

# NFC attendance system

Mohamed Hafez, Radwa Ahmed, and Rana Mahmoud

Zagazig, Egypt, mo.hafez.271@gmail.com, ra6578168@gmail.com, rana.mahmoud147253@gmail.com

Supervisor: Prof. Dr Osama Elkomy, Computer science and informatics, Egypt, osamaelkomy2010@gmail.com.

*Abstract– In the area of technology, smartphones play a significant role in our day-to-day life. Nowadays smartphones can solve most of the problems very quickly and easily. It has made life of every person simple and easier. As mobile usage keeps growing up, the demand on new software is increasing as well in different fields. One of these fields is attendance registration. student attendance is a challenging and time-consuming process for the instructor. This decreases the efficiency of the course and causes time loss. So, this project aims to develop an application to monitor students' attendance during exams, lectures and provides synchronization with a backend; our application helps to facilitate the track of exams for supervisors to track student attendance. We use throwaway methodology to develop this application. This application saves time, applies authentication, and prevents forgery, and it can be extended for other areas rather than educational institutions. Near field communication technology is using magnetic fields to send and receive data between NFC cards and smartphones; we use NFC technology as it's now supported by many of smartphones and no need for a specific reader to do the job, all students will be provided with NFC cards attached to their ID. NFC is a very useful, easy to use and helpful application for controlling and managing attendance.*

## I. INTRODUCTION

In any organization, one of the trusts exist between employers and their employees is attendance. Attendance is a symbolic representation which may be a benchmark to higher authority to assess their staffs' commitment toward their job. This is similar to any organization such as the educational system. In this case, a lecturer will be the higher authority while the students will be his/her subordinates. Most universities in Egypt have attendance systems that can be easily manipulated. As a proof to this fact, imagine if in the class, a lecturer must pass the attendance list which is printed in a paper to the students to record their attendances. In this situation, the student only needs to fill the attendance with their signature. However, some of the students might imitate their friends' signatures even though they are absent. Most universities have barring procedures which exclude the students from taking the examination if their attendance record is less than 75%. One of the solutions is to call out the students' name to mark their attendance. Nevertheless, this approach is very time consuming. Hence, a new system to record the attendance should be implemented to replace the current one.

A. What issues should the new system solve?

1) *Time wasting problem:* This application helps to save time because student don't have to queue in front of their lecturer or waiting till he calls out their names.

2) *Portability:* Users don't have to use specific devices; it is enough to have a smart phone supported with NFC and the students' NFC card to take attendance.

3) *Accuracy:* As mentioned before, at the end of terms lecturers must calculate students' attendance record manually to make sure whether any have exceeded the allowed limit. This process wouldn't be so accurate manually, using the system this will be calculated automatically and the students will be able to track their attendance record. Not only this but lecturer will also get rid of the problem of losing or damaging papers of attendance lists.

4) *Applying vaccine law:* After COVID-19 the whole world have been distributed between vaccinated people and unvaccinated people. New law prevented unvaccinated from entering governmental buildings including educational buildings such as schools, universities and institutions as unvaccinated people threaten the safety of the vaccinated. How will you know whether the student vaccinated or not? Using an app that would store vaccine status with the basic information of the student before entering from gates while ensuring student's identity card security man will find his vaccine status. **The rest of this paper is organized into five sections, section 2 presents an overview of the previously related work to our application, section 3 explains the proposed application, section 4 discusses the experiments on the proposed application, and section 5 concludes the paper.**

## II. RELATED WORK

Many universities build their own attendance system to solve the traditional system issues mentioned before. There are various examples of students' attendance systems developed using different technologies. Among those different types what's developed using punch cards, logbooks, fingerprint, barcodes, QR codes and RFID systems. But most of these systems still cause lots of problems such as providing inaccurate information to users, security issues possibility of infection with diseases. The advantage of NFC based attendance system compared with other attendance systems is its ease of use and quick setup. Beside low cost unlike other systems. NFC (Near Field Communication) is a new generation wireless communication technology.[1] It's becoming increasingly widespread in mobile two-way data transmission, smart posters, electronic identification and social network applications. Thus, New generation of smart mobile devices with NFC sensor technology have become increasingly widespread. Mobile devices with this feature can read data from NFC cards. For this system to be used it's enough to have a smart phone and students' NFC cards.[2]

### III. METHODOLOGY

Design is the title of the project, and most users tend to use simple user interfaces as it's easier to be used and understood, thus programmers should take these vital issues in consideration. In the app we pay great attention to design similar to all other sides in the app., so we used a lot of advanced techniques and tools to make the design look better. Here are some tools used in our work:

1) *Dart language*: Was used to design our project in Flutter. Dart is a programming language designed for client development, such as for the web and mobile apps. It's developed by Google and can also be used for building servers and desktop applications.

2) *Adobe xd*: It is a raster graphics editor developed and published by Adobe Inc. for Windows and macOS. It was created in 1988 by Thomas and John Knoll. to add some features to it to look much more appropriate and pretty.

3) *Illustrator*: It's the industry-leading graphic design tool that lets you design anything you can imagine from logos and icons to graphics and illustrations, and customize it with professional-level precision, as well as time saving features like Repeat for Patterns or Global Edits. You can use the graphics you create with Illustrator in any size digital or print format and be confident they'll look exactly the way you designed them. We used it for logo to make sure it's more and more attractive and appropriate.

