

Scandence: QR Code based Attendance Management System

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Abstract: This paper aims to develop a digital attendance taking system using the QR Code technology. The main goal of this project is to eliminate the manual process of attendance taking mainly in colleges and universities. This system will help provide an efficient automated alternative to the expensive and complex attendance systems being developed and implemented.

Keywords: QR Code, Attendance Management System, Digitalization

1. INTRODUCTION

a. PROJECT SPECIFICATIONS

i. Problem Statement

The manual process of taking attendance is a time consuming and inefficient way. The project aims to automate the process and give a user-friendly and more efficient way.

ii. About the Project

The idea of Scandence is to digitize the way attendance is taken in colleges and gives a more comfortable and easier experience while taking attendance. Tracking of attendance is entirely web-based so the data can be entered from anywhere you can access the internet.

This idea is viable and is a requirement amongst the teachers at colleges and universities. After interviewing faculties at NMIMS University and their views on the current attendance system, a need for a more robust and time-efficient method of attendance was identified. The market for Scandence is all the colleges and universities who look forward to entering into digitization and also make the task of taking attendance easier and efficient.

It aims at creating 2 platforms:

1. A web application for the teachers to generate the QR code and maintain the attendance record.
2. A mobile application for students to scan the QR code displayed on the screen and mark their attendance.

The vision is to create attendance tracking software that is so simple and effortless to use that the faculties with any size of classes or organizers of any groups or events can spend more time with their students and participants.

The value that Scandence will add to the users' overall structure of time value to the normal functioning of lectures and also be identified as adopters of digital technologies. The proposed solution will be offered at a One-Time Setup Fee followed by Annual Maintenance Charges.

iii. Stakeholder Map

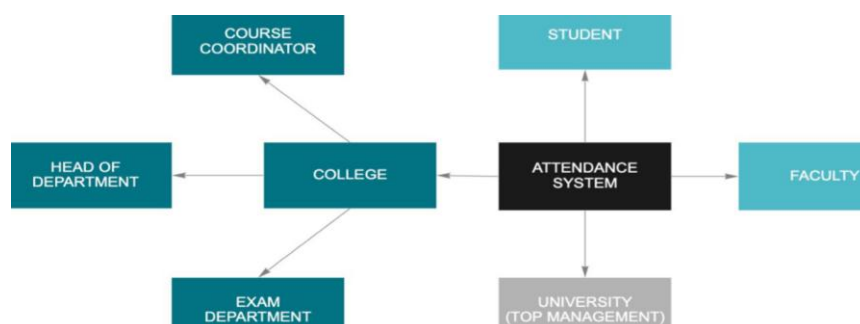


Figure 1: Stakeholder Map

Stakeholder mapping is a process of finding out the key stakeholders relating to a project. The process involves identifying all individuals who have an interest in the project outcome. A project stakeholder can be one individual or multiple individuals as in the case of large public infrastructure projects.

The stakeholder map depicts the direct and indirect users of the application. The direct users are the students and faculties. The indirect user is the college entity which is further subdivided into course coordinator, head of the department and the exam department. The facilitator is the university which is the top management.

2. LITERATURE REVIEW

Reference [1] proposes a system that is based on a QR code, which is being displayed for students during or at the beginning of each lecture. The students will need to scan the code in order to confirm their attendance. It requires a high-level implementation of the proposed system and discussion of student identity to eliminate false registrations.

Reference [2] deals with the process of attendance management and evaluation of attendance. It emphasizes on the provision of QR code to the students to mark the attendance. The purpose of the paper is to computerize the traditional way of recording attendance and a smart way of tracking attendance in the institutions.

Reference [3] discusses the elimination of the current problems, while also promoting a paperless environment at the same time. The aim was to develop an attendance system that will require minimal hardware cost, setup and maintenance. i.e. by having the application to run on the instructor’s existing Android mobile device.

Reference [4] discusses how the system speeds up the process of taking attendance would save valuable teaching time. It helps students avoid consequences that may result from poor attendance which will eventually penalize them from sitting their final examinations as required by the administrators.

