Classync - Virtual Classroom Platform

Sprint 1 Report

Group - 33

Course: Software Engineering

Professor: Prof. Saurabh Tiwari

Mentor: Shyam Patel

Team Members:

Role	Name (ID)
Team Leader	ATIK VOHRA - 202301447
Member	KANANI TANUJ - 202301474
Member	SANAGADHIYA RADHIKA - 202301184
Member	PATEL JAY - 202301430
Member	CHOVATIYA AYUSH - 202301461
Member	OM PATEL - 202301163
Member	BADRESIYA ANSH - 202301477
Member	PREM KUKADIYA - 202301452
Member	RAMOLIYA SHUBHAM - 202301442
Member	GAJERA MANTHAN - 202301488

Contents

1. Overview / Summary

1.1 Authentication System(Auth)

Sprint 1 focused on implementing a comprehensive and secure authentication system for the Virtual Classroom Platform. The authentication module serves as the foundation for user management, enabling role-based access control (Student/Instructor), email verification, and secure password management using Firebase Authentication and MongoDB integration.

1.2 AI-Bubble Assistant (AI-Bubble)

The Objective of this part of the sprint is to Implement the quick AI-chat assistant for quick doubt solving using langchain framework.During this time, we focused on developing a good AI-Assistant that quickly responds to your questions and also rejects irrelevant questions which are not related to the field of education. We use the langchain framework for doing the same.

Duration

15 Sep – 22 Sep

2.   User Stories Covered

2.1   User Stories - Auth

US-AUTH-01: User Registration

Front Card

As a new user, I want to create an account with email and password, so that I can access the virtual classroom platform.

Back Card

success
- The user successfully created a new account and is logged in.
- The user is redirected to the platform's dashboard or welcome page.
- For Instructor role, verification password is written and User is now logged in as instructor
- Email is Verified & Account is created in Firebase and MongoDB

Failure
- Email already exists → "Email already in use" error shown
- Password too weak → "Password must be 6+ characters" error
- Invalid instructor password → "Invalid verification password" error
- Network offline → "You are offline" warning displayed

US-AUTH-02: User Login

Front Card

As a registered user, I want to log in with my email and password, so that I can access my personalized dashboard.

Back Card

Success
- User enters email and password
- System validates credentials against Firebase
- Verified users are logged in successfully
- Unverified users are prompted to verify email first
- Correct role-based dashboard displayed

Failure
- Wrong password → "Incorrect password" error
- User not found → "Email not registered" error
- Email not verified → Verification prompt shown
- Network error → "Check internet connection" message

US-AUTH-03: Password Reset

Front Card

As a user who forgot their password, I want to reset my password via email, so that I can regain access to my account.

Back Card

Success
- Reset email sent within 30 seconds
- Reset link is valid and functional
- New password works for login
- Success confirmation displayed

Failure
- Email not registered → "Email not found" message
- Invalid email format → "Invalid email" error
- SMTP failure → "Unable to send email" error
- Link expired → User can request new reset link

US-AUTH-04: Username update

Front Card

As a new user, I want to change my username accordingly, so that I can identify myself.

Back Card

Success
- Change username dialog loads .

Failure
- Username not changed on all the cards .

US-AUTH-05: Role-Based Access Control

Front Card

As an instructor, I want to register with instructor role verification, so that I can access instructor-specific features.

Back Card

Success
- Instructor option available in registration
- Correct password grants instructor role
- Instructor sees Admin Dashboard in navigation

Failure
- Wrong verification password → "Invalid instructor password" error
- Role not saved → Defaults to student role
- Unauthorized access attempt → Redirected to student view

US-AUTH-06: Logout

Front Card

As a logged-in user, I want to securely log out of my account, so that my account remains secure on shared devices.

