Technical Report: EduTrack Smart Campus Attendance Management System

This report outlines the vision, stakeholders, requirements, and information-gathering plan for the EduTrack Smart Campus Attendance Management System, based on the project case study.

1. System Vision Document

Project: EduTrack Smart Campus Attendance Management System

Purpose: The purpose of the EduTrack Smart Campus Attendance Management System is to modernize and automate the university's current attendance-taking process. It will replace the inefficient, and manual paper-based method with a faster, more reliable, and accurate digital solution.

Scope: The system will be a university-wide solution impacting all academic departments. The scope includes:

- A **Student-facing application** (mobile and web) for marking attendance via QR code scanning .
- A **Faculty-facing interface** (web and mobile) for creating and managing lecture sessions, generating QR codes, viewing attendance summaries, downloading reports, and making manual corrections for excused absences.
- **Hardware integration** to support in-classroom fingerprint verification devices as an alternative attendance method for the students can't do the attendance on the app and if any problem happened to the app.
- A **secure central database** to store all student registration data, biometric (fingerprint) data, and attendance records.
- **Backend integration** with the university's existing **Faculty Management System (FMS)** (to update attendance percentages) and the **Academic Affairs Department's systems** (for monitoring, reporting, and student performance analysis).

The system's scope begins when a teacher creates a lecture session and ends when end-of-term reports are generated for administrative review.

Goals:

- **Accuracy:** To drastically improve the accuracy of attendance records and eliminate fraudulent attendance by using validated QR codes (with location and time checks) Or fingerprint verification.

- **Efficiency:** To automate the entire attendance-taking, calculation, and reporting lifecycle, saving significant administrative time for faculty and staff.
- **Insight:** To provide the Academic Affairs department with analytical tools to identify attendance trends, improve course scheduling, and proactively support students with low attendance.
- **Accessibility:** To provide a reliable, fair, and easy-to-use system for all users (students, faculty, and administration).

2. Stakeholder Identification

Based on the four-category model, the following stakeholders have been identified:

Category	Stakeholder	Aspects of Interest to Stakeholder
Internal Stakeholder	**Faculty / *Teachers***	Ease of creating sessions, reliability of the system (QR/fingerprint), ability to make manual corrections, quick access to class attendance reports.
Internal Stakeholder	**IT Services Department**	System security, database integrity, server uptime, app performance (mobile/web), maintainability, and secure data storage.
Executive Stakeholder	**Academic Affairs Department**	Accuracy of end-of-term reports, ability to identify and notify at-risk (low attendance) students, high-level attendance trends, system fairness.
Executive Stakeholder	**Faculty Management System (FMS) Admin**	Seamless and accurate data integration, automated updates to student attendance percentages, data consistency for official records.
Operational Stakeholder	**Students**	A fast, easy, and reliable way to check-in (both QR and fingerprint), confirmation that their attendance was recorded, fairness (no system errors).
External Executive	**Accreditation Bodies / Ministry of Education**	(Inferred) Verifiable and accurate records of student attendance, compliance with educational standards, and secure handling of student data (like biometrics).

3. Functional Requirements

The main functional requirements of the system are:

- **FN1:** The system shall allow authorized Faculty to create a new attendance session for a specific lecture.
- **FN2:** Upon session creation, the system shall generate a unique, time-limited QR code and a session ID.
- **FN3:** The system shall allow Students to mark attendance by scanning the QR code via the Edu-Track mobile or web app.
- **FN4:** The system shall validate the Student's identity, course registration, and physical location before accepting a QR code scan.
- **FN5:** The system shall reject attendance scans that are outside the session's time limit or physical location.
- **FN6:** The system shall allow Students to mark attendance using a registered fingerprint on classroom-equipped biometric devices.
- **FN7:** The system shall securely store Student fingerprint data , registered during the admission process.
- **FN8:** The system shall provide an interface for Faculty to view real-time attendance summaries and download reports.
- **FN9:** The system shall allow authorized Faculty to make manual corrections to attendance records (for excused absences).
- **FN10:** The system shall automatically send recorded attendance data to the Faculty Management System (FMS) to update student percentages.
- **FN11:** The system shall provide the Academic Affairs Department with access to attendance data for monitoring and analysis.
- **FN12:** The system shall automatically generate end-of-term attendance reports for all classes and students.
- **FN13:** The system shall enable the Academic Affairs Department to send warning notifications to students identified with low attendance.
- **FN14:** The system shall restrict database access to authorized IT Services and administrative staff only.

