ÇANKAYA UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

Project Report
Version 1

CENG 408
Innovative System Design and Development II

202213
Cankaya Mobile App

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Abstract

Due to the development of technology day by day and the digitalization of our world, many old-fashioned works done with human power in many fields can now be done faster and more easily by computers. We have chosen the mobile application project that we aim to prepare for our school, taking this matter into consideration.

At our school, attendance is taken by signing the signature paper. After finding the idea that attendance can be taken with QR technology instead, we saw that this is possible because of our literature research. In this way, we think that the attendance process will be faster and more hygienic without causing paper waste. Another issue is about the identity check of the students while the school buses enter the school. This process is done by the security guards entering the services and having each student's identity read to the device with the device in their hands. For shuttles that arrive at school at almost the same time each morning, this process takes too long due to the lack of devices and security guards. To minimize this waste of time, we aim to provide identity control by using QR technology within the services. Finally, we aim to ensure that the course evaluation questionnaires distributed before the final exams are filled through our application. In this way, we want to prevent the waste of paper and the loss of time caused by entering these surveys into the system.

Özet

Teknolojinin her geçen gün gelişmesi ve dünyamızın dijitalleşmesi nedeniyle birçok alanda insan gücü ile yapılan eski usul birçok iş artık bilgisayarlar sayesinde daha hızlı ve kolay bir şekilde yapılabilmektedir. Biz de okulumuz için hazırlamayı hedeflediğimiz mobil uygulama projesini bu konuyu dikkate alarak seçtik.

Okulumuzda yoklama imza kâğıdı imzalanarak alınmaktadır. Bunun yerine QR teknolojisi ile yoklama alınabileceği fikrini bulduktan sonra literatür araştırmamız sayesinde bunun mümkün olduğunu gördük. Bu sayede yoklama sürecinin kâğıt israfına yol açmadan daha hızlı ve daha hijyenik olacağını düşünüyoruz. Bir diğer konu da okul servislerinin okula girişlerinde öğrencilerin kimlik kontrolü yapmasıyla ilgili. Bu işlem güvenlik görevlilerinin servislere girerek her öğrencinin kimliğini elindeki cihaza okutmasıyla yapılır. Her sabah okula hemen hemen aynı saatte gelen servislerde, cihaz ve güvenlik görevlisi eksikliğinden dolayı bu süreç çok uzun sürüyor. Bu zaman kaybını en aza indirmek için hizmetler içerisinde QR

teknolojisini kullanarak kimlik kontrolü sağlamayı hedefliyoruz. Son olarak final sınavları öncesi dağıtılan ders değerlendirme anketlerinin uygulamamız üzerinden doldurulmasını amaçlıyoruz. Bu sayede kâğıt israfının ve bu anketlerin sisteme girilmesinden kaynaklanan zaman kaybının önüne geçmek istiyoruz.

1.   Introduction

Due to the development of technology day by day and the digitalization of our world, many old-fashioned works done with human power in many fields can now be done faster and more easily by computers. We have chosen the mobile application project that we aim to prepare for our school, taking this matter into consideration.

At our school, attendance is taken by signing the signature paper. After finding the idea that attendance can be taken with QR technology instead, we saw that this is possible because of our literature research. In this way, we think that the attendance process will be faster and more hygienic without causing paper waste. Another issue is about the identity check of the students while the school buses enter the school. This process is done by the security guards entering the services and having each student's identity read to the device with the device in their hands. For shuttles that arrive at school at almost the same time each morning, this process takes too long due to the lack of devices and security guards. To minimize this waste of time, we aim to provide identity control by using QR technology within the services. Finally, we aim to ensure that the course evaluation questionnaires distributed before the final exams are filled through our application. In this way, we want to prevent the waste of paper and the loss of time caused by entering these surveys into the system.

Our aim is to learn more about the technologies we need to use in realizing these project ideas. As a starting point, we have conducted a literature survey revealing the current state of academic literature surrounding QR Attendance. In literature, there are studies conducted with many different features and technologies in this field. In doing so, we have gained insight into what aspects or technologies have already been studied or deployed.

The organization of this paper is reflective of our process of understanding and gaining insight by reviewing previous works in the field of attendance practice. Section 2 provides an overview of the topics of the articles we selected and our criteria for choosing these articles. Section 3 addresses the studies that have been done in the past and the features of these studies and the technologies used in detail. Section 4 mentions the challenges that come within the QR Technology. In Section 5, we summarized why we chose this topic in our project and our conclusion.

2. Literature Search

This study aims to summarize the QR technology research literature that relates to mobile app technologies and QR Attendance. We considered research that directly addresses the QR Attendance in the developing world after gaining general information about QR Technology. Our criteria for including a paper require that it touches previous studies related to our project subject and the technologies we aim to use. As technology develops rapidly, we chose to review the recently shared ones while researching articles.

2.1 Main Findings

When searching for studies with a focus on QR attendance, our overall impression is that the existing mobile app is sparse.

When we examine many projects and articles, we see that many technologies (Fingerprint, voice recognition, face recognition, QR reading, etc.) and many software languages and software frameworks (JavaScript, Java, Python, etc.) have been used from the old to the new. However, these remained as a rather incomplete, unsustainable, or useless project. Universiti Teknologi Petronas (UTP) [9] and Multimedia University [10] in Malaysia, used the absentee tracking technology with this QR code. It is not difficult to foresee that over time, most universities will have their own application and that online attendance will be tracked through that application. Over time, not only universities but also businesses will want to use it for the entry-exit tracking of their employees. Let's look at the projects we found in general:

One of the projects developed a project on the Android system, not for iOS [1]. After the application saves the barcode or QR code it reads to the database and stores it, it gives it to the user as XLS and CSV document output if requested. SQLite Database is used as a database. In another project, which is like this project, differently, GPS was added [3]. Different databases are used in some projects, like MySQL [4].

In another project, an application was developed that works on both android and iOS [2]. There is MongoDB with NoSQL in the technology stack, which performs high-performance data logging and flexible data modeling for the database. It has a modular structure with Single Page Application (SPA) in Angular, which divides the application into parts and enables it to be reusable, and it is easy and fast to develop projects with third-party

frameworks. It also uses Node.js, which is compatible with JavaScript and enables new updates. Mobile applications use a cross-platform language named React Native that enables fast testability, a high user experience, and compatibility with the JavaScript back-end. MongoDB, Angular for the web interface, and a Node.js server for Create, Read, Update, Delete, operations on cloud databases are implemented. It runs on "localhost" and includes Angular, which provides the interface for the participant. There is also a Node.js server that enables network operations, attendance listing, or sending data. App is executed by the local IP address of the attendance network (For example, 192.168.1.2), and it contains the Node.js server that receives the incoming attendance requests. And if the participant's device does not support biometric recognition, an alternative React Native application with face recognition is also available.

There are only applications written for iOS on the internet [5]. PHP was used as the software language and MySQL DBMS was used as the database. To compile all the technologies used in this Attendance in general:

2.1.1   Fingerpoint Recognition Based

Most of the research has demonstrated that fingerprint or hand gesture recognition is a highly suitable method for an attendance management system. The method of digitally comparing one or more unknown fingerprints to a collection of known and unknown fingerprints in the database is known as automated fingerprint recognition. A particular finger assumption device that is used as a component of a special finger impression attendance framework was described by Mohamed and Raghu [6]. The students may check their essence by placing their fingertips on the device's sensor. But because fingerprint scanners can't always identify something the first time, this framework lacks viability. Soewito et al. [8] presented an attendance system employing smartphone GPS and fingerprint technologies. The method takes a lot of time since it makes use of fingerprint recognition.

2.1.2   GPS-based Attendance System

Global Positioning System, or GPS, enables us to determine a person's location and direction at any time, any place on Earth. In terms of knowing where humans are and how to go to other areas, people still Bawar Ali Abdalkarim and Devrim Akgün, A Literature Review on Smart Attendance Systems, ICAENS 2022, Konya, Turkey 1570 need objects in the sky, but now satellites utilize them. In their work, Kumar and Kumar [11] presented a creative

location-based time and attendance monitoring system that was deployed on an Android mobile app. The use of smartphones helps to reduce the need for additional biometric scanning equipment. Components of the organization include a specific location, which may be located using GPS. The GPS on mobile phones determines each student's place, and these locations are crucial for some time and attendance tracking.

2.1.3 Barcode / QR code Based

An associated barcode is a graphical way to represent data that machines regarding the item can read. A quick Response Code, sometimes known as a QR code, is comparable to a barcode. However, it holds data in both two perpendicular directions because of its two-dimensionality. As a result, a QR code may store several times more data than a barcode. Discussing a system for automating student attendance was introduced by Noor et al. [12]. Everyone in this system has a unique ID that is assigned a barcode that the mobile app can scan. Each user in this system has an individual ID with a barcode that the mobile app may scan. One of the drawbacks of this approach was that a single student may trick it by using the IDs of the other students in the arrangement.

Another approach depends on gathering attendance and updating data in one area. The suggested method, which was built utilizing QR code technology and is based on research by Sutar et al. [13], is a smart attendance system that would speed the attendance process by creating and scanning QR codes. The system runs as an application on mobile devices and is built on QR Technology. Moreover, to assure student attendance in the course, Sunaryono et al. suggest "an Android-based course attendance system using face recognition." [14]. The course information is encoded into a QR code and presented from the front of the class. The student is just required to use their phone to take a photo of their face and display a QR code. The picture will subsequently be transmitted to the server to manage the attendance.

2.1.4 Face Recognition Based

The idea of finding human faces in referenced photographs or videos is known as face detection. A face recognition system is a type of tech that can compare face images from a video or photograph to a database of known and unknown faces. The Face, Recognition-based Attendance Management System, was developed by Smitha to develop an organized classroom attendance system using face recognition methods [18]. Through facial ID, the

system can record involvement. Through a camera, it finds faces and then recognizes them. The system is split into two parts: facial recognition and detection. Using the Local Binary Pattern Histogram (LBPH), the system will identify faces of students in the livestreamed video from the class and, if the recognized face is found in the database, will mark their attendance.

Face recognition technology was also discussed by Varadharajan et al. in their paper. They placed a camera inside the class, using this technique to take pictures. The attendance is registered as a present after faces are found and identified in the database. Parents are informed of a student's disappearance if their attendance is noted as absent [21].

The research by Chandramouli et al. [17], wherein they utilized NVIDIA's Jetson Nano, is one of many that tries to modernize how attendance is managed in a certain method and even the parameters for time management. The device is set in the class, where the names and photos of the students are held. Open CV is used to obtain the photos. The processor board would be NVIDIA Jetson Nano's Developer kit. A Haar classifier is used to identify faces once the extraction has been processed. They subsequently identified with the aid of the LBPH Algorithm. An Excel spreadsheet is generated and refreshed hourly with data from the appropriate class teacher.

Ofualagba et al. [25] suggested a system named Automated Student Attendance Management System Using Face Recognition that highlights the use of Cloud Computing (CC) technological concepts to boost the performance of face identification methods. The FACECUBE system, which is suggested here, uses facial recognition to take attendance. The system provides students, instructors, and administrators with online features. However, putting this system together involves several steps, including purchasing new hardware and software.

Susanto et al. [15] attempted to perform a slightly different type of research concerning the detection of face recognition of lecturers who are present in the application system via an Android device. They make a connection with face recognition detection and, after that, save it to the database that was used as information about the presence of lecturers who are teaching. The local binary pattern histogram (LBPH) classifier approach, which may be used as a strategy in the attendance system of lecturers to be more efficient and productive, is used to evaluate the facial recognition system.

An open-source, generic application for assessing daily attendance using face recognition and making use of the Android system was proposed in the Hava et al. [22] study. Almost every institution may readily get it at no cost. With this suggested solution, Google Sheets are automatically created and available to the institution with no effort. The system involves facial identification and recognition algorithms to identify individual students and record their participation.

Prangchumpol mentions in his research, "Face Recognition for Attendance Management System Using Multiple Sensors," [16] that his performance still falls short when it comes to accurately identify students' faces and that he is still unable to confirm or rectify the data when a mistake occurs in class. Therefore, he seeks to improve the efficiency of the face recognition-based attendant system and make the system's principles simple for students to understand. This sort of validation aims to discover how to detect faces utilizing the Android Face Recognition with Deep Learning approach. The database is linked to the web server using cloud storage.

Alburaiki et al. [19] developed a methodology that solved three key elements: First, using mobile phone cameras and automatically recognizing and analyzing faces. The second is a machine-learning-based facial recognition API. Lastly, maps API. The outcome demonstrates that face recognition has attained high accuracy in identifying students' faces even in unfavorable conditions. The system displayed practical examples of responses by marking the student's attendance after identifying the student's face and location, as well as the lecturer has the option to access a report of submitted attendance.

A portable attendance system that could be accessed from any location at any time inspired Salac's study [23]. Without carrying paper and PCs, the lecturer may simply verify attendance using an Android smartphone. The students' Android phones make it simple for them to check their attendance information.

2.1.5 Android-Based Authorized ID and Password

Android OS was developed mainly for touch mobile devices. It is based on a slightly different version of the Linux kernel and other open-source applications. You can be prompted to sign up or sign in each time you use an android-based smartphone and visit an application or website. Typically, a login/password creation request can be made for you. Now that this procedure is so popular, some users may register their accounts without giving attention to

their password because it has practically become part of the routine. Unfortunately, if a user picks poor credentials, there is much risk. Hameed [20] developed and put into use an intelligent Android-based attendance system. The technology creates attendance data automatically and offers a quicker, more economical, and accessible solution for tracking online student attendance. The three characteristics of the attendance system are the admin account, which can log in and change the database; the instructor account, which can mark students as the present; and the reporter which can verify attendance records and report all duties.