Back Card

Success
- Logout button visible in navigation
- User redirected to default homepage
- All user data cleared from state

Failure
- Logout fails → Error message shown, retry option provided
- Partial logout → Force clear local storage and redirect

2.2 User Stories - AI Bubble

US-AI-01: Quick helping AI-Assistant

Front Card

As a user if I get a small doubt, I want an AI-Assistant which provides me with a solution to my doubt quickly in easy to understand fashion.

Back Card

success
- The response from the AI-Assistant is quick and relevant.

Failure
- The AI-Assistant is unable to help offline.
- The AI-Assistant is unable to help if the server is down.

US-AI-02: Respond only to Education specific questions

Front Card

As a user(guardian) i want my AI-Assistant to provide students the response to only useful questions.

Back Card

success
- The AI-Assistant responds to questions related to educational fields only.

Failure
- The AI-Assistant sometimes rejects questions of general knowledge and modern welfare.

# 3.   Proof of Concept (POC)

3.1   Auth Flow

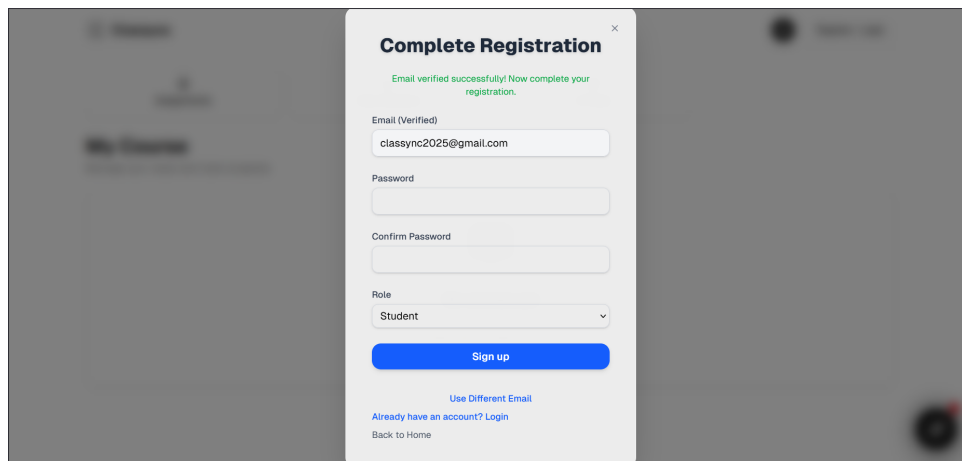This section provides a visual overview of the authentication flow.