4. Requirements Elicitation Techniques

To collect comprehensive information, the following elicitation techniques will be used:

1. **Document Analysis:**
    - **Technique:** We will analyze the university's current Student Information System (SIS), which you mentioned is like 'Edugate'. We'll study how students register for courses, pay fees, and how attendance is currently viewed. We will also review the current paper attendance sheets and any official attendance policies from Academic Affairs.
    - **Justification:** This helps us understand the existing data (like student lists and course schedules) and the official rules. It ensures our new system correctly integrates with these existing processes and knows exactly what data needs to be shared with other systems, like the FMS.
2. **Interviews:**
    - **Technique:** We will conduct one-on-one structured interviews with key stakeholders from each identified group (e.g., a teacher, an IT admin, an Academic Affairs manager, and a student representative).
    - **Justification:** Interviews are essential for gathering detailed, nuanced requirements and understanding the specific pain points and high-priority needs of different stakeholders, which cannot be captured from documents alone.
3. **Questionnaires:**
    - **Technique:** We will design and distribute a digital questionnaire to a wide group of operational users (a large sample of students and faculty).
    - **Justification:** While interviews provide depth, questionnaires provide breadth. They are efficient for collecting quantitative data and general opinions from a large user base, such as preferences (QR vs. fingerprint) or common technical concerns (e.g., "what if my phone dies?").
4. **Prototyping:**
    - **Technique:** We will create low-fidelity, clickable mock-ups of the student and faculty application interfaces. These prototypes will be shown to users during interviews and focus groups.

- **Justification:** This visual approach helps users (especially non-technical ones) understand what the system will *look* like. It allows us to get concrete feedback on usability and workflow *before* development begins, saving significant time and resources on rework.

5. Interview Agendas

A. Interview Agenda: Internal Operational Stakeholder

- **Stakeholder:** Faculty Member / Teacher
- **Goal:** To understand the day to day classroom experience, frustrations with the current system, and functional requirements for the new system's workflow.

Agenda / Questions:

1. **Introduction:** Thank you for your time. We are developing a new digital attendance system and want to ensure it works for *you* in the classroom.
2. **Current Process:** Can you walk me through exactly how you take attendance right now?
    - What works well? What are your biggest frustrations?
    - How much class time does this usually take?
3. **Core Functionality:** We are planning two methods: a QR code on the screen and a fingerprint scanner.
    - How do you feel about managing a "session" and displaying a code in your class?
    - In what scenarios would you prefer one method over the other?
4. **Exceptions & Corrections:** How do you currently handle students who are late, leave early, or have an excused absence?
    - What is the *easiest* way the new system could let you make these corrections?
5. **Reporting:** What attendance information do you need to access *during* the semester?
    - What would you want to see on a dashboard (a student's overall percentage, a class's daily average)?

6. **Concerns:** What are your main concerns about this new system? (students on phones, setup time, technical failures, "what if the Wi-Fi is down?")
7. **Wrap-up:** Is there anything else we should have asked?

B. Interview Agenda: Internal Executive Stakeholder

- **Stakeholder:** Manager / Administrator from Academic Affairs
- **Goal:** To understand the high-level strategic goals, reporting needs, and policy requirements for the system.