The course instructor will be ready to obtain attendance with ease using phones with Android OS which has been developed to save attendance both on the device and servers, as well as to Verify statistics and print a paper version according to Islam et al. [24] paper. Their system can record attendance, mark invaders' admission, calculate attendance percentages, and send emails and Text Messages to the parents to keep them informed about their child's enrolment at the Institution using the stored data. The proposed system allows internet access at any time and from any location, which might greatly help course instructors take care of their student's attendance.

An attendance management system was developed by Kumbhar et al. [26] to address issues with class attendance using Android devices. Both students and teachers must install APKs on their phones to access the system. They also received a unique ID and password. Students must fill out the application with their information and their parents. The student may register their attendance with only one click after the program is started by the lecturer and is ready for use during attendance checking. Both weekly and monthly attendance records are available for lecturers. Parents are informed about their student's attendance through SMS each month.

2.1.6 Android-Based RFID

Some researchers refer to RFID as a more straightforward form of the NFC (Near field communication) technology that many Android devices utilize for digital payments. Souza et al. [27] explores numerous frameworks put up for board involvement using different improvements. The board is advised to use another form of participation specifically for ordinary level institutions in consideration of this discussion. The proposed model includes components for mobile applications and RFID. The RFID component is suggested for

documenting student engagement in the database at the back end. The application portion is intended to give their families attendance information. When there is no electricity or not many resources to send by the RFID component, the application part is used as a backup to track the attendance.

3. Software Requirements Specification

3.1 Introduction

3.1.1 Purpose

The purpose of this document is describing the mobile application whis is called Cankaya Mobile App: An application developed for Çankaya University which has several functions such as QR Attendance, QR Id Check for school buses and Online Course Evaluation Questionnaires. This application aims to digitizing the attendance process, preventing paper waste, reducing the possibility of forgery in documents for QR Attendance; minimizing the queue that occurs during identity checks at school entrances for QR ID Check; minimize the use of paper and the loss of time in the process of entering the questionnaires into the system for Online Course Evaluation Questionnaires. This document includes detailed information about the requirements of the project. It reflects the identified constraints and proposed software functionalities. Moreover, the SRS document explains how participants interact with the application. This document explains how the concerns of the stakeholders are met.

3.1.2 Scope of Project

QR code started to play a big role in our daily life. With the Cankaya University Mobile Application, we aim to take advantage of the fast and easy process opportunities provided by the QR code. Quick Response, QR code in short, is a special code encoded with black dots in a white square background. The location and shape of these black dots in the white square background allows encoding of different information.

The main purpose of creating the Cankaya University Mobile application is to overcome the difficulty of taking attendance in lessons, which we frequently encounter, and to eliminate problems such as long shuttle queues at school entrances. When we addressed all these problems, we realized that the solution could be solved with QR codes, which are used frequently today. Another feature of our application is the questionnaires used for complaints and suggestions about lessons and school.

The only thing required to use the ID Check, QR Attendance, which are solved with the QR code, and the Course Evaluation Questionnaire features will be for the users to have a smartphone with a camera.

3.1.3   Glossary

Table 1 Glossary of SRS

Term	Definition
QR	It is a type of barcode that can be read easily by a digital device and which stores information as a series of pixels in a square-shaped grid.
iOS	It is an operating system used for mobile devices manufactured by Apple Inc.
Android	It is a mobile operating system based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices such as smartphones and tablets.

3.2   Overall Description

3.2.1   Product Perspective

Cankaya Mobile App is a mobile application which is intended to operate on iOS and Android operating systems, containing QR Attendance, QR Id Check for school buses and Online Course Evaluation Questionnaires.

The application has two different interfaces prepared for lecturers and students. When the lecturers open the application, the courses they are giving that semester will be displayed on the screen, and the course content will have options to create a QR code for taking attendance, view past attendance information and export the attendance. When lecturers want to take attendance; they will have two options: before or during the class, they can choose the course they will take and create a QR code, then print the code and take it to the class, or by clicking on the e-mail option, sending the QR code to their e-mail address and project the code on the projection screen in the classroom, they can take attendance. Leturers can view their attendance history on the screen. They can also export the selected attendance record to a Word file. Another feature that lecturers will display will be QR Id check, which is for identity checks when boarding school buses.The interface of the QR Bus feature will be the same for students and lecturers. When this option is clicked, the camera will open and the QR code at the entrance of the services will be scanned while boarding the service, and the driver will control the screen. If the person is verified to be from the school, a green message will appear on the screen, and if not verified, a red warning will appear. The driver will control it.

The last feature is for the lecturers is to create and activate the course evaluation questionnaires. They can prepare course evaluation questionnaires via app and activate them whenever they want.

When students open the application, they will see QR Attendance and Id Check options for school buses. When the selection is made for both features, the camera will open. The QR Bus interface was explained in the previous paragraph. For QR Attendance, students will scan the QR Code and close the application. Students will be able to see the course evaluation survey only when the instructors activate it. They will not be able to perform any other action on the application without completing these surveys.

3.2.1.1 Development Methodology

We aim to develop our project with the agile project management method. This method is basically based on "iteration" and its main purpose is to increase efficiency in projects. Agile project management models are used in projects whose details are not clear at the initial stage. The desired project is completed by bringing together small and working parts. Each iteration goes through the stages of analysis, design, coding, testing, user feedback and evaluation. In this way, sudden changes can be organized quickly. At the same time, after each completed iteration, the product is given feedback by the customer and the process continues.[1] We thought that this method would be the most suitable for us, since there is a possibility that there will be changes in our project over time, and our project consultant, whom we can see as a customer, evaluates the point we have reached in the meetings we hold every week and gives feedback.

3.2.2 User Characteristics

3.2.2.1 *Participants*

Participant must be an active student or employee (janitor etc.) of Cankaya University.

Participant must have a Smartphone.

Participant must have an Internet.

3.2.2.2 Admin

Admin must be a lecturer of Cankaya University.

Admin must have a Smartphone.

Admin must have Internet.

3.3 Requirements Specification

3.3.1 External Interface Requirements

3.3.1.1 User interfaces

The user interface will be worked on iOS and Android smartphones.

3.3.1.2 Hardware interfaces

For using CankayaMobileApp, requires smartphone which have camera for using QR Technology.

3.3.1.3 Software interfaces

Survey templates will be used for the surveys to be created.

3.3.1.4 Communications interfaces

There are no external communications interface requirements.

3.3.2 Functional Requirements

3.3.2.1 Profile Management Use Case

Use Case:

Sign up as Lecturer.

Sign up as Student.

Diagram:
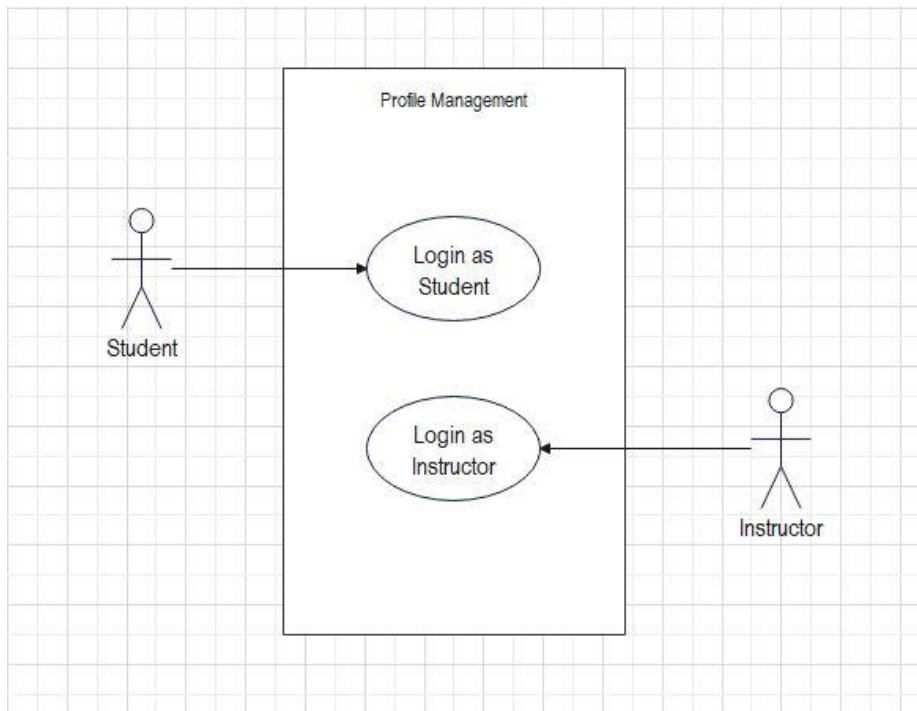
Brief Description: It is required to sign up with the e-mail addresses used in the Çankaya University system. The application cannot be used without signing up. There are two options for user sign up: Lecturer and Student.

Initial Step-By-Step Description:

1. Users must sign up to start the application.
2. If password or e-mail address is invalid, users should try again.

3.3.2.2 Options Menu Use Case

Use Case:

Home Page

Announcement Page

QR Page

Profile Page

Survey Page

Diagram:

Brief Description: After successful login to the application, user can display the menu and choose one of the functions.
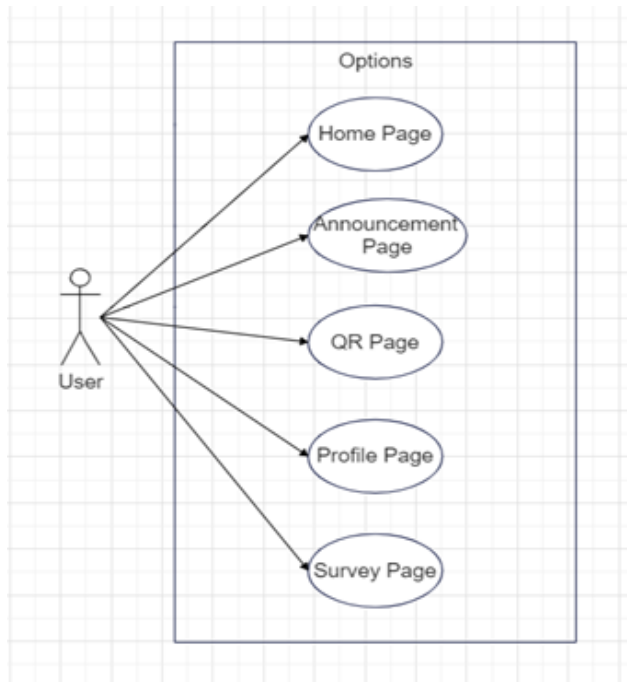
Initial Step-By-Step Description:

1. If user selects home Page button which is displayed by default when the application starts, Cankaya University's website is displayed.
2. If a user selects Announcement Page button, announcements on Cankaya University's website are displayed.
3. If the user selects QR button, Camera is opened for students, and attendance options are opened for lecturers.
4. If the user selects Profile button, user's personal information is displayed.
5. If lecturer selects Survey button, survey options are displayed.

3.3.2.3   Home Page Use Case

Use Case:

        Access to the Cankaya University Web Site

Diagram:
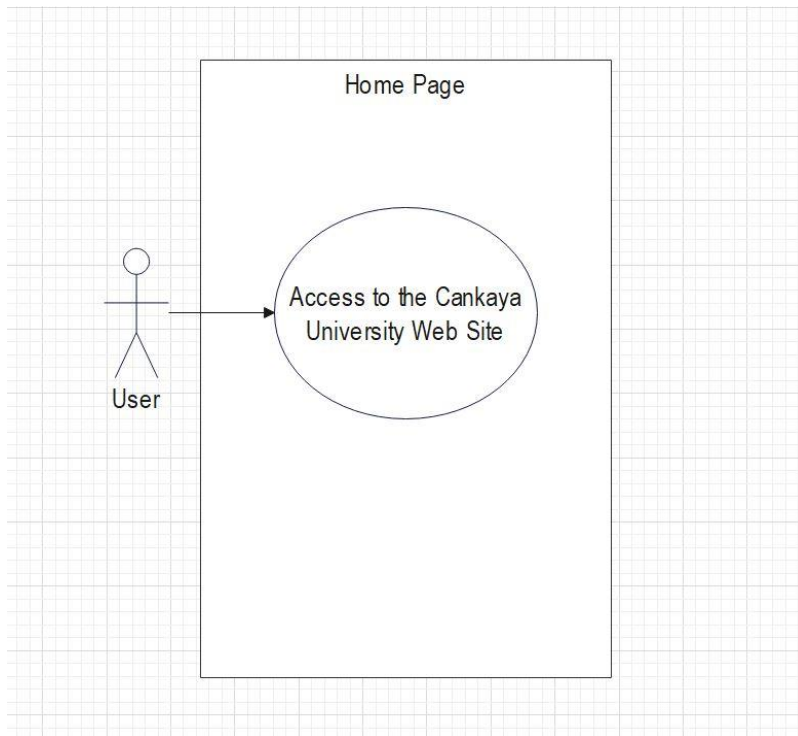
Brief Description:

Users can easily access the Cankaya University's Website while using the application.

