



UPLB ARMS: QR CODE-BASED ATTENDANCE RECORDING AND MONITORING SYSTEM



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With the fast-evolving technology and growing subscription on smartphones, digitalization has become more prevalent which revolutionized the world that we live in today. The simple tasks that people usually do such as banking, shopping, buying foods, and many more, have now been digitalized through the use of mobile and web applications which can be easily accessed using smartphones.

Mobile and web applications have made traditional processes more efficient and accessible. However, these processes are still too procedural when it comes to making transactions.

With the advancement in smartphones, companies have been incorporating a new technology to their mobile and web applications to make processes more efficient; this technology is called the Quick Response (QR) code. Nowadays, QR code technology finds widespread use in mobile banking and e-wallet platforms wherein transactions are done by just scanning a QR code instead of manually inputting transaction requirements which provides an extra level of convenience and efficiency for users.

It is indeed evident that UPLB admin is trying their best to improve digitalization programs in the campus. However, there are still aspects that are not receiving enough attention. One of these is the recording and tracking of students' class attendance which still relies on the traditional methods like passing a piece of paper with student details on it, writing down names on a sheet of paper that is passed around the classroom, and calling out student names one by one.



STATEMENT OF THE PROBLEM

The traditional approach in attendance recording and managing consumes a substantial amount of time which could have been utilized for lectures or discussions.

Instructors, particularly those teaching large lecture classes, face a heavy workload as they must manually monitor and record the attendance for a large number of students.

The absence of attendance records for students can lead to significant problems, such as losing track of the number of absences which can lead to serious issues like forced dropping of units or course.

By leveraging the QR Code scanning feature of smartphones and the idea that the main device that UPLB students use are smartphones, an attendance recording and monitoring system can be developed without significant financial investment .

Through the proposed system, the students can effortlessly record their attendance by scanning a QR code provided by the instructor, freeing up valuable time for lesson-related discussions and lectures. Instructors will no longer have to endure the cumbersome task of manual attendance recording since the system will automatically log the data once the student scans the QR code. Moreover, students will have access to their attendance records, enabling them to keep track of their attendance and avoid being forced to drop units.

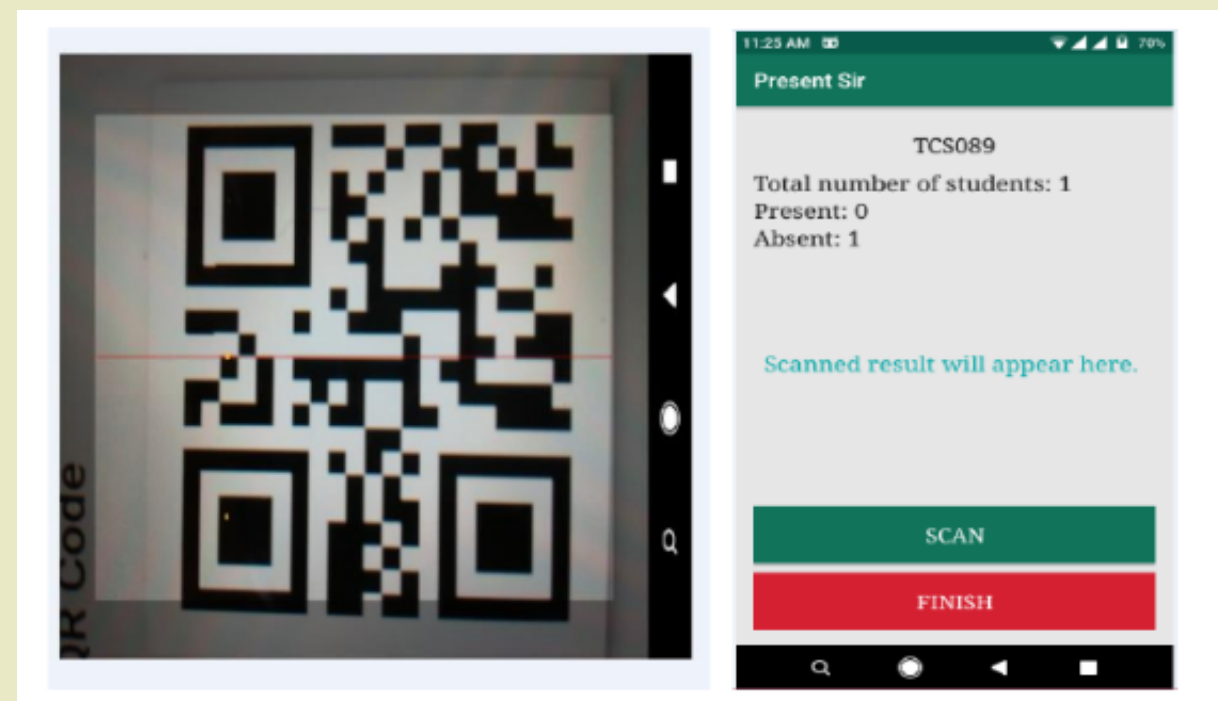
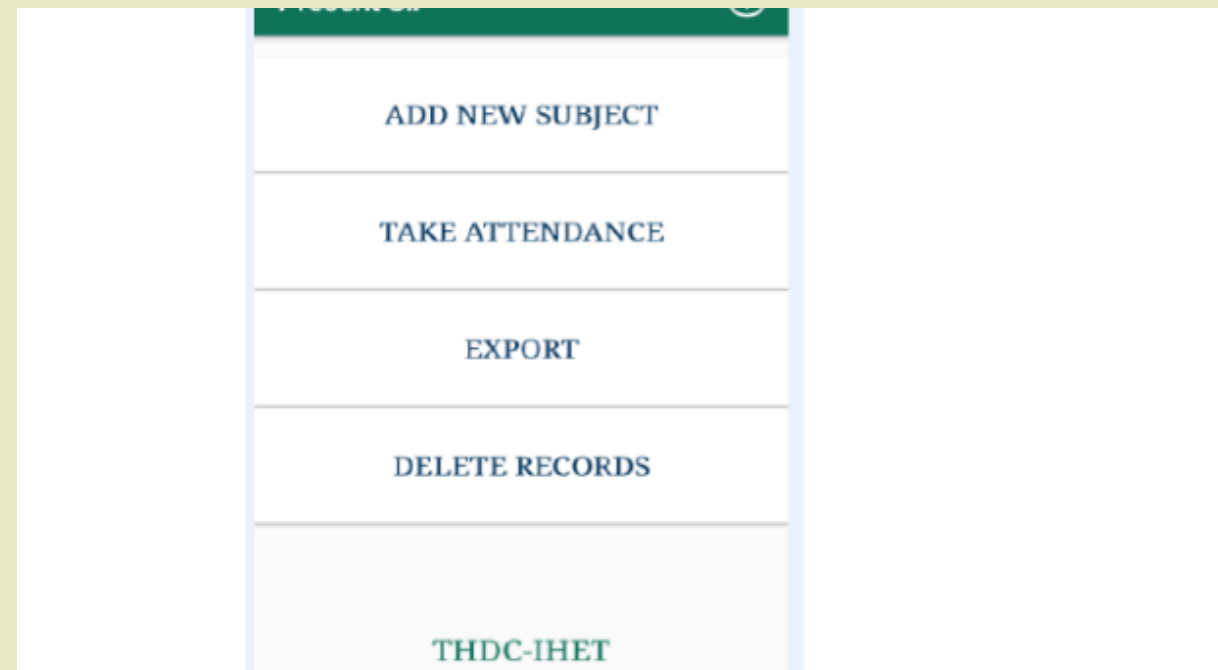


OBJECTIVES OF THE STUDY

The general objective of this study is to digitalize the process of student attendance recording and monitoring in UPLB through a web application. Specifically the web application aims:

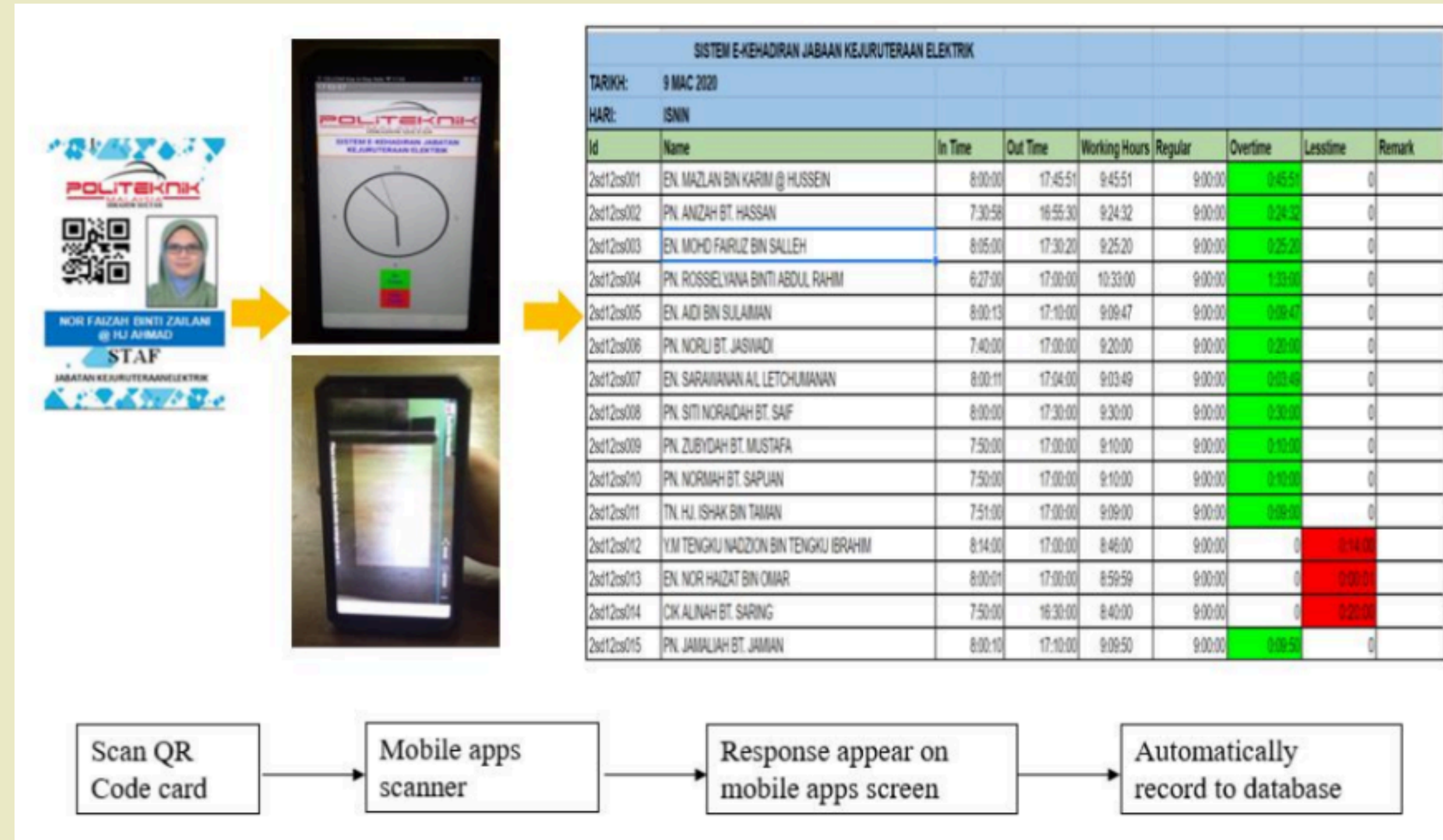
- 1.To enable teachers and students to record attendance with just a single scan.
- 2.To enable teachers and students to monitor attendance by providing a view of the attendance records.
- 3.To provide warning notification to students regarding their absences.
- 4.To evaluate the usability of QR Code-based Attendance Recording and Monitoring System through a survey.