Agenda / Questions:

1. **Introduction:** Thank you for your time. We are developing the new attendance system and need to understand its strategic importance and reporting requirements from your department's perspective.
2. **Strategic Goals:** From your point of view, what is the *single biggest problem* this new system needs to solve for the university? (accuracy, student engagement, administrative cost)
3. **Monitoring & Policy:** You are responsible for monitoring student performance.
    - Can you walk me through the current process for identifying and warning students with low attendance?
    - What is the *exact rule* that triggers a "warning"? How can the system automate this for you?
4. **Data & Reporting:** What key metrics must be included in the end-of-term reports?
    - What information do you need to *trust* the data (proof of validation)?
5. **Trend Analysis:** The system can spot trends. What kind of attendance patterns would you want to look for?
    - (Which courses have low attendance? Do morning classes have worse attendance? How does attendance affect grades?)
6. **Success Criteria:** Six months after launch, what would make you call this project a success?
7. **Wrap-up:** Are there any compliance or policy rules we must be aware of, especially regarding student data and biometrics?

6. Questionnaire

Target Audience: Operational Users (Students)

Title: Feedback on New EduTrack Attendance System

Introduction: We are developing a new digital attendance system to replace the paper sign-in sheets. Your feedback is crucial to building a system that is fair and easy to use. This anonymous survey takes about 3 minutes.

Section 1: Your Experience

1. What is your year of study? * [ ] 1st Year * [ ] 2nd Year * [ ] 3rd Year * [ ] 4th Year

2. On a scale of 1 (Very Dissatisfied) to 5 (Very Satisfied), how do you rate the *current* paper-based attendance system? * (1) - (2) - (3) - (4) - (5)

3. What are the biggest problems you face with the current paper system? (Select all that apply) * [ ] It takes too long to sign * [ ] It's easy for others to sign in for friends (unfair) * [ ] I sometimes forget to sign the sheet * [ ] My professor makes errors entering the data * [ ] Other: _____

Section 2: New System Features

4. We are proposing two new methods. Please rate your comfort level with each: * Scanning a QR code with your phone/laptop: (1-Very Uncomfortable ... 5-Very Comfortable) * Using a fingerprint scanner in the classroom: (1-Very Uncomfortable ... 5-Very Comfortable)

5. Which method would you *prefer* to use most often? * [ ] QR Code * [ ] Fingerprint * [ ] No Preference

6. What is your biggest concern about a QR code system? * [ ] I might forget my phone * [ ] My phone battery might die * [ ] Poor Wi-Fi/data connection in the lecture hall * [ ] I don't want to install another app * [ ] No concerns

7. What is your biggest concern about a fingerprint system? * [ ] Hygiene (touching a shared scanner) * [ ] Privacy (the university storing my fingerprint) * [ ] The scanner might not read my print correctly * [ ] No concerns

8. To prevent cheating, the QR system will check your location to confirm you are in the lecture hall. How do you feel about this feature? * (1) Very Negative - (2) Negative - (3) Neutral - (4) Positive - (5) Very Positive

