**JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY**

**SEC- 62, NOIDA**

**MINOR PROJECT-2(15B19CI691) REPORT**


# TITLE OF PROJECT:

## *Genius Gateway- Student Portal*

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# 1 PROBLEM STATEMENT

In today's digital world, students use multiple apps for online classes, chatting with teachers and friends, solving academic problems, and seeking AI-powered assistance. However, constantly switching between different platforms creates inefficiencies and distractions, reducing student engagement and focus. Social media and entertainment apps often divert students' attention, making it difficult to concentrate on their studies.

Additionally, existing learning platforms are fragmented—students need separate applications for video conferencing, messaging, and AI-driven academic support. This scattered approach disrupts the learning process, making it harder for students to stay involved, collaborate effectively, and access the right tools when needed. A more streamlined and engaging solution is required to help students stay focused and actively participate in their studies without unnecessary distractions.

# 2 SOLUTION

To enhance student involvement and create a more structured learning experience, we have proposed a solution **Genius Gateway**, an all-in-one student application designed to integrate essential academic tools within a single platform. By consolidating these features, the application keeps students engaged, improves collaboration, and minimizes distractions.

**Key Features:**

1. **Online Meetings** – Helping students and teachers connect through high-quality video calls using **Stream IO**.

2. **Chat System** – Allowing students to talk to their friends and teachers in a focused, distraction-free environment.

3. **AI Calculator with Whiteboard** – Using **Gemini AI** to understand handwritten questions and provide quick solutions.

4. **LLM-Based RAG System** – Helping students upload academic questions and get AI-generated answers from relevant resources.

Hence this project aims to enhance the overall digital education experience.

## Technology Used

- **Frontend Technologies:**
  - **Next.js** – Framework for server-side rendering and static site generation.
  - **React.js** – UI library for building interactive user interfaces.
  - **Tailwind CSS** – Styling framework for responsive design.
  - **Clerk Authentication** – User authentication and authorization.
- **Backend Technologies:**
  - **Node.js** – Server-side runtime environment.
  - **Express.js** – Backend framework for handling API requests.
  - **Firebase** – Database for real-time chat and user authentication.
  - **Stream.io** – Video conferencing and chat API for online meetings.
  - **Gemini AI API** – AI-powered calculations and handwritten question recognition.
  - **Groq AI & Ollama 3** – AI models for enhanced academic assistance.
- **AI & Machine Learning:**
  - **Python** – Used for AI-based tools and models.
  - **LLM-Based RAG System** – Retrieval-augmented generation for answering academic questions.

- **PDF Summarization** – NLP techniques for summarizing academic documents.

**Deployment & DevOps:**

- **Vercel** – Hosting Next.js frontend.
- **Railway** – Hosting python Backend
- **Firebase Hosting** – Backend and storage solutions.
- **Git & GitHub** – Version control and collaboration.

**Running Environment:**

- **IDE** – Visual Studio Code (VS Code) for development.
- **Operating System** – Windows 10/11 or macOS.

## Libraries:

- **Axios** – HTTP client for API requests.
- **CORS** – Handling cross-origin resource sharing.
- **Base64** – Encoding and decoding images/files.
- **Generative Active Hooks** – AI-driven UI behavior and interactions.
- **Swatches** – Color picker and palette generation.
- **Draggable** – Implementing drag-and-drop functionality.
- **PDF Libraries** – Includes pdf.js, PyMuPDF (fitz) , and pypdf for reading, parsing, and analyzing PDFs.

## Functional Requirements

**1 User Authentication & Management -** Secure login and registration system using Clerk Authentication with Firebase integration for user management.

**2 Online Meetings - High**-quality video conferencing powered by Stream.io, allowing scheduling, screen sharing, and real-time chat.

**3 Chat System -** Real-time messaging platform for students and teachers with support for group and private chats, message history, and file sharing.

**4 AI-Powered Calculator with Whiteboard -** Gemini AI-powered calculator that recognizes handwritten questions, provides step-by-step solutions, and features an interactive whiteboard.

**5 AI-Powered Academic Assistance -** LLM-based Retrieval-Augmented Generation (RAG) system for AI-generated answers to academic queries and PDF summarization using Groq AI & Ollama 3.

## Non Functional Requirements

1. **Performance** - The system must provide fast response times, ensuring AI calculations, chat, and video calls are processed with minimal latency.