W. Xiong, A. Manori, N. Devnath, N. Pasi, and V. Kumar, "QR Code Based Smart Attendance System," International Journal of Smart Business and Technology, vol. 5, no. 1, pp. 1–10, Mar. 2017, doi: 10.21742/ijibt.2017.5.1.01



	A	B	C	D	E
1	RollNo	Name	StudentID	Apr261252	Apr261256
2	130970101011	Anupam Manori	13CSE04	1	1
3	130970101001	Aryan Vasishth	13CSE01	0	1
4	130970101002	Abhishek Pal	13CSE02	0	0
5	130970101003	Abhinav Arora	13CSE04	1	0
6	130970101004	Ajeet Singh	13CSE05	0	1
7	130970101005	Akhil Singh	13CSE06	1	1
8	130970101029	Nandgopal Devnath	13CSE19	1	1
9	130970101032	Nitin Pasi	13CSE04	1	1
10					
11					

N. Zailani, H. Ahmad, and A. Adli, "QR Code Attendance System," ResearchGate, Dec. 2020, doi: 10.5281/zenodo.4310523



M. Maleriado and J. Carreon, "THE FEATURES OF QUICK RESPONSE (QR) CODE AS AN ATTENDANCE MONITORING SYSTEM: ITS ACCEPTABILITY AND IMPLICATION TO CLASSROOM," ResearchGate, May 2019, [Online]. Available: <https://www.researchgate.net/publication/353701451>

J. Taracina, "Acceptability and Effectiveness of a Proposed Attendance Monitoring System (ASAP) for Safety of the Stakeholders," Scholarum: Journal of Education, Mar. 2023, [Online]. Available: <https://scholarum.dls.edu.ph/wp-content/uploads/2023/03/V2I2-Article-4-Jairoh-Nicolas-Taracina.pdf>

308.csv

B	C	D	E	F
ARRIVAL DATE	ARRIVAL TIME	DEPARTURE DATE	DEPARTURE TIME	TOTAL
2018.04.27	9:46:11	2018.04.27	16:26:13	6 hrs 40 min 2 seg
2018.04.27	14:47:11			
		2018.04.27	17:15:13	
2018.04.27	8:41:15	2018.04.27	18:30:13	9 hrs 48 min 57 seg

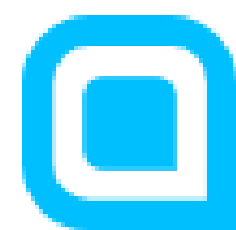
QR Attendance Control

1-	Example Name 3	2018.04.27	08:41:15	Arrival
2-	Example Name 1	2018.04.27	09:46:11	Arrival
3-	Example Name 4	2018.04.27	14:47:11	Arrival
4-	Example Name 1	2018.04.27	16:26:13	Departure
5-	Example Name 2	2018.04.27	17:15:13	Departure
6-	Example Name 3	2018.04.27	18:30:13	Departure

☒ Arrival

SCAN

AdMob Test Smart Banner



QR Code Generator
CREATE YOUR QR CODE FOR FREE

POWERED BY **bitly**

F. Masalha and N. Hirzallah, "A students attendance system using QR code," International Journal of Advanced Computer Science and Applications, vol. 5, no. 3, Jan. 2014, doi: 10.14569/ijacsa.2014.050310

A study by Masalha and Hirzallah proposes a QR code-based attendance system wherein the class instructor logs in through the Server Module to generate an encrypted QR code containing specific information before the class. During the class, students use the Mobile Module on their smartphones to scan the QR code. The Mobile Module captures the student's facial image during the scan and communicates the collected information to the Server Module for attendance confirmation. Additionally, the system records the mobile phone's location using GPS to ensure attendance tracking occurs within the classroom. The authors suggest that this system could potentially reduce the time spent on attendance tracking during class by approximately 90%.



Development Tools

MongoDB

A scalable, high-performance, and schema-less NoSQL database that will serve as the system's database.

Express JS

A lightweight and flexible Node.js web application which will be used for the system's backend development.

React JS

A JavaScript Library which will be used to develop the system's frontend.

Node JS

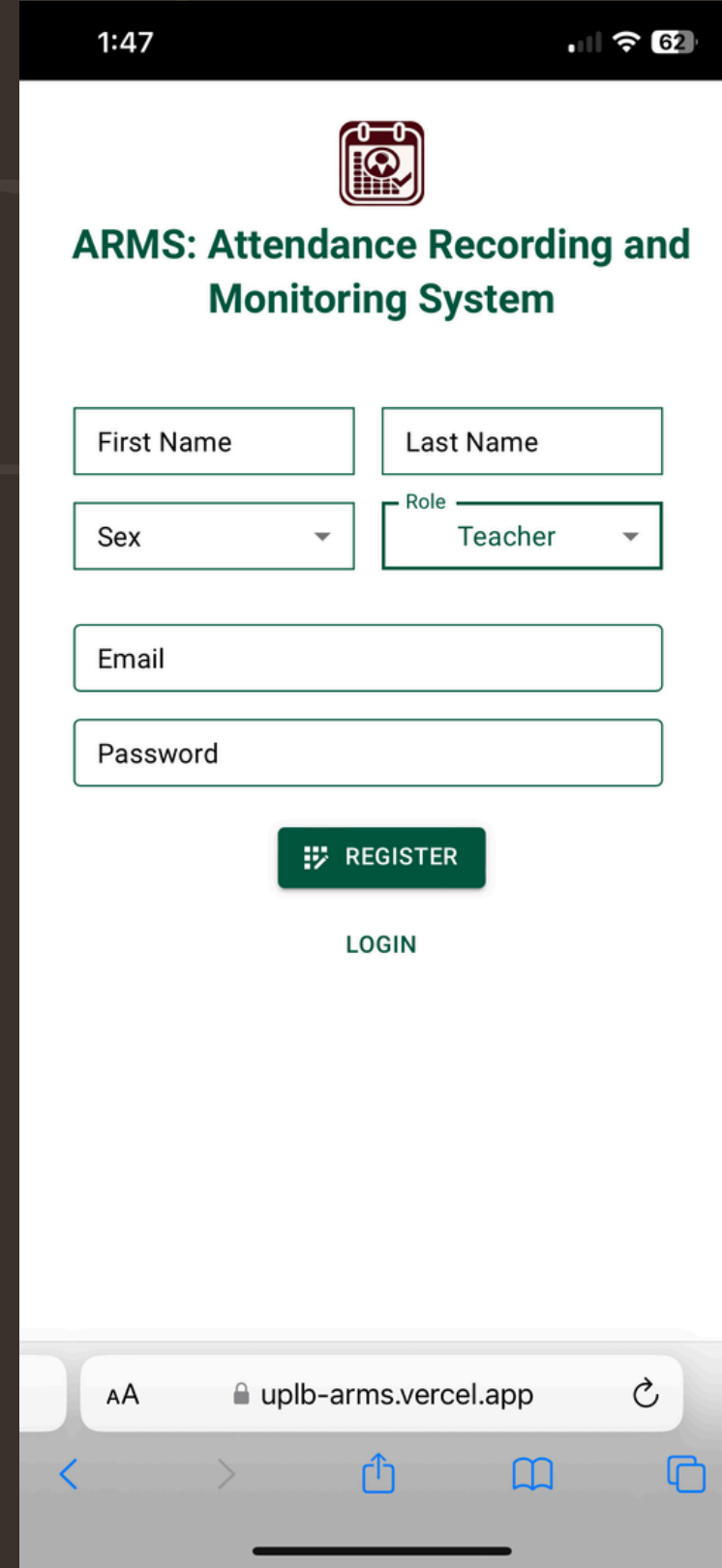
A JavaScript runtime environment which will be used to execute the system's server-side code.

Features

Teachers

- Signup
- Login
- Create class
- Generate QR code
- View Records
- Validate Excused Attendance
- Revoke Attendance
- Set Absence Threshold
- Export Attendance
- Detect Fraudulent Activities

Features (Teacher side)