- **1. Email Verification Screen:** Email input field with validation. "Verify Email" button to initiate verification process. Links to login page and back to home.
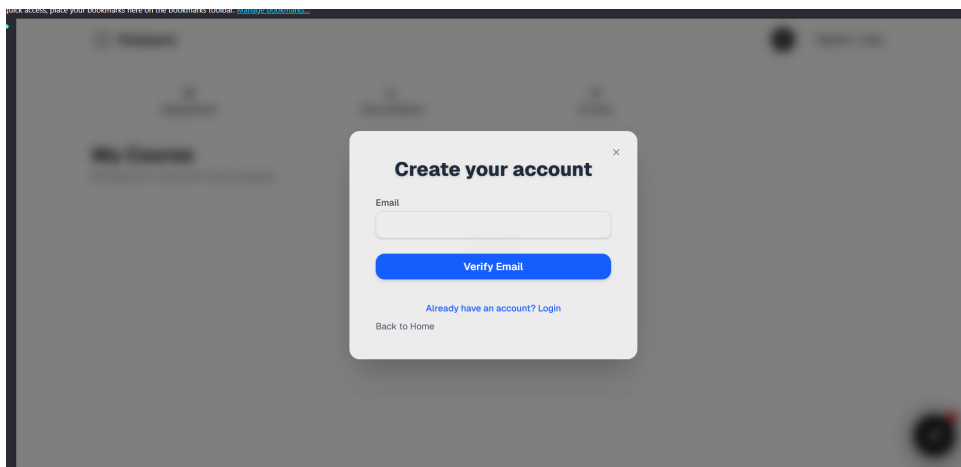
- **2. Email Verification Screen:** Confirmation message showing email sent. Clear instructions for users to check inbox.
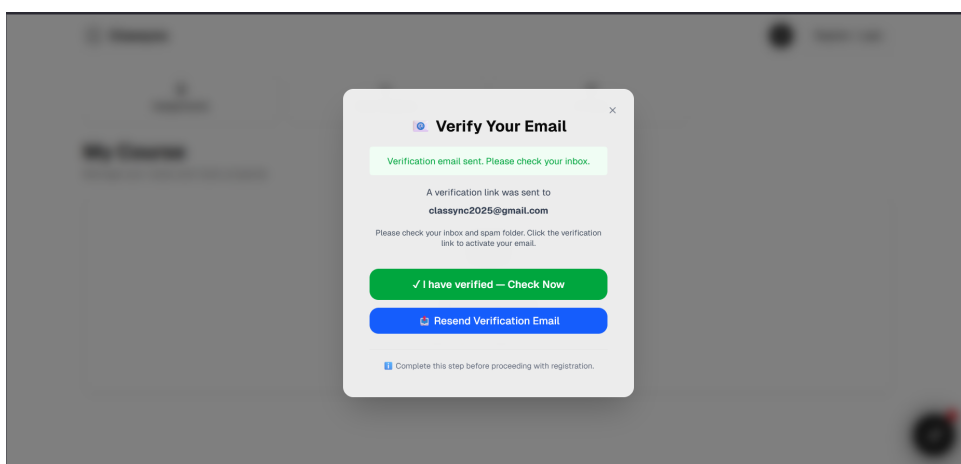
- **3. Complete Registration Form:** Instructor verification password field (conditional). Professional form validation with error messages.

- **4. Login Interface:** "Sign In" button with loading states. "Forgot Password?" link.
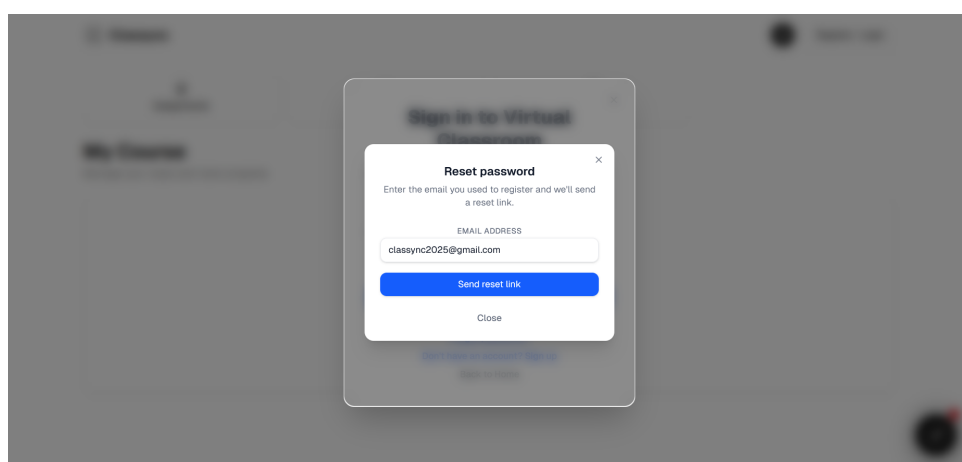
- **5. Reset password:** Email input field. "Send reset link" button. Success/error message display.