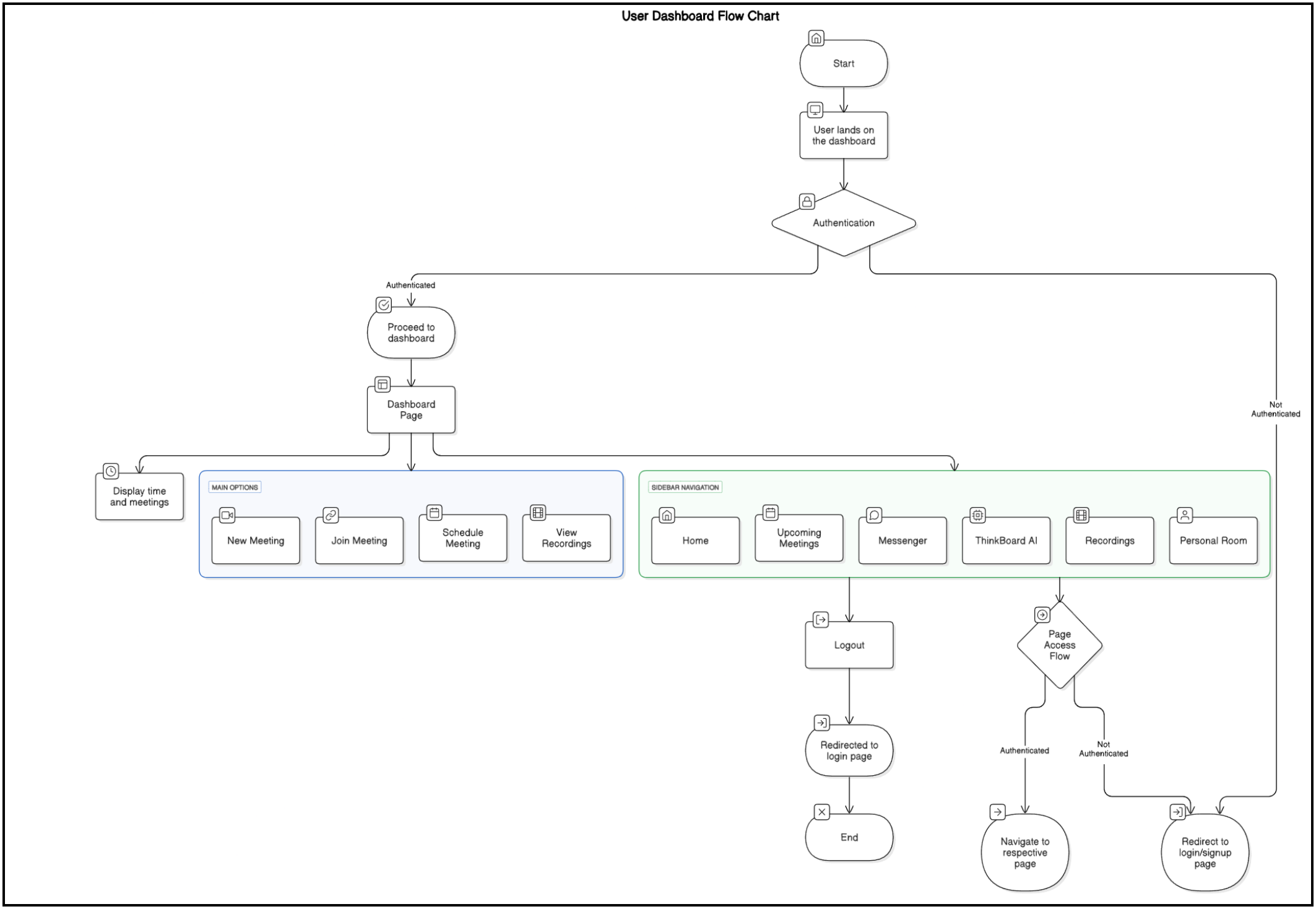
2. **Scalability** - The platform supports a growing number of users and handle increased loads efficiently.

3. **Security** - User authentication, data encryption, and secure API access should be implemented to protect sensitive information from unauthorized access.