ARMS: Attendance Recording and Monitoring System

First Name

Last Name

Sex

Role

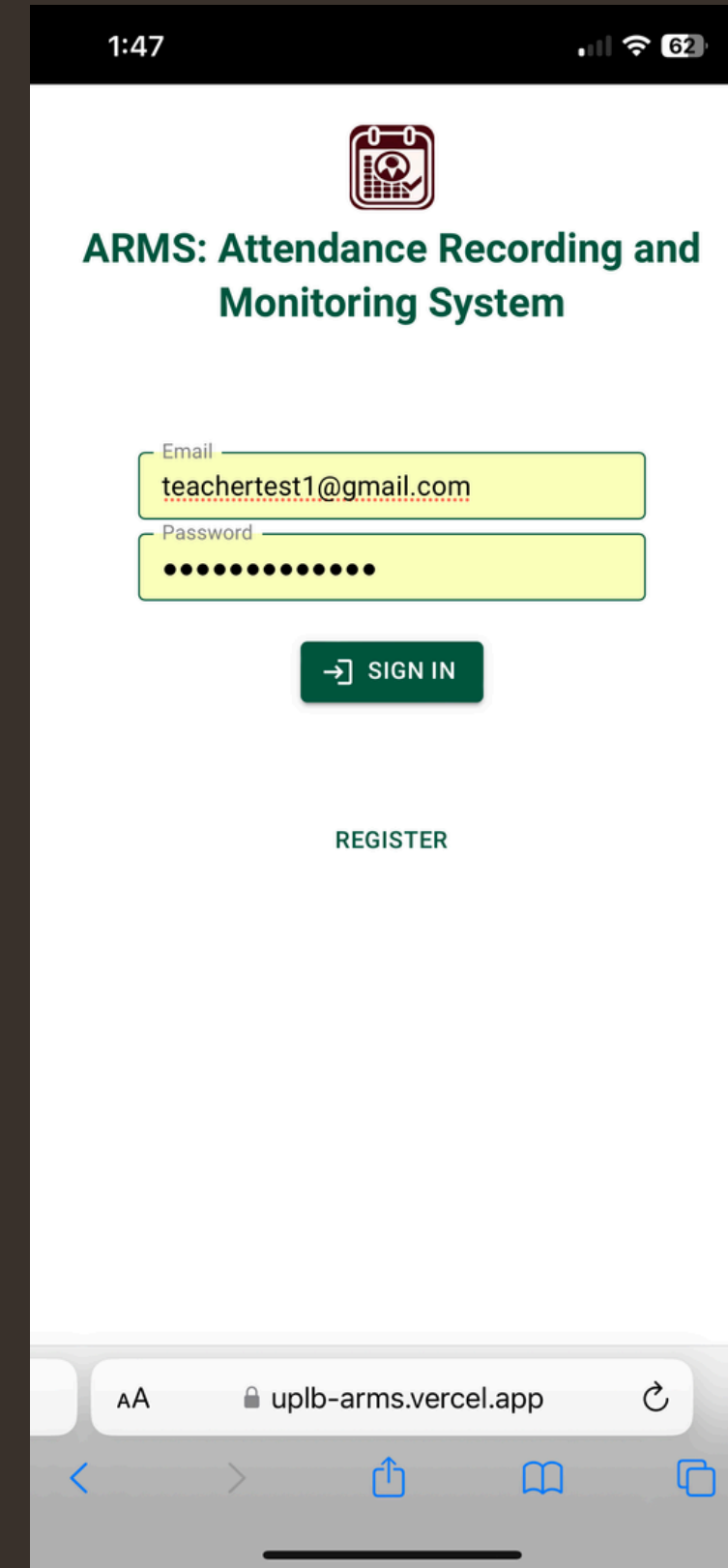
Email

Password

REGISTER

LOGIN

Sign-up



ARMS: Attendance Recording and Monitoring System

Email

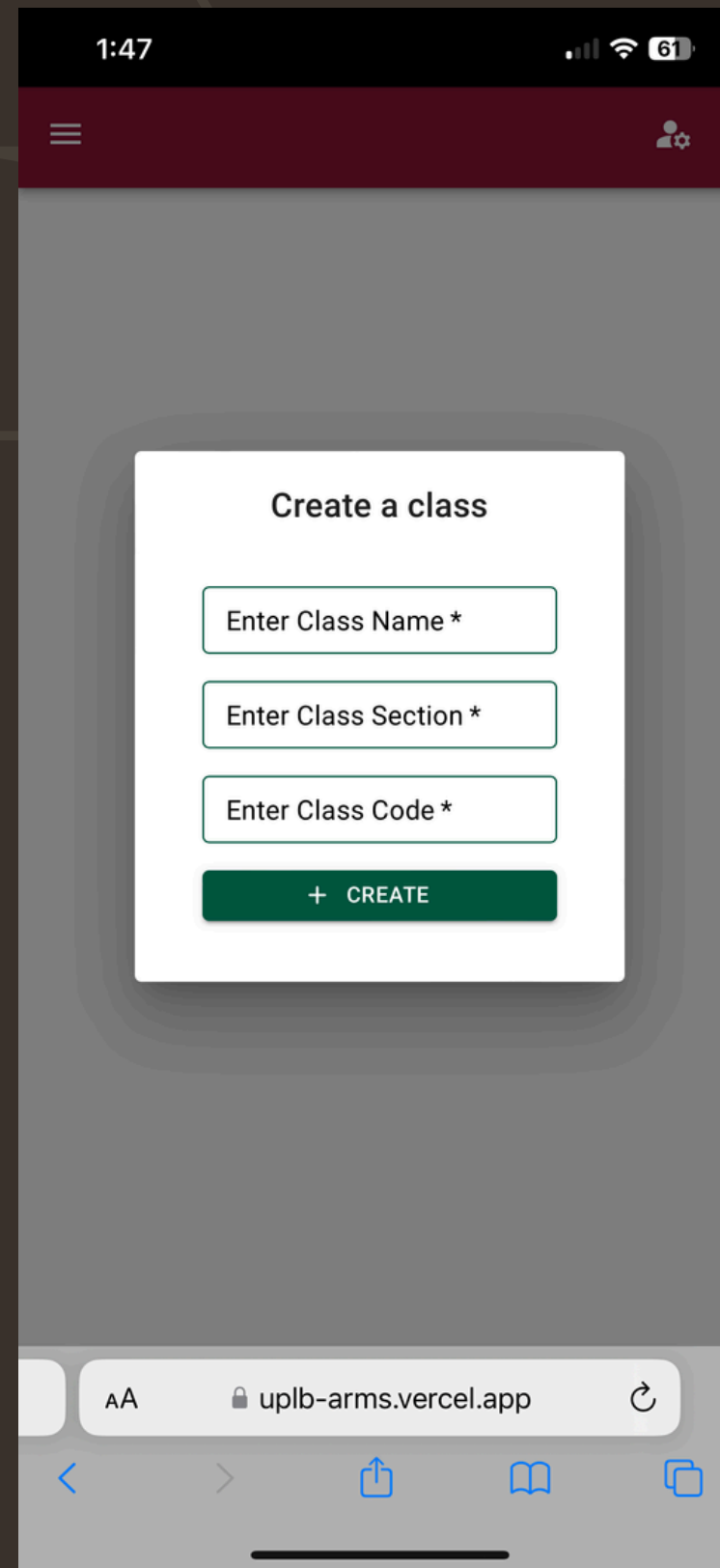
Password

SIGN IN

REGISTER

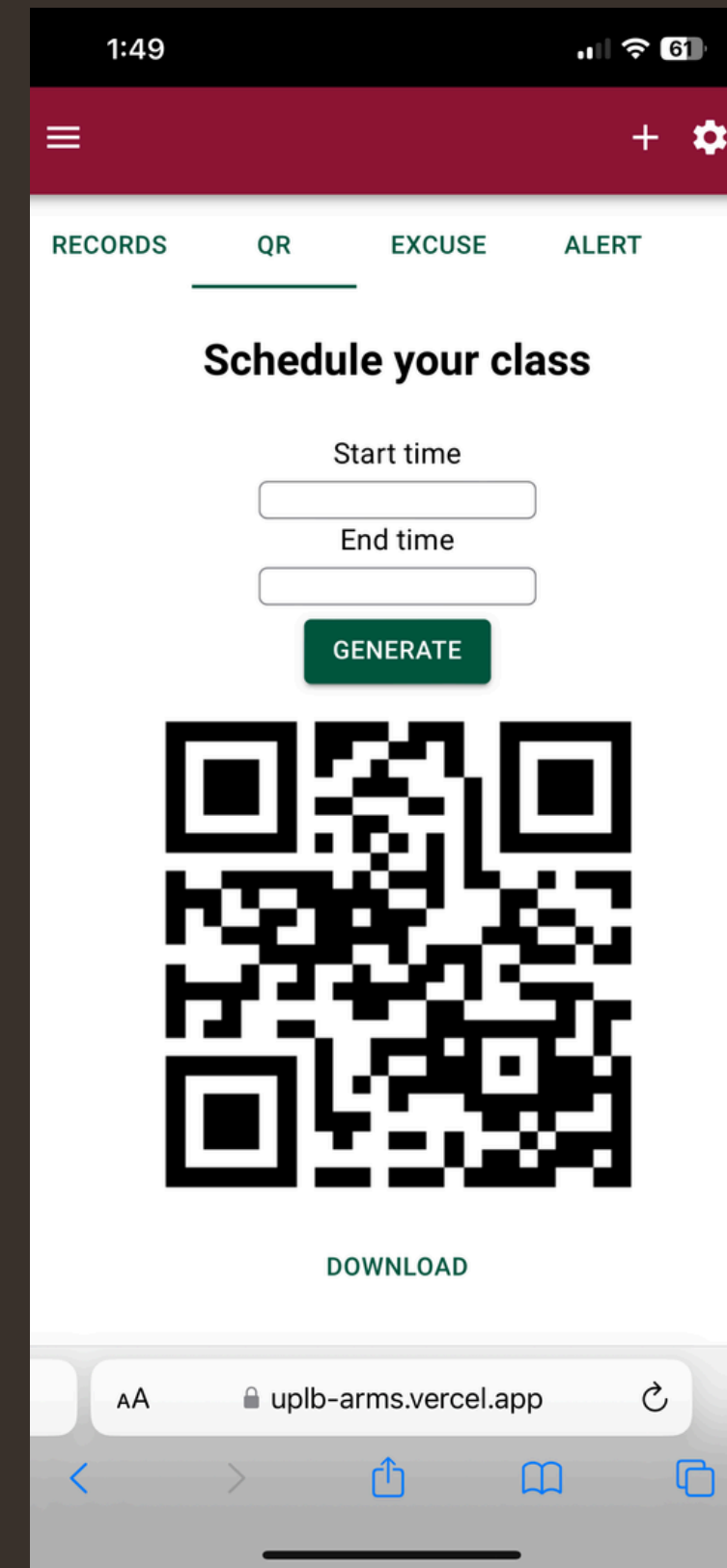
Login

Features (Teacher side)



A screenshot of a mobile application interface for creating a class. The app has a dark red header with a hamburger menu icon on the left and a user profile icon on the right. The main content area is light gray and features a white card titled "Create a class". Inside the card, there are three input fields: "Enter Class Name *", "Enter Class Section *", and "Enter Class Code *". Below these fields is a green button with a white plus icon and the text "+ CREATE". The bottom of the screen shows a browser address bar with the URL "uplb-arms.vercel.app" and standard mobile navigation icons.

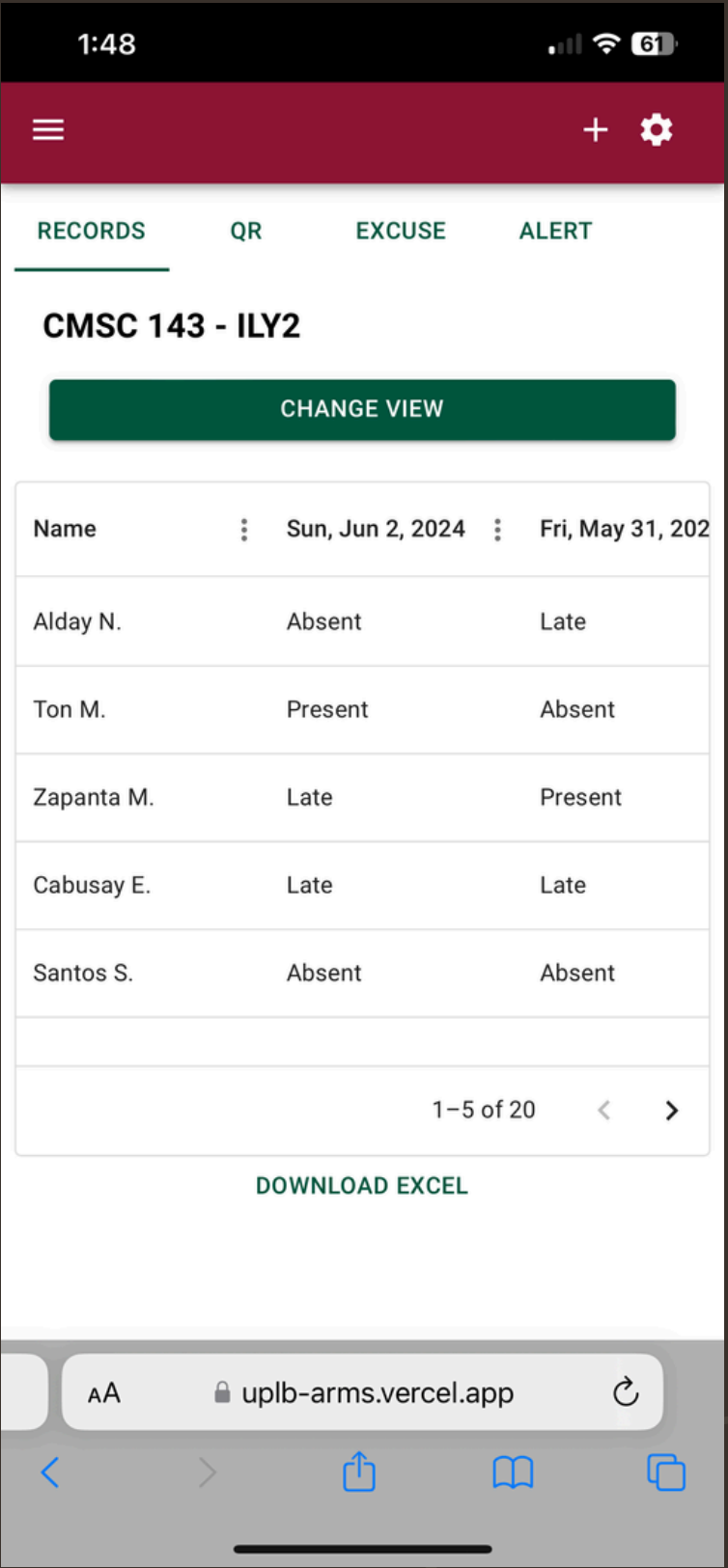
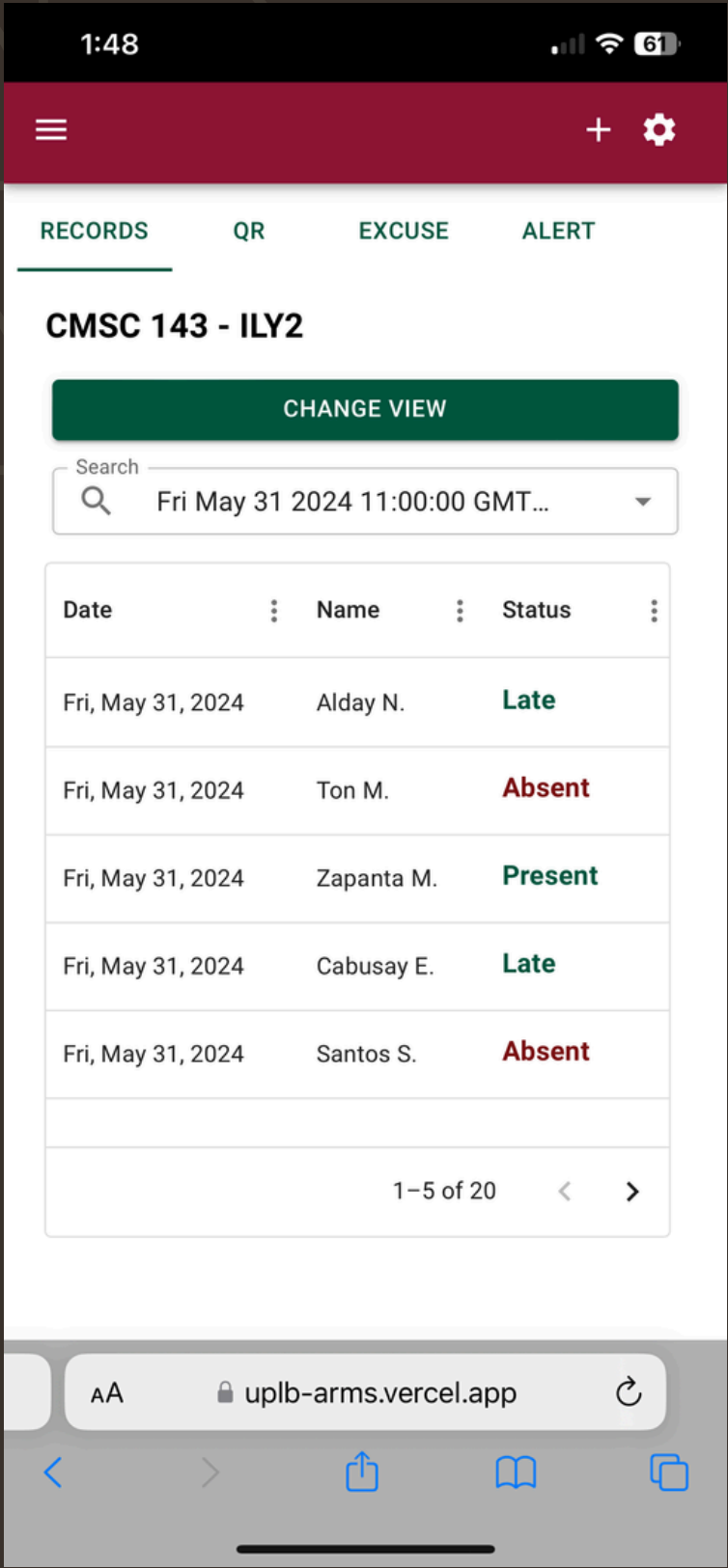
Create Class



A screenshot of a mobile application interface for generating a QR code. The app has a dark red header with a hamburger menu icon on the left and a plus icon and a settings gear icon on the right. Below the header is a tab bar with four options: "RECORDS", "QR", "EXCUSE", and "ALERT". The "QR" tab is selected. The main content area is white and features a section titled "Schedule your class". Below this title are two input fields: "Start time" and "End time". Below these fields is a green button with the text "GENERATE". Below the button is a large QR code. Below the QR code is a green button with the text "DOWNLOAD". The bottom of the screen shows a browser address bar with the URL "uplb-arms.vercel.app" and standard mobile navigation icons.