Initial Step-By-Step Description:

1. Users start the application.
2. Users access the Cankaya University web site.

3.3.2.4 Announcement Page Use Case

Use Case:

Access to the Cankaya University Web Site – Announcement Page

Diagram:
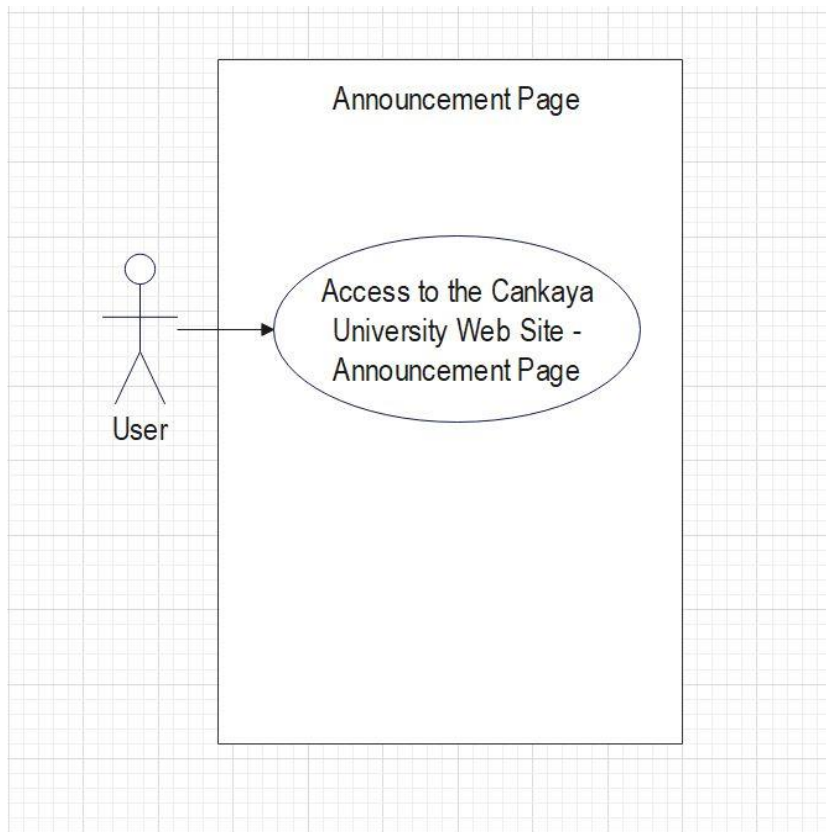
Brief Description:

Users can easily stay informed about announcements by accessing the Cankaya University Web Site- Announcement Page.

Initial Step-By-Step Description

1. Users start the application.
2. Users access the Cankaya University web site – Announcement Page.

3.3.2.5   QR Attendance Use Case

Use Case:

Add course to the system.

Login to the course

Create QR code for the course.

Scan QR code for attendance

Collect attendance data.

Access the attendance data.

Diagram:
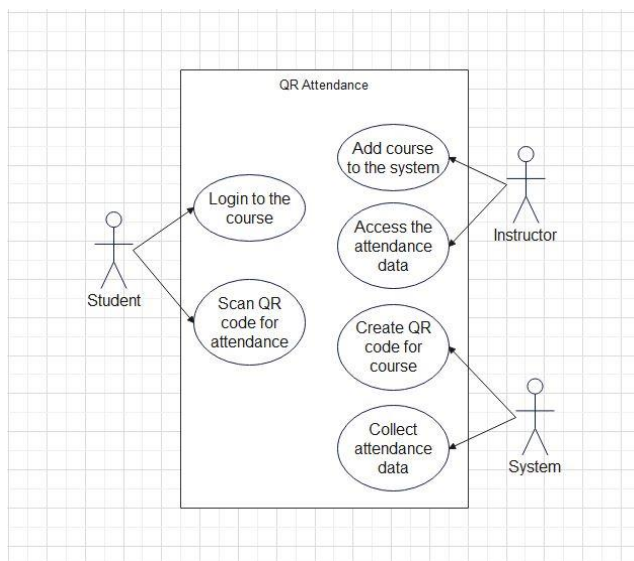
Brief Description: In this use case diagram, instructor add course to the system later system create specific QR code for the course. Students scan this QR code for attendance, system collect student's data and instructor can receive the data via system's commune.

Initial Step-By-Step Description:

1. Instructor adds course to the system for attendance tracking.
2. System creates QR code for course.
3. System uploads this QR code to the course page.
4. Students scan QR code with camera access.
5. The system collects every single student data for attendance tracking.
6. The course instructor receives this data and attendance will be taken.

3.3.2.6   QR ID Check Use Case

Use Case:

Create QR code for ID check.

Scan QR code for ID check.

Access ID data from system.

Collect data of passengers' ID.

Diagram:
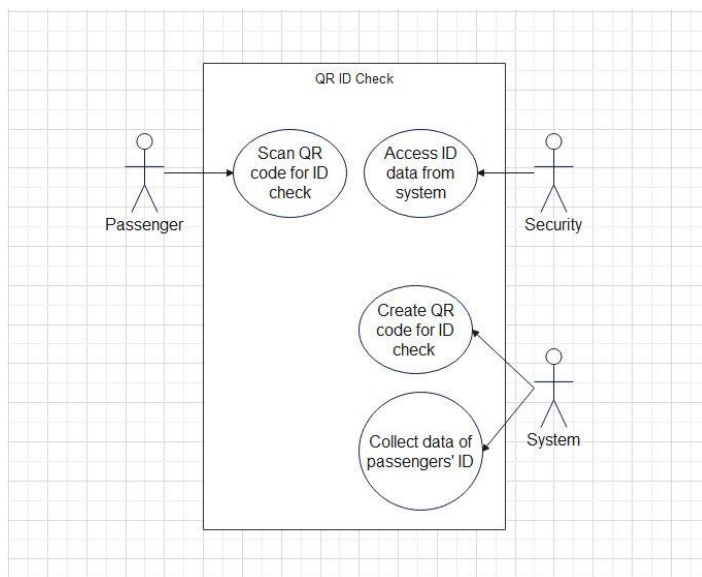
Brief Description: In this use case diagram application provides an improvement to prevent the shuttle waiting queue at school entrances. Passengers get into shuttle by scanning the QR code created by system. The system collect the data and security will check it on the school entrance.

Initial Step-By-Step Description:

1. The system creates QR code for each shuttle.
2. All passengers will scan QR code while getting into shuttle.
3. The system will store data for ID check.
4. Security will check data.

3.3.2.7   Profile Page Use Case

Use Case:

Access to the Personal Information

Diagram:
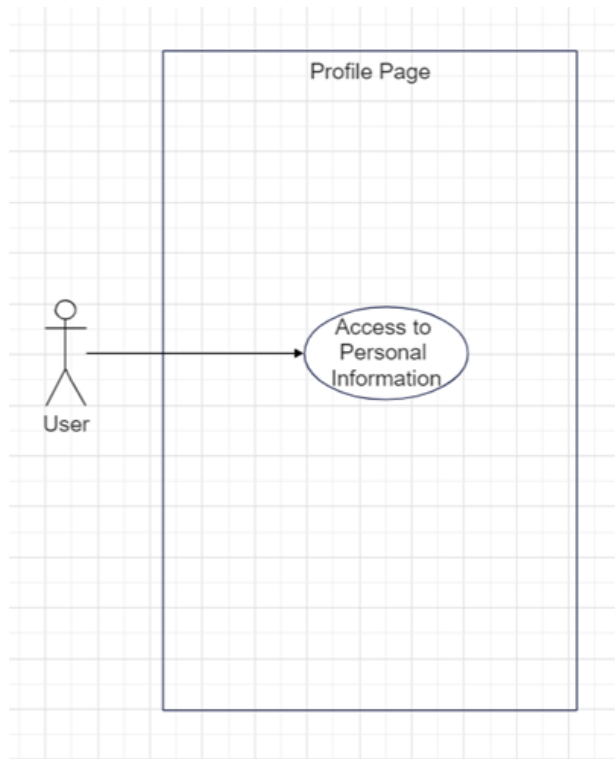
Brief Description:

In the Profile Page section, users can access their personal information.

Initial Step-By-Step Description:

1. Users access the Profile Page.

2. Users can view their personal information.

3.3.2.8 *Course Evaluation Questionnaire Use Case*

Use Case:

Add questionnaire.

Fill in the questionnaire.

Add opinions/suggestions.

Process questionnaire data

Show evaluation result.

Access the results.

Diagram:
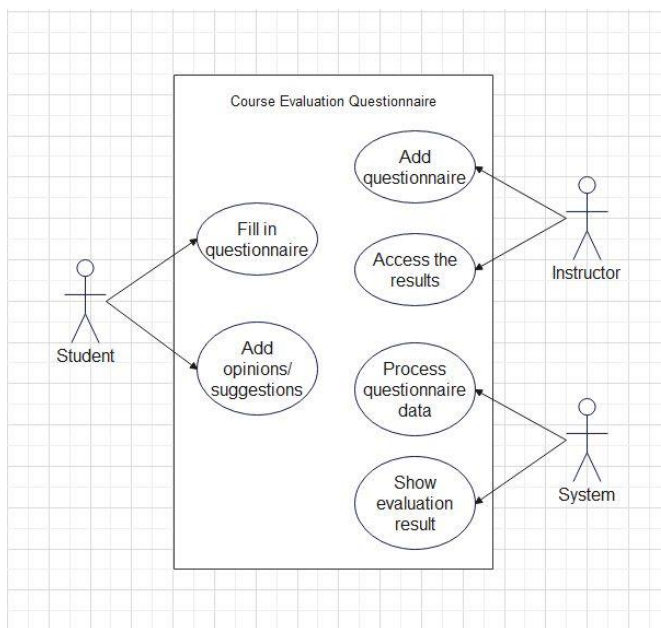
Brief Description: In the survey section, while making the surveys about the courses more accessible through the application, it also allows us to receive the suggestions and opinions of the students. Creation of questionnaire and evaluation part is arranged by instructor and the system.

Initial Step-By-Step Description:

1. Course instructor creates questionnaire.
2. Student fills in questionnaire.
3. Students add opinions/suggestions about the course and Çankaya University.
4. System processes the data.
5. System shows evaluation results to instructors.
6. The instructor of the course accesses the evaluation results and student's opinions/suggestions.

3.3.3 Performance Requirements

Apps must run smoothly without any latency to keep the level of user experience high. Minimum requirements for running CankayaMobileApp are:

Operating system: iOS (iOS 11 or higher), Android (Android 9 Pie or higher)

3.3.3.1 Database Requirements

In this project, we will create all the required data ourselves with Firebase. We will add the information of our project team as students and a few of our lecturers to the database we have created.

3.3.4 Software System Attributes

3.3.4.1 Portability

The application can be used with all smartphones and can be easily used with the phones we carry in our daily life.

3.3.4.2 Usability

It will be very easy, user-friendly, and familiar to everyone, just like the apps we use almost every day.

3.3.5 Safety Requirement

The app is designed to be used by a student on one phone only. It is not possible to log in with a phone other than the phone that was logged in for the first time. In case your phone is lost or switched to a new phone, student affairs should be contacted.

4. Software Design Description

4.1 Introduction

4.1.1 Purpose

The purpose of this document is describing the mobile application whis is called Cankaya Mobile App: An application developed for Çankaya University which has several functions such as QR Attendance, QR Id Check for school buses and Online Course Evaluation Questionnaires.

The target audience is students at Çankaya University. The mobile application will make it easier for students to track attendance and id check for school buses with QR technology and will provide an opportunity for teachers to receive feedback by presenting surveys to students. We aim to make the work of students and teachers easier.

This application aims to digitizing the attendance process, preventing paper waste, reducing the possibility of forgery in documents for QR Attendance; minimizing the queue that occurs during identity checks at school entrances for QR ID Check; minimize the use of paper and the loss of time in the process of entering the questionnaires into the system for Online Course Evaluation Questionnaires. This document includes detailed information about the requirements of the project. It reflects the identified constraints and proposed software functionalities. To provide a better comprehension, this SDD includes various diagrams such as UML diagram of the project, activity diagram and block diagram.

4.1.2 Scope

This document contains a complete description of the design of Cankaya Mobile App.

React Native is a JavaScript framework for writing real, natively rendering mobile applications for iOS and Android. It's based on React, Facebook's JavaScript library for building user interfaces, but instead of targeting the browser, it targets mobile platforms. Most of the code we write will be cross-platform [1]. There is another similar and selectable framework, that is Flutter. Flutter is an open-source UI software development kit created by Google. It is used to develop cross-platform applications for Android, iOS, Linux, macOS, Windows from a single codebase [2]. We chose React Native, because Since Flutter uses Dart, only used by 6.54% of people, according to Statista[3], which states fewer developers can learn Dart. Moreover, since it is not widely used, it is restricted by several IDEs,

providing no support for the language. Because of these facts, we have chosen React Native as our development environment.

The scripting part of the project is occurred using JavaScript. JavaScript is a dynamic computer programming language. It is lightweight and most used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities. The reasons why we have chosen JavaScript as our programming language are all the members of the group have knowledge of JavaScript programming language and JavaScript is necessary for React Native.