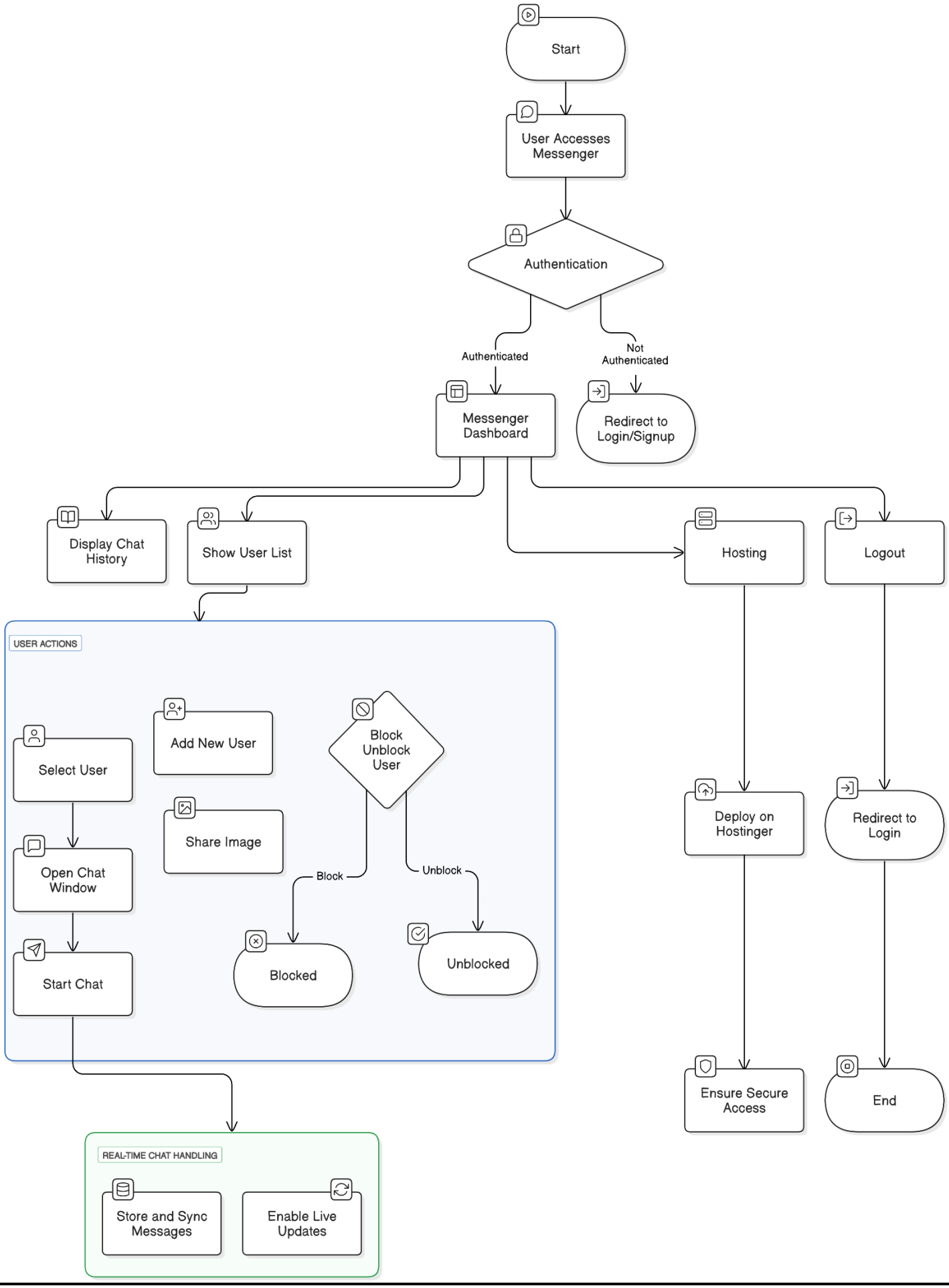
4. **Reliability** - The system must maintain a high uptime percentage, ensuring continuous availability for online meetings, chat, and AI-powered tools.