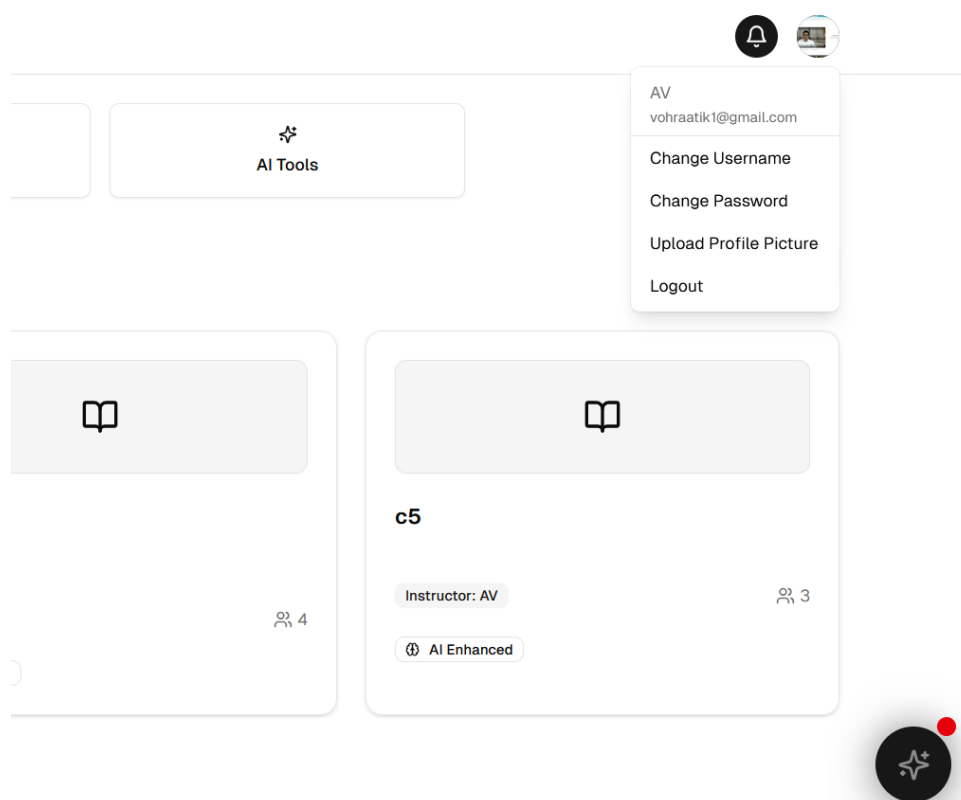- **6. Verification Success Page:** Success checkmark icon. "Email verified