3. METHODOLOGY

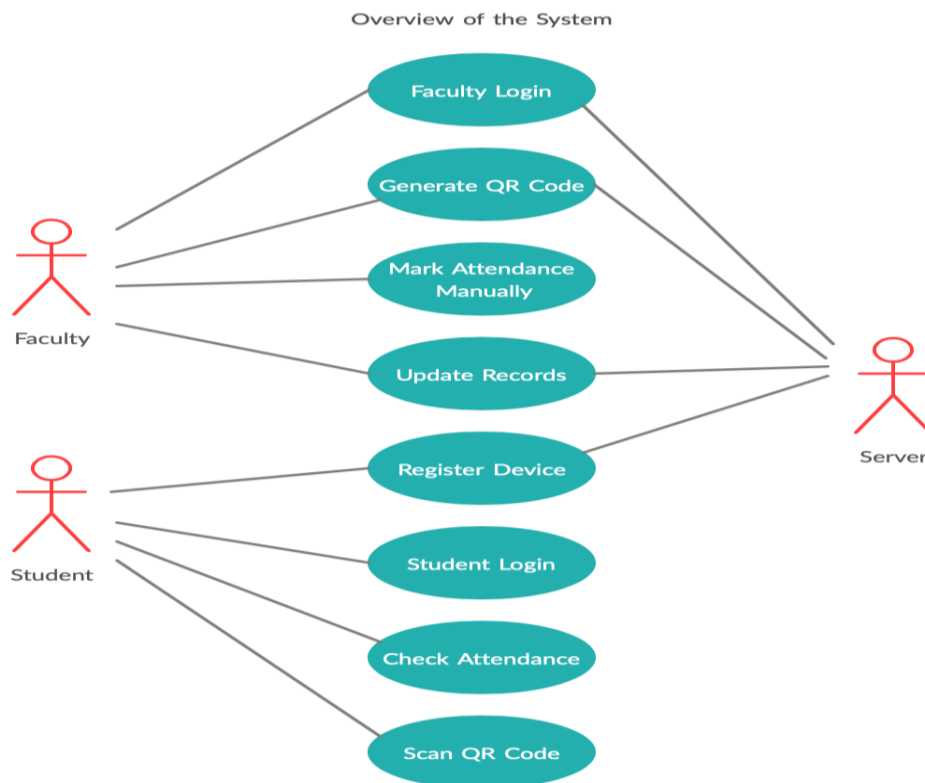


Figure 2: Use case Diagram

The below figures show the activity diagrams for the actions performed by Teacher and Students.