4.1.3 Glossary

Table 2 Glossary of SDD

Term	Definition
React Native	React Native is an exciting framework that enables web developers to create robust mobile applications using their existing JavaScript knowledge. It offers faster mobile development, and more efficient code sharing across iOS, Android, and the Web, without sacrificing the end user's experience or application quality.
JavaScript	JavaScript is a dynamic computer programming language. It is lightweight and most used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.
Flutter	Flutter is an open-source framework by Google for building beautiful, natively compiled, multi-platform applications from

	a single codebase.
Dart	Dart is an open-source, general-purpose, object-oriented programming language with C-style syntax developed by Google in 2011.
QR	It is a type of barcode that can be read easily by a digital device and which stores information as a series of pixels in a square-shaped grid.
iOS	It is an operating system used for mobile devices manufactured by Apple Inc.
Android	It is a mobile operating system based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices such as smartphones and tablets.
Udemy	Udemy is an online learning and teaching marketplace with over 213000 courses and 57 million students.

4.1.4 Overview of document

The remaining chapters and their contents are listed below.

Section 4.2 is System Design which describes the project development phase. Also, it contains a class diagram of the system and architecture design of the simulation which describes actors, exceptions, basic sequences, priorities, pre-conditions, and post conditions. Additionally, this section includes activity diagram of scenario generator.

Section 4.3 is Use Case Realization. In this section, a block diagram of the system, which is designed according to use cases in SRS document, is displayed and explained.

4.2   Architecture Design

4.2.1   Problem Description

One of the purposes of creating the Cankaya University Mobile application is to overcome the difficulty of taking attendance in lessons, which we frequently encounter. Sometimes there are people who cannot sign because the signature paper is circulated incorrectly. Sometimes the lecturer forgets to give the signature paper and even though the lecture is over, lecturer and students has to wait in the classroom for a long time to sign it. In addition to such problems, it is a time-consuming process in general, and the paper and common pens that touch everyone's hand can pose a threat in terms of hygiene.

There may be very long waiting times for the identity checks of the passengers when school buses enter the school. These checks are carried out by the security guards entering the shuttles in order, and by reading the passenger ID cards to the devices in their hands. This process can cause students and lecturers to be late for classes in the morning hours.

The last problem is the course evaluation surveys used for complaints and suggestions about lessons and school. These questionnaires are distributed by the lecturers to the students just before the final exams. This may cause students who experience exam stress to be distracted, be more stressed and not be able to fill out the questionnaire correctly. In addition, the lecturers' processing of the questionnaires into the system causes a waste of time for them and causes a lot of paper wastage.
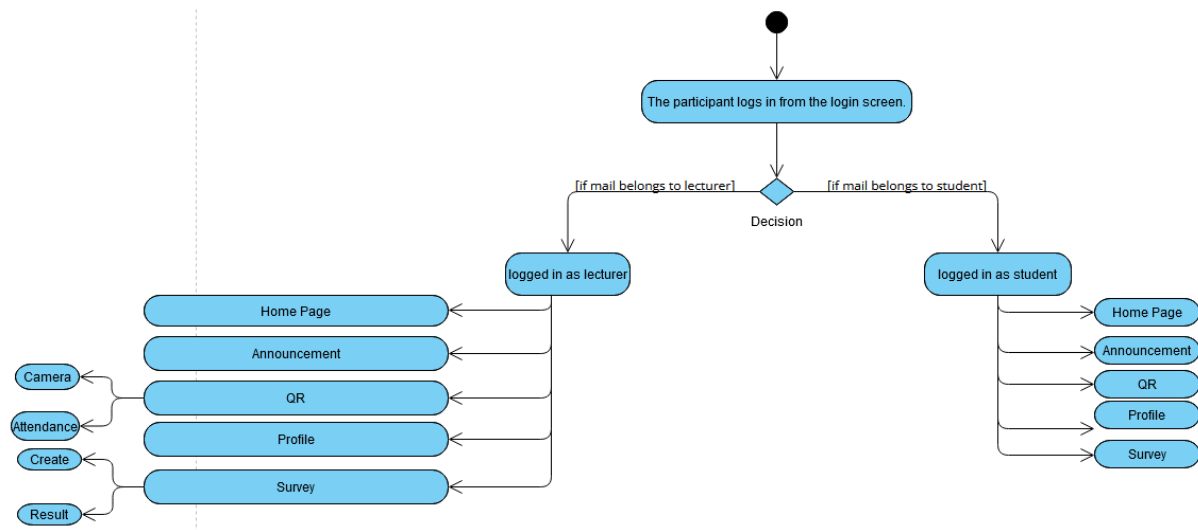
4.2.2   Technologies Used

Our IDE: Jetbrains Webstorm version 2022.2.3.

Programming Language: JavaScript

Framework: React Native (Facebook)

Database: Firebase (Google)

4.2.3 Activity Diagram

4.2.4 Class Diagram
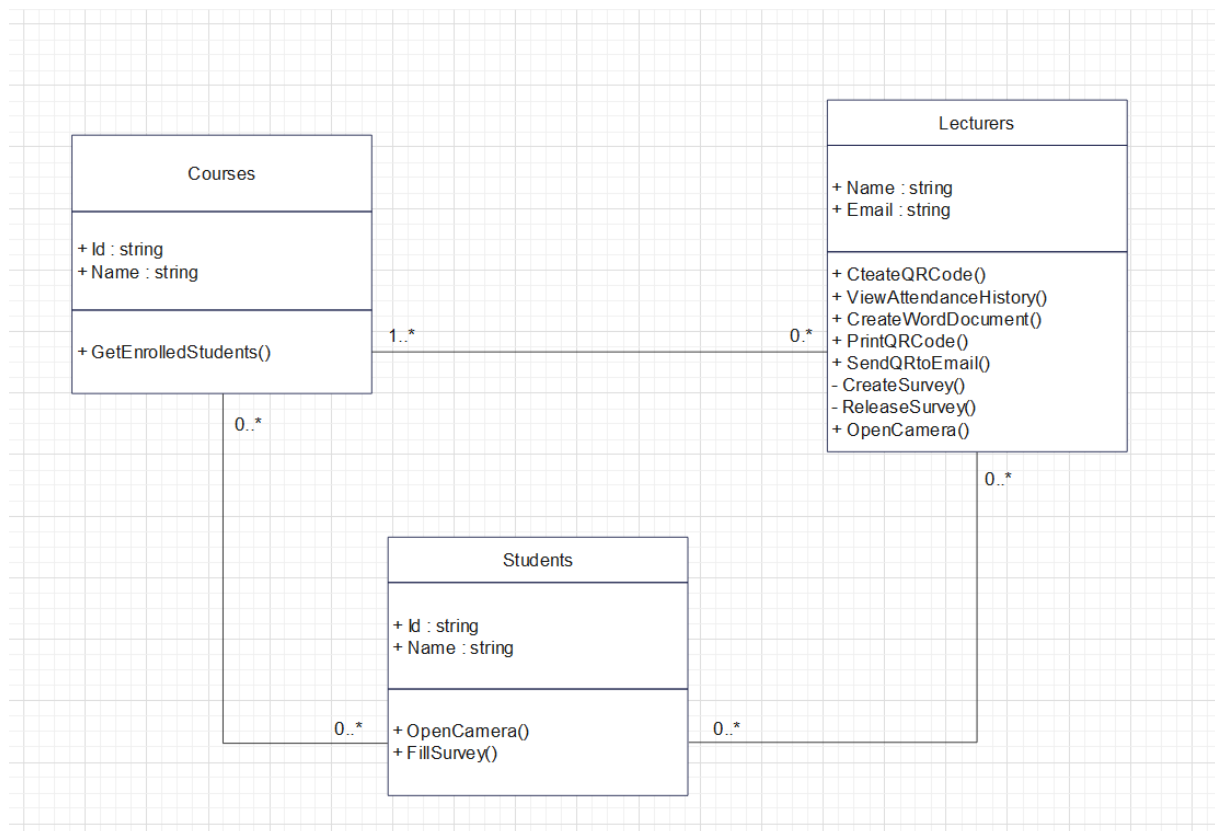
4.2.5 Sequence Diagram

4.2.5.1 Login Sequence Diagram
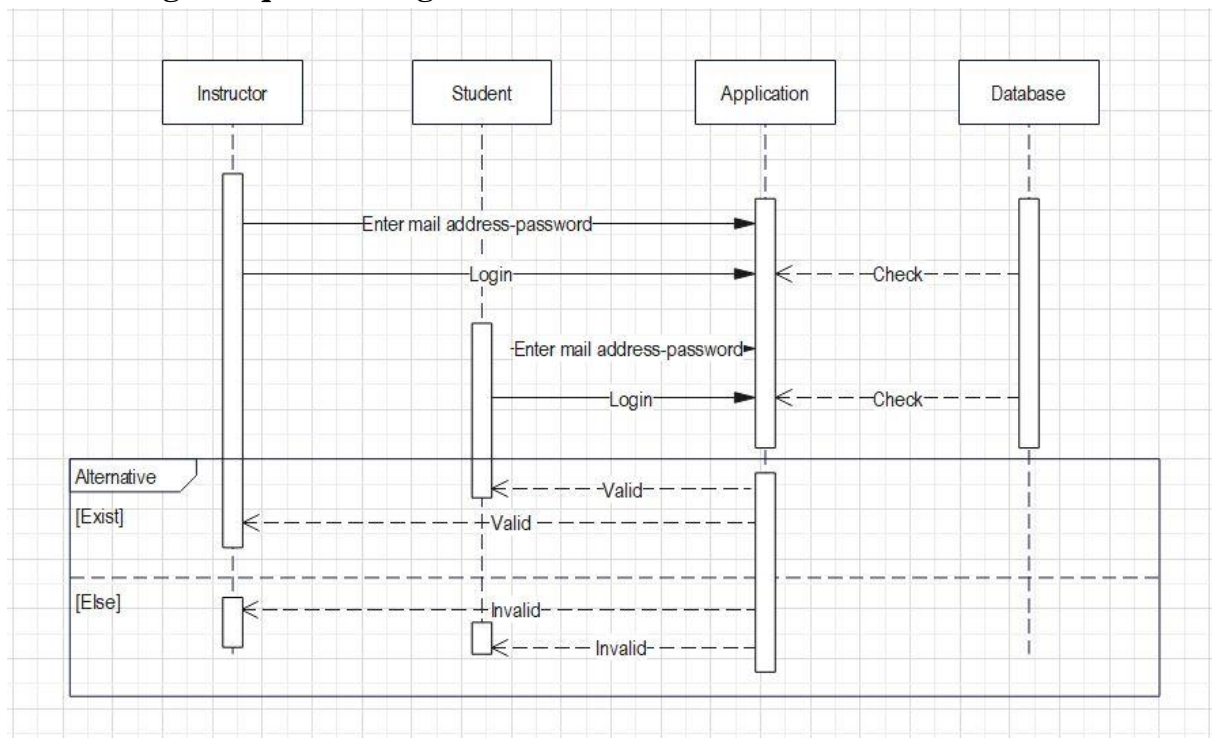
4.2.5.2 Questionnaire Sequence Diagram
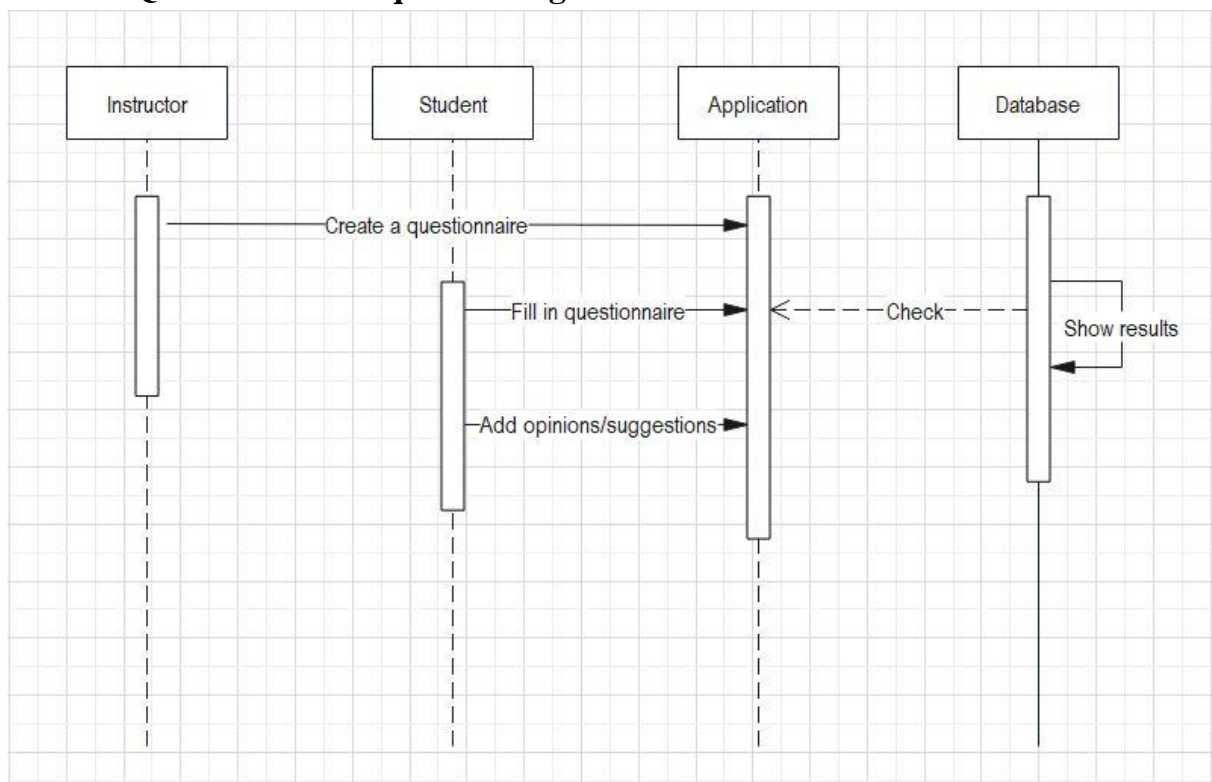
4.2.5.3 QR Attendance and ID Check Sequence Diagram
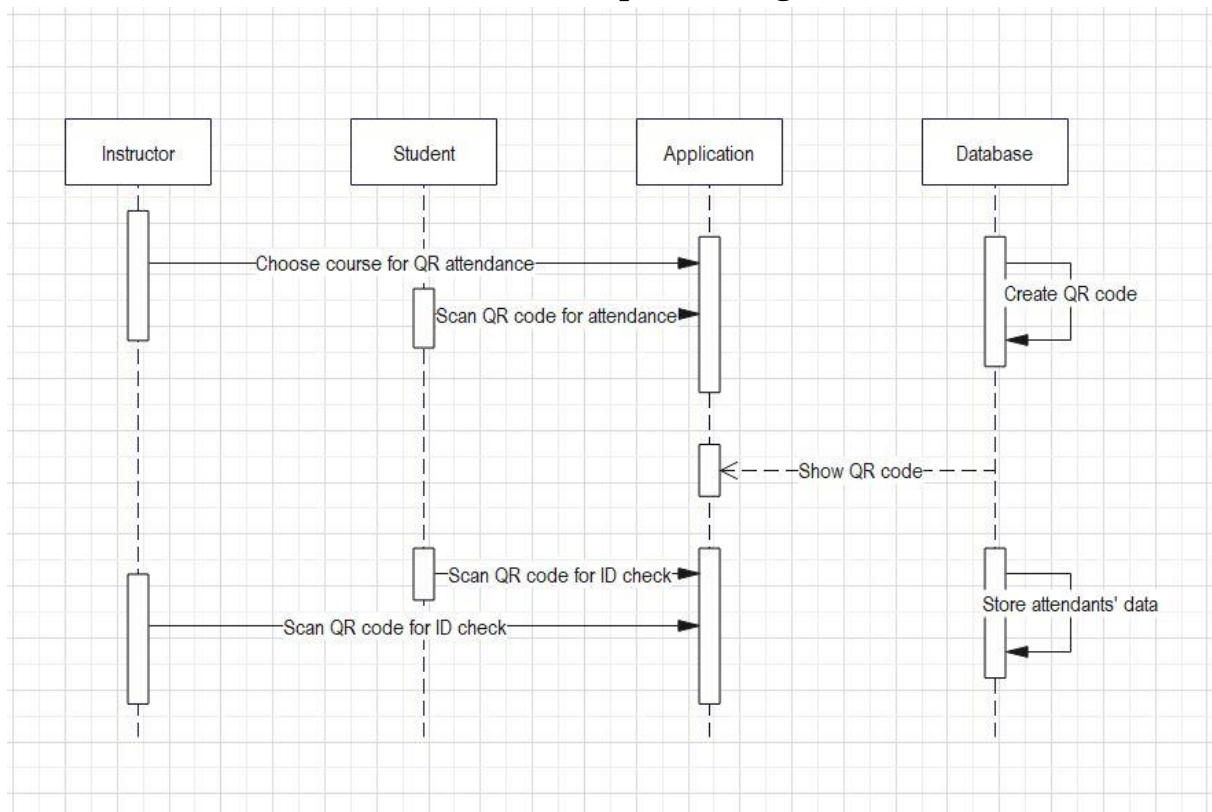
4.3 User Interface Design