4) *Flutter*: It's an open-source UI software development kit created by Google. It is used to develop cross platform applications for Android, iOS, Linux, macOS, and Windows, and the web from a single codebase. [3]

### IV. EXPERIMENTAL RESULTS

Here is the activity diagram in Fig. 1 that shows app processes:

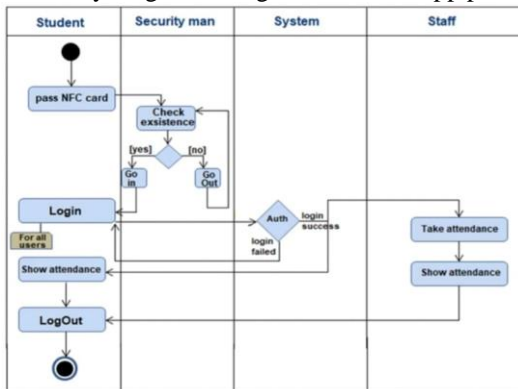


Fig. 1: The application activity diagram.

What would you find if you open the app?

1) *Firstly*, user will face a screen containing app logo as in Fig. 2



Fig. 2: Fig. 2 The first screen users face.

1) *Secondly*, Fig. 3 shows the second screen where the user will choose whether he wants to sign in if he's a student or a professor, or he's a security man thus he just needs to view student's basic information, or he wants to take attendance for exams. This can be considered the main screen as after it, what user will face depends on who he is?

**Welcome**  
to Attendance App



Fig. 3 Main screen

2.1) If user chooses to sign in, then he will face the screen shown in fig. 4 to select whether he is a student or a professor.

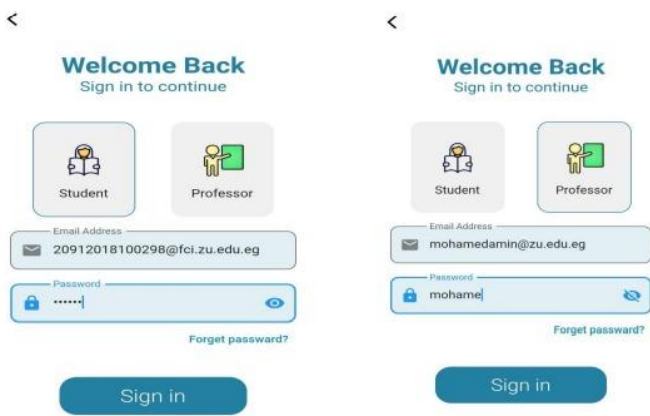


Fig. 4 signing in screen.

From this point the application can be divided into two parts:

- From student's side:
  - He will see his stored data such as his full name, pic, vaccine status, level, ... etc.
  - Then, He can open his subjects list.
  - After that, He will be capable of showing his attendance record in any class.
  - Finally, He will be notified when he's near to exceed his allowed absence limit and if he already exceeds it.
- From professor's side:
  - He will take student's attendance using his mobile device by scanning student's NFC card.
  - He will be notified before his classes.
  - He'll be able to track his students' attendance record without having to calculate it manually.

2.2) If user chooses security, then he will face the screen shown in fig. 5 that ask him to scan student's card, after scanning the student's information will be displayed including his name, pic, level, code, email and vaccine status.

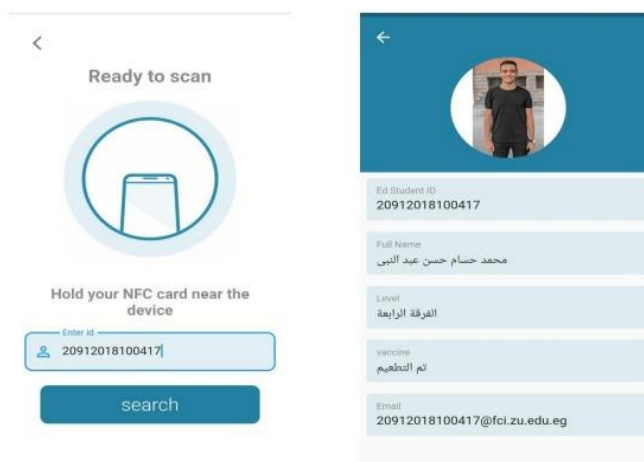


Fig. 5 Security screen.

2.2) If user chooses Exam, then he will face the screen shown in fig. 6 that ask him to log in to make sure he's one of the staff, after logging in a screen containing calendar and schedule will be displayed. On exam time he will be able to create attendance list by scanning student's card from scanning screen after scanning the card the student's pic, name, code, email, whether he's registered in the subject or not.

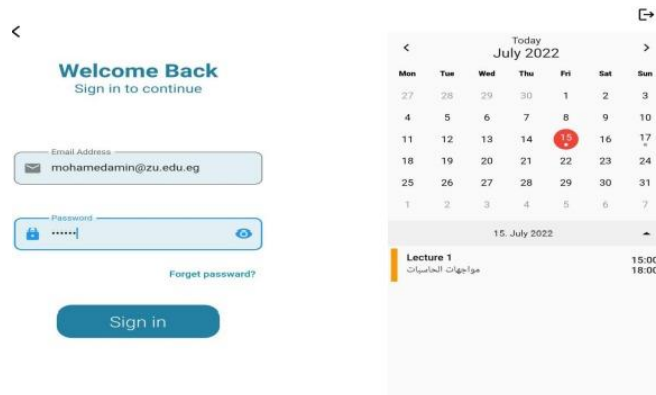


Fig. 6 exams screen.

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