

Software Engineering Project

AI Agent for Academic Guidance

Team 24

January 2025

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Problem Statement

About our Project

- With the rapid advancement of Generative AI (GenAI), educational environments can be significantly enhanced to support students in their learning journeys.
- The goal of this project is to create an academic advice agent driven by AI that helps IITM BS Program students.
- As a virtual mentor, the AI agent will assist students in completing their assignments, developing better study techniques, and maintaining academic integrity.
- The users which are students, instructors and administrator have dedicated dashboards.
- In addition to that, there are various resources including assignments, practice exercises, videos and quizzes which thereby help the students.

Types of Users

A. Primary Users: Students

- who register for the courses, access course related materials, and have to submit their assignments.

B. Secondary Users: Instructors and Teaching Assistants

- who coordinate the projects of students as well as release the weekly assignments and weekly supplementary contents on the platform.
- also assist students with their difficulties along the duration of the courses.

C. Tertiary Users: Administrators

- having higher privileges and functionalities to handle any urgent issues and maintain the portal.
- also resolving the queries that students might face.

User Stories

Student

- Summarize lectures into bullet points
 - As a Student, I want the AI agent to summarize lectures into bullet points so that I can get a brief overview of the topic.

Instructor

- Providing Insights into Student Performance
 - As an Instructor, I want the AI agent to provide insights into student performance and common challenges so that I can tailor my teaching approach and provide targeted support.

Administrator

- Analyzing Learning Patterns
 - As an Administrator, I want the AI agent to analyze learning patterns and engagement metrics across courses to identify improvement areas and enable data-driven decisions.

Storyboards

Student Perspective

I've been struggling with a few topics in my programming course. I don't know where to start improving.

Have you tried using the new AI assistant? It suggests personalized learning strategies based on your progress.

Student Perspective

Oh, so it helps me figure out where I'm falling behind?

Exactly! It'll even recommend relevant course materials like videos and tutorials to help you understand the concepts better, without just giving you the answers.

Student Perspective

That sounds perfect! I need something that helps me learn, not just solve everything for me.

It also summarizes lectures into bullet points, so you can quickly get an overview before diving into the details.

Student Perspective

Since exams are coming up as well, and I feel overwhelmed and don't know which topics to prioritize.

The AI assistant can help with that too! It analyzes your past performance and suggests the most important topics to focus on.

