

# AI Study Bot

**Student Name:** Charan G

**College:** VNR VJIET

## 1. Project Overview

AI Study Bot is an intelligent chatbot developed using FastAPI, MongoDB Atlas, LangChain, and Groq LLM. The system is designed to help learners understand and retain knowledge through structured explanations, quizzes, flashcards, and practice questions. The bot maintains conversational memory by storing previous interactions in MongoDB, allowing it to provide context-aware responses.

## 2. Technology Stack

1. Backend Framework: FastAPI
2. Database: MongoDB Atlas (Cloud)
3. LLM Integration: Groq API (openai/gpt-oss-20b model)
4. Prompt Engineering: LangChain
5. Data Validation: Pydantic
6. Deployment Platform: Render

## 3. Memory Implementation Explanation

The chatbot stores every user message and assistant response in MongoDB Atlas with the following fields: `user_id`, `role` (user/assistant), `message`, and `timestamp`. When a new request is received:

1. The system retrieves all previous chats for the given `user_id`.
2. These messages are sorted chronologically using timestamps.
3. The conversation history is passed to the LLM using LangChain.
4. The model generates a context-aware response.
5. Both the user query and assistant response are stored back in MongoDB. This implementation enables conversational memory, allowing the bot to remember previous questions and provide personalized, contextual responses.

## 4. API Endpoints

| Method | Endpoint | Description                                       |
|--------|----------|---|
| GET    | /        | Returns welcome message                           |
| POST   | /chat    | Accepts user_id and question, returns AI response |

## 5. Deployment Details

Hosted API Link: <https://study-bot-xqem.onrender.com/> GitHub Repository: <https://github.com/Master-Rizen/Study-Bot>

## 6. Screenshots

```
Pretty print
{"message": "Welcome to the Study Bot!"}
```

Responses

Curl

```
curl -X 'POST' \
  'https://study-bot-xqem.onrender.com/chat' \
  -H 'accept: application/json' \
  -H 'Content-Type: application/json' \
  -d '{
    "user_id": "string",
    "question": "Hi, what's your speciality and explain photosynthesis in 2-3 lines"
  }'
```

Request URL

https://study-bot-xqem.onrender.com/chat

Server response

Code

Details

200

Response body

```
{
  "response": "I'm a study-bot that helps learners grasp concepts, create clear explanations, and design quizzes or flashcards to reinforce learning. \n\n**Photosynthesis (2-3 lines):** \n\nPlants convert sunlight, water, and carbon dioxide into glucose and oxygen. Chlorophyll in chloroplasts captures light energy, which powers the conversion of CO2 and H2O into glucose (C6H12O6) and releases O2 as a by-product. This process fuels plant growth and supplies oxygen for aerobic organisms."
}
```

Response headers

```
access-control-allow-credentials: true
access-control-allow-origin: *
alt-svc: h3="463"; ma=86400
cf-cache-status: DYNAMIC
cf-ray: 9d1863867f8cda7-HVD
content-encoding: br
content-length: 341
content-type: application/json
date: Fri, 28 Feb 2025 19:25:18 GMT
priority: u=1,i
render-id: b6a8f1de-0f68-4aa2
server: cloudflare
server-timing: cfExtPri
vary: Accept-Encoding
x-render-origin-server: uvicorn
```

Responses

## 7. Future Improvements

• Implement user authentication and session management. • Add frontend interface for better user interaction. • Improve prompt optimization for more accurate responses. • Add analytics dashboard for tracking user learning progress.