successfully! Redirecting..." message. Auto-redirect countdown.
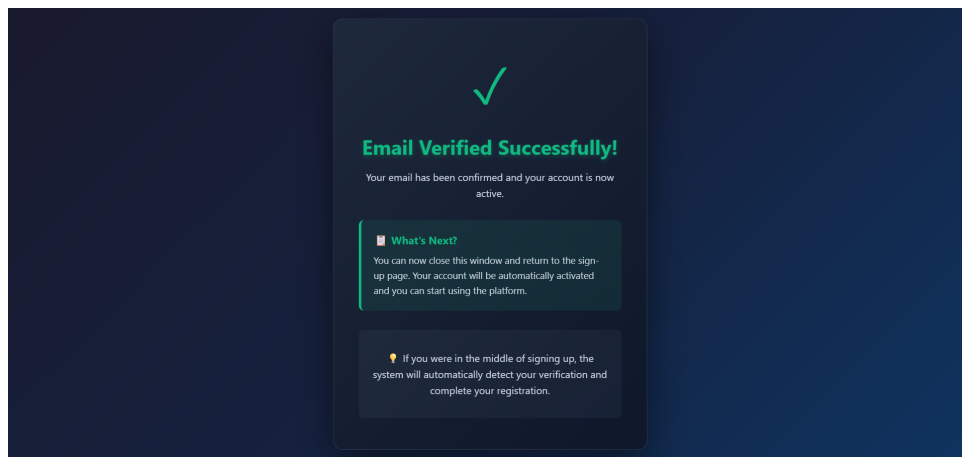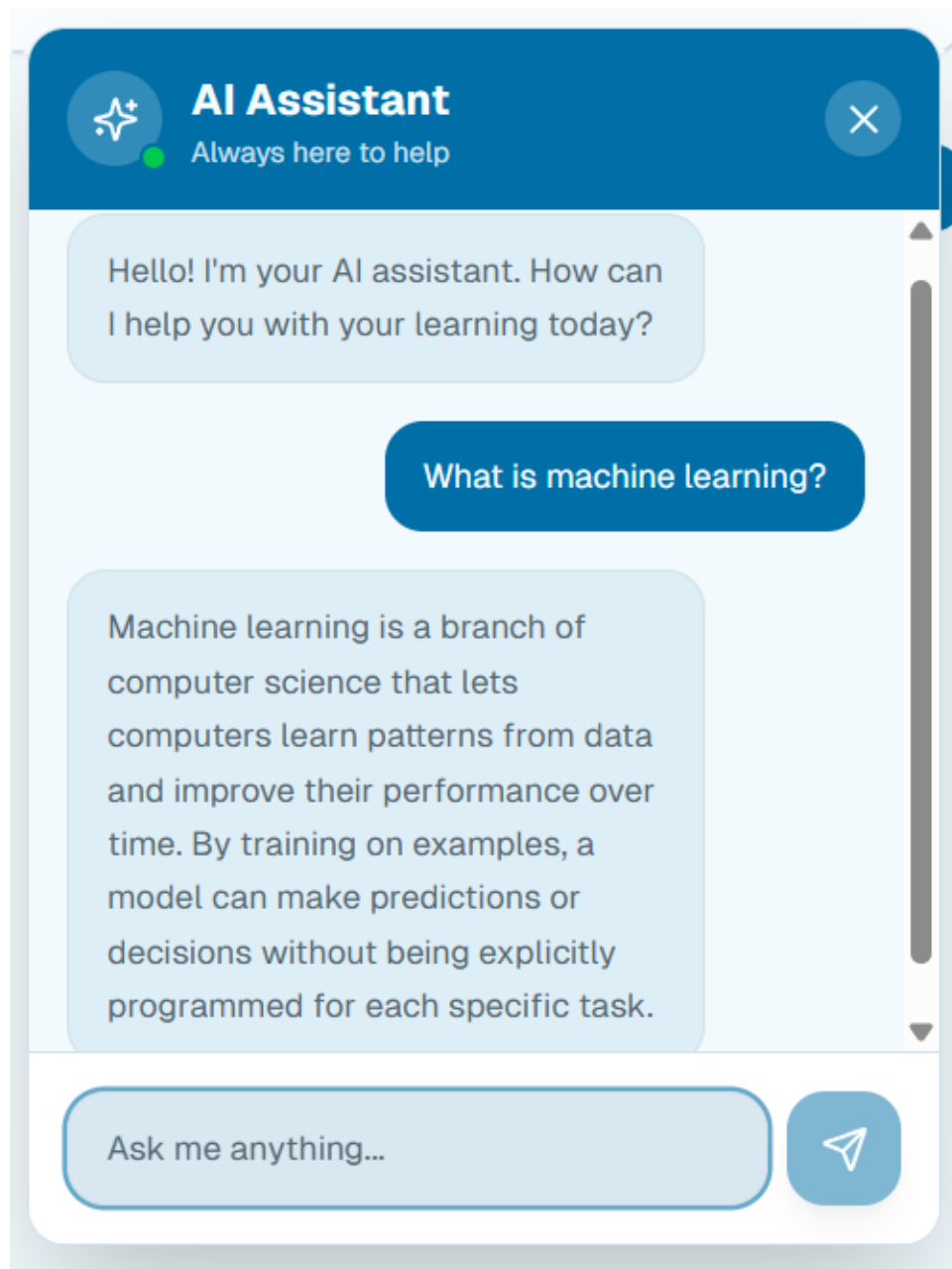