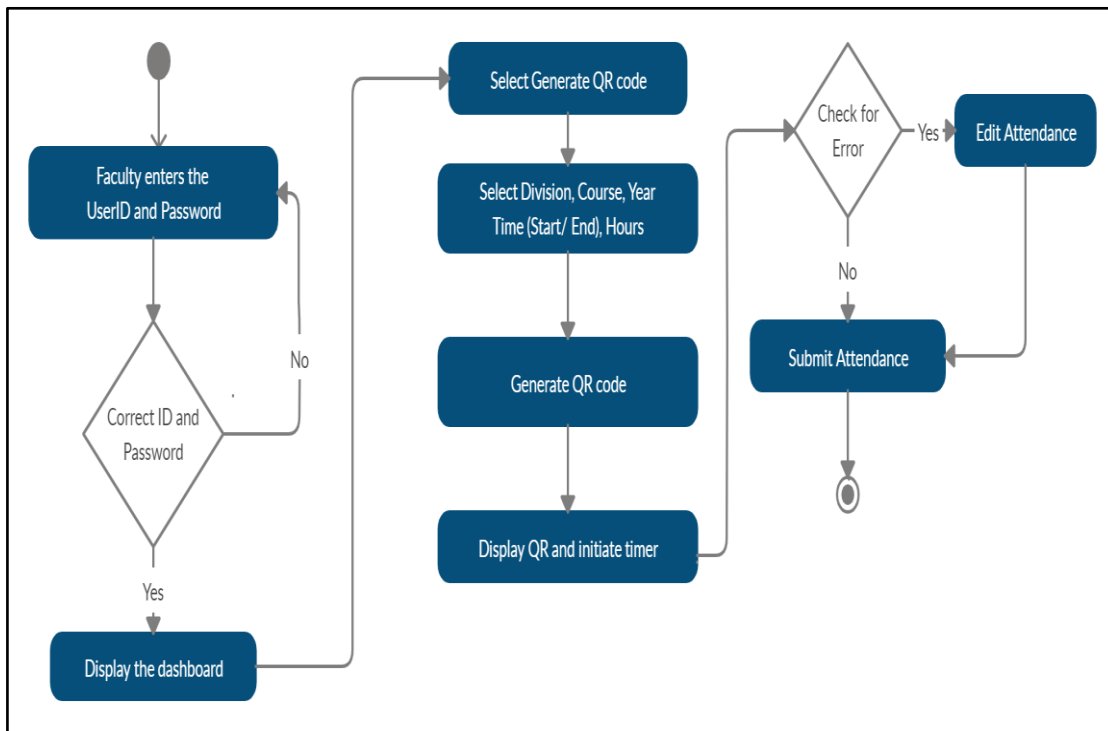


Figure 3: The process of generating QR code by the teacher

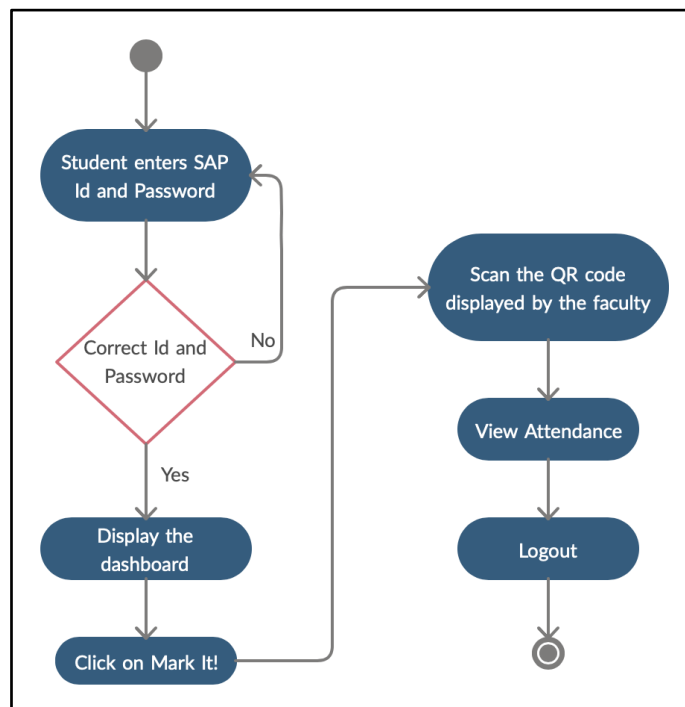


Figure 4: How the student can scan the QR code and mark the attendance

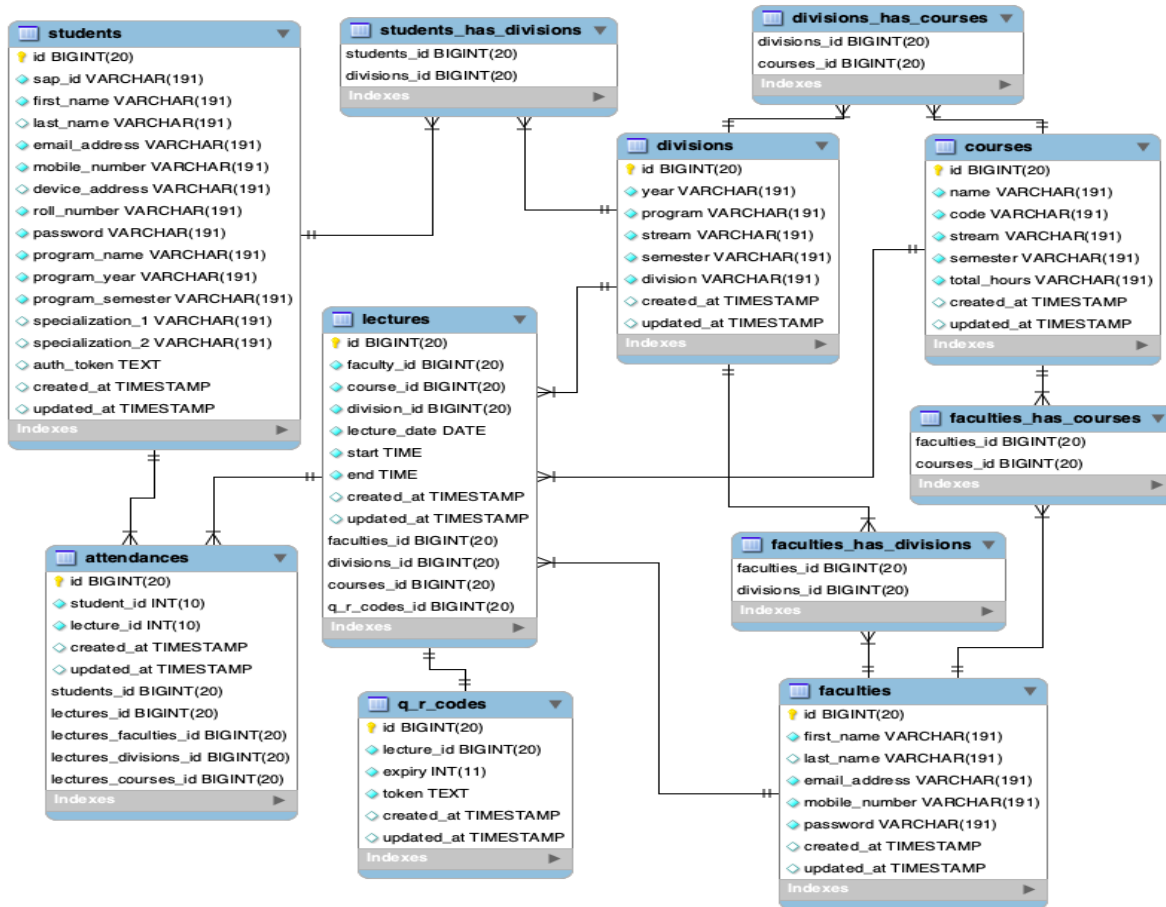


Figure 5: ER Diagram

4. Project Blueprint

Attendance - an unavoidable part of any class or lecture! Marking attendance is quite important for a number of reasons. As significant as attendance is, it consumes a lot of class time and doesn't contribute toward student progress.

The crucial class-time can be saved with a student attendance system, which is an automated solution to not only mark attendance but also to find out meaningful patterns in order to monitor student performance around key metrics.

Attendance taking process leveraging QR code technology will save time, reduce teacher workload and streamline the process of attendance management.

The purpose of Scandence is to make the traditional tedious attendance taking process seamless. The existing process consumes a lot of time and energy to take the attendance manually. Scandence cuts the time required to take the attendance in less than half.

5. User Journey

a. Student

Screen 1: Student is supposed to login using its SAP ID and Password. Each account will be associated with that mobile device's IMEI Number. This will allow only a single user to login from a particular mobile device.

Screen 2: A QR code will be displayed on the screen with the help of a projector. The students will use the application from their respective mobile phones to scan that QR code.

Screen 3: ON successful scanning of the QR code, the students will be automatically marked present at the backend and they will get a notification.

Screen 4: Students can check their attendance in all the subjects to date. The subject whose attendance criteria is not met will turn red to warn the student.

