

**الملتقى العلمي الثاني عشر لطلاب
وطالبات جامعة شقراء
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..... **محور التنمية المستدامة: مسار أبحاث**

عنوان البحث

EXAM DIGITAL ENTRY CARD

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ABSTRACT

The exam period is an important period for both students and teachers. We noticed many problems occur during the student's attendance to take the exam, such as the student forgetting university ID, or some exam information. Also, the process of confirming the student's attendance using paper has many drawbacks. Thus, there is a need to replace traditional methods with modern technologies.

The Exam Digital Entry Card is a contribution to the university system. It is issued to each student in his account in the university application . It displays student and exam information. It is also used to confirm the student's attendance by using QR code technology. This will facilitate and organize all processes done for attending exams.

This report will be about analysis and design of the system, based on Waterfall methodology and Unified Modeling Language. So, we will discuss several UML diagrams (use case diagram, activity diagram, and class diagram) in order to conceive the proposed system.

Interfaces and implementation tools of Exam Digital Entry Card will be given at the end of the report. As well as the alternative solutions and recommendations.

1. Introduction

The period of exams is an important period for both students and teachers. Usually it is a difficult time, as it is full of stress and anxiety. Therefore a lot of problems may occur while a student is attending for the exam. The student needs to prove his/her identity, needs to attend the desired exam at the right time and right place, and needs to confirm his/her attendance. So there is a need for a technology that can be used to facilitate these procedures.

2. Problem statement

There are many problems that usually happen in the exam period like the student forget or lose his/her university ID card ,or the student enters the exam while he/she is deprived, or enters another exam that is not his/her exam, the student could forget the exam time, and while the student is trying to deal with these issues his precious time of the exam is wasted, this accumulate stress and anxiety, therefore affect the student performance in the exam. It happens that a deprived student enters the exam while he should not. Also asking the student to sign on the attendance paper during the exam may interrupt and disturb him. In addition to that, is the risk of spreading diseases when touching and exchanging that paper between students and teachers. Therefore, not only the students but also teachers are affected by these problems.

3. Proposed Solution

Digital IDs are widely used around the world, and the technology of QR codes is spreading rapidly. Thus we can use these technologies to help students and teachers. A suitable solution is to develop the Exam Digital Entry Card that will be issued by the university system. This card will be a contribution in the university application that appears for each student at his account in the university application. It contains the student ID information, the student academic status, and the exam information. Thus, its information will be updated to show the desired information for each exam. Also it will be used to confirm the student attendance for the exam by allowing him to scan a QR code. A unique QR code will be generated for each exam. .The teacher will print and provide the QR code to the student to scan it to verify the attendance. The list of attending students will appear at the teacher account on the university website. This will help students and teachers, and prevent many problems from occurring.

4. Aim of the study

The purpose of our research is to:

- Determine the problems during the exam period.
- Define a solution for the problems.
- Design a digital card that contains important information and is used to check attendance.
- Facilitate and organize the exam entry process for students and teachers.
- Replace the use of papers for when checking exam attendance.
- Prevent problems from occurring.

5. Similar Information Systems

1. Tawakkalna App

An application developed by (SDAIA) provides a digital ID card that is approved by Qiyas Center and can be used to enter the Center's exams. It also shows the health status and the vaccines that have been taken ^[1].

2. The digital university identity service for students

Is a service provided by universities in their application, in order to be an alternative to the traditional student card. Shaqra University provided an app for students that displays their academic information and provides other services.

3. Biometric Attendance Systems

A biometric attendance system uses a fingerprint to allow employees to check in and out of their workplaces. Every fingerprint has its unique coordinates which is scanned and then mapped using various system coordinates. If the coordinates of the employee's finger are matched to those of the scanned image, only then the entry is verified ^[2].

6. Subjects and Methods

6.1 Methodology

In the waterfall model, software development is split up into a number of independent steps. These steps are carried out in sequence one after the other. Each stage produces a product which is the input into the next stage. It is important to realize that each stage is pursued until its conclusion before the next stage is begun. Thus, for example, all the coding is completed before testing starts^[3]. Waterfall methodology consists of the following stages: requirements gathering, analysis, design, implementation, testing, deployment and maintenance.

The decision of choosing waterfall methodology for this project was based on its advantages and it fits the academic field. The functional requirements of this project are well determined, fixed and clear, and the project has a short life cycle. The Waterfall methodology is ideal for projects like that.

6.2 Functional requirements

Functional requirements specify the function that a system or system component must perform. In other words, how the system should react to particular inputs, and how the system should behave in particular situations ^[4].

The student can do the following functions:

- Display the student information and the exam information.
- Scan the QR code to verify attendance.

The teacher can perform these function:

- Generate the QR code for each exam.
- Display the list of exam attendance.
- Edit the list of exam attendance.