Wireframes

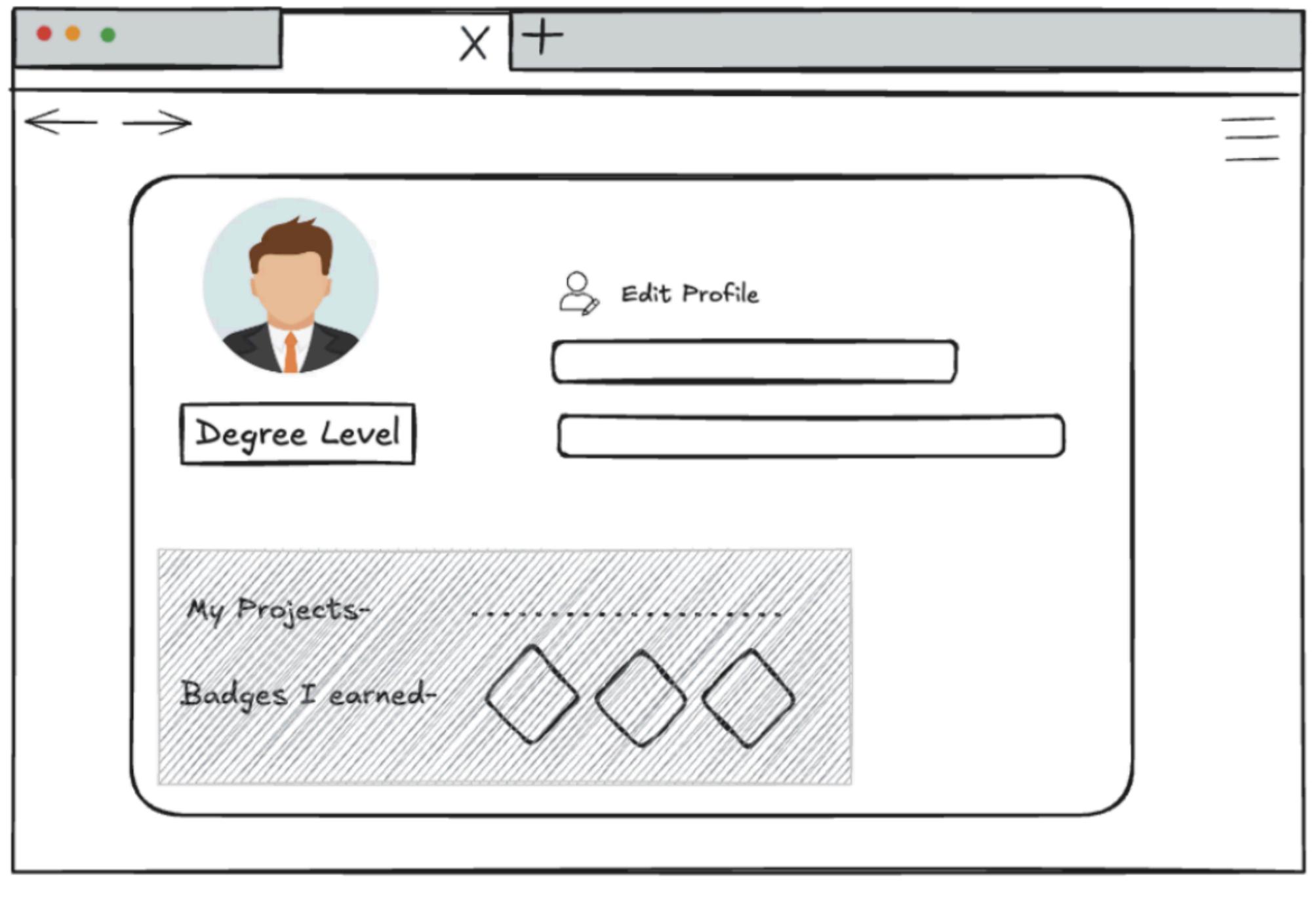
Login Page

The Login Page wireframe shows a standard browser header with window controls (red, yellow, green dots) and a search bar. Below the header is a navigation bar with a logo icon, a left arrow, a right arrow, a magnifying glass icon, and a three-line menu icon. The main content area is titled "User Login". It features a large rectangular input field containing three stacked buttons labeled "Username", "Password", and "Login". Above this input field, the text "User Login" is centered. In the top right corner of the main content area, there is a link "Login | Sign-up".