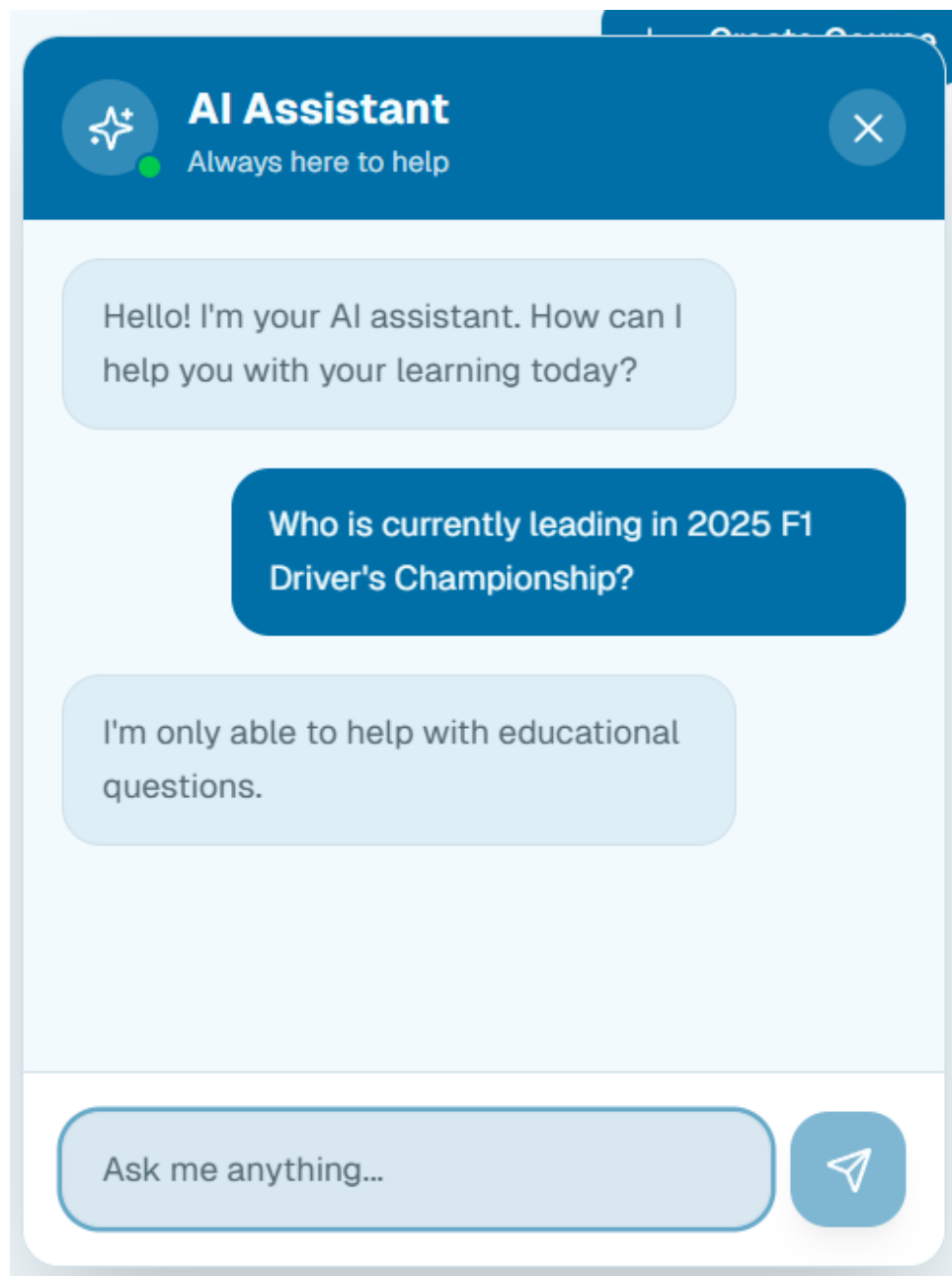- **7. Logout:** (Showing logout button in user dropdown).