6.3 Non-functional requirements

Non-functional requirements are restrictions on the services or functions provided by the system. These include time constraints, constraints on the development process and constraints imposed by standards. Non-functional requirements often apply to the system as a whole, rather than to individual system features or services. The constraints are important as the student can verify attendance only

during the exam time, the teacher can display the lists after exam start, and can generate only one QR code for each exam.

6.4 Unified Modeling Language

The Unified Modeling Language (UML) is a language used in software engineering that represents the components of the Object-Oriented Programming concepts. It is a visual modeling language for describing designs, modeling system requirements and depicting implementation details ^[5].

7. Results

We model our information system with UML through three levels:

1. Functional Level
2. Dynamic Level
3. Static Level

7.1 Functional Level (Use Case Diagram):

A UML use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases are a simple and powerful way to express the functional requirements, or behaviors, of a system. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation ^[6].

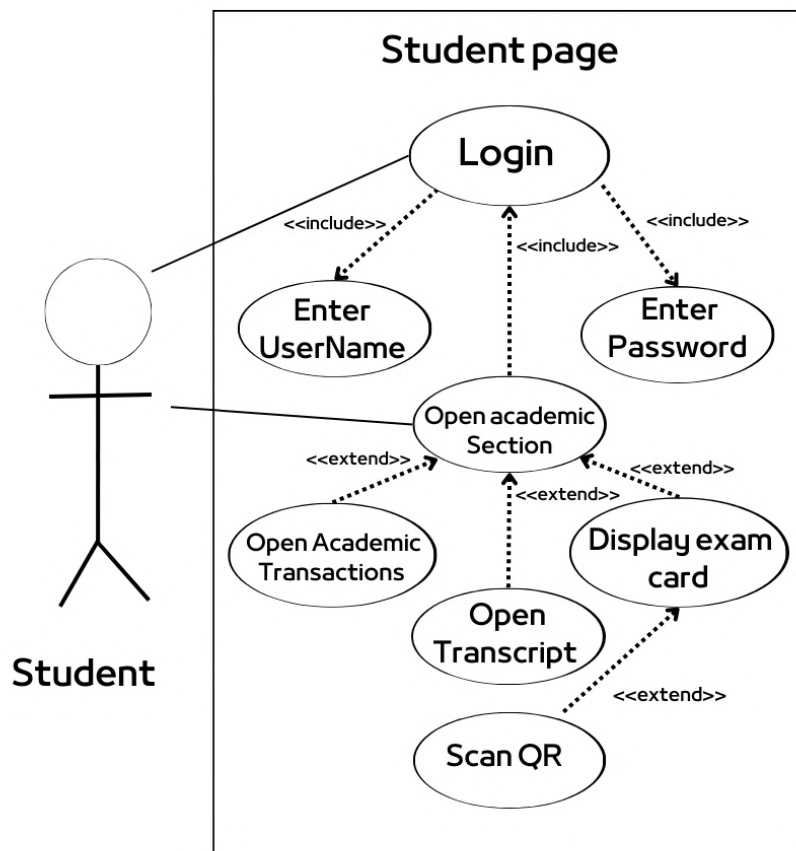


Figure 7.1.1 Use case diagram for student page

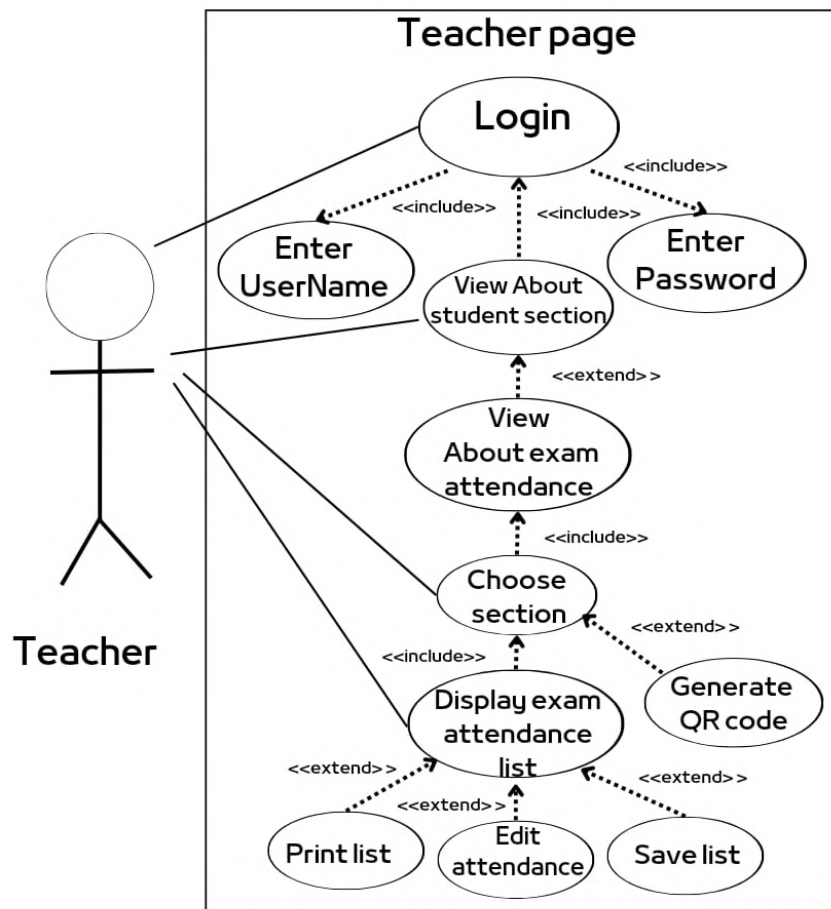


Figure 7.1.2 Use case diagram for teacher page

7.2 Dynamic Level (Activity Diagram):

An activity shows the flow of control among the activities. An activity node is a group of actions or sub activities. Activities are shown on activity diagrams [7].

In the following activity diagrams, we suppose that both student and teacher have an account , and here we will discuss the part that we added to the university app, which is the exam entry card and the list showing students' attendance for the exam.