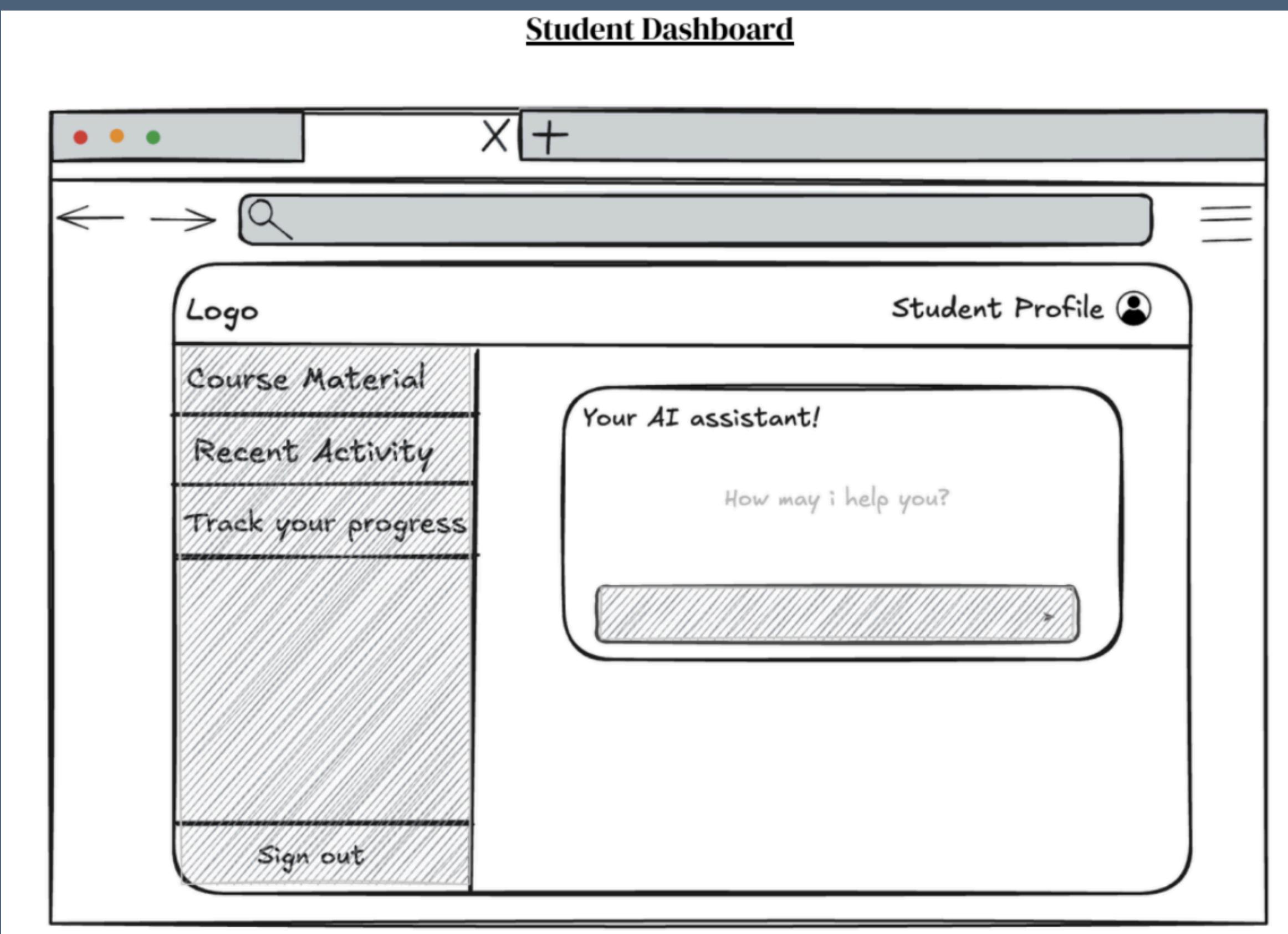
Registration Page

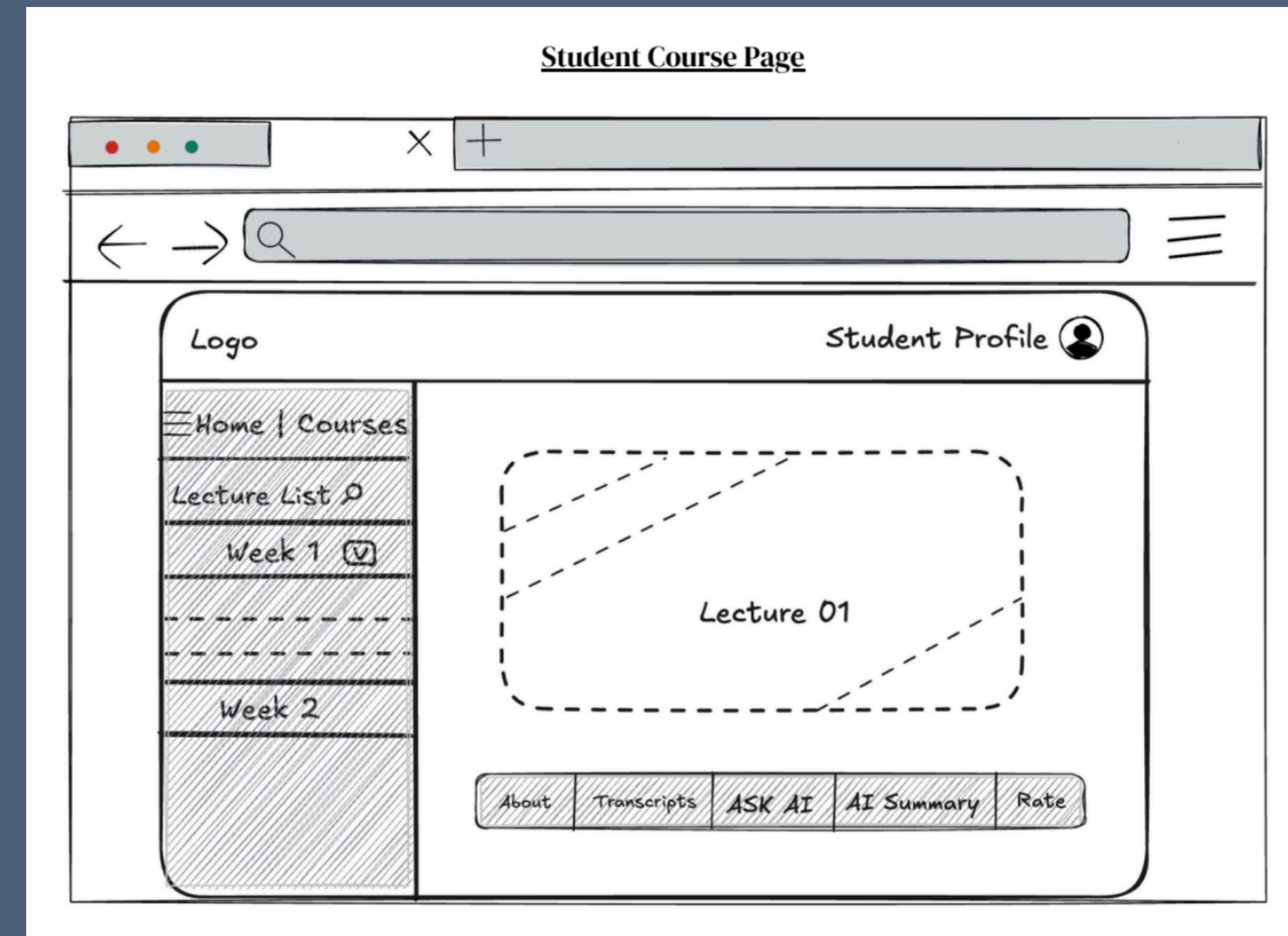
The Registration Page wireframe shows a standard browser header with window controls (red, yellow, green dots) and a search bar. Below the header is a navigation bar with a logo icon, a left arrow, a right arrow, a magnifying glass icon, and a three-line menu icon. The main content area is titled "Create an Account". It features a large rectangular input field containing four stacked buttons labeled "Username", "Password", "Role", and "Create". The "Username" field contains the placeholder "user@gmail.com". The "Password" field contains five black dots. The "Role" field has a dropdown menu with the placeholder "Select role". Below the input field are two buttons: "Create" and "Cancel". At the bottom of the page, there is a link "Already have an account? [Login here](#)". To the right of the main content area, there is a sidebar with a dashed border containing a list of roles: "Role: Student Instructor Administrator Teaching Assistant".

Student Profile



Student Dashboard





