front of the web camera to record their attendance. The second part is the lecturer records actions, used by lecturers to view or print the reports, view or edit their own dashboard, and view students' profiles. The third part is the administrator activities, used by academic staff in the department to view or print reports, view or edit profiles, add or remove users, add or delete courses and add or delete any other options. Furthermore, each student has a unique ID-Card that was created using our same project and each Lecturer has a unique account with all its own lectures. Also, the system can send a notification to the student's parents via SMS or Email. Hence, an efficient attendance system is achieved in fast and safe process compare with traditional paper attendance. The software based on the new advanced programming language JavaFX which is better when compared to others in the form of the short code and the JavaFX scene tool that include many features in the background help to build an adaptive and easy to use application using FXML add-on language and could be developed and upgraded smoothly with minimum effect on the code.

In such cases we can add an advanced feature for this software by using a GSM Simcard and plug it into the computer or the central server to depend on for sending the SMS notifications and making calls instead of using API.

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