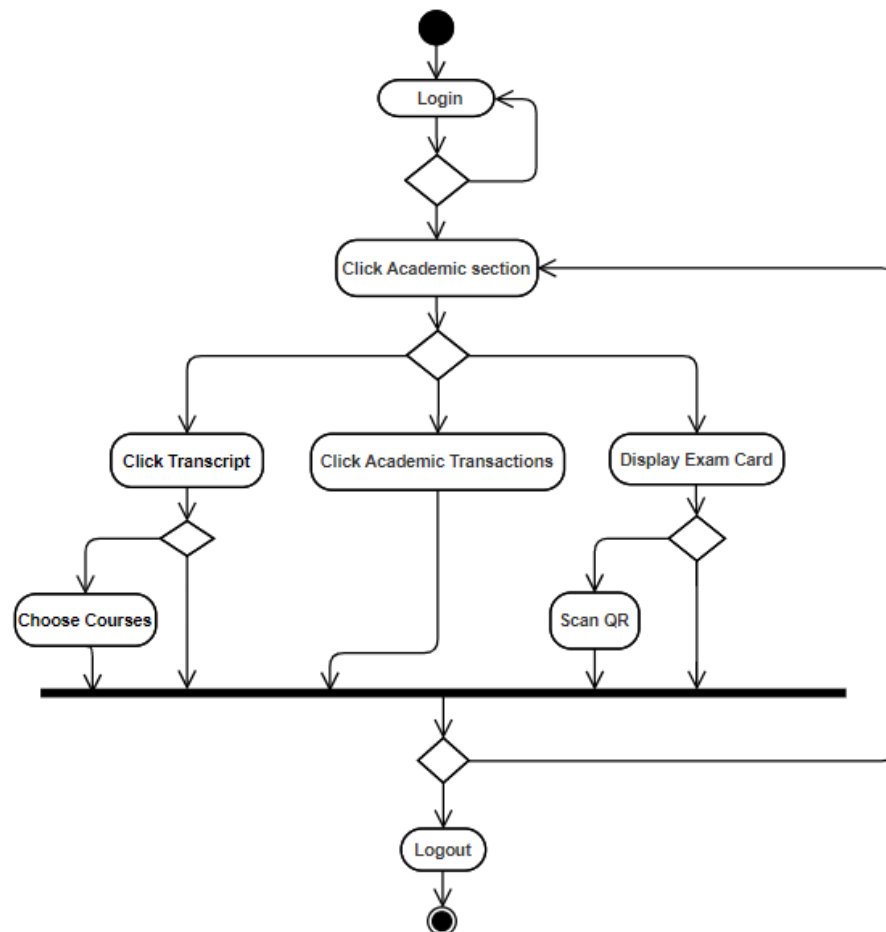


Figure 7.2.1 activity diagram for students

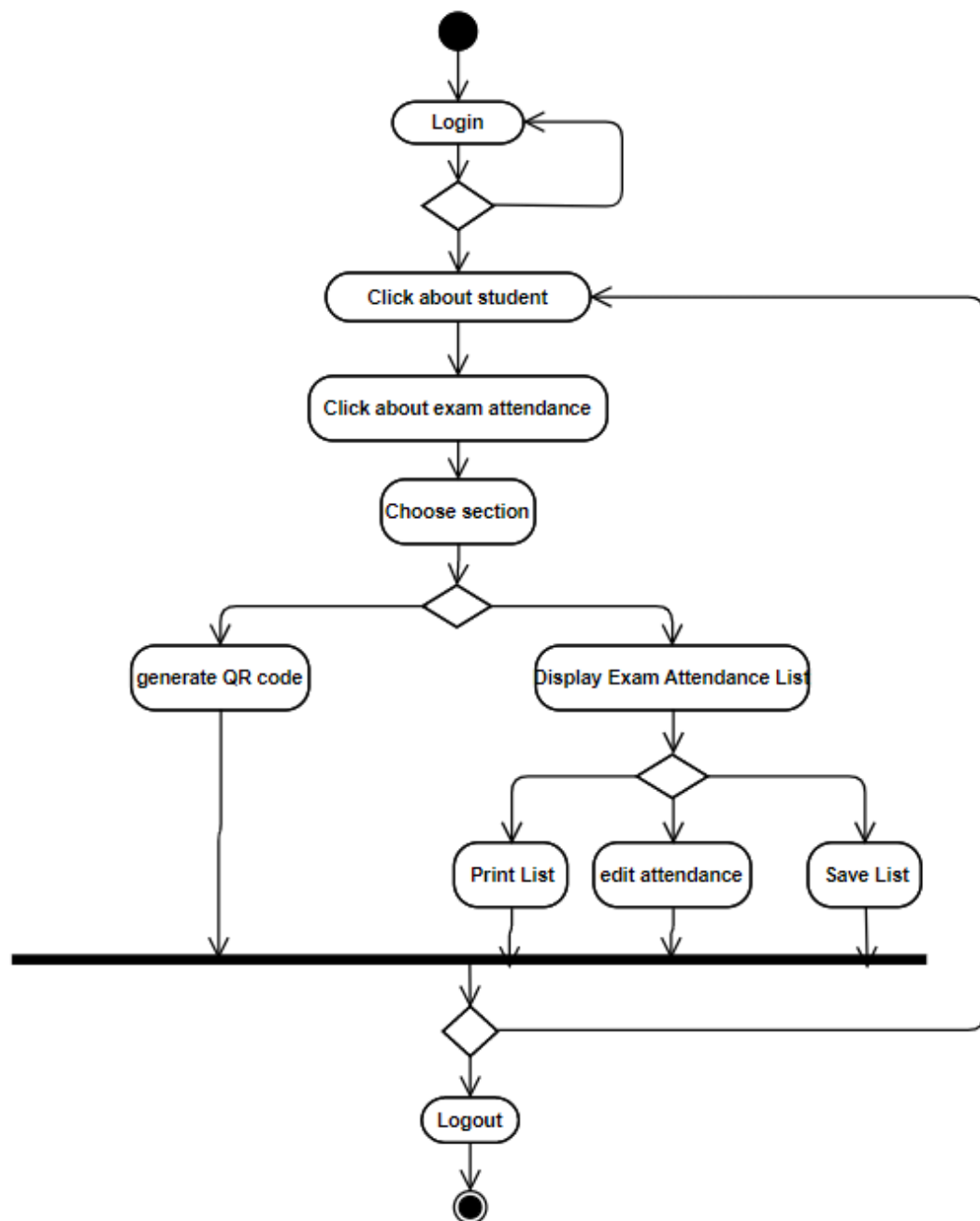


Figure 7.2.2 activity diagram for teachers

7.3 Static Level (Class Diagram):

A class diagram in the Unified Modeling Language(UML) is an important diagram for object-oriented methodologies. It shows the static structure of the system by illustrating the system's classes, their attributes, operations (or methods), and the relationships among objects [8].