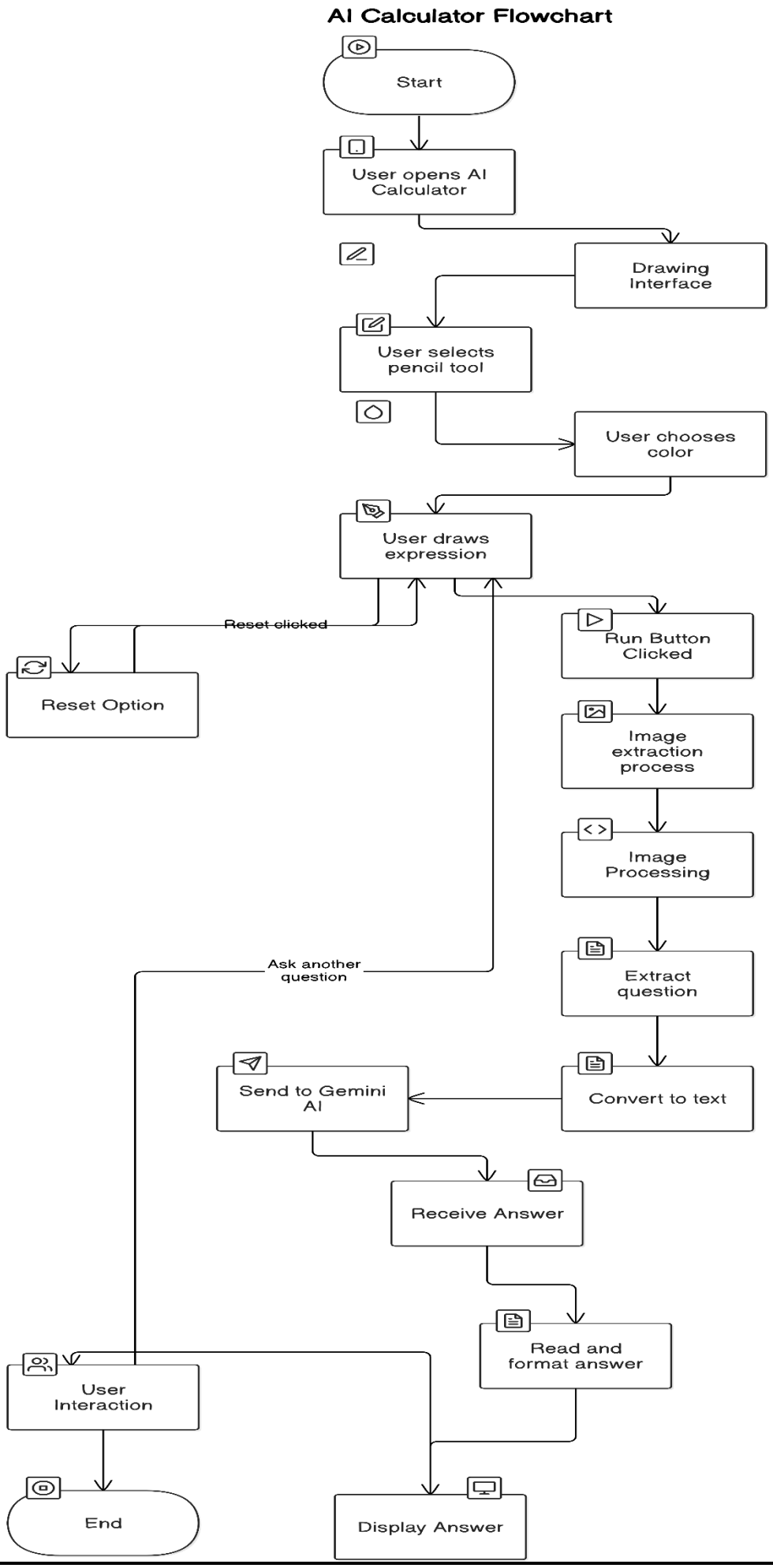
5. **Usability** - The interface should be intuitive, easy to navigate, and accessible to users with varying levels of technical expertise.

