Project Report: AI-Powered Study Assistant

1. Project Overview

This project involves the development of an **AI-powered Study Assistant Chatbot** designed to help students with academic queries. The core objective was to build a system that not only answers questions but also maintains a **Persistent Contextual Memory**. Unlike basic chatbots, this assistant can recall previous interactions, providing a more personalized and human-like tutoring experience.

2. Tech Stack Used

- **Backend Framework:** FastAPI (Python)
- **LLM Model:** Llama-3.3-70b (via Groq Cloud API)
- **AI Orchestration:** LangChain
- **Database:** MongoDB Atlas (Cloud)
- **API Testing:** Swagger UI (FastAPI Docs)
- **Deployment:** Render

3. Memory Efficient (How’s it works)

- The most critical feature of this project is the **Persistent Memory** handled via MongoDB Atlas.
- **Data Persistence:** Every interaction (User Query and Bot Response) is stored as a document in the MongoDB 'chats' collection, mapped to a unique user_id.
- **Contextual Retrieval:** Before processing a new request, the system queries the database to fetch the **last 5 interactions** for that specific user_id.
- **Contextual Injection:** These past messages are formatted into LangChain HumanMessage and AIMessage objects and passed to the LLM as a prefix to the current question. This ensures the AI model "remembers" the user's name and previous academic context.

4. Key Features

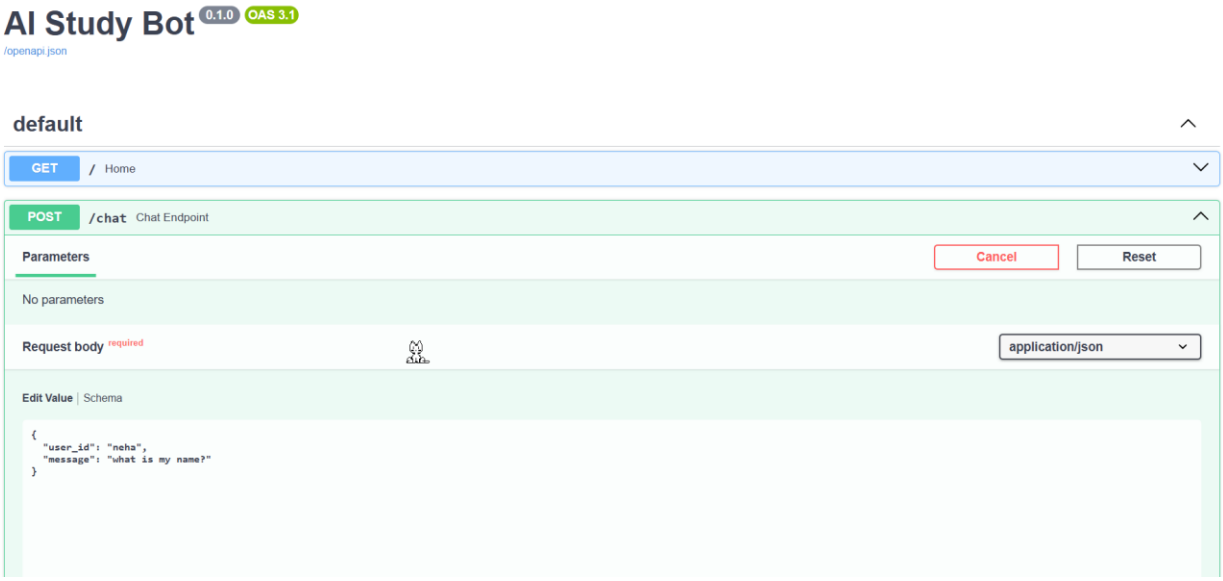
- **Session Persistence:** The bot retains memory across different sessions and server restarts.
- **High Performance:** Utilizing FastAPI and Groq's LPU (Language Processing Unit) ensures near-instantaneous response times.
- **Educational Guardrails:** Configured with a SystemMessage to act specifically as a "Helpful AI Study Assistant."

5. Project Links

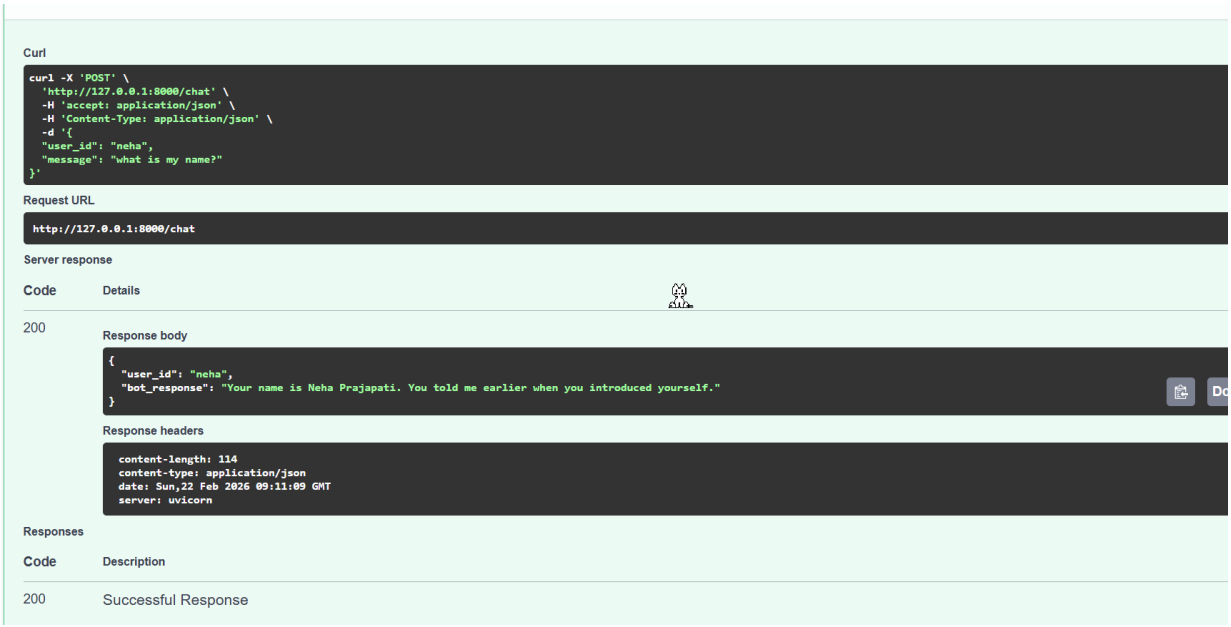
- **GitHub Repository:** https://github.com/knehaprajapati/chatbot/tree/main
- **Hosted API Link:** https://chatbot-2tog.onrender.com/

6. API Test Screenshots

1. **Screenshot 1 (Introduction):**



2. **Screenshot 2 (Memory Proof):**



3. **Screenshot 3 (MongoDB):**