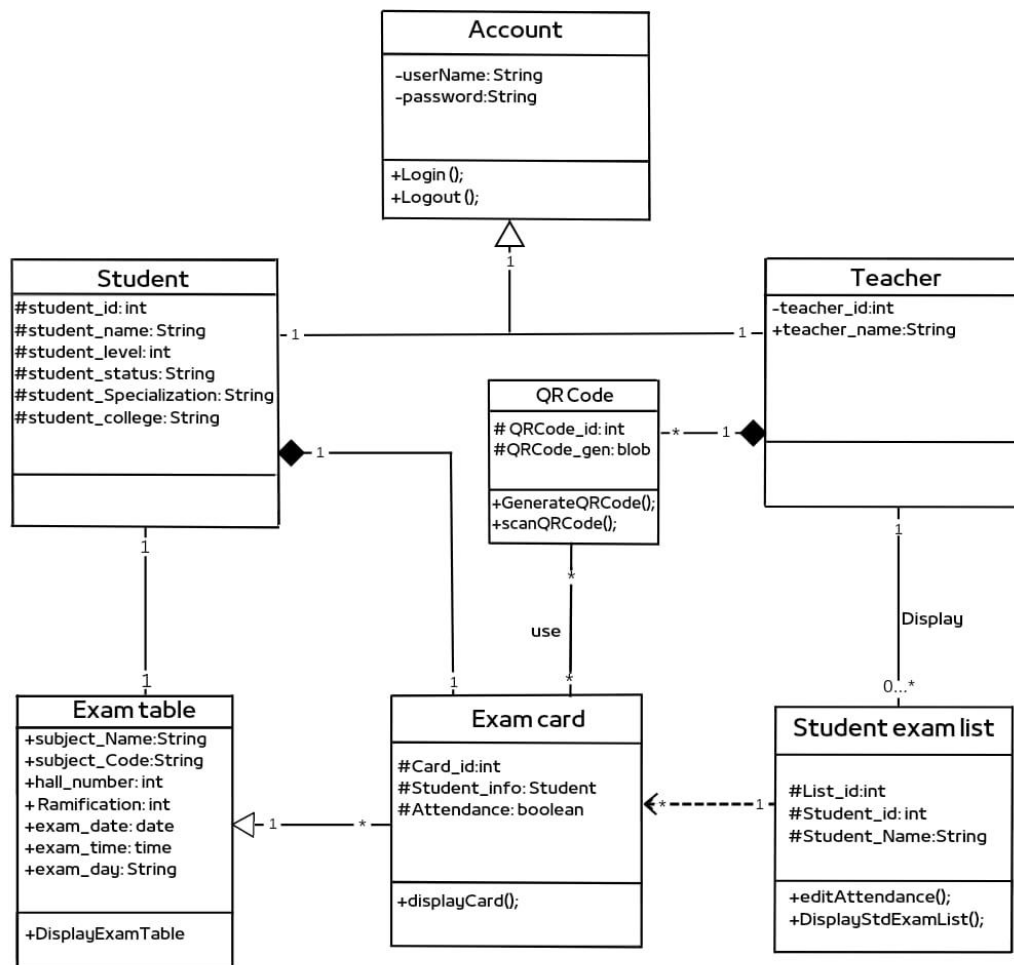


Figure 7.3.1 class diagram of the system

7.4 Interfaces

- **Student Interfaces**

Our contribution in the university application is the (exam entry card) at the academic section, as shown in figure 7.4.2