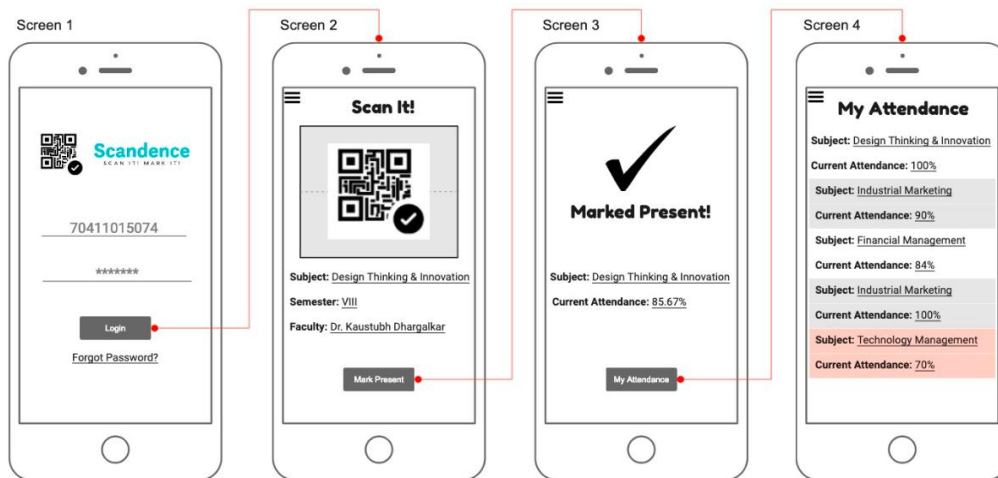


Figure 6: Student User Journey

b. Faculty

Screen 1: The Faculty will log in by entering the Username and Password which will be provided by us.



Figure 7: Faculty Login

Screen 2: Then, faculty has to select the course, division and set a time limit for the QR Code to be displayed on the screen.
Screen 3: Faculty will be able to see the roll numbers of students who have scanned the QR code in green and others in red.

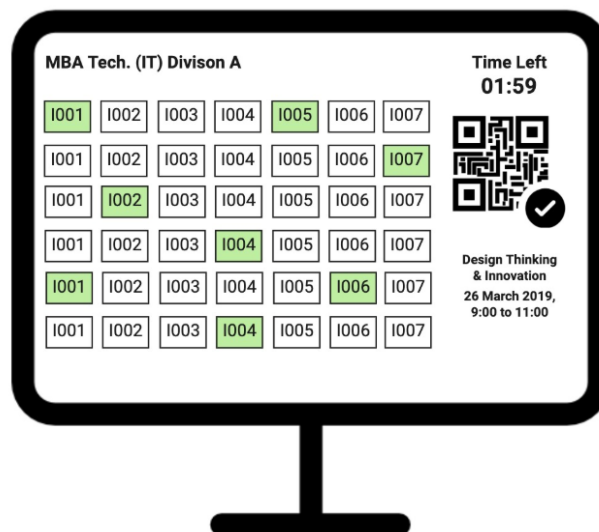


Figure 8: QR code and attendance

6. REQUIREMENT ANALYSIS

6.1 Competitive Study

The table below depicts a competitive study between a QR based system and other existing innovations for attendance management.

Features	Traditional or Manual	Facial Recognition	Biometric	Scandence
Prior Requirements	Nothing (just a record of students)	Requires prior Scanning of every face	Requires prior Scanning of every fingerprint	Nothing (just a digital record of students)
Infrastructure Cost	Low	High	High	Medium
Installation	Need Physical File or Ms Excel Sheet	Install Cameras	Install Fingerprint scanner	Simply visit the website and Login
Ease of Use	Very Tedious	Quite Easy	Quite Easy	Quite Easy
Scalability	Very Difficult	Very Difficult	Very Difficult	Grows with you
Usage-based on no. of person	One person at a time	One person at a time	One person at a time	Multiple people at a time
Data Integrity	Low	High	High	High
Process Time	4-5 seconds per student	2-3 seconds per student	2-3 seconds per student	Same time for 'n' number of students

Table 1: Competitive Study

While the traditional method has the least cost, the process is time-consuming. The other innovations like facial recognition and biometrics are more efficient. However, they have high infrastructure cost and are difficult to scale. As we can see in comparison to the other systems, Scandence is economical, reliable and efficient. The process is not tedious and multiple users can process it at the same time.

6.2 Functional Requirements

1. The system must reduce the time consumption for taking attendance for the faculty.
2. The application must be able to mark and log the attendance record of the student for the lectures.
3. The student can monitor the attendance real time.

6.3 Non-Functional Requirements

The attendance must be marked in a latency of not more than 2 minutes from such an activity.

The application must be accessible from any device across all platforms.

User privacy is maintained and response time of the application is less than 3 seconds.

6.4 Customer Interview and Need

A survey of the faculties and students of University provided a start in understanding the major problems that students face. It also helped in understanding the needs of the students from the solution.