4.3.1 Login Page

When the mobile application is opened for the first time, this screen will be opened to both the student and the instructor. If the user is logging in from the device for the first time, an activation e-mail will be sent to this e-mail address after typing the previously created e-mail account and passwords registered in the database and clicking the Login button. When they enter the link in this e-mail, the e-mail becomes active and then the identity of the device is mapped to the e-mail. Thus, the user will only log in with the device they first logged into. If an error is detected in the mail address or code, a warning message is sent.

4.3.2 Activation Process

We write the information while logging into the application. If the user is in the database and has never logged in before, the activation link is on that mail.

Verification link sent to your e-mail ! Please click that link to activate your e-mail !

Important note: When you confirm the activation, the identity of the phone you are logged into will be saved in this e-mail, and you cannot enter this phone with another e-mail or log in to a different phone with your e-mail.

c1811409@student.cankaya.edu.tr

Login

Forget Password?

Cankaya University Student Webmail Service
Request Support!

c1811409@student.cankaya.edu.tr user not fou...

User not found!

We click on the link in the mail, and we see the confirmation message.

Then it redirects us to the home page so that the user can now enter the application.

4.3.3 Home Page

This screen will open to both the student and the lecturer each time the application is opened.

4.3.4 Announcement Page
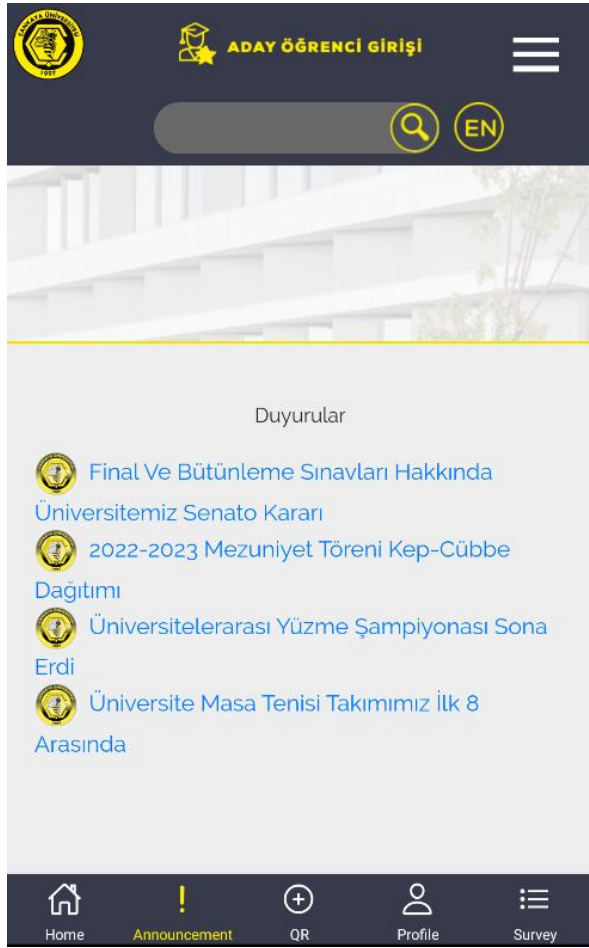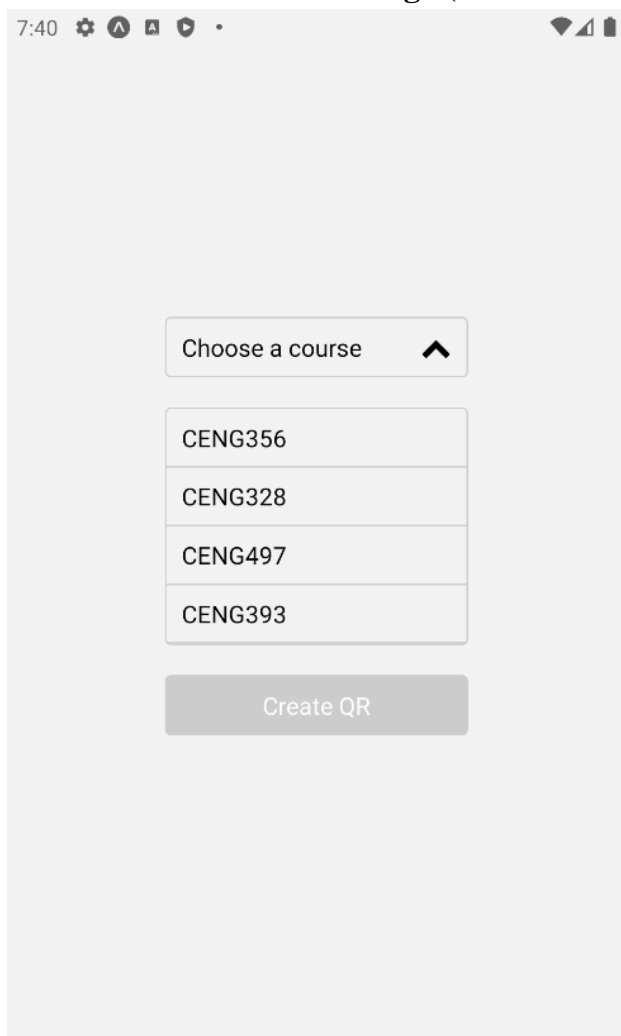
On this page, announcements about the school can be viewed. It will be the same for students and lecturers.

4.3.5 QR Page for Lecturers
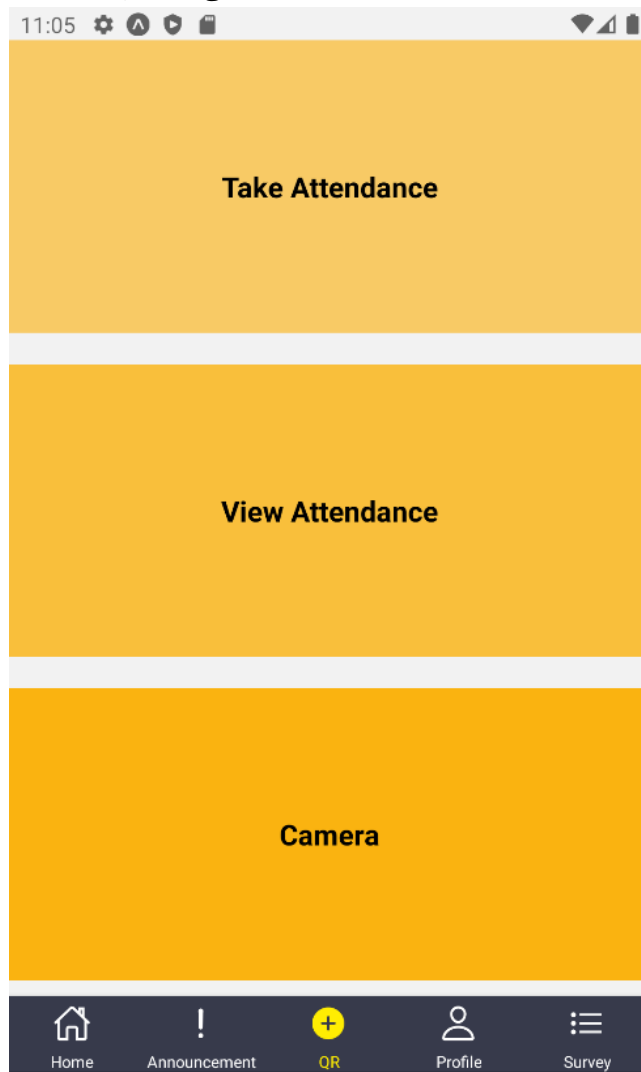
When the QR button is pressed, three options will be presented to the lecturer.

4.3.6 Take Attendance Page (Available for only lecturers)

The lecturer will see this page if he chooses "Attendance" from the options that appear when he/she clicks on the QR Button. After selecting the course, he/she wants to act from the drop-down list, he/she will click on one of the "Create" or "View Attendance" buttons at the bottom. If the Lecturer clicks "Create", the application will generate a QR code, and the lecturer will be presented with sharing options. When the "View Attendance" option is clicked, the attendance history of the selected course will be displayed and sharing options will be presented again.