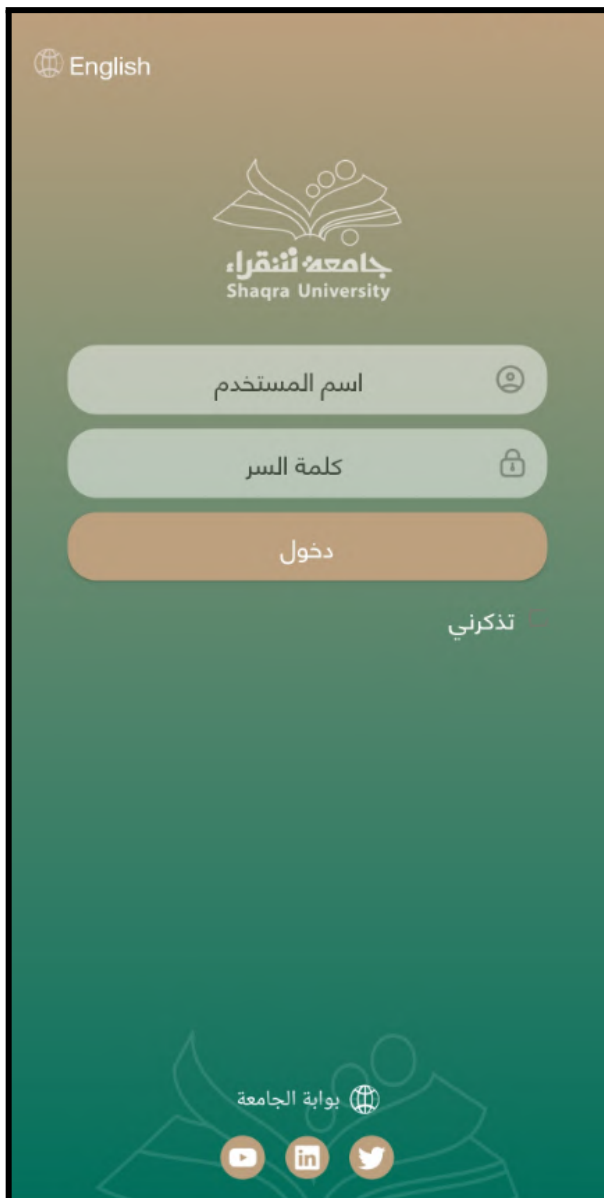


Figure 7.4.1 Student Login page



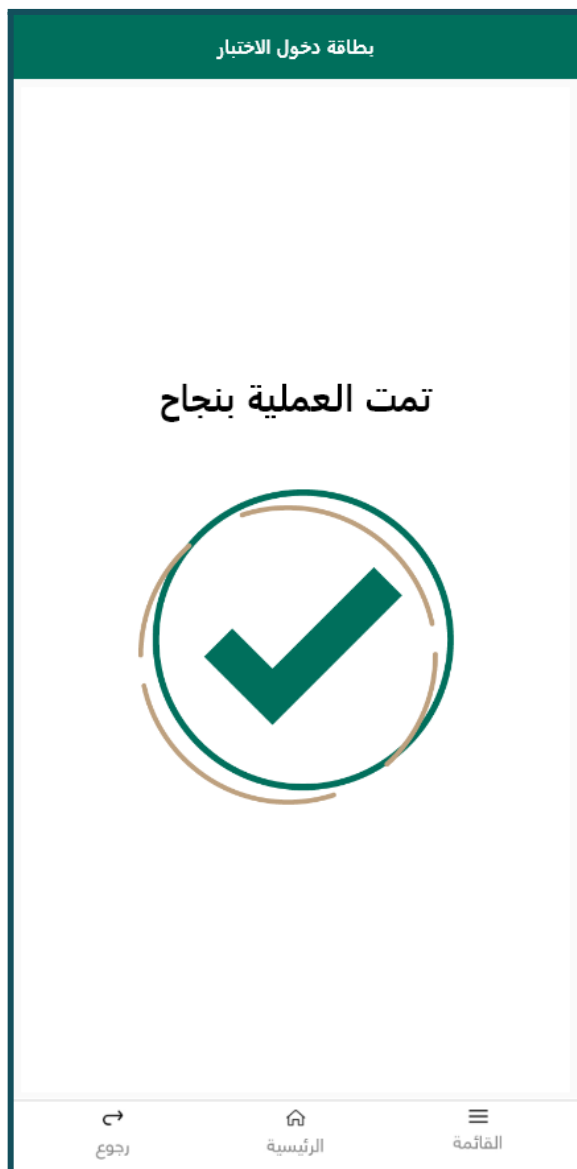
Figure 7.4.2 Main page

بطاقة دخول الاختبار	
بيانات الطالب	
الاسم	نورة بنت عيد بن عبد الله العتيبي
الرقم الجامعي	441888000
الحالة	منتظم
المستوى	الخامس
الكلية	العلوم والدراسات الإنسانية بعفيف
التخصص	علوم حاسب
بيانات الاختبار	
اسم المقرر	لغة برمجة (1)
الشعبة	412
اليوم الأحد	20/11
الوقت	8:00 - 9:30
رقم القاعة	53
تأكيد الحضور	
QR امسح رمز	
رجوع	الرئيسية
القائمة	

**Figure 7.4.3 Exam Card
(Regular Student)**

بطاقة دخول الاختبار	
بيانات الطالب	
الاسم	أمل بنت فهد بن سالم العتيبي
الرقم الجامعي	441889000
الحالة	محروم
المستوى	الخامس
الكلية	العلوم والدراسات الإنسانية بعفيف
التخصص	علوم حاسب
بيانات الاختبار	
اسم المقرر	لغة برمجة (1)
الشعبة	412
اليوم الأحد	20/11
الوقت	8:00 - 9:30
رقم القاعة	53
تأكيد الحضور	
QR امسح رمز	
رجوع	الرئيسية
القائمة	

**Figure 7.4.4 Exam Card
(Deprived Student)**



**Figure 7.4.5 Feedback page
(Successful scanning)**



**Figure 7.4.6 Feedback page
(Failed scanning)**

- **Teacher Interfaces**

Our contribution in the university website is the (exam attendance lists) at the about student section, as shown in figure 7.4.8