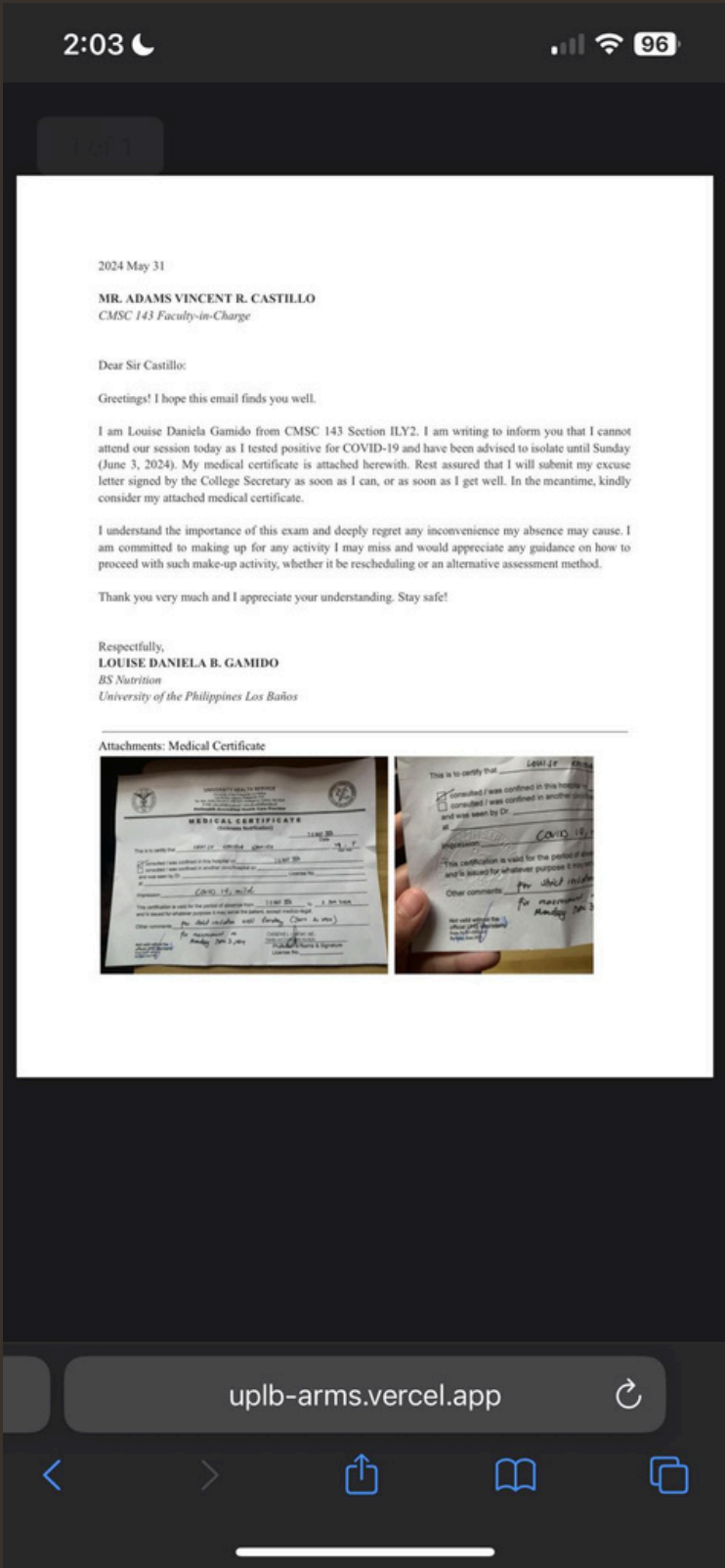
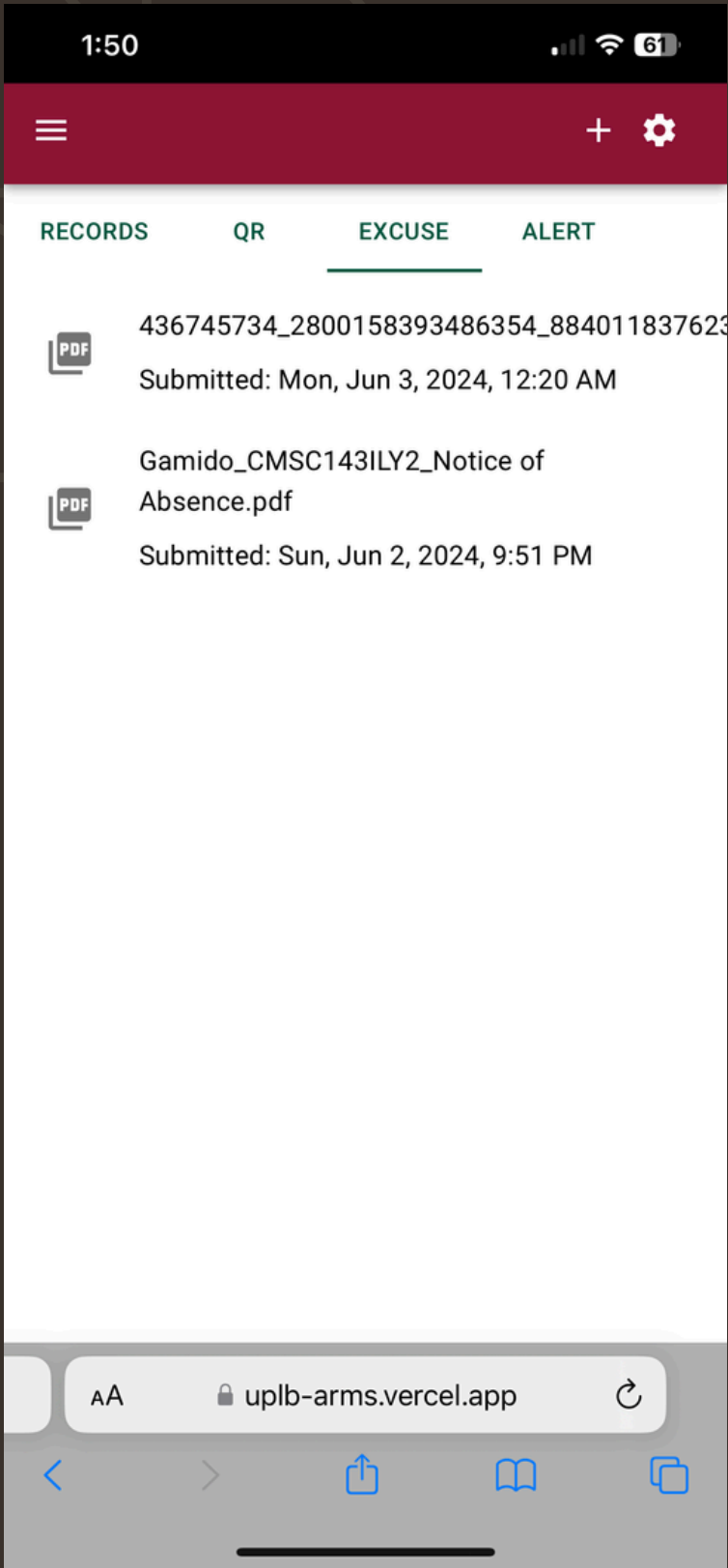
Generate QR code

Features (Teacher side)



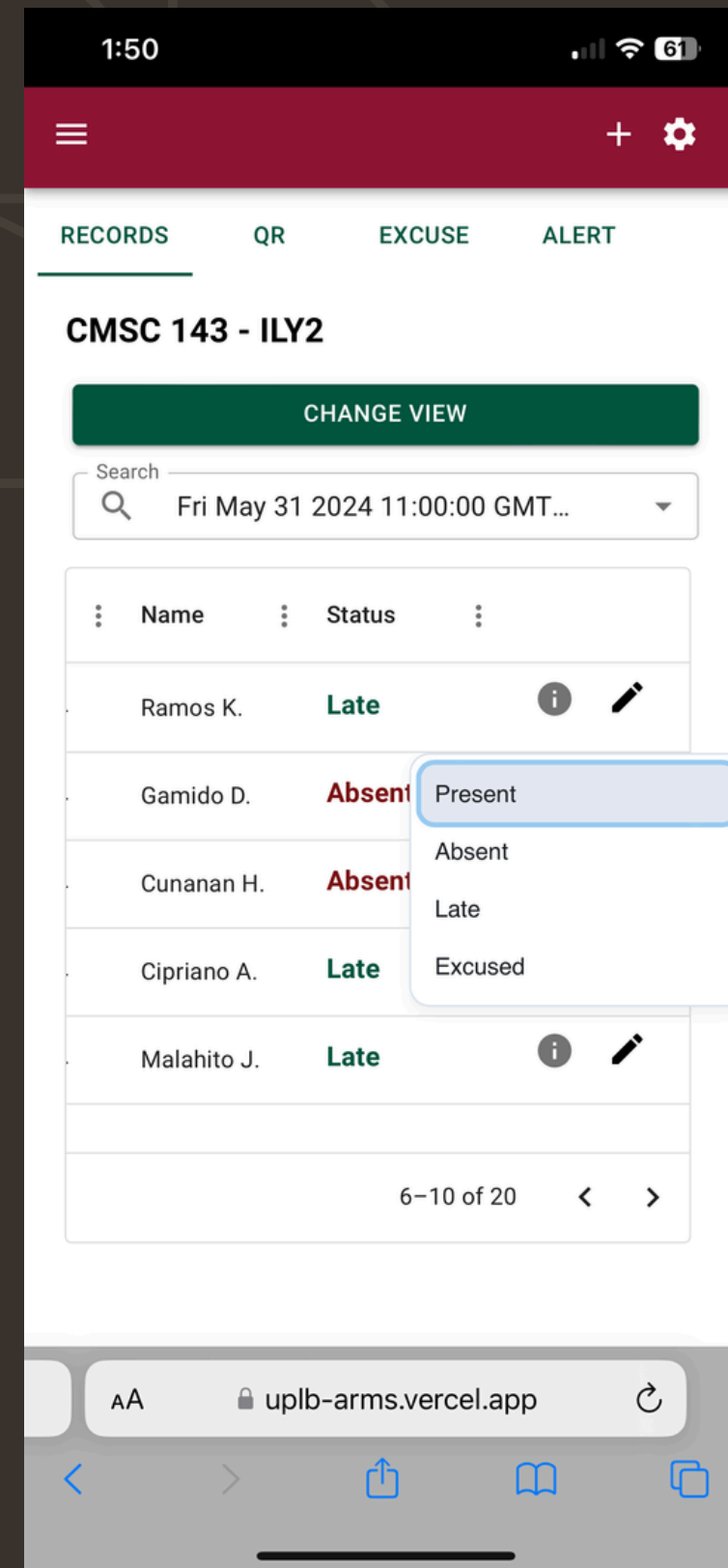
View Records

Features (Teacher side)

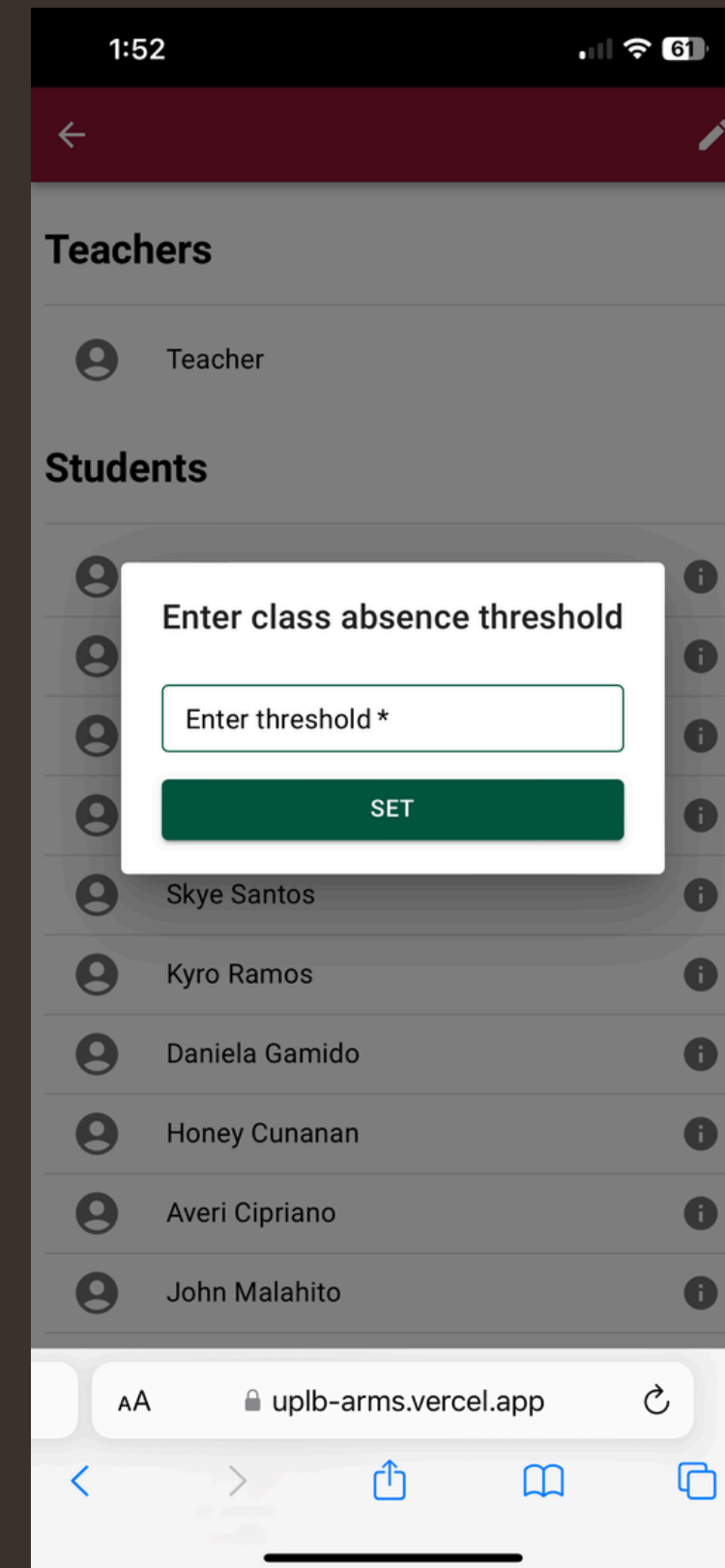


Validate Excuse Attendance

Features (Teacher side)