Project Management/ Project Schedule Design

Serial No.	Milestone	Sub Tasks	Sprint	Assigned To
1	Milestone 1	User Identification	1	Rushil, Prakhar
		User Stories	1	Poorvi, Soumyadeep
		With/Without Gen AI	1	Kanishka, Rajarshi
		Learner's Journey through Diagram	1	Kanishka
2	Milestone 2	Storyboards	2	Rajarshi, Soumyadeep
		Wireframes	2	Kanishka, Poorvi
3	Milestone 3	Project Scheduling and Management	3	Kanishka, Rajarshi
		System Design and Architecture	3	Rushil, Prakhar
		UI Development	3	Rushil, Prakhar, Abhinash
		Documentation	3	Poorvi, Kanishka, Rajarshi, Soumyadeep

Serial No.	Milestone	Sub Tasks	Sprint	Assigned To
4	Milestone 4	API Endpoint Development	4	Rushil, Prakhar, Abhinash
		API List and Documentation	4	Kanishka, Poorvi, Soumyadeep
		Code Implementation	4	Rushil, Rajarshi, Prakhar
5	Milestone 5	Test Case Design, Unit Testing	5	Abhinash, Prakhar
		API Testing	5	Abhinash, Rushil
		Drafting Report	5	Poorvi, Kanishka
6	Milestone 6	Code Quality and Process	6	Soumyadeep, Rushil, Prakhar
		Presentation Slides	6	Prakhar, Rajarshi, Kanishka, Poorvi
		Presentation Video	6	Rushil