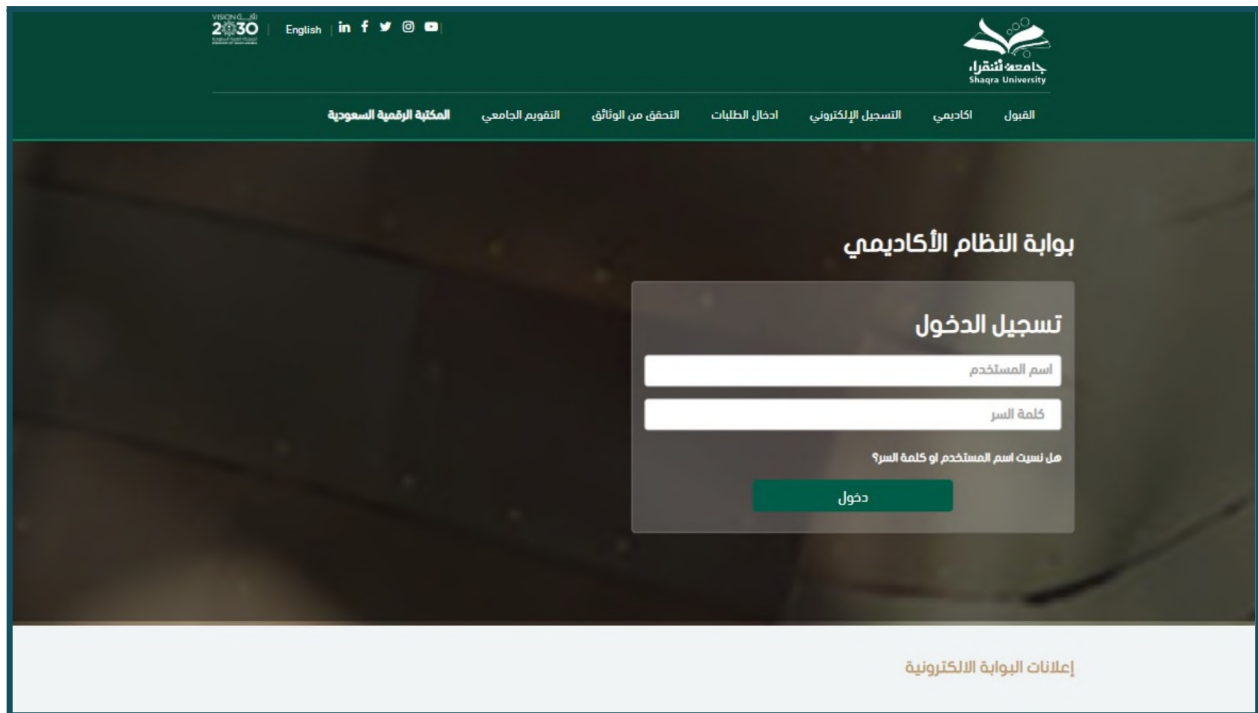


Figure 7.4.7 Teacher's Login page

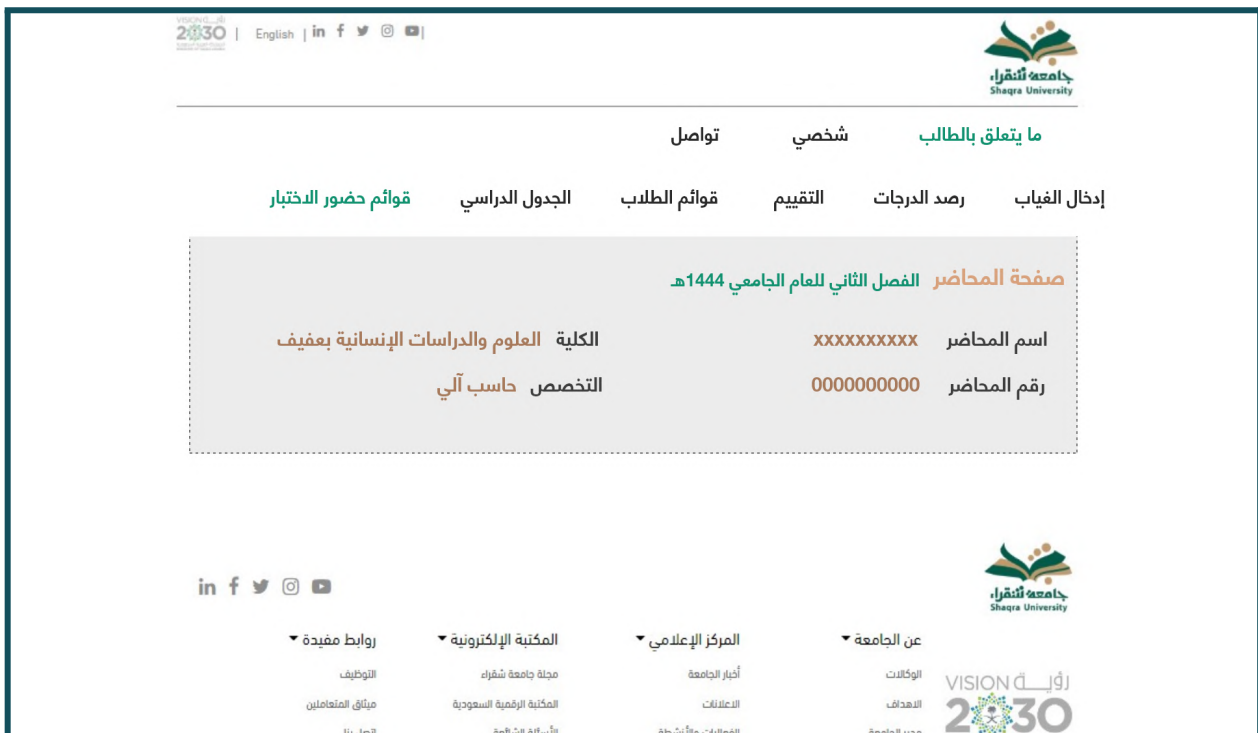


Figure 7.4.8 Main page

قائمة حضور الاختبار

لعرض قائمة الحضور يرجى الضغط على رقم الشعبة
لإصدار رمز QR يرجى الضغط على إصدار

المقر	الدرجة	رمز المقرر	اسم المقرر	الشعبة	رمز QR
عفيف(مشارك)	الدبلوم العالي	512 رقم	الشبكات	65	إصدار
عفيف-(طالبات)	البكالوريوس	203 تقن	تنظيم وعمارة الحاسب التلي	143	إصدار
عفيف-(طالبات)	البكالوريوس	212 عال	لغة برمجة (1)	412	إصدار
عفيف-(طالبات)	الدبلوم المتوسط	1001 داس	مهارات الحاسب التلي	205	إصدار

Figure 7.4.9 Choose section and generate QR Code page

قائمة حضور الاختبار

لغة برمجة (1)

رقم الطالب	اسم الطالب	الحضور
441222333	نورة بنت عيد بن عبد الله العتيبي	<input checked="" type="checkbox"/>
441222334	نوف بنت سعد بن تركي العتيبي	<input checked="" type="checkbox"/>
441222335	أمل بنت فهد بن سالم العتيبي	----
441222336	رهف بنت عبد الرحمن بن سلمان العتيبي	<input checked="" type="checkbox"/>
441222337	الجوهرة بنت منيف بن صالح المطيري	<input type="checkbox"/>

رجوع

طباعة

حفظ

Figure 7.4.10 Exam attendance list page

7.5 Implementation Tools

We will use the Android Studio IDE and Java in the implementation of the project, and MySQL to implement the database of our project.

7.5.1 Android Studio

In order to write an Android application, we are going to need a development environment. Google provides a powerful development environment, which is Android Studio. Android Studio is the official Integrated Development Environment (IDE) for Android app development. It has a powerful code editor and many developer tools from IntelliJ IDEA. Included in the download kit, are the Software Development Kit (SDK), with all the Android libraries we may need ^{[9][10]}.

7.5.2 Java

Java is an object-oriented programming language. The Java language was designed to be small, simple, powerful and portable across different platforms and operating systems. It is widely used for developing different applications^[11].

7.5.3 MySQL

It is a popular database management system. SQL is a standardized programming language used for manipulating databases. SQL statements can be used in various ways, they might be entered directly or embedded into a code written in a different language, or use an API that hides the SQL syntax altogether. In our project we will use the second option of embedding the SQL statements into a different programming environment ^[12].