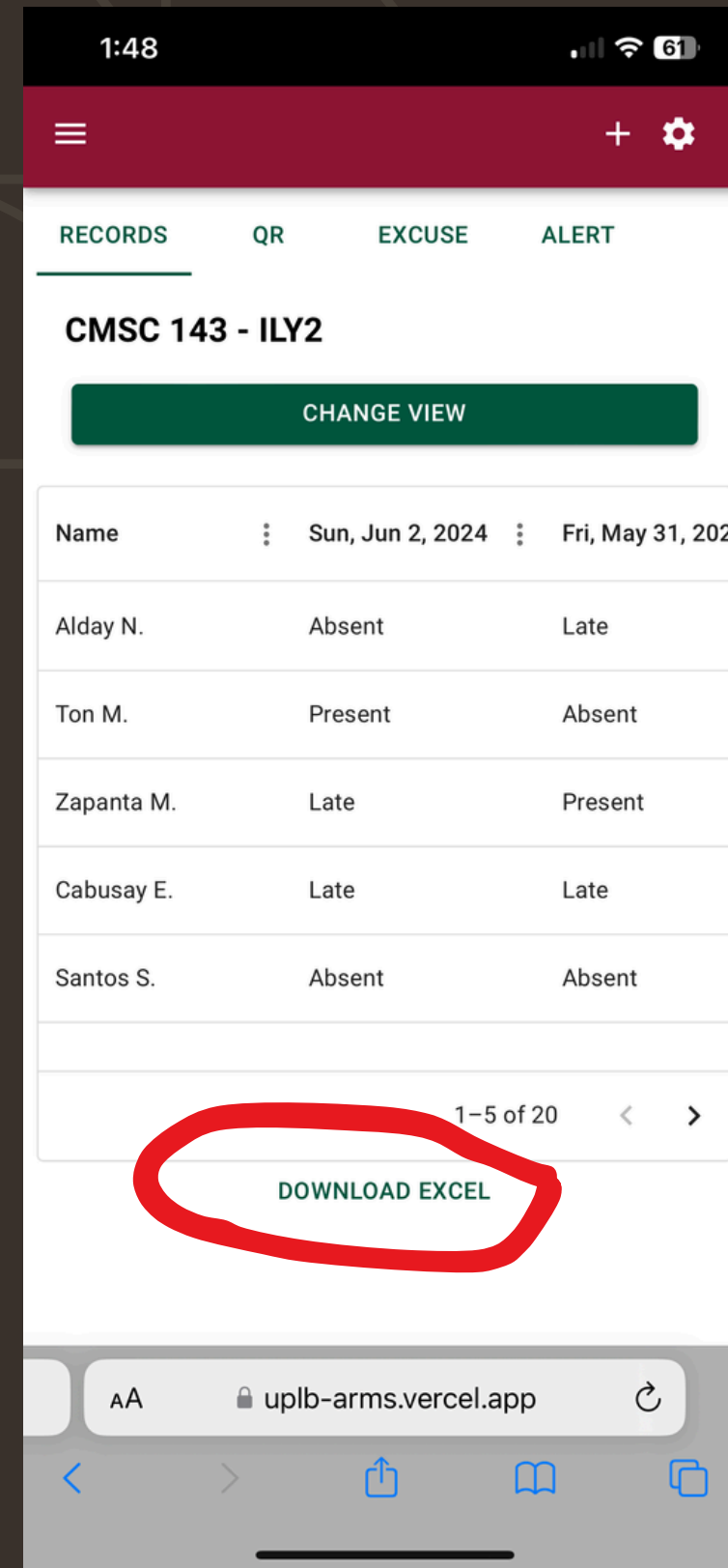


Revoke Attendance



Set Absence Threshold

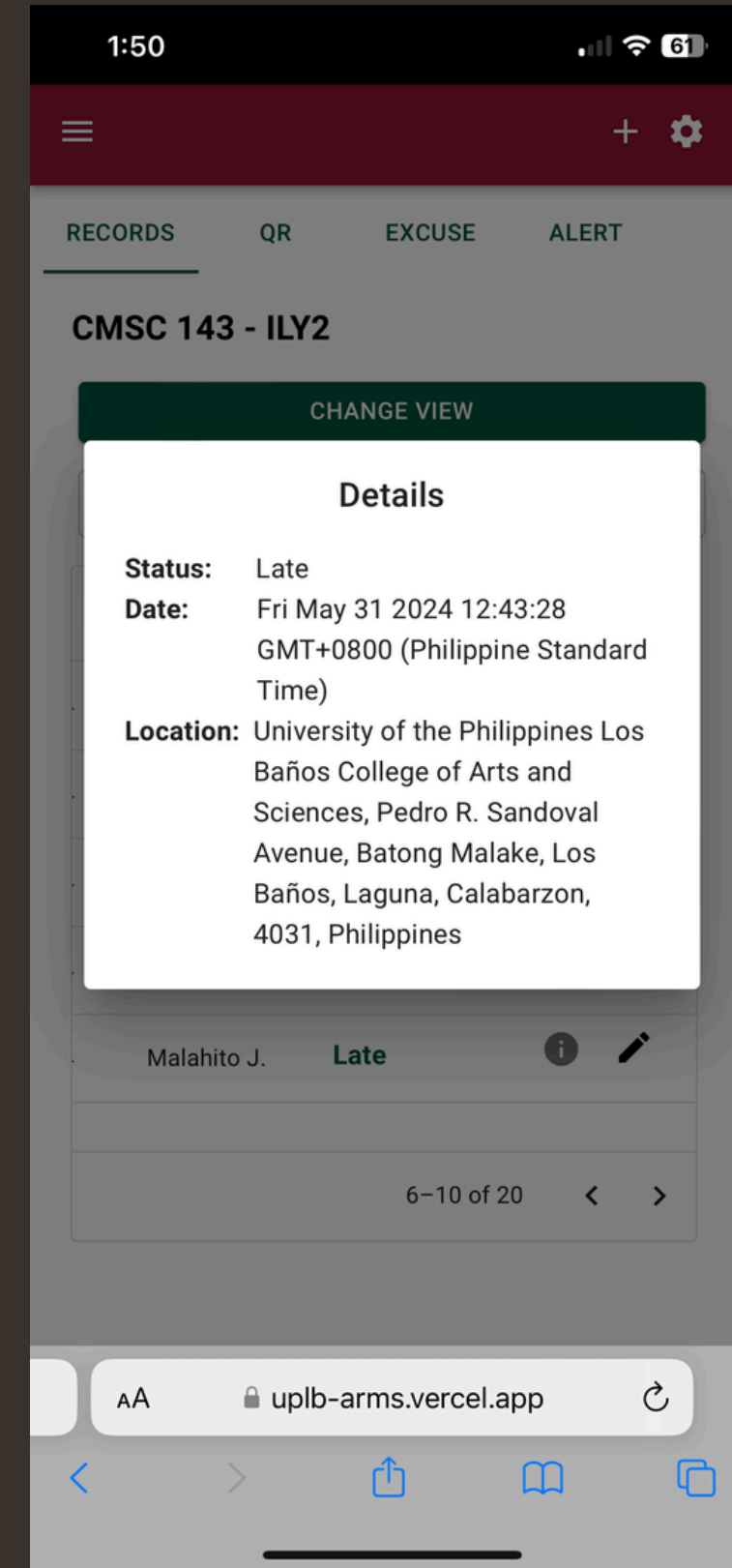
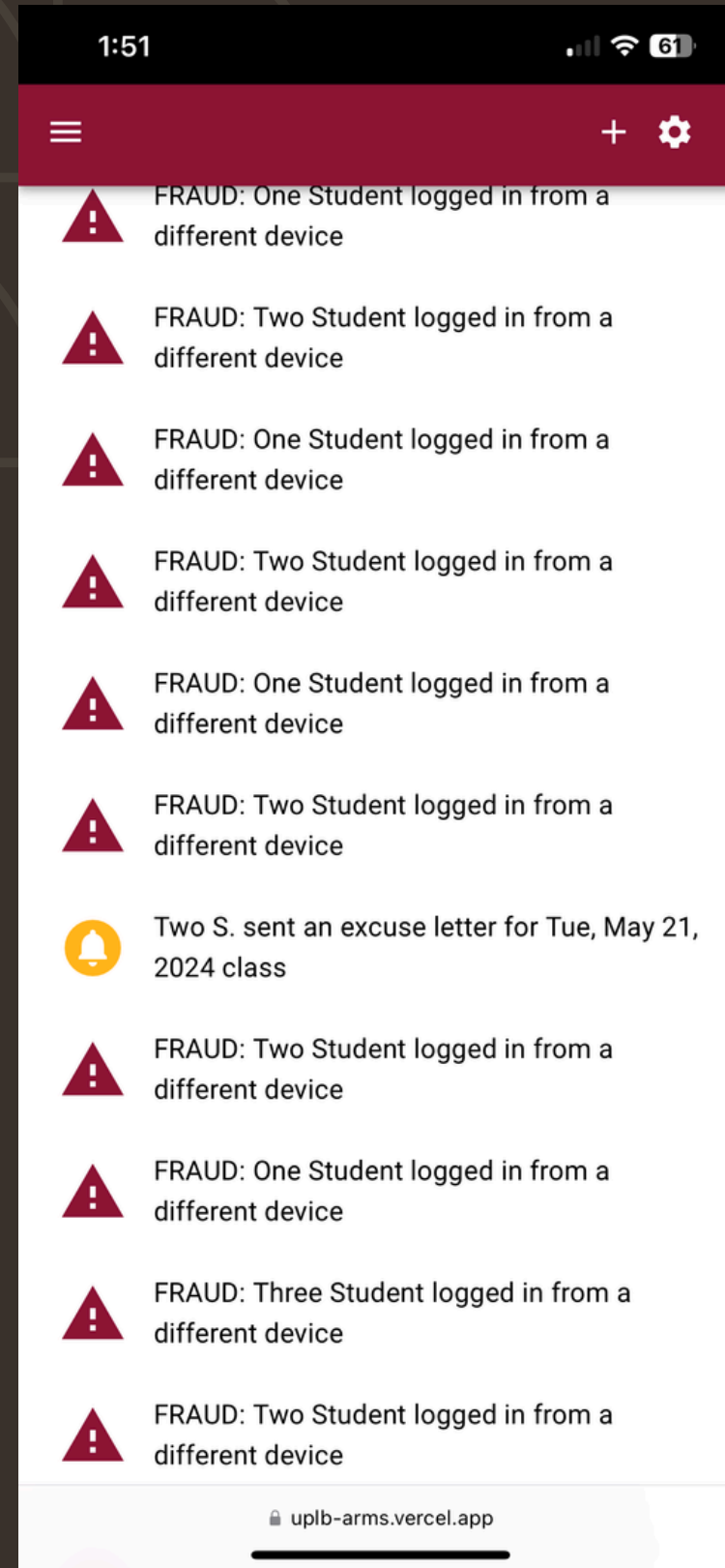
Features (Teacher side)



A	B	C	D	E
Name	Thu, Jun 6,	Sun, Jun 2,	Fri, May 31, 2024	
Alday N.	Absent	Absent	Late	
Ton M.	Absent	Present	Absent	
Zapanta M.	Absent	Late	Present	
Cabusay E.	Absent	Late	Late	
Santos S.	Absent	Absent	Absent	
Ramos K.	Absent	Late	Late	
Gamido D.	Absent	Late	Excused	
Cunanan H.	Absent	Absent	Absent	
Cipriano A.	Absent	Absent	Late	
Malahito J.	Absent	Present	Late	
Mabaga A.	Absent	Absent	Late	
Santiago M.	Absent	Late	Absent	
Yukit D.	Absent	Late	Absent	
Nagaño T.	Absent	Present	Late	
Wallit Z.	Absent	Absent	Late	
Lucero J.	Absent	Late	Late	
Villavicencio S.	Absent	Absent	Late	
Francisco N.	Absent	Absent	Late	
Guzman C.	Absent	Absent	Late	
Agcaoili A.	Absent	Present	Late	

Export Attendance

Features (Teacher side)



Detect Fraudulent Activities

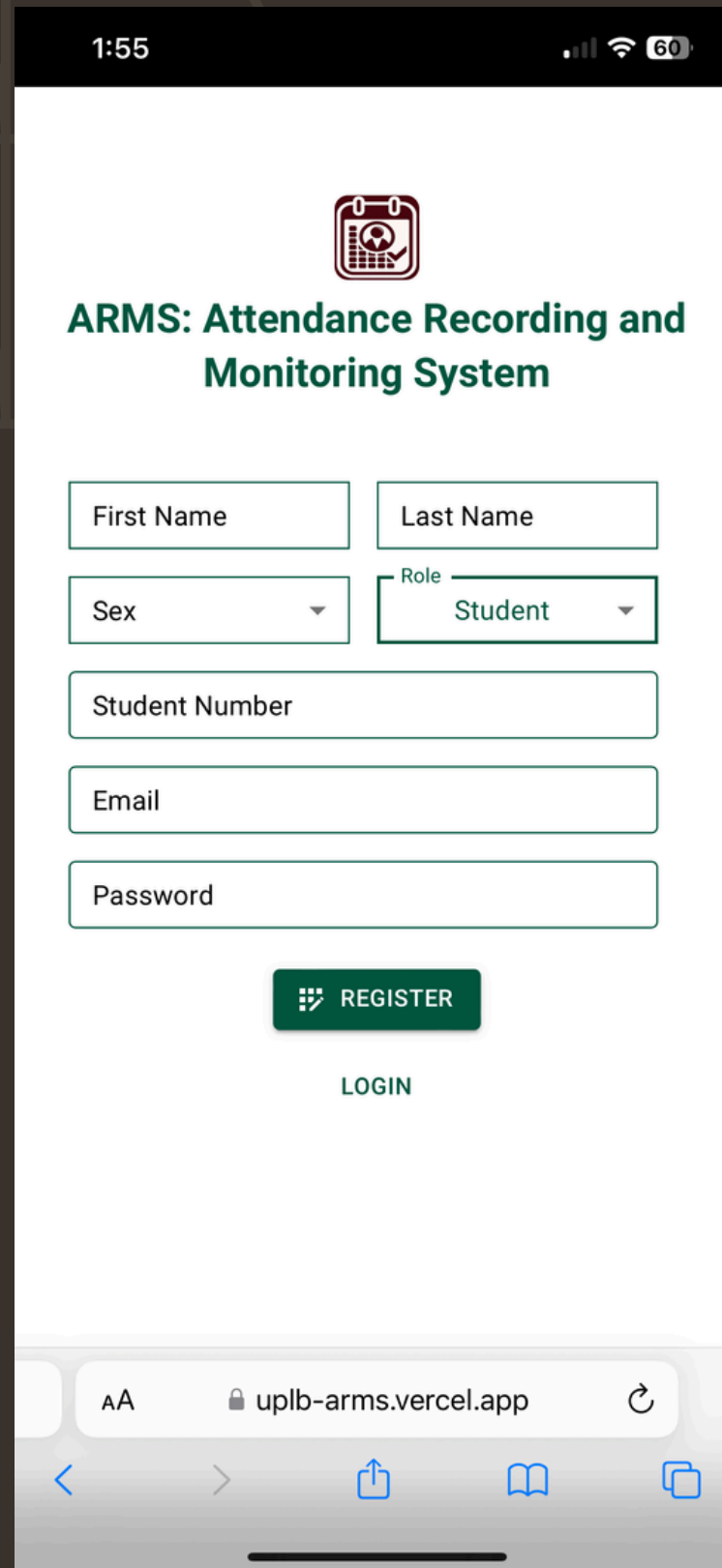
METHODOLOGY

Features


Students

- Signup
- Login
- Join class
- Scan QR code
- Submit Excuse Letter
- Absence Warning
- View Records
- Export Records