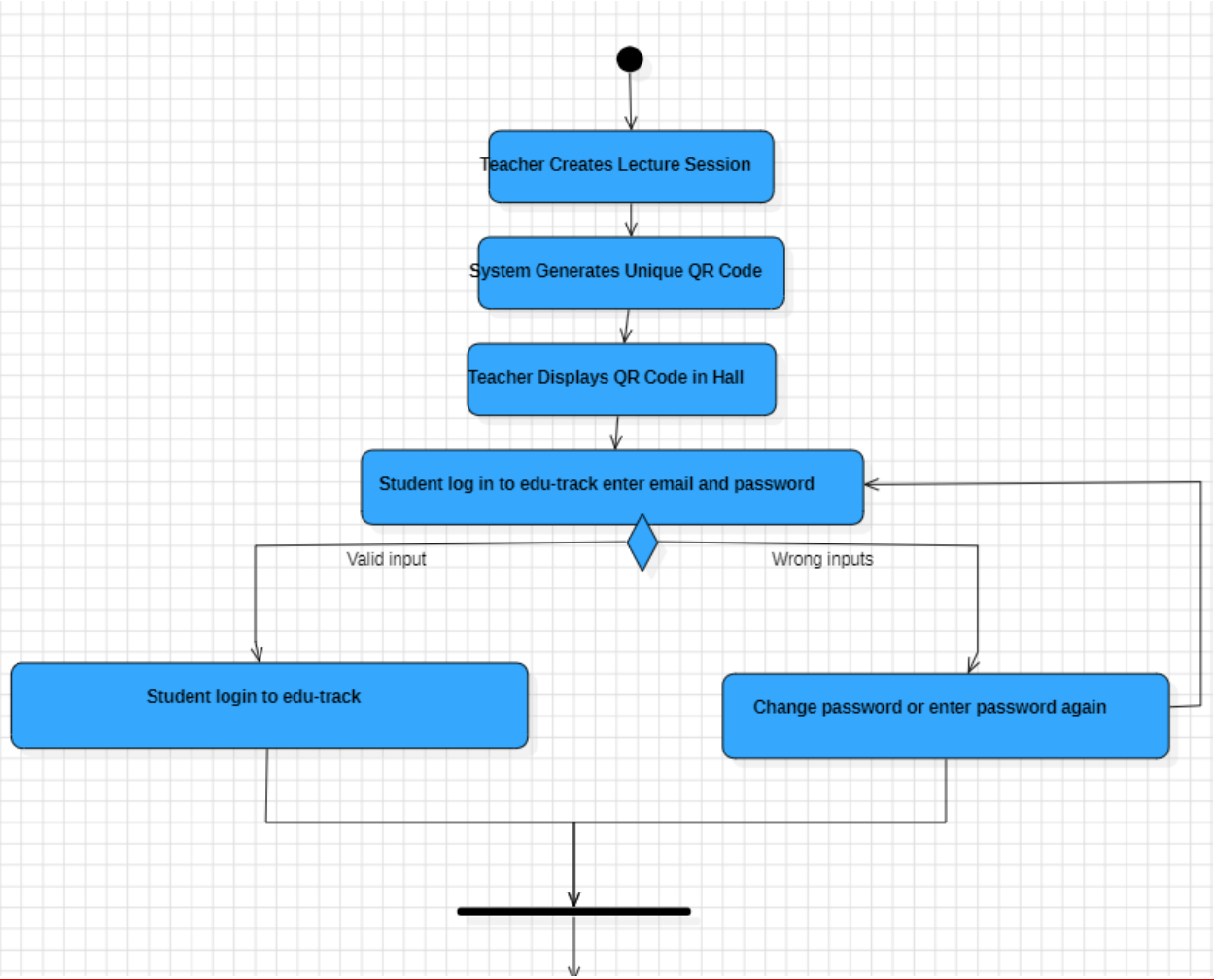
Section 3: Open Feedback

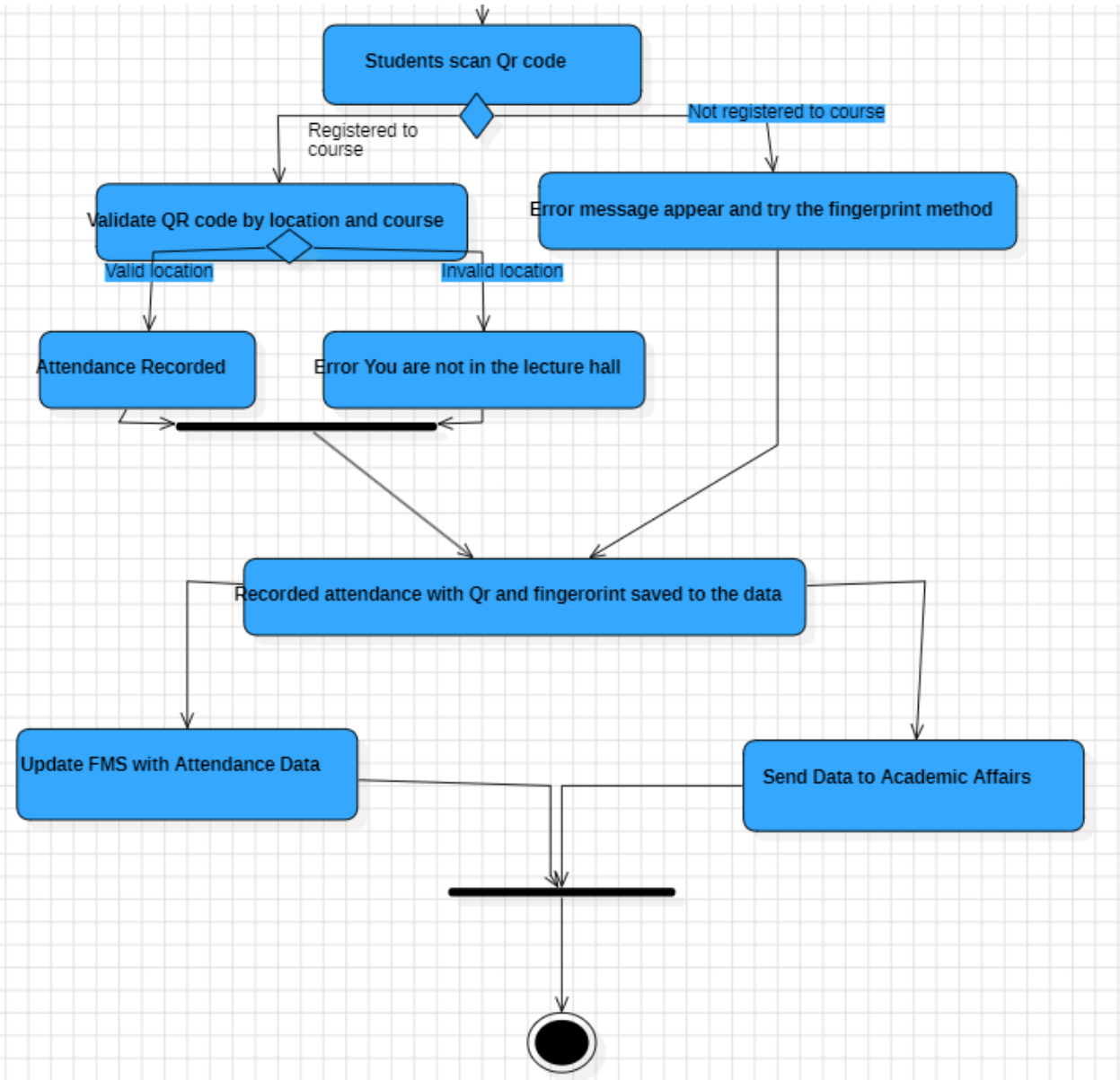
9. In your opinion, what is the *most important* feature a new attendance app must have for you as a student? * (e.g., seeing confirmation, checking your own attendance percentage, etc.) * [Short answer box]