4.3.7 View Attendance Page (Available for only lecturers)

Select a Course ⌃

CENG356

CENG328

CENG497

CENG393

View Attendance

4.3.8 Camera Page
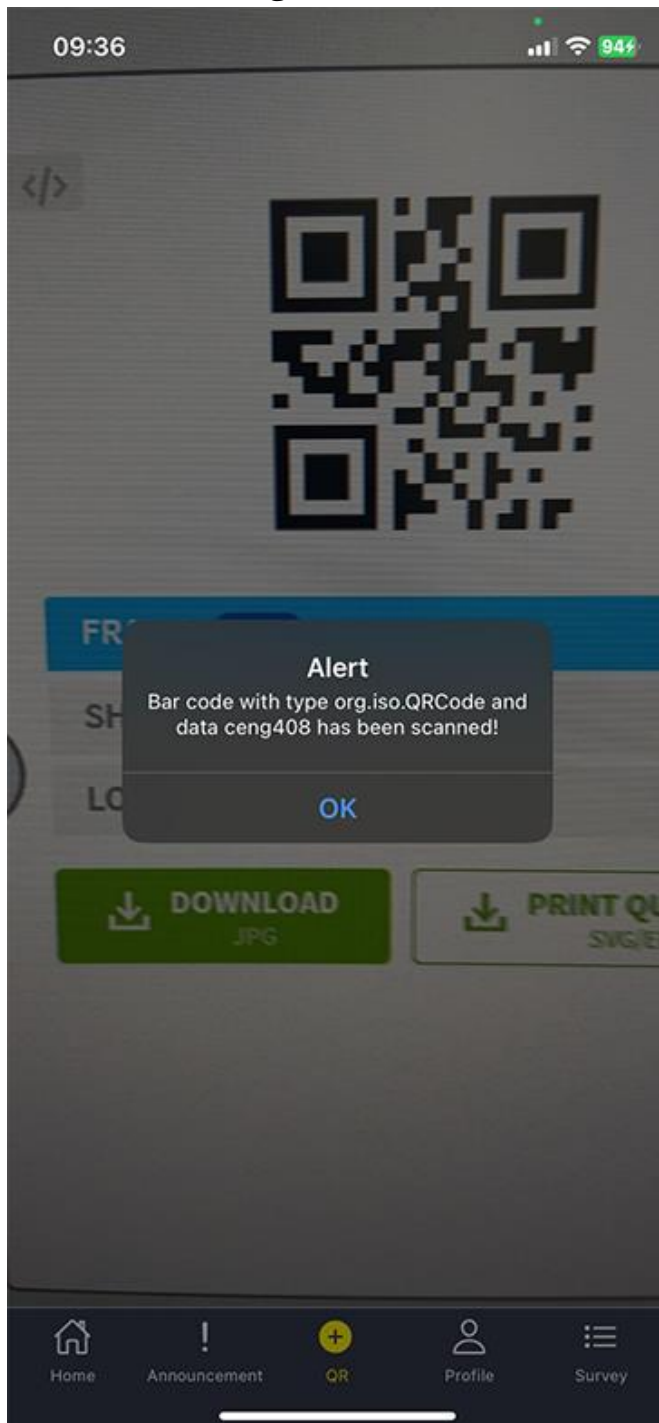
4.3.9 Profile Page
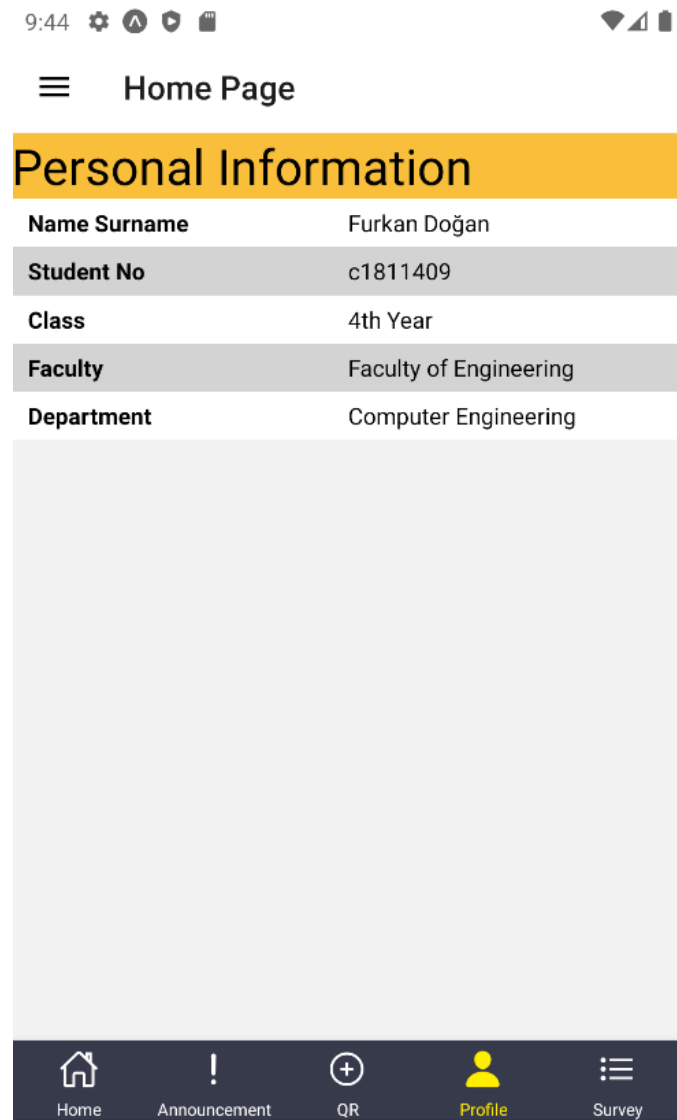
This page will contain the user's personal information.

4.3.10 Survey Page (For students)
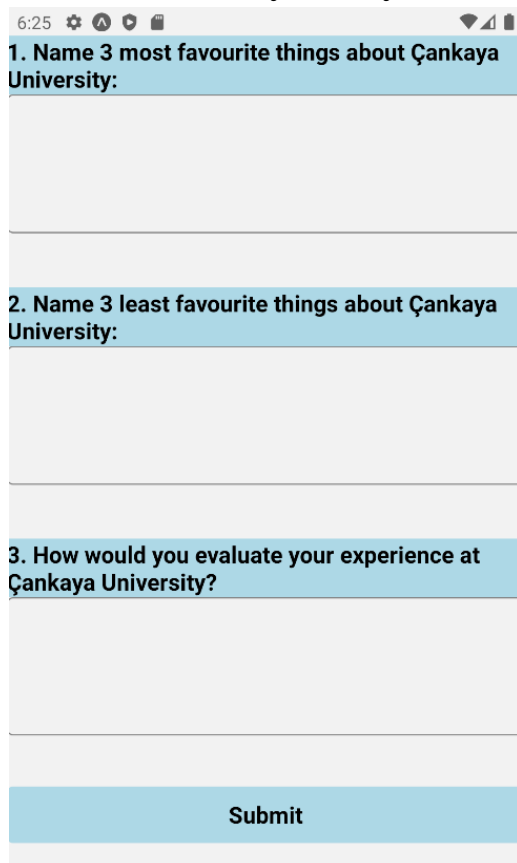
4.3.10.1 Course Survey (First survey option)

Your Attendance:

%25< ⭘

%25 - %49 ⭘

%50 - %74 ⭘

%75 - %100 ⭘

%50 - %74 ⭘

Your CGPA:

1.69< ⭘

1.70 - 1.99 ⭘

2.00 - 2.49 ⭘

2.50 - 2.99 ⭘

3.00 - 3.49 ⭘

3.50 - 4.00 ⭘

Strongly Agree ⭘

Agree ⭘

Neutral ⭘

Disagree ⭘

Strongly Disagree ⭘

2. This course has provided the ability to program networking.

Strongly Agree ⭘

Agree ⭘

Neutral ⭘

Disagree ⭘

Strongly Disagree ⭘

Submit

4.3.10.2 Lecturer Survey (Second survey option)

Choose your attendance percentage range.

%25< ⭘

%25 - %49 ⭘

%50 - %74 ⭘

%75 - %100 ⭘

%50 - %74 ⭘

What is your expected letter grade?

AA ⭘

BA\BB ⭘

CB\CC ⭘

DC\DD ⭘

FD\FF ⭘

FD\FF ⭘

1. The instructor arrived on time and left the class on time.

Strongly Agree ⭘

Agree ⭘

Neutral ⭘

Disagree ⭘

Strongly Disagree ⭘

2. The language of instruction for the course was English.

Strongly Agree ⭘

Agree ⭘

Neutral ⭘

Strongly Disagree ⭘

3. The instructor followed the planned course content and chose suitable teaching materials.

Strongly Agree ⭘

Agree ⭘

Neutral ⭘

Disagree ⭘

Strongly Disagree ⭘

What are your suggestions and opinions?

Submit

4.3.10.3 University Survey (Third survey option)

1. Name 3 most favourite things about Çankaya University:

2. Name 3 least favourite things about Çankaya University:

3. How would you evaluate your experience at Çankaya University?

Submit

The Survey options will only be available for students when the lecturer activates it. When they can view it, they will need to fill out the questionnaires provided.

4.3.11 Survey Page (Available for only lecturer)

Clicking the Survey option for Lecturer will open two options. If the "Result" option is clicked, the results of the surveys will be displayed and there will be an option to share.

4.3.12 Create Survey Page
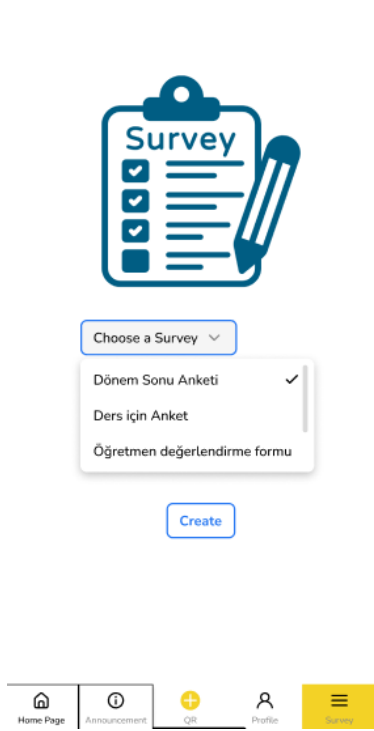
If the "Create" option is clicked from the two options that appear when the Survey button is pressed, this page will open. After the lecturer selects the survey, he/she wants to create, prepares the survey on the template that will appear, and clicks on the create button, the survey will be created and shared.

4.3.13 Result Survey Page

4.4 Use Case Realizations

CankayaMobileApp Project
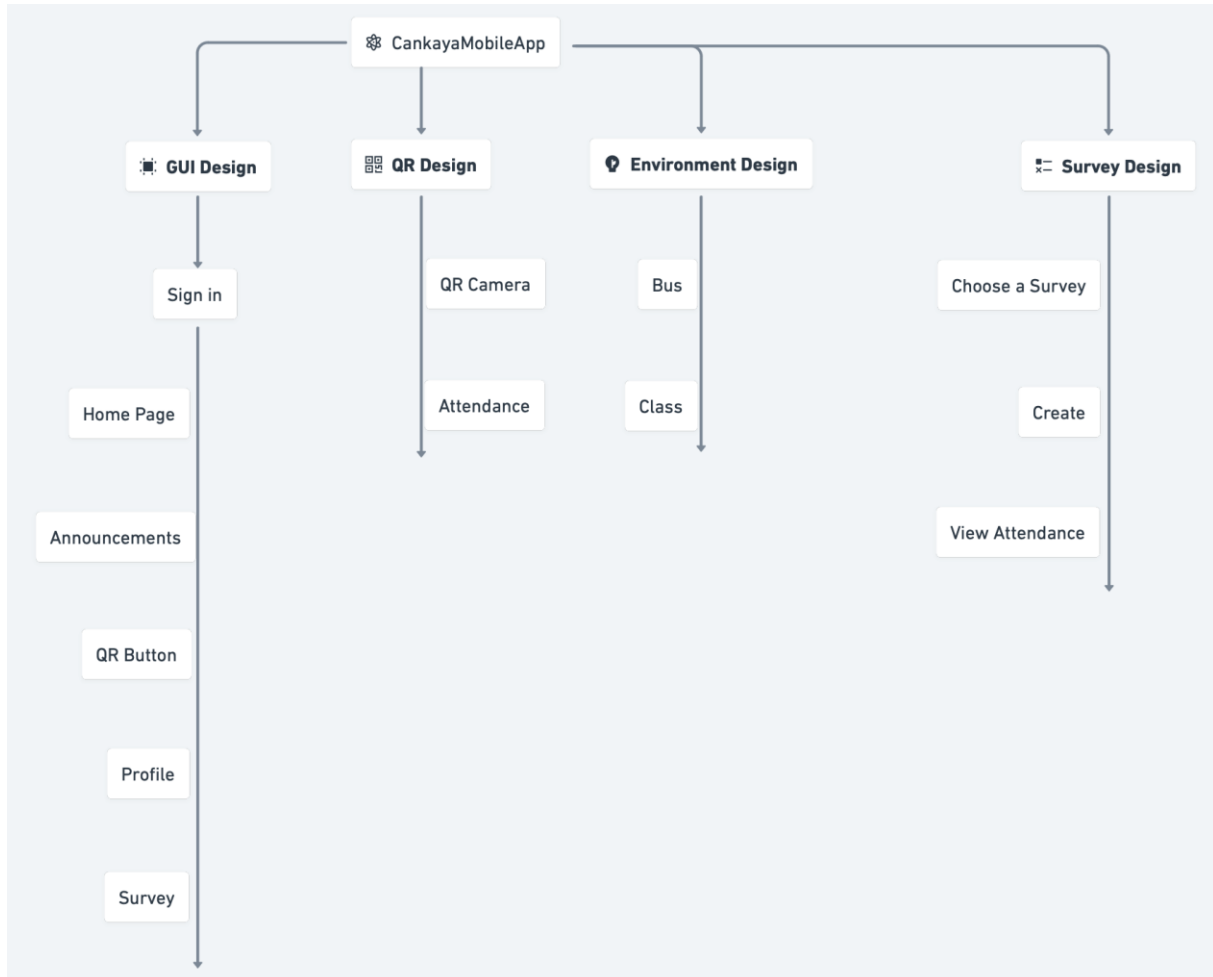
Figure 1 Project Components of CankayaMobileApp

4.4.1 Brief Description of Figure 2

Components of the CankayaMobileApp Project are shown in Figure 2. All designed systems of the mobile app are displayed in the block diagram in the figure. There are four main components of the system which have their own sub-systems.