Features (Student side)



1:55 60



ARMS: Attendance Recording and Monitoring System

First Name Last Name

Sex Role Student

Student Number

Email

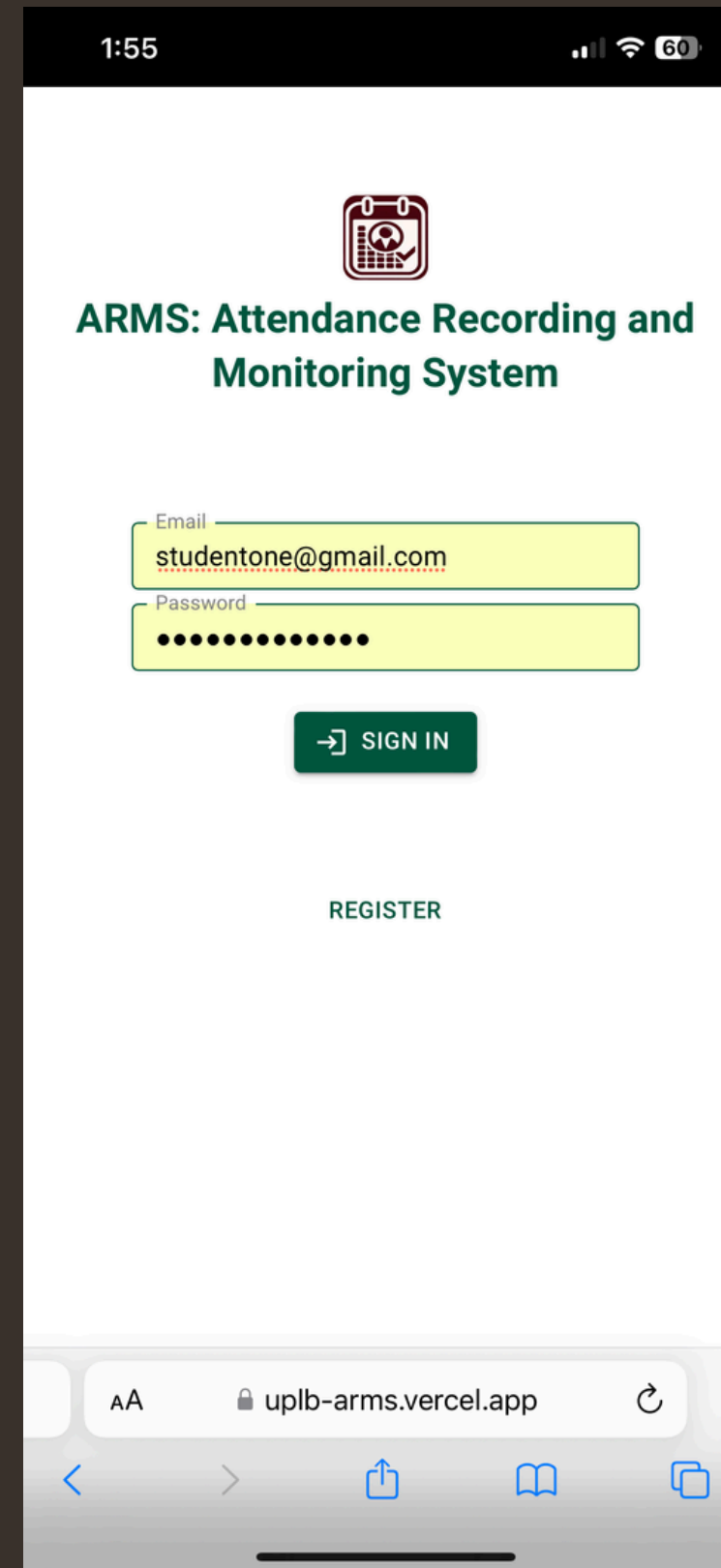
Password

REGISTER


LOGIN

AA uplb-arms.vercel.app

Sign-up



1:55 60



ARMS: Attendance Recording and Monitoring System

Email studentone@gmail.com

Password