The main issues that the faculties faced were:

- Time consumption in attendance process
- Student proxies
- Irregularities in viewing attendance

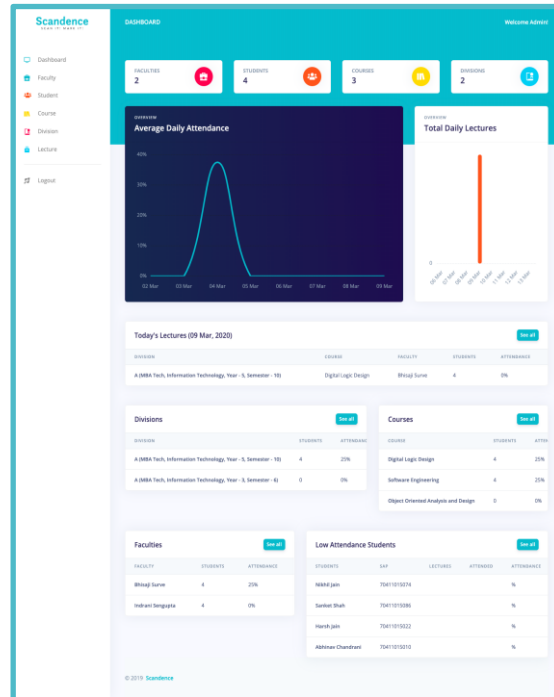
The main issues that the students faced were:

- Missing out on attendance due to technical or manual glitch
- No effective way of viewing attendance

Viewing course wise attendance with daily attendance records.

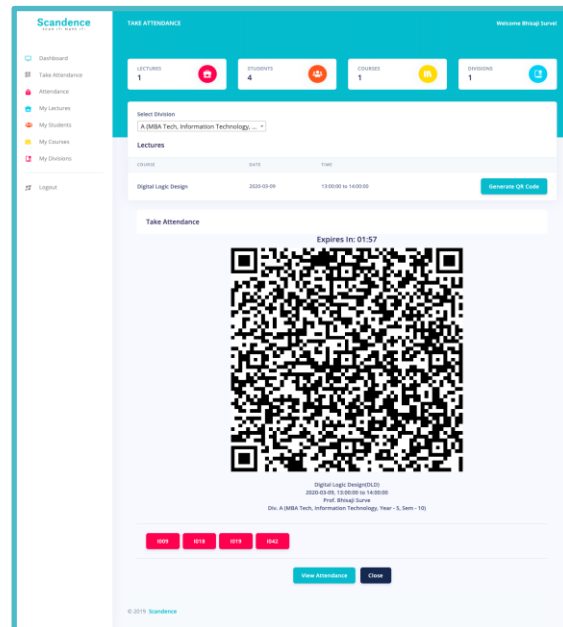
7. Application Walkthrough

a. Admin Portal



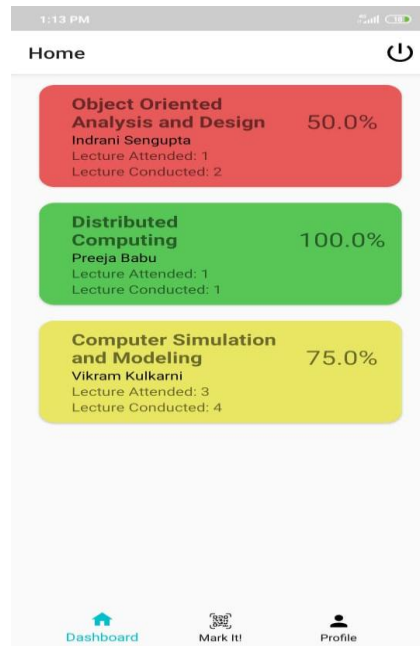
The admin has the right to edit and add new courses, faculties, lectures, students and divisions. The admin also has the right to edit the attendance log in case of any discrepancy in the record.