3.2   AI-Flow

This section provides a visual overview of the AI user flow.

- **1. AI Chat window:** On clicking Ai bubble opens this Chat window as shown in the figure.

- **2. AI-Assistant's response: :** Ai Assistane providing valid answer to user's prompt(only educational answers are provided)

4. Sprint Review

4.1 What We Achieved

4.1.1 In Auth part

- Advanced multi-step email verification system

- Custom SMTP email integration (beyond default Firebase)

- Offline detection and error handling

- Persistent session management with Firebase Auth state

- Conditional instructor verification password

- Email verification enforcement during login

- Resend verification email

- Auto-redirect after successful verification

4.1.2 In AI part

- An AI-Assistant that quickly responds to your any doubts but the doubt must be in the domain of the educational field.

4.2 Challenges

4.2.1 In Auth Part

Challenge 1: Email Verification Integration Issue: Firebase's default email verification didn't meet requirements as it is considered spam so disregarded by firewalls.

> **Solution:** Implemented custom SMTP server using Nodemailer with branded email templates.

> **Learning:** Gained experience with email service configuration and HTML email design.

Challenge 2: Verification State Management Issue: Users bypassing email verification during registration.

Solution: Created multi-step registration flow with verification enforcement.

Learning: Improved understanding of React state management and form flows.

Challenge 3: Offline Handling Issue: Poor UX when users lost internet connection during registration.

Solution: Added online/offline detection with clear user messaging.

4.2.2   In AI Part

Challenge 1: Lengthy Responses Issue: The AI is initially responding in a too lengthy way and also giving some irrelevant solutions. **Solution:**

- Implemented stricter response-length control using system-level prompts and output constraints.
- Added a relevance-filtering layer to ensure answers remain focused on the user's query.
- Tuned model parameters and prompt-engineering rules to encourage concise and streamlined explanations.

Learning:

- Fine-tuning response behaviour requires clear, explicit instructions and iterative testing.
- Small prompt adjustments can significantly influence the AI's communication style.
- Maintaining relevance depends on providing the right level of context without overloading the model.

Challenge 2: Responding to Irrelevant questions: Issue: The AI initially is responding to irrelevant questions which are not even related to any field of research.

Solution:

- Implemented domain-based filtering to detect and decline irrelevant or out-of-scope queries.
- Added guardrails that redirect users toward study-related topics when unrelated questions are asked.
- Introduced validation checks to ensure each prompt aligns with the assistant's intended purpose of academic support.

Learning:

- Guardrails are essential to keep the AI assistant focused on its primary purpose.

- Clear boundaries help the model recognize which queries to answer and which to gracefully reject.

- Contextual filtering is necessary to maintain alignment with the academic workflow.

5. Conclusion

Sprint 1 successfully delivered a production-ready authentication system that exceeds initial requirements. The implementation provides:

- **Security:** Multi-factor verification, secure password storage via Firebase, role-based access control.

- **User Experience:** Intuitive multi-step flows, clear error messages, responsive design, offline detection.

- **Scalability:** MongoDB integration for extensible user profiles, modular component architecture.

- **Reliability:** Comprehensive error handling, email verification enforcement, session persistence.

- **Maintainability:** Clean code structure, reusable components, well-documented API routes.

Sprint 1 successfully delivered a production-ready AI Assistant designed to quickly resolve study-related doubts without requiring learners to switch tabs. The implementation provides:

- **Efficiency:** Instant doubt-solving directly within the study interface, reducing context switching and improving focus.

- **Intelligence:** Context-aware responses, accurate explanations, and support for a wide range of academic topics.

- **User Experience:** Seamless in-app integration, minimal UI friction, and smooth interaction through a clean and responsive design.

- **Scalability:** Modular architecture enabling integration of new features, subject domains, and advanced AI models in future sprints.

- **Reliability:** Consistent response handling, fallback mechanisms for unclear queries, and stable performance across devices.

- **Maintainability:** Well-structured codebase, reusable components, and documented workflows for easy extension and debugging.