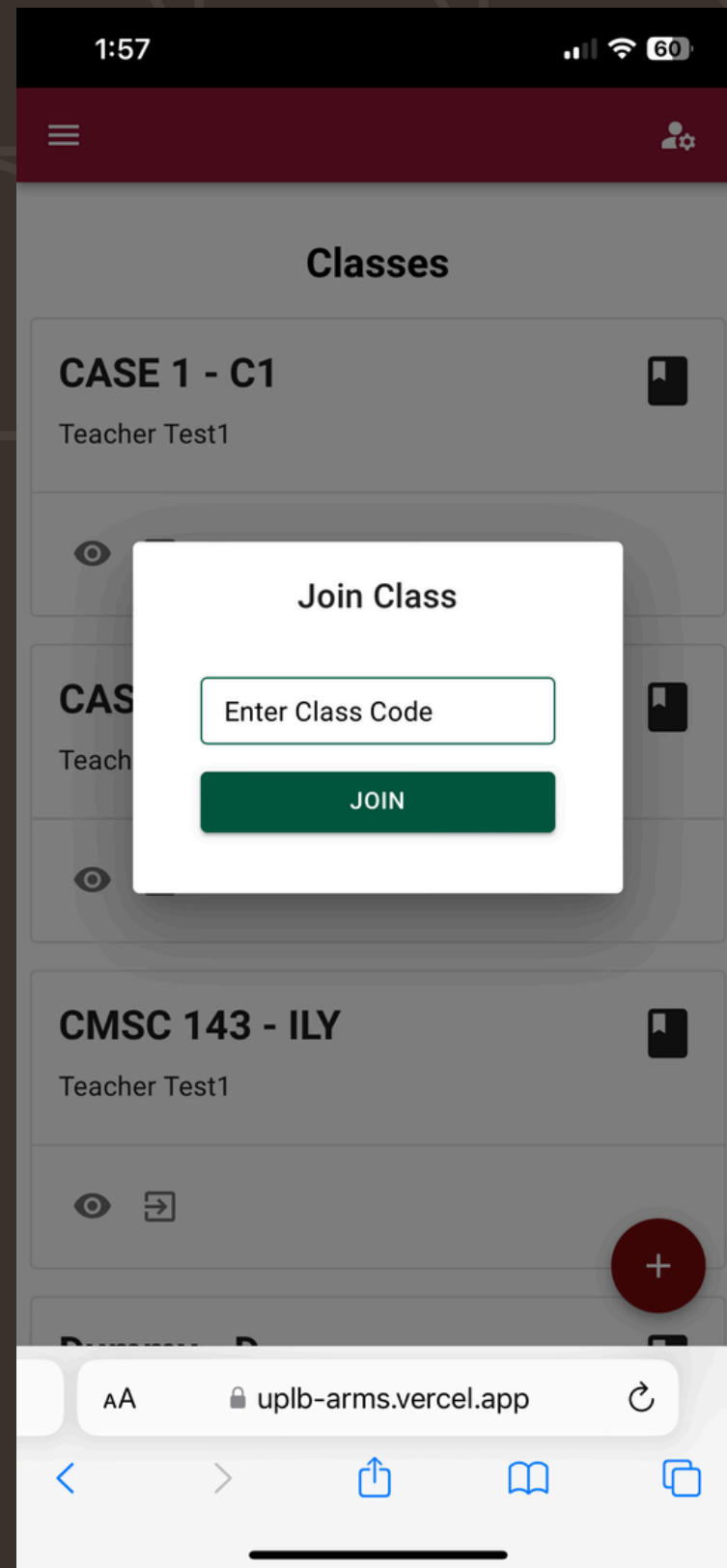
SIGN IN

REGISTER

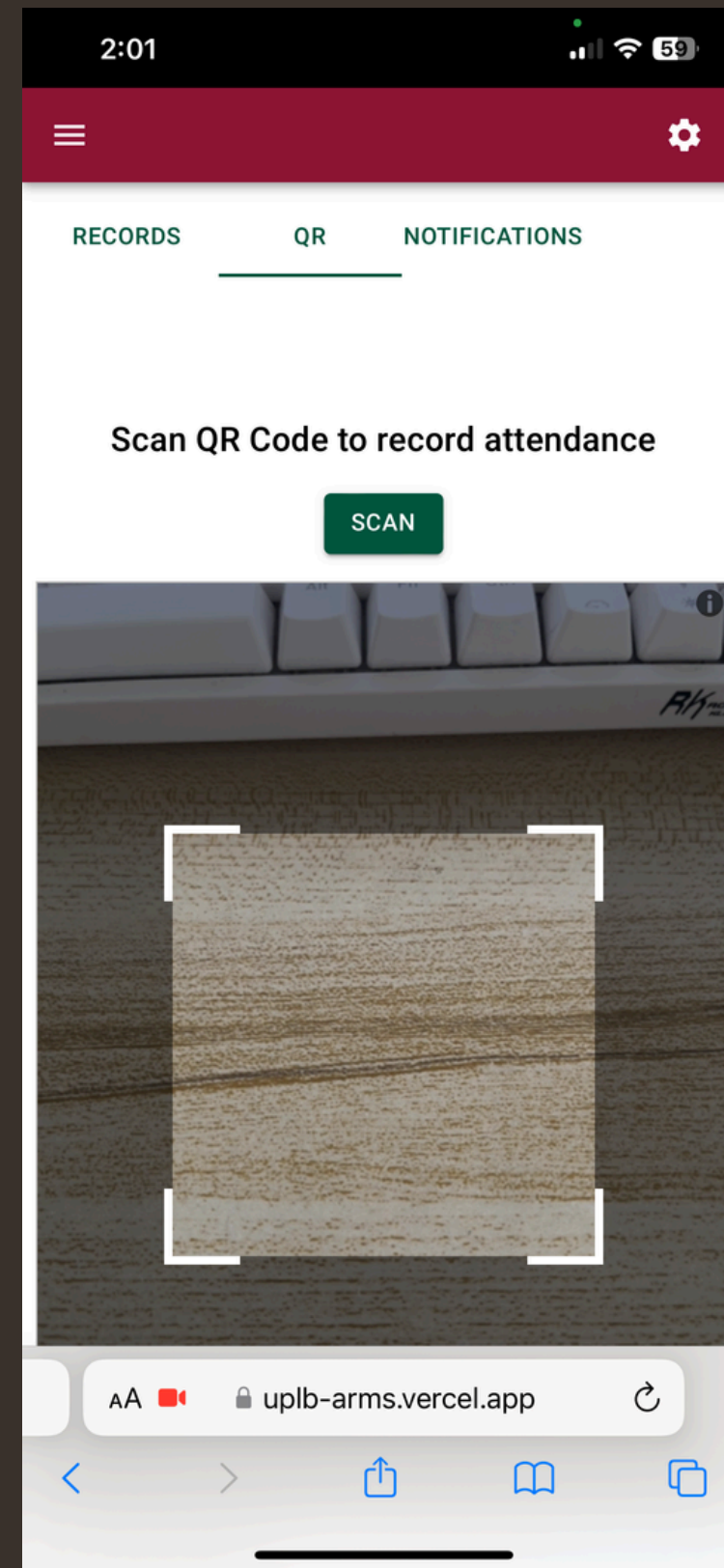
AA uplb-arms.vercel.app

Login

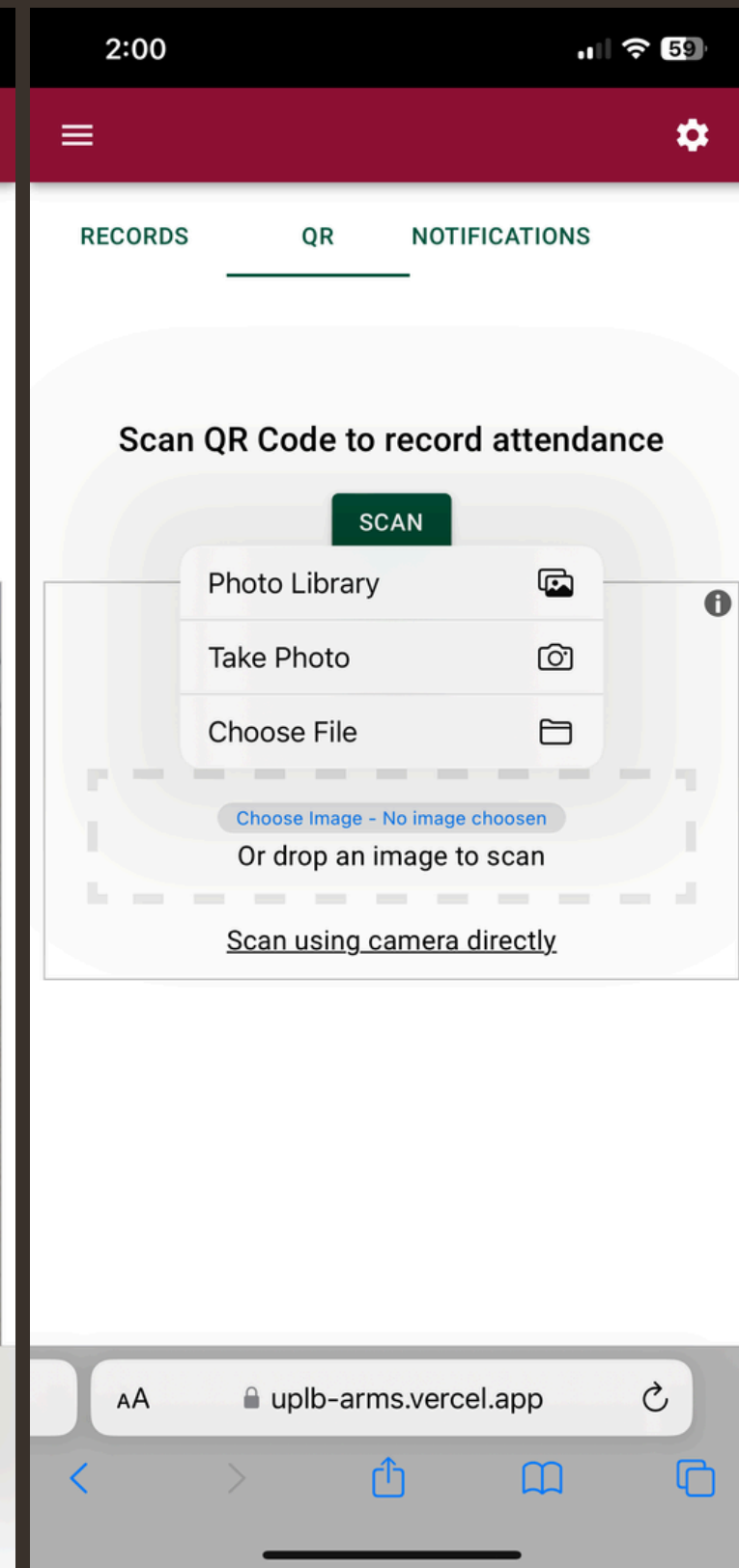
Features (Student side)



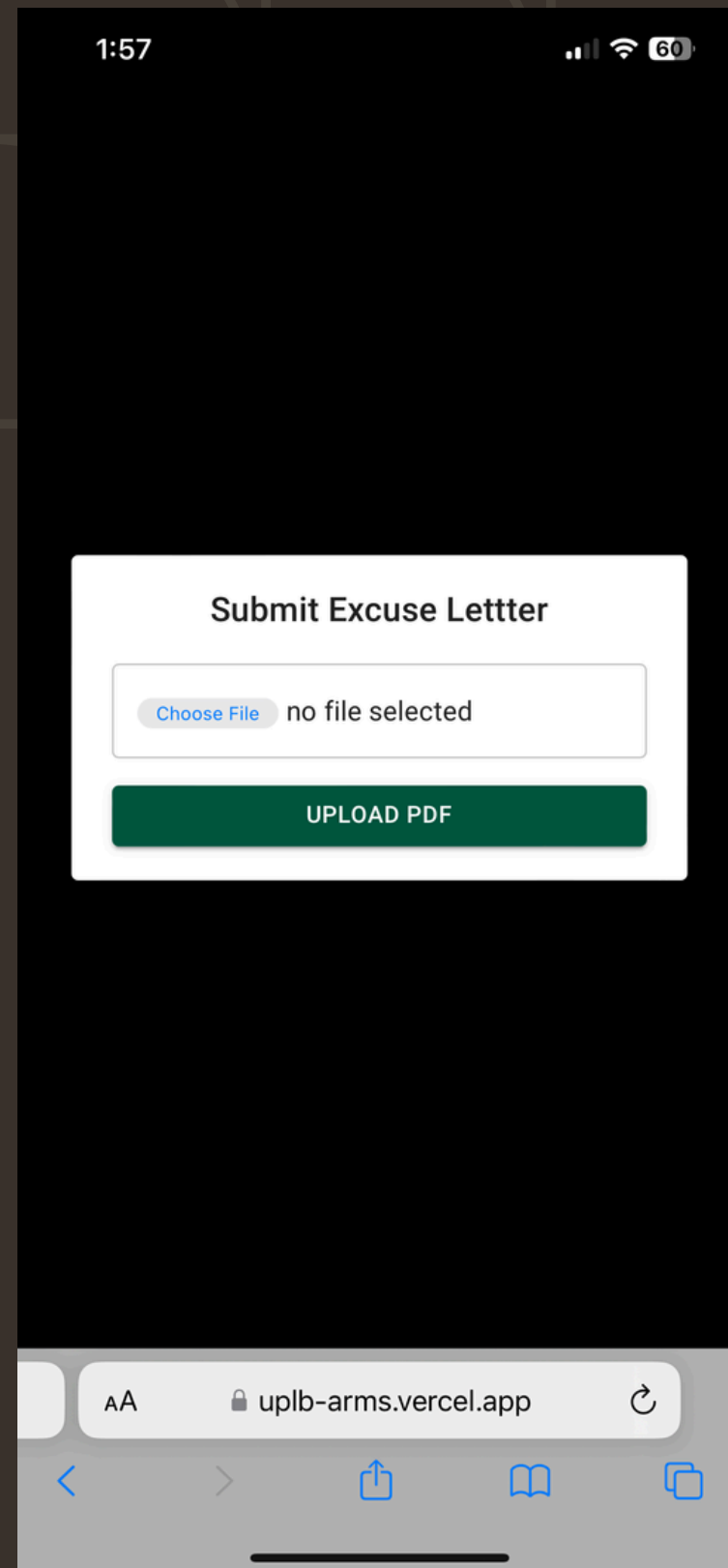
Join class



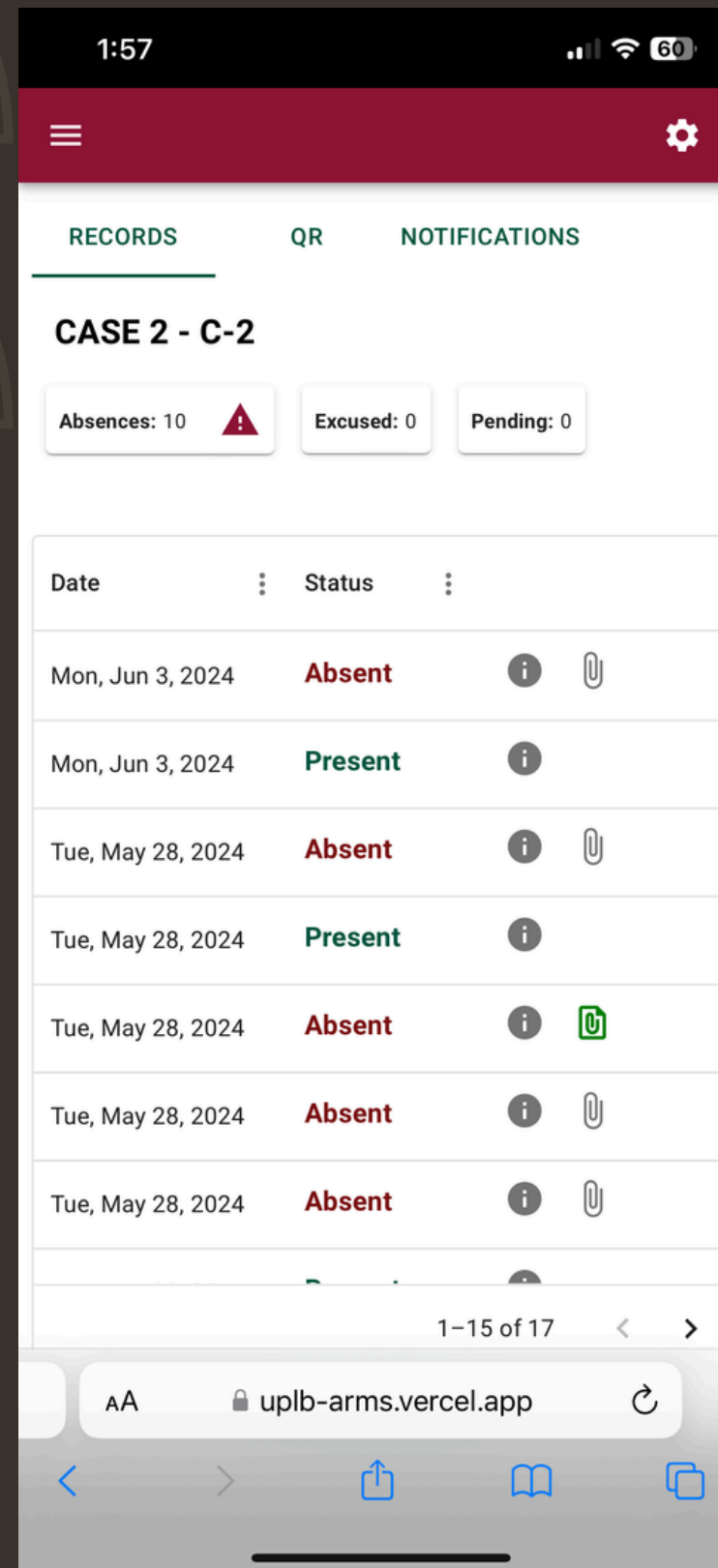
Scan QR code



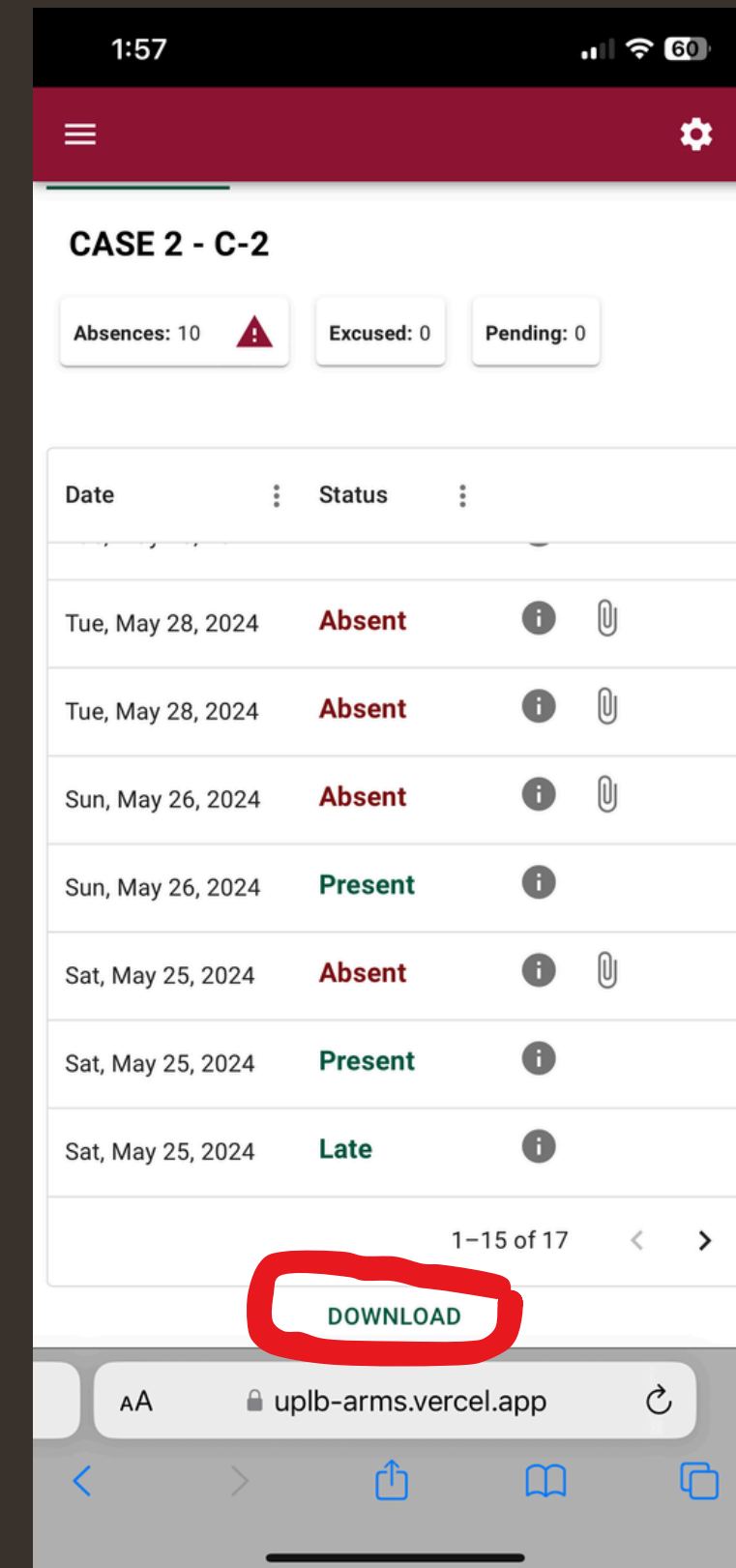
Features (Student side)