4.4.1.1 GUI Design

GUI design is responsible for interaction between the users and the system. There are five sub-systems in this design which are Home Page, Announcements, QR Button, Profile, and Survey. There is one main system in this design which is Log in. Log in is a start page, participant should login the system. After logging in, it will be determined that the user is a

lecturer or student according to the e-mail extension logged in, and a suitable interface and set of settings will appear.

a.   Student Interface

There are five tabs in this interface which are Home Page, Announcements, QR Button, Profile, and Survey. Students can enter each tab, read, and follow the updated university articles. In the QR tab, students can press the button and read the code directly from the camera and record own attendance.

b.   Lecturer Interface

It has the same design as the students. There are two differences, the first difference is that when the qr button is clicked, 2 more tabs are opened, one of them is camera and the other one is attendance. The second difference is that when the survey button is clicked, 2 tabs are opened, one is created and the other is the result.

4.4.1.2   QR Design

There will be a QR Button in the middle of the bottom of the app. Clicking this button will open the phone's own camera for QR reading.

4.4.1.3   Environment Design

There will be some environments for QR reading, and conditions that must be met in these environments.

a.   Bus

On buses, there will be a QR sign with the information of the bus, and this QR code will be scanned by the user while getting on the bus.

b.   Class

In the classrooms, there will be a projector reflecting the code created by the instructor or a QR Code ready for distribution after printing. The student will read this code from our application and record his/her name for attendance tracking.

4.4.1.4   Survey Design

The survey filling part will not appear in the application, instead, when the instructor is asked to fill in any survey, the instructor will create the survey and send it to the required student

community. Students, on the other hand, will receive a notification when survey filling is active and will be required to fill in.

5. Test Plan

5.1 Introduction

5.1.1 Version Control

Table 3 Version Control

Version No	Description of Changes	Date
1.0	First Version	April 1, 2023

5.1.2 Overview

The use case of Cankaya Mobile App has Student, Lecturer/Instructor and System which had been specified in the SRS document will be tested. The interfaces that will be created according to two different user types and the three main features promised for the application will be tested.

5.1.3 Scope

This document encapsulates the test plan of the use cases, test design specifications and the test cases correspond to test plan.

5.1.4 Terminology

Table 4 Terminology

Acronym	Definition
LP	Login Page
HP	Home Page
AP	Announcement Page
LQP	Lecturer QR Page
SQP	Student QR Page
PP	Profile Page
LSP	Lecturer Survey Page
SSP	Student Survey Page

5.2 Features to be tested

This section lists and gives a brief description of all the major features to be tested. For each major feature there will be a Test Design Specification added at the end of this document.

5.2.1 Login Page (LP)

This part includes test cases and test plan of Login Page. On the login page, there are two text entries where users enter their e-mail and passwords, a login button and a link that leads to the IT department in case the student has a problem.

5.2.2 Home Page (HP)

Home Page includes all the information displayed in Cankaya University website. Therefore, the page doesn't conatin anything to test.

5.3 Announcement Page (AP)

This page includes all the information displayed in Cankaya University website's Announcement page. Therefore, page doesn't contain anything to test.

5.4 QR Page (QP)

This page has different scenarios for two users. When Lecturer logs in, he will see 3 buttons on this page. TakeAttedance button, ViewAttendance button and camera. When the student logs in, he can only open the camera and scan the QR.

5.5 Profile Page (PP)

This part includes test cases and test plan of Profile Page. This page includes user's personal information, which is almost the same as the information displayed in SQL.

5.6 Survey Page (SP)

This part includes test cases and test plan of Survey Page. This page includes three different survey options: similar to the SQL surveys and end-of-exam surveys.

5.7   Item pass / fail criteria

5.7.1   Exit Criteria

- 100% of the test cases are executed.
- 95% of the test cases passed.
- All High and Medium Priority test cases passed.

5.8   References

[1] CENG408_Group13_SRS

[2] CENG408_Group13_SDD

5.9   Test design specifications

5.9.1   Login Page (LP)

5.9.1.1   *Subfeatures to be tested*

a.   E-mail and Password Inputs (LP.EPI)
There are 2 text inputs where only the people written to the school's database are approved. One of them e-mail, another is password.

b.   Login Button (LP.LB)

When user enters her/his mail and password and presses the login button, the application is directed to the admin or student pages according to the entered mail.

c.   Request Support Button (LP.RSB)

Clicking this button takes the user to the required support page.

5.9.1.2   Test Cases

Table 5 Test Cases

TC ID	Requirements	Priority	Scenario Description
LP.EPI.01	*3.3.1*	*M*	There are 2 text inputs where only the people written to the school's database are approved. One of them e-mail, another is password.
LP.LB.01	3.3.1	H	If the user presses the login button after entering the mail and password, they will be directed to the student or lecturer screen according to the entered email.
LP.RSB.01	3.3.1	L	Clicking this button takes the user to the requested support page.

5.9.2   Lecturer QR Page (LQP)

5.9.2.1   Subfeatures to be tested

a.   Take Attendance Button (LQP.TAB)

When the button is pressed, the lecturer is directed to the lecture selection screen to start the attendance process.

b.   Drop-down List (LQP.DDL)

When the Take Attendance page is opened, the courses given by the lecturer appear as a drop-down list in order to make the course selection first. The lecturer selects the relevant course from the list.

c.   Create QR Button (LQP.CQB)

When Lecturer presses the "Create QR Code" button on the screen, the application creates disposable QR codes for the Attendance and displays them on the screen one by one.

d.   View Attendance Button (LQP.VAB)

When the View Attendance page is opened, the courses given by the lecturer appear as a drop-down list in order to make the course selection first. This list is the same as the one on the Take Attendance page, so we didn't open a separate thread. The lecturer selects the relevant course from the list.

e.   Attendance List (LQP.AL)

Past attendance information of the selected course is displayed on the screen as a list.

f.   Camera Button (LQP.CB)

This button directly opens the camera to scan a QR Code.

5.9.2.2   *Test Cases*

Here list all the related test cases for this feature

Table 6 Test Cases

TC ID	Requirements	Priority	Scenario Description
LQP.TAB.01	3.3.1	M	There are 2 text inputs where only the people written to the school's database are approved. One of them e-mail, another is password.
LQP.DDL.01	3.2.3	H	All courses given by the lecturer in that term should be displayed in the list.
LQP.DDL.02	3.2.3	H	When the course is selected, the lecturer should be directed to the QR Code Generation page.
LQP.CQB.01	3.2.3	H	When the button is pressed, application should start creating QR codes.
LQP.VAB.01	3.3.1	H	When the button is pressed, it should go to the drop-down list screen where the course selection will be made.
LQP.AL.01	3.3.1	H	Lecturer shoul see the Attendance History in this list.
LQP.CB.01	3.3.1	M	When the button is pressed, camera should open.

5.9.3 Student QR Page (SQP)

5.9.3.1 Subfeatures to be tested

a.   Camera Button (SQP.CB)

This button directly opens the camera to scan a QR Code.

5.9.3.2 Test Cases

Here list all the related test cases for this feature

Table 7 Test Cases

TC ID	Requirements	Priority	Scenario Description
SQP.CB.01	3.3.1	M	When the button is pressed, camera should open.

5.9.4 Profile Page (PP)

5.9.4.1 Subfeatures to be tested

a.   Database Connection (PP.DC)

Profile Page shows personal information about user. Therefore, it should be tested whether it has a connection with the database.

5.9.4.2 Test Cases

Here list all the related test cases for this feature

Table 8 Test Cases

TC ID	Requirements	Priority	Scenario Description
PP.DC.01	3.3.1	H	Since all the pages in the Profile Page contains personal information about the user, database connection and the accuracy of the information should be checked.

5.9.5 Lecturer Survey Page (LSP)

5.9.5.1 Subfeatures to be tested

a.   Survey Results Button(LSP.SRB)

Button to access the page displaying the survey results.

5.9.5.2 *Test Cases*

Here list all the related test cases for this feature

Table 9 Test Cases

TC ID	Requirements	Priority	Scenario Description
LSP.SRB.01	3.3.1	H	After clicking the Result button, the instructor can access the survey results.

5.9.6 **Student Survey Page (SSP)**

5.9.6.1 *Subfeatures to be tested*

a.   Survey Dropdown List(SSP.SDL)

A dropdown list of surveys available to choose. List has three survey options to choose. These options are: Course Survey, Lecturer Survey and University Survey.

b.   Choose Survey Button(SSP.CSB)

Button to navigate user to the chosen survey page from dropdown list.

c.   Submit Survey Button(SSP.SSB)

Button to submit filled survey data.

5.9.6.2 *Test Cases*

Here list all the related test cases for this feature

Table 10 Test Cases

TC ID	Requirements	Priority	Scenario Description
SSP.SDL.01	3.3.1	M	When the user reaches the survey section, surveys are displayed in the form of a dropdown list.
SSP.CSB.01	3.3.1	M	After choosing survey from dropdown list user have to use that button to navigate to the chosen survey page.

SSP.SSB.01	3.3.1	H	After filling out all the questions in the survey, the survey completion process is finalized by clicking the submit button, and the data is saved.

5.10 Detailed Test Cases

5.10.1 LP.EPI.01

Table 11 LP.EPI.01

TC_ID	LP.EPI.01
Purpose	Enter a valid user email and password
Requirements	3.3.1
Priority	High.
Estimated Time Needed	8-10 seconds
Dependency	Email and password must be registered in the database
Setup	Administrators can add and remove users
Procedure	[A01] Enter valid user email
	[A02] Enter valid user password
Cleanup	Delete from keyboard

5.10.2 LP.LB.01

Table 9 LP.LB.01

TC_ID	LP.LB.01
Purpose	Press button and check user email and password
Requirements	3.3.1
Priority	High.
Estimated Time Needed	50 seconds
Dependency	LG.AD.01 must be filled with the correct email and password.
Setup	An admin user should be created.
Procedure	[A01] Enter valid user email
	[A02] Enter valid user password
	[A03] Click on the "Login" button.
Cleanup	Logout

5.10.3 LP.RSB.01

Table 10 LP.RSB.01

TC_ID	LP.RSB.01
Purpose	Link to be clicked for any problem
Requirements	3.3.1
Priority	Low.
Estimated Time Needed	5 seconds
Dependency	-
Setup	An admin user should be created.
Procedure	[A01] Click on the "Request Support!" button.
Cleanup	Logout

5.10.4 LQP.TAB.01

Table 11 LQP.TAB.01

TC_ID	LQP.TAB.01
Purpose	Taking attendance
Requirements	3.2.3
Priority	High
Estimated Time Needed	10 seconds
Dependency	Lecturer must be logged in.
Setup	QR button should be selected by the lecturer.
Procedure	[A01] Go to QR page.
	[V01] Observe that the drop-down list is opened successfully.
Cleanup	Exit

5.10.5 LQP.DDL.01

Table 12 LQP.DDL.01

TC_ID	LQP.DDL.01
Purpose	Selecting a course for taking attendance
Requirements	3.2.3
Priority	High
Estimated Time Needed	30 seconds
Dependency	Courses must be in the database. Lecturer must be logged in.
Setup	Take Attendance button must be selected by the lecturer.
Procedure	[A01] Click on the drop-down list.
	[V01] See all the courses that lecturer teaches that semester.
Cleanup	Exit

5.10.6 LP.LB.02

Table 13 LP.LB.02

TC_ID	LQP.DDL.02
Purpose	Viewing QR generation page
Requirements	3.2.3
Priority	High
Estimated Time Needed	30 seconds
Dependency	Lecturer must be logged in.
Setup	Related course must be selected from the list.
	[V01] Observe that the Create QR Code page is opened.
Cleanup	Exit

5.10.7 LQP.CQB.01

Table 14 LQP.CQB.01

TC_ID	LQP.CQB.01
Purpose	Generating QR Code
Requirements	3.2.3
Priority	High
Estimated Time Needed	3 Minutes
Dependency	Lecturer must be logged in.
Setup	Related course must be selected from the list.
Procedure	[A01] Select "Create QR Code" button.
	[V01] Observe that the QR codes generated one by one.
Cleanup	Exit

5.10.8 LQP.VAB.01

Table 15 LQP.VAB.01

TC_ID	LQP.VAB.01
Purpose	Viewing Attendance History
Requirements	3.3.1
Priority	High
Estimated Time Needed	30 Seconds
Dependency	Lecturer must be logged in.
Setup	An admin user should be created.
Procedure	[A01] Go to QR page.
	[A02] Click the "View Attendance" button.
	[V01] Observe that the drop-down list is opened for selecting the course.
Cleanup	Exit

5.10.9 LQP.AL.01

Table 16 LQP.AL.01

TC_ID	LQP.AL.01
Purpose	Viewing Attendance History
Requirements	3.3.1
Priority	High
Estimated Time Needed	1 Minute
Dependency	Lecturer must be logged in.
Setup	Drop-down list must be opened.
Procedure	[A01] Select a course from the list.
	[V01] Observe that a list with the previous attendance results is opened.
Cleanup	Exit

5.10.10 LQP.CB.01

Table 17 LQP.CB.01

TC_ID	LQP.CB.01
Purpose	Scanning QR Code
Requirements	3.3.1
Priority	Medium
Estimated Time Needed	30 Seconds
Dependency	Lecturer should be logged in.
Setup	An admin user should be created.
Procedure	[A01] Go to QR page.
	[A02] Select "Camera" button.
	[V01] Observe that the camera is opened.
Cleanup	Exit