10. Do you have any other comments or suggestions for the new system? * [Long answer box]

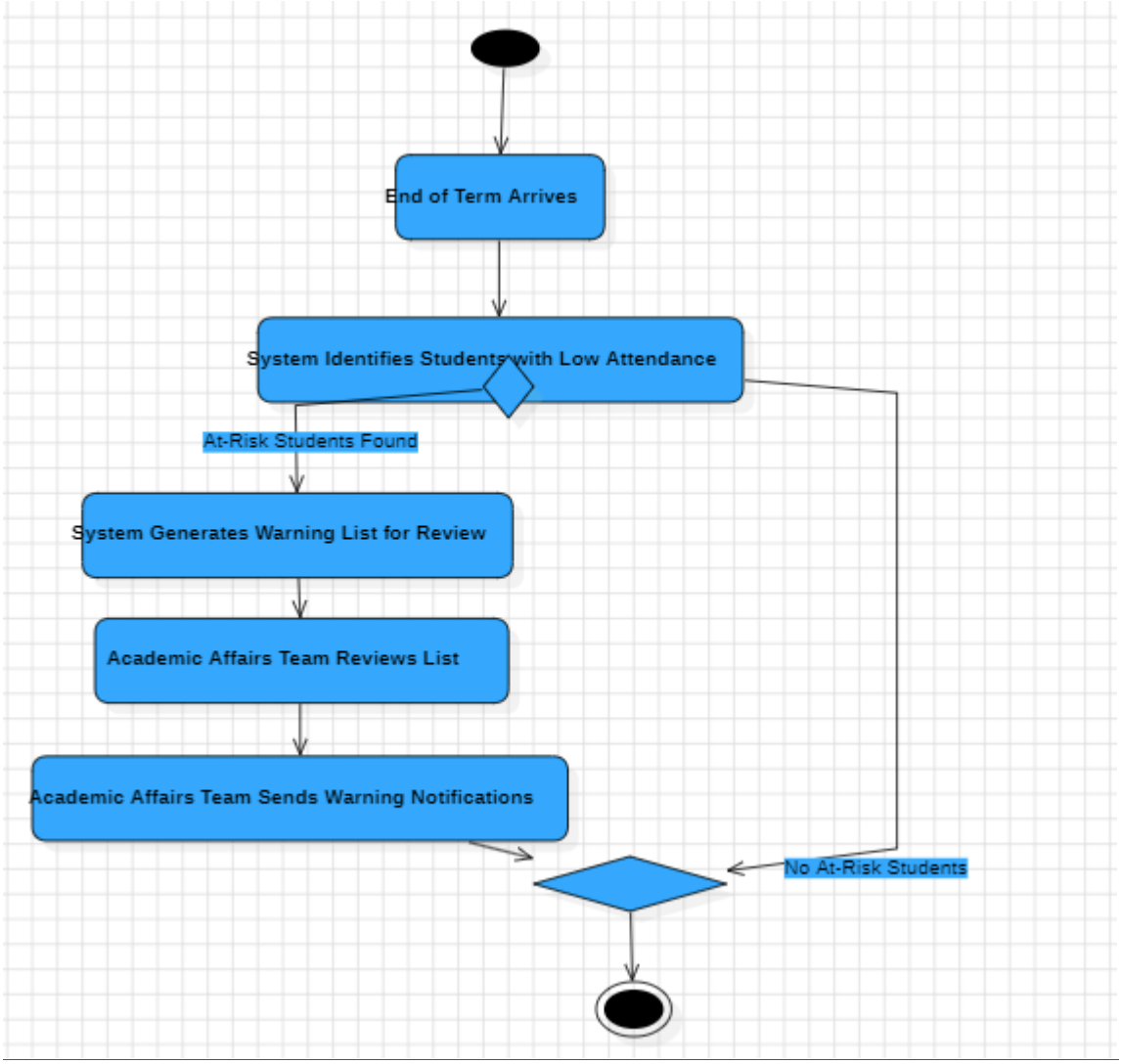
Thank you for your feedback!