Submit Excuse Letter

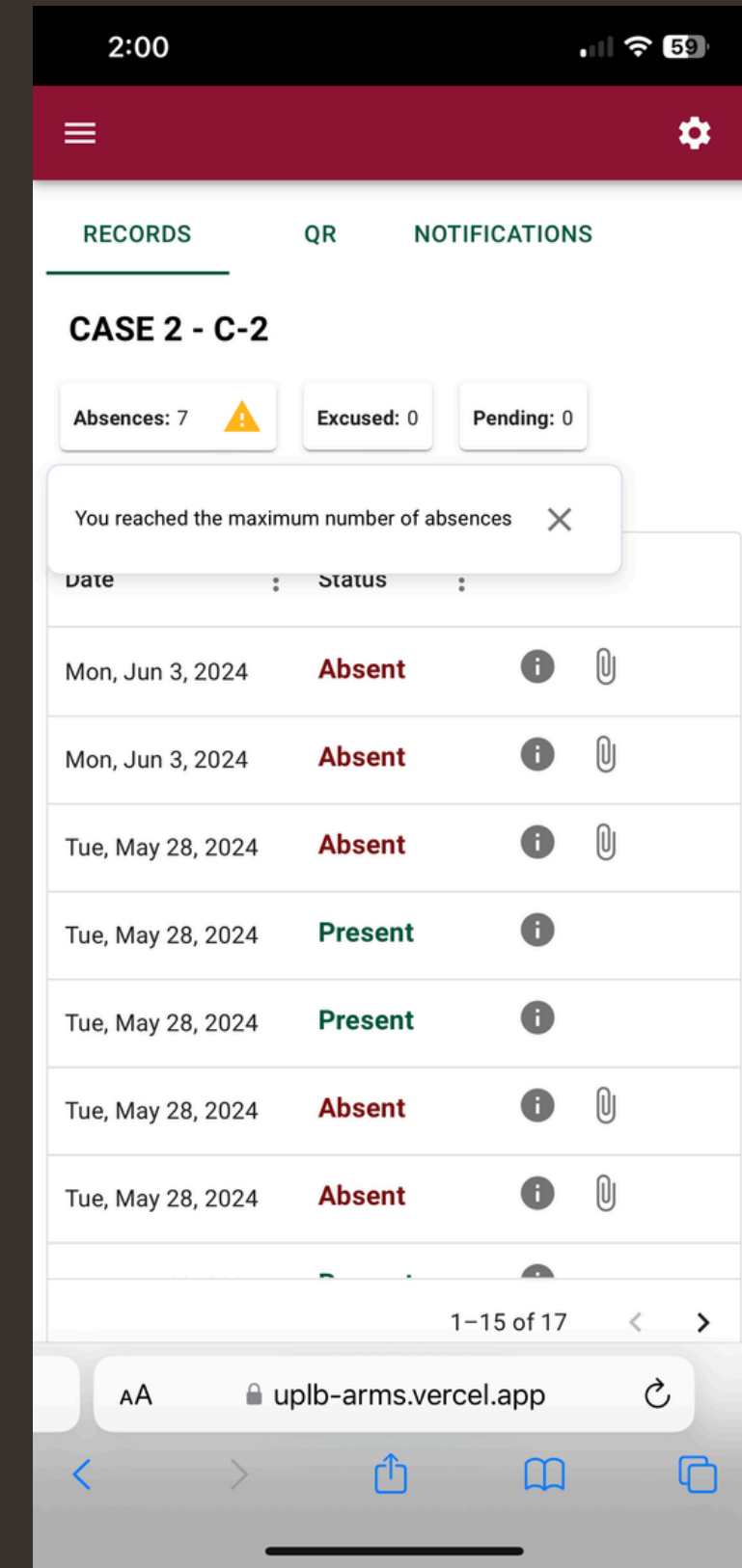
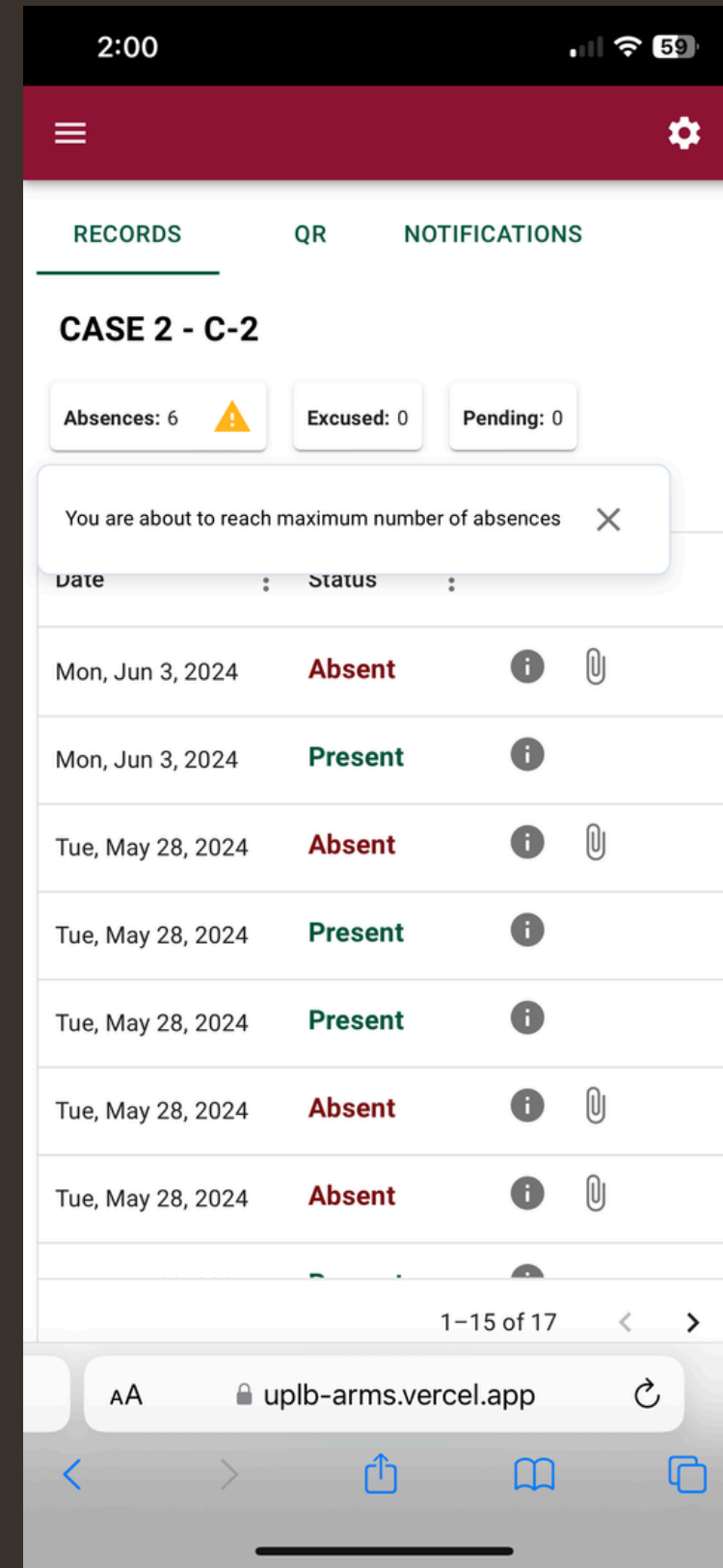
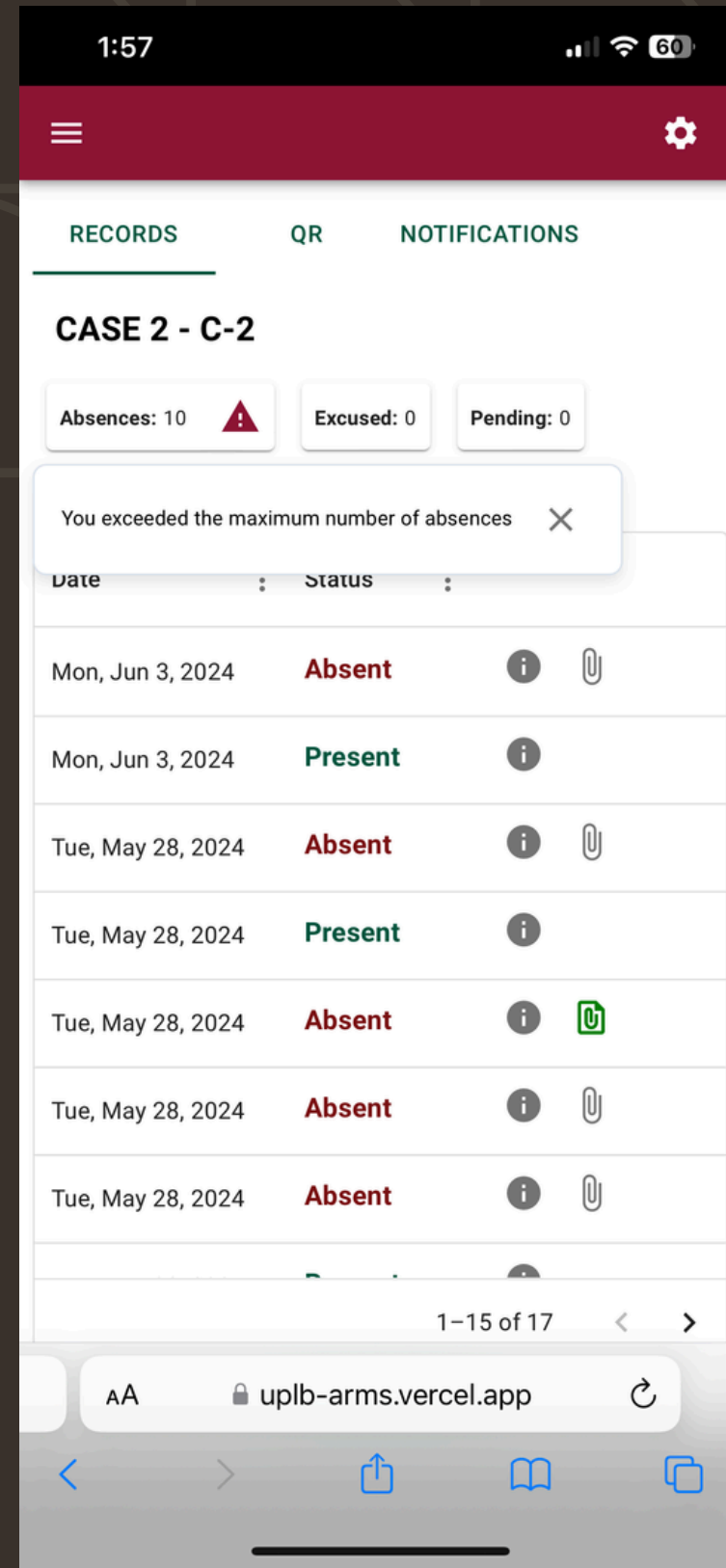


View Records



Export Records

Features (Student side)



Absence Warning

A. Development Stage

- CORS policy issue
- Reliability of Geolocation API
- Free-tier services of Render and Vercel

B. Testing

Student user-application

- An actual class was simulated in one of the computer labs in ICS involving 20 participants.
- Utilized Post-Study System Usability Questionnaire
- Overall mean score: 1.503125, indicating excellent usability.
- Average mean score for Q1 to Q6: 1.308333333, indicating high satisfaction in terms of inefficiency

Questions	Mean Score
Q1	1.3
Q2	1.2
Q3	1.4
Q4	1.2
Q5	1.3
Q6	1.45
Q7	1.65
Q8	1.5
Q9	1.7
Q10	1.75
Q11	1.55
Q12	1.65
Q13	1.6
Q14	1.55
Q15	1.7
Q16	1.55
Overall	1.503125
Q1 to Q6	1.308333333
Q7 to Q12	1.633333333
Q13 to Q15	1.6

B. Testing

Teacher user-application

- Tested by 1 ICS instructor.
- Utilized Post-Study System Usability Questionnaire
- Overall mean score: 1.875, indicating excellent usability.
- Average mean score for Q1 to Q6: 1.5, indicating high satisfaction in terms of inefficiency

Questions	Score
Q1	1
Q2	2
Q3	2
Q4	1
Q5	1
Q6	2
Q7	3
Q8	2
Q9	3
Q10	2
Q11	2
Q12	2
Q13	2
Q14	2
Q15	2
Q16	1
Overall Mean Score	1.875
Mean Score Q1 to Q6	1.5
Mean Score Q7 to Q12	2.333333333
Mean Score Q13 to Q15	1.75

Conclusion

The study was able to develop a mobile-friendly digital attendance recording and monitoring system for the students and teachers of the University of the Philippines Los Banos. The teacher user-side application enables users to generate a QR code for a certain class time schedule. This QR code can be scanned by the users in the student user-side application to record their attendance. Users in both teacher and student user-side applications can also monitor the attendance through the records feature of the system. Teacher users have a view of the attendance records of all the students in the class. On the other hand, student users have a view of their own attendance record in a certain class. Furthermore, student users can also see the number of absences they have in a certain class. An absence warning will appear in the student user-side application if a user is about to reach, has reached, and has exceeded the absence threshold of a class.

Future Work

- Limit the app to a certain network when scanning a QR code
- Implement statistics features like graphs and charts
- Use paid-tier services of Render and Vercel or any other compatible deployment platforms