8. Results Discussion

We find that the proposed system (Exam Digital Entry Card) solves many problems for students and teachers when attending for exams. It replaces the traditional student ID with a digital ID. It shows the student's academic status. It provides the student with the needed information about the exam. And it replaces the use of papers for confirming attendance with modern technology of QR codes which protects society from diseases spreading by avoiding touching, specially in pandemics.

8.1 Strength Points:

Our project has many benefits that can be described as strength points:

- Combines student ID, exam info and checking attendance in one technique.
- Alternative for traditional mechanisms.
- Solves essential issues in the university.
- Saves time and effort.
- Protecting society's health and safety by replacing the use of papers with non-touching technology which is QR code scanning.

8.2 Alternative Solutions

1. Issuing the card on the university website.
2. QR code is issued on the student card and the scanning is done by the teacher.

9. Conclusion

We conclude that the Exam Digital Entry Card provides solutions for the problems mentioned at the beginning of the report, also helps students and teachers and has many advantages.

In this report we introduced the idea of our study and its aims. We determined the problems and presented our solution. Then we explained the subjects and methodology of the study. After that we presented the results at different levels and talked about the implementation tools . Finally, we discussed the results, strength points of the study, the alternative solutions and the recommendations.

10. Recommendations

We hope to take our idea to the next level by:

- Adding the feature of automatic mobile silent mode during the exam time.
- Informative feedback about errors types when scanning QR code.
- Adding the feature of exam supervisor in the teacher account.
- Applying the project to be used in the whole university.
- Applying the system for all universities in the kingdom.

References

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- [12] <http://www.mysqltutorial.org/what-is-mysql/>

Appendix

A questionnaire was done asking students about the problems they face when attending for exams and whether they think an exam entry card will be useful or not.