Technologies Used

Tool	Usage
Python	Core Programming Language
Javascript	Programming Language
Vue.js	Javascript Framework
Flask	Web Framework for Backend API
Sqlite	Server Database
Canva	Storyboards
Excalidraw	Wireframes
Visual Studio Code	Main IDE
Pytest	Unit Testing
Swagger	API Doc, YAML File Generation
Jira	Project Management, Scheduling
Gemini AI	Chatbot Functionality

Testing

```
test_app.py U app2.py U test_ai_app.py U test_ai.txt U X change_by_abhi.txt U
genAI > test_ai.txt
1 ===== test session starts =====
2 platform linux -- Python 3.10.12, pytest-8.3.5, pluggy-1.5.0 -- /home/abhi/team24/.venv/bin/python3
3 cachedir: .pytest_cache
4 rootdir: /home/abhi/team24/genAI
5 plugins: langsmith-0.3.18, anyio-4.9.0
6 collecting ... collected 9 items
7
8 test_ai_app.py::test_load_pdf_valid PASSED [ 11%]
9 test_ai_app.py::test_load_pdf_invalid_path PASSED [ 22%]
10 test_ai_app.py::test_create_faiss_index_create_new PASSED [ 33%]
11 test_ai_app.py::test_create_faiss_index_load_existing PASSED [ 44%]
12 test_ai_app.py::test_create_faiss_index_with_empty_text PASSED [ 55%]
13 test_ai_app.py::test_generate_prompt_basic PASSED [ 66%]
14 test_ai_app.py::test_generate_prompt_empty PASSED [ 77%]
15 test_ai_app.py::test_generate_prompt_special_chars PASSED [ 88%]
16 test_ai_app.py::test_chat_with_ai PASSED [100%]
17
```

```
backend > test_report.doc
14  test_app.py::test_user_notfound PASSED [ 18%]
15  test_app.py::test_update_password PASSED [ 21%]
16  test_app.py::test_get_courselist PASSED [ 23%]
17  test_app.py::test_get_course_not_found PASSED [ 26%]
18  test_app.py::test_get_course_success PASSED [ 28%]
19  test_app.py::test_create_course PASSED [ 31%]
20  test_app.py::test_update_course PASSED [ 34%]
21  test_app.py::test_delete_course PASSED [ 36%]
22  test_app.py::test_get_assignmentslist PASSED [ 39%]
23  test_app.py::test_get_assignment_by_ID PASSED [ 42%]
24  test_app.py::test_get_assignment_not_found PASSED [ 44%]
25  test_app.py::test_create_assignment PASSED [ 47%]
26  test_app.py::test_update_assignment PASSED [ 50%]
27  test_app.py::test_delete_assignment PASSED [ 52%]
28  test_app.py::test_create_questions PASSED [ 55%]
29  test_app.py::test_update_questions PASSED [ 57%]
30  test_app.py::test_get_student_details PASSED [ 60%]
31  test_app.py::test_get_student_not_found PASSED [ 63%]
32  test_app.py::test_get_student_by_course PASSED | [ 65%]
33  test_app.py::test_get_instructor_list PASSED [ 68%]
34  test_app.py::test_get_instructor_details_by_ID PASSED [ 71%]
35  test_app.py::test_get_instructor_not_found PASSED [ 73%]
36  test_app.py::test_get_course_by_student PASSED [ 76%]
37  test_app.py::test_get_course_by_instructor PASSED [ 78%]
38  test_app.py::test_get_questions_by_assignment PASSED [ 81%]
39  test_app.py::test_get_submission_by_course PASSED [ 84%]
40  test_app.py::test_get_submission_by_courseweek PASSED [ 86%]
41  test_app.py::test_get_video_by_course PASSED [ 89%]
42  test_app.py::test_get_videos_by_courseweek PASSED [ 92%]
43  test_app.py::test_get_videos_by_ID PASSED [ 94%]
44  test_app.py::test_get_assignment_by_course PASSED [ 97%]
45  test_app.py::test_get_assignment_by_courseweek PASSED [100%]

46
47 ===== 38 passed in 1.59s =====
48
```



Thank You!