# User Dashboard Flow Chart

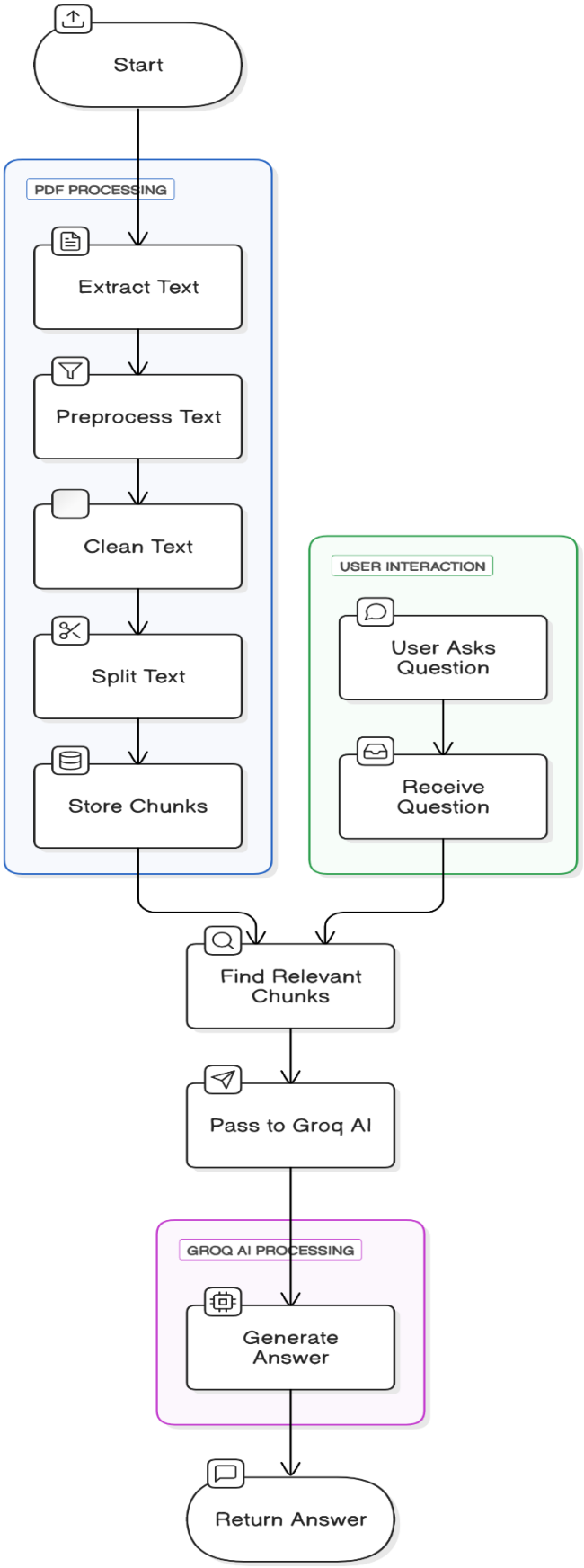


# Real-Time Messenger Flowchart




AI Calculator Flowchart
Start
User opens AI Calculator
Drawing Interface
User selects pencil tool
User chooses color
User draws expression
Reset clicked
Reset Option
Run Button Clicked
Image extraction process
Image Processing
Extract question
Ask another question
Send to Gemini AI
Convert to text
Receive Answer
Read and format answer
User Interaction
End
Display Answer

# LLM Flowchart



# 4 UNIQUENESS OF THE PROJECT

- **Genius Gateway** stands out from traditional educational apps by providing a **comprehensive, all-in-one learning platform** that integrates essential academic tools into a single, distraction-free environment.

- **A Unified Academic Hub** – Most educational apps focus on either online meetings, chat, or AI assistance separately. **Genius Gateway** brings all these features together, eliminating the need for multiple apps and keeping students focused.

- **Distraction-Free Chat System** – Unlike social messaging apps that lead to distractions, our chat feature is designed **exclusively for academic discussions**, ensuring that students remain engaged in their studies without external interruptions.

- **LLM-Based RAG System for Academic Support** – Instead of generic AI answers, our Retrieval-Augmented Generation (RAG) system provides students with context-aware, subject-specific responses, ensuring accurate and relevant academic assistance.

- **Optimized Online Meeting Experience** – Unlike apps that rely on traditional WebRTC, **Genius Gateway uses Stream IO**, ensuring a **smoother, lag-free online class experience** with enhanced performance.

By integrating these unique features into a single, easy-to-use application, Genius Gateway creates a focused, productive, and highly engaging learning environment, setting it apart from conventional education tools.

# 5 CONCLUSION

The Genius Gateway project is a comprehensive, all-in-one academic platform designed to enhance student engagement, minimize distractions, and streamline digital learning. By integrating online meetings, structured academic chat, an AI-powered whiteboard calculator, and an intelligent LLM-based RAG system, this platform provides a seamless and interactive learning experience tailored specifically for students.

This project redefines digital education by fostering a structured, engaging, and highly productive learning space that empowers students to stay focused, communicate effectively, and excel academically. Genius Gateway is not just a tool—it is a smarter way to learn, collaborate, and succeed in today's digital world.

# 6 FUTURE SCOPE

The **Genius Gateway** project has great potential for future development and expansion. Some of the key areas for improvement and enhancement include:

- **Mobile Application Development** – Expanding the platform by developing a dedicated Android and iOS app so that students can access all features on their smartphones and tablets.
- **Integration with Learning Management Systems (LMS)** – Connecting with platforms like Google Classroom, Moodle, or Blackboard to help students manage assignments and coursework easily.
- **Multi-Language Support –** Expanding the app to support different languages so students from various regions can use it comfortably.
- **Push Notifications and Reminders –** Adding alerts for upcoming meetings, deadlines, and important messages to keep students informed and organized.
- **Gamification of Learning –** Introducing leaderboards, achievement badges, and quiz-based competitions to make learning more interactive and engaging.

- **Advanced Meeting Features –** Enhancing the virtual meeting system with screen sharing, live polls, Q&A sessions, and interactive whiteboards for better collaboration.
- **Personalized Learning Suggestions –** Using AI to provide customized study material recommendations based on a student's progress and learning behaviour.

**Genius Gateway** can evolve into a **comprehensive digital learning ecosystem**, making education more accessible, engaging, and efficient for students worldwide.

# 7 References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