5.10.11 SQP.CB.01

Table 18 SQP.CB.01

TC_ID	SQP.CB.01
Purpose	Scanning QR Code
Requirements	3.3.1
Priority	High
Estimated Time Needed	30 Seconds
Dependency	Student should be logged in.
Setup	A student user should be created.
Procedure	[A01] Go to QR page.
	[A02] Select "Camera" button.
	[V01] Observe that the camera is opened.
Cleanup	Exit

5.10.12 PP.DC.01

Table 19 PP.DC.01

TC_ID	PP.DC.01
Purpose	Check the database connection
Requirements	3.3.1
Priority	High
Estimated Time Needed	5 Minutes
Dependency	Select every page from the drop-down list and check the informations inside.
Setup	User must be logged into the application.
Procedure	[A01] Go to Profile Page.
	[A02] Select drop-down list icon.
	[V01] Check the information for every page in the list.
Cleanup	Exit

5.10.13 SSP.SDL.01

Table 20 SSP.SDL.01

TC_ID	SSP.SDL.01
Purpose	A dropdown list to show surveys available to choose.
Requirements	3.3.1
Priority	Medium.
Estimated Time Needed	20 Seconds
Dependency	-
Setup	User must be logged into the application.
Procedure	[A01] Go to survey page. [A02] Select a survey from drop-down list. [V01] Observe that the drop-down list is functional.
Cleanup	Exit

5.10.14 SSP.CSB.01

Table 21 SSP.CSB.01

TC_ID	SSP.CSB.01
Purpose	Navigate user to the chosen survey page from dropdown list.
Requirements	3.3.1
Priority	Medium.
Estimated Time Needed	20 Seconds
Dependency	-
Setup	User must be logged into the application.
Procedure	[A01] Go to survey page. [A02] Select a survey from drop-down list. [V01] Observe that the drop-down list and navigation process is functional.
Cleanup	Exit

5.10.15 SSP.SSB.01

Table 22 SSP.SSB.01

TC_ID	SSP.SSB.01
Purpose	Choose a survey from the drop-down list, and when the submit button is clicked, the data must be saved.
Requirements	3.3.1
Priority	High.
Estimated Time Needed	1 Minute
Dependency	Students should fill these surveys.
Setup	User must be logged into the application.
Procedure	[A01] Go to survey page. [A02] Select a survey from drop-down list. [A03] Fill the survey. [A04] Submit the survey. [V01] Observe that the surveys are available and submit button is functional.
Cleanup	Exit

5.10.16 LSP.SRB.01

TC_ID	LSP.SRB.01
Purpose	Check the results of surveys.
Requirements	3.3.1
Priority	High.
Estimated Time Needed	1 Minute
Dependency	The survey results must be stored in a database.
Setup	User must be logged into the application.
Procedure	[A01] Go to survey page.
	[A02] Check the results.
	[V01] Ensure that the survey results are being stored.
Cleanup	Exit

6. Test Results

6.1   Individual Test Results

Table 12 Individual Test Results

TC ID	Priority	Date Run	Run By	Result	Explanation
LP.EPI.01	M	06.06.2023	Furkan Doğan	Pass	E-mail and password inputs worked and active
LP.LB.01	H	06.06.2023	Furkan Doğan	Pass	The entered information is compared with the database.
LP.RSB.01	L	06.06.2023	Furkan Doğan	Pass	Link worked.
LQP.TAB.01	H				
LQP.DDL.01	H				
LQP.DDL.02	H				
LQP.CQB.01	H				
LQP.VAB.01	H				
LQP.AL.01	H				
LQP.CB.01	M				
SQP.CB.01	M				
PP.DC.01	H				
SSP.SDL.01	H				
SSP.CSB.01	M				
SSP.SSB.01	M				
LSP.SRB.01	H				

6.2   Summary of Test Results

Table 13 Test Results

Priority	Number of TCs	Executed	Passed
H			
M			
L			
Total			

6.3   Exit Criteria

Table 14 Exit Criteria

Criteria	Met or Not
100% of the test cases are executed	Y
95% of the test cases passed	Y
All High and Medium Priority test cases passed	N

6.4   Known Problems

Describe here any known problems.

7. User Manual

Technology

React Native Framework - A framework for building native apps using React.

Node.js – It is an open-source, cross-platform JavaScript runtime environment and library for running web applications outside the client's browser.

Expo - It is an open-source platform for making universal native apps for Android, iOS, and the web with JavaScript and React.

Firebase – The Firebase Realtime Database is a cloud-hosted NoSQL database that lets organizations store and sync data in real time across all their users' devices.

Build Setup

Choose your IDE (We use WebStorm and Visual Studio Code)

Open our Directory with IDE and clone
Our directory: https://github.com/CankayaUniversity/ceng-407-408-2022-2023-Cankaya-Mobile-App.git

In terminal from IDE:
$ cd CankayaMobileApp

$ npm install (Installation for Node.js modules, and necessary libraries)

$ npm start

Press key: Android for a, iOS for i

Enjoy !

8. Conclusions

As a result, we did a mobile application that aims to minimize the paperwork and paper costs on absenteeism and surveys, to reduce the work of teachers and assistants who write and print out the absenteeism one by one, and to focus on more useful works, and to minimize waiting at the school entrance in the services. We also supported them with security measures.

In addition, we conducted a literature review covering whether such projects were carried out, how they were done, and if not, why they were not done. Based on our findings, we designed an easy-to-use, user-friendly interface and application supported by modern technologies.

We want to continue to improve the application, support it with user feedback, and keep it up to date. We hope to see the real use of this application in our school.

References

[1] Xiong Wei, Anupam Manori, Nandgopal Devnath, Nitin Pasi, Vivek Kumar. (2017, July). QR Code Based Smart Attendance System. Researchgate. https://www.researchgate.net/publication/318779349_QR_Code_Based_Smart_Attendance_System

[2] Alparslan Çay, Doğan Kasas, Müge Erel-Özçevik. (2021, November 26). Attendance as a Service: A Multi-Layered System Design in Attendance Applications for Covid-19. Dergipark. https://dergipark.org.tr/en/download/article-file/2099062

[3] Zakiah Ayop, Chan Yee Lin, Syarulnaziah Anawar, Erman Hamid, Muhammad Syahrul Azhar. (2018, January). Location-aware Event Attendance System using QR Code and GPS Technology. Researchgate. https://www.researchgate.net/profile/Zakiah-Ayop/publication/327985848_Location-aware_Event_Attendance_System_using_QR_Code_and_GPS_Technology/links/5bd80eac4585150b2b90e8c8/Location-aware-Event-Attendance-System-using-QR-Code-and-GPS-Technology.pdf

[4] Arpankumar Patel, Ansel Joseph, Shubham Survase, Rohini Nair. (2019, April 24). Smart Student Attendance System Using QR Code. SSRN. https://deliverypdf.ssrn.com/delivery.php?ID=3000720210250000650980841051171121130250050050040700180731181131170260881080211041091171030250241230460081060671020020060111270170600930090000931020930060071070090220170930951200930200871010900290030201270760951000040840981060691121130041070891190821018&EXT=pdf&INDEX=TRUE

[5] M.V. Stupina, K.V. Anistratenko, L.O. Pazina. (2021). Using the QR code as a means of automating the process of accounting for attendance at educational classes. Iopscience.

https://iopscience.iop.org/article/10.1088/1742-6596/2131/2/022077/pdf [6] B. K. P.
Mohamed and C. V. Raghu, "Fingerprint Attendance System for Classroom Needs," in 2012
Annual IEEE India Conference, INDICON 2012, 2012, doi: 10.1109/INDCON.2012.6420657

[7] Kabir Singh Lamba, Kunwarpreet Singh, Mankirat Singh, Mandeep Singh, Dr.Amandeep
Kaur. (2022, Aug 3). Online Attendance Face Recognition and QR Code Monitoring. SSRN.
https://deliverypdf.ssrn.com/delivery.php?ID=53202708711202809506909512709707206412
50380250410330380281131250661011270300861091200540390210170010311141091240790290101220900460130570000411060290910651170970300890490120850030100850191080681011020870690061190281161231031090310720190921120001270701119&EXT=pdf&INDEX=TRUE

[8] B. Soewito, F. L. Gaol, E. Simanjuntak, and F. E. Gunawan, "Attendance System on
Android Smartphone," in ICCEREC 2015 - International Conference on Control, Electronics,
Renewable Energy and Communications, 2015, pp. 208–211. doi:
10.1109/ICCEREC.2015.7337046.

[9] Study International Staff. (2018, Feb 13). Now there's no skipping class: Unis in Malaysia
use QR codes to mark attendance. Studyinternational.
https://www.studyinternational.com/news/unis-use-qr-codes-mark-attendance-now-theres-no-skipping-class/

[10] Awareness. (2022, June 21). Class Attendance Using QR Code is Now Available in
MMU Mobile App. Nice.mmu.edu.my. https://nice.mmu.edu.my/2022/06/class-attendance-using-qr-code-is-now-available-in-mmu-mobile-app/

[11] Y. N. S, A. Kumar, and N. R. Kumar, "Location Based Smart Attendance System Using
GPS," Ann. Rom. Soc. Cell Biol., vol. 25, no. 2, pp. 4510–4516, 2021, [Online]. Available:
http://annalsofrscb.ro

[12] S. A. M. Noor, N. Zaini, M. F. A. Latip, and N. Hamzah, "Android-Based Attendance
Management System," in 2015 IEEE Conference on Systems, Process and Control (ICSPC),
2015, pp. 118–122.

[13] H. Sutar, S. Chaudhari, P. Bhopi, and D. Sonavale, "Automated Attendance System," Int.
Res. J. Mod. Eng. Technol. Sci., vol. 04, no. 04, 2022 [14] D. Prangchumpol, "Face
Recognition for Attendance Management System Using Multiple Sensors," in Journal of
Physics: Conference Series, 2019, vol. 1335, no. 1, doi: 10.1088/1742-6596/1335/1/012011.

[15] F. Susanto, F. Fauziah, and A. Andrianingsih, "Lecturer Attendance System using Face
Recognition Application an Android-Based," J. Comput. Networks, Archit. High Perform.
Comput., vol. 3, no. 2, pp. 167–173, 2021, doi: 10.47709/cnahpc.v3i2.981.

[16] D. Prangchumpol, "Face Recognition for Attendance Management System Using
Multiple Sensors," in Journal of Physics: Conference Series, 2019, vol. 1335, no. 1, doi:
10.1088/1742-6596/1335/1/012011.

[17] B. Chandramouli, S. A. Kumar, C. V. Lakshmi, G. B. Harish, and P. A. Khan, "Face
Recognition Based Attendance System Using Jetson Nano," Int. Res. J. Mod. Eng. Technol.
Sci., vol. 3, no. 8, 2021.

[18] P. S. H. Smitha, "Face Recognition based Attendance Management System.," Int. J. Eng. Res. & Technol., vol. 9, no. 05, 2020.

[19] V. Somasundaram, M. Kannan, and V. Sriram, "Mobile Based Attendance Management System," Indian J. Sci. Technol., vol. 9, no. 35, pp. 1–4, 2016, doi: 10.17485/ijst/2016/v9i35/101807.

[20] M. A. J. Hameed, "Android-based Smart Student Attendance System," Int. Res. J. Eng. Technol., vol. 12, pp. 2356–2395, 2017.

[21] E. Varadharajan, R. Dharani, S. Jeevitha, B. Kavinmathi, and S. Hemalatha, "Automatic Attendance Management System using Face Detection," in 2016 Online international conference on green engineering and technologies, 2016.

[22] V. Hava, S. Kale, A. Bairagi, C. Prasad, S. Chatterjee, and A. Varghese, "Free & Generic Facial Attendance System using Android," Int. Res. J. Eng. Technol., vol. 06, no. 09, p. 6, 2019.

[23] D. M. V. Salac, "PRESENT: An Android-Based Class Attendance Monitoring System Using Face Recognition Technology," Int. J. Comput. Sci. Res., vol. 2, no. 3, pp. 102–115, 2018, doi: 10.25147/ijcsr.2017.001.1.28.

[24] M. M. Islam, M. K. Hasan, M. M. Billah, and M. M. Uddin, "Development of Smartphone-Based Student Attendance System," in 5th IEEE Region 10 Humanitarian Technology Conference 2017, 2018, vol. 2018, doi: 10.1109/R10-HTC.2017.8288945.

[25] O. Godswill, O. Osas, O. Anderson, I. Oseikhuemen, and O. Etse, "Automated Student Attendance Management System using Face Recognition," Int. J. Educ. Res. Inf. Sci., vol. 5, no. 4, pp. 31–37, 2018.

[26] A. A. Kumbhar, K. S. Wanjara, D. H. Trivedi, A. U. Khairatkar, and D. Sharma, "Automated Attendance Monitoring System using Android Platform," Int. J. Curr. Eng. Technol., vol. 4, no. 2, pp. 1096–1099, 2014, [Online]. Available: International Journal of Current Engineering and Technology

[27] J. D. W. S. Souza, S. Jothi, and A. Chandrasekar, "Automated Attendance Marking and Management System by Facial Recognition Using Histogram," in 2019 5th International Conference on Advanced Computing and Communication Systems, ICACCS 2019, 2019, doi: 10.1109/ICACCS.2019.8728399.

[28] Awareness. (2022, June 21). Class Attendance Using QR Code is Now Available in MMU Mobile App. Nice.mmu.edu.my. http://dspace.unive.it/bitstream/handle/10579/15022/956262-1208160.pdf?sequence=2