b. Faculty Portal

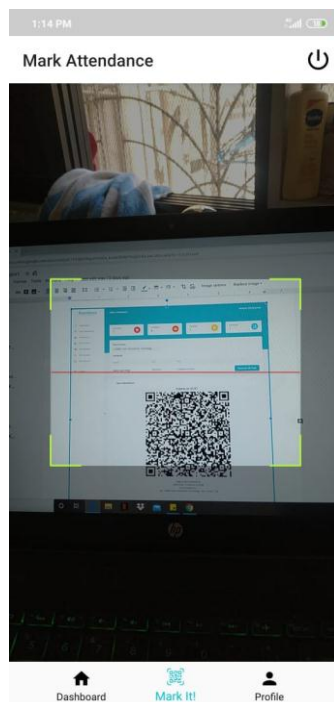


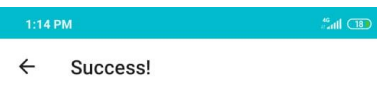
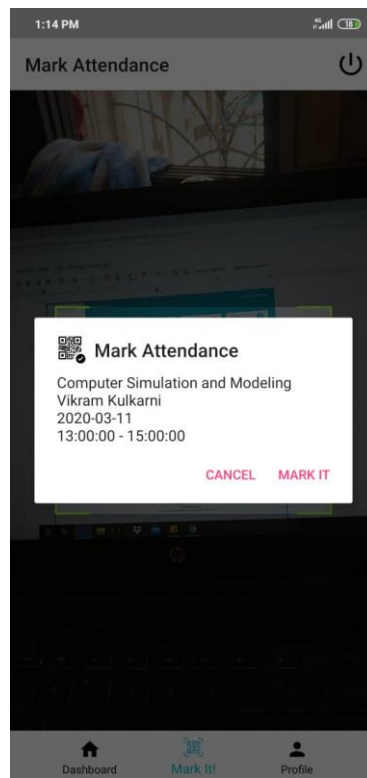
Take Attendance tab is the most important tab where the entire attendance taking process takes place. Faculty simply selects the division and then selects the lecture for which attendance has to be taken post which the "Generate QR Code" Button has to be pressed. A large-sized QR Code is displayed which has to be scanned by the student and the relevant colour would be seen in the bottom roll number section

c. Mobile Application



Mark it!



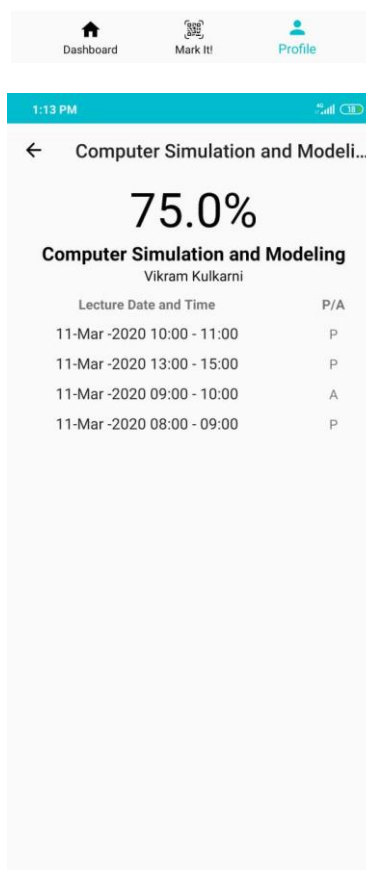
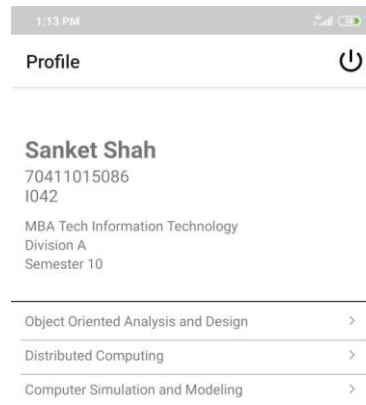


Marked Successfully!

Computer Simulation and Modeling 75.0%
Vikram Kulkarni
Lecture Attended:3
Lecture Conducted:4

[VIEW ALL ATTENDANCE](#)

Profile



Using the mobile application the student can view their attendance record and mark it by scanning the QR code for the lecture.

8. CONCLUSION

The application aims on digitizing the process of taking attendance across colleges, thus eliminating the manual process of taking attendance. This provides the university with an efficient automated alternative to expensive attendance management systems being developed and implemented. Scandence gives a much more comfortable and user friendly experience to the student as well as the faculty to conserve their time and energy thus resulting in a better experience.

The value that Scandence will add to the users is the overall structure of time value to the normal functioning of lectures and also be identified as adopters of digital technologies. The future scope of the project is enormous as to collaborating it into a learning management system and developing a complete experience for the university.

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