7.UMl 1. The Daily Attendance Workflow



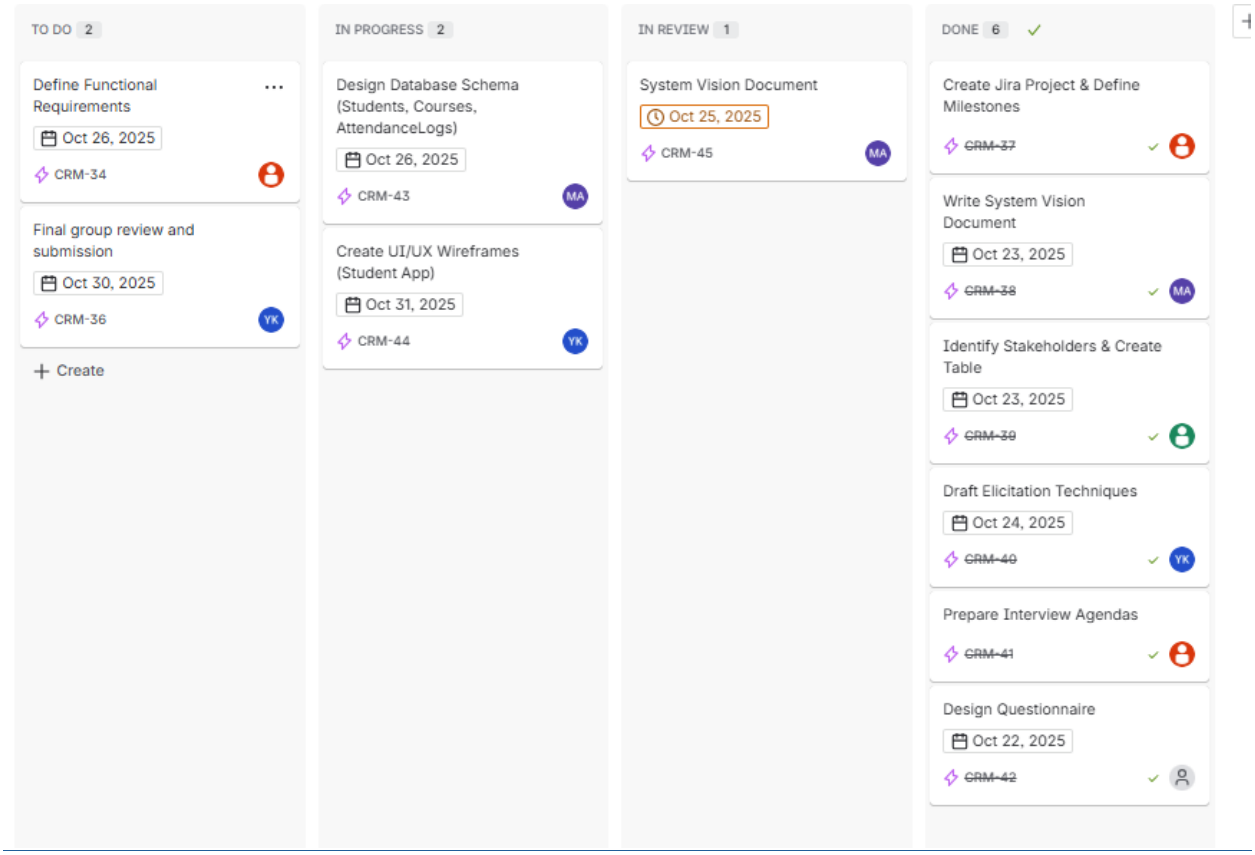

Students scan Qr code
Registered to course
Not registered to course
Validate QR code by location and course
Error message appear and try the fingerprint method
Valid location
Invalid location
Attendance Recorded
Error You are not in the lecture hall
Recorded attendance with Qr and fingerorint saved to the data
Update FMS with Attendance Data
Send Data to Academic Affairs

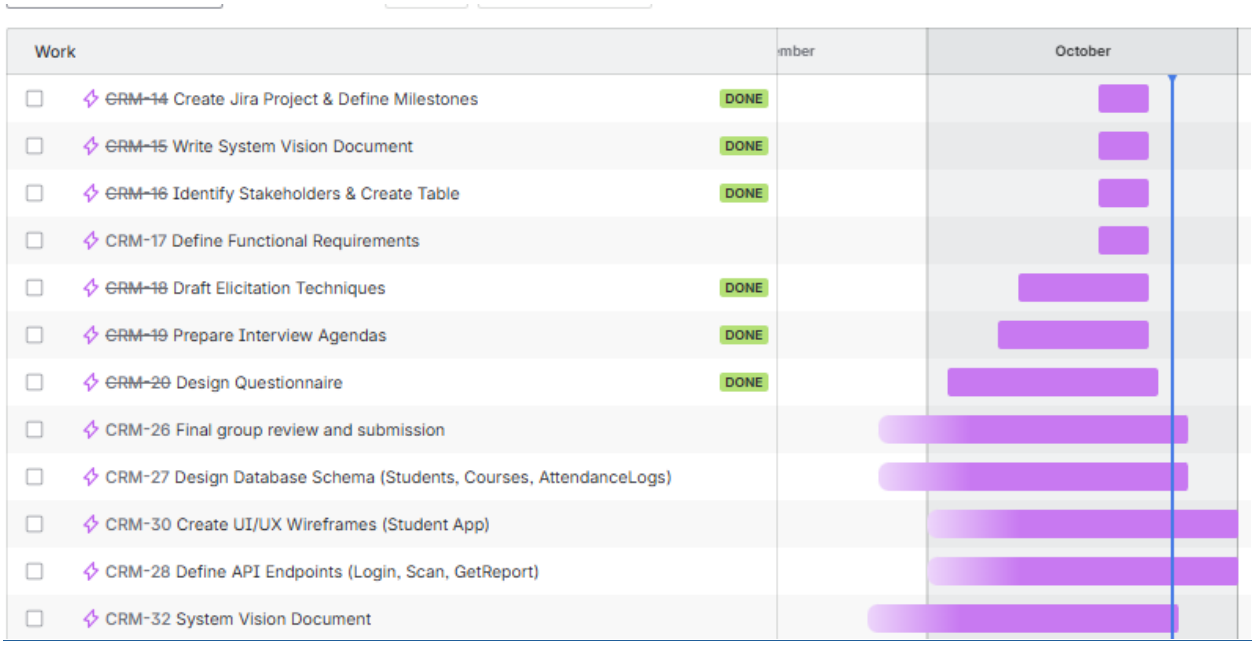
The End-of-Term Reporting & Warning Process



Jira

Type	Key	Summary	Status	Assignee	Due date	Priority
	CRM-14	Create Jira Project & Define Milestones	DONE	Mohamed Abdullah	Oct 22, 2025	Medium
	CRM-15	Write System Vision Document	DONE	Youssef Ahmed Ab...	Oct 22, 2025	Medium
	CRM-16	Identify Stakeholders & Create Table	DONE	23-101295	Oct 22, 2025	Medium
	CRM-17	Define Functional Requirements	IN REVIEW	Mohamed Abdullah	Oct 22, 2025	Medium
	CRM-18	Draft Elicitation Techniques	DONE	Mohamed Abdullah	Oct 22, 2025	Medium
	CRM-19	Prepare Interview Agendas	DONE	Ahmed Tamer Salah	Oct 22, 2025	Medium
	CRM-20	Design Questionnaire	DONE	Youssef Ahmed Ab...	Oct 23, 2025	Medium
	CRM-26	Final group review and submission	IN PROGRESS	23-101295	Oct 26, 2025	Medium
	CRM-27	Design Database Schema (Students, Courses, Attendan...	TO DO	Ahmed Tamer Salah	Oct 26, 2025	Medium
	CRM-30	Create UI/UX Wireframes (Student App)	TO DO	Mohamed Abdullah	Oct 31, 2025	Medium
	CRM-28	Define API Endpoints (Login, Scan, GetReport)	TO DO	Ahmed Tamer Salah	Oct 31, 2025	Medium
	CRM-32	System Vision Document	TO DO		Oct 25, 2025	Medium





8. ***GitHub***
   https://github.com/ahmed23-101116/edu-track