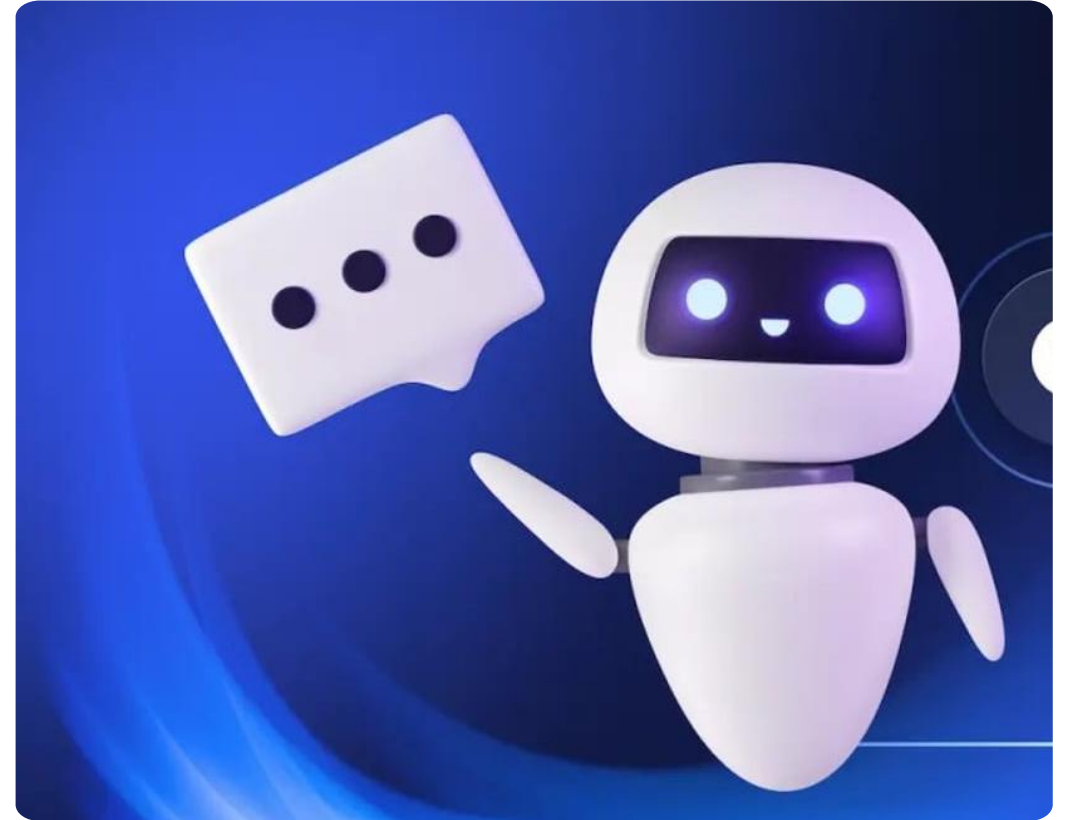


ESILV Smart Assistant: An Agentic RAG Chatbot

Automating Student Services with Generative AI



The Problem

Context:

- High volume of repetitive questions (Admissions, Programs, Majors).
- Administrative staff overwhelmed by basic inquiries.
- Inefficient lead capture forms (static web forms have low engagement).

The Need:

- A system available 24/7.
- Instant, accurate answers from official source documents.
- A conversational way to register prospective students.

Project Objectives

1

Automated RAG (Retrieval Augmented Generation):

- Answer student questions using *only* verified school brochures (PDFs).
- Reduce hallucination by grounding answers in retrieved context.

2

Agentic Registration:

- Move beyond simple Q&A.
- Proactively guide users to register (Name, Email, Interest).
- Store data for the administration.

3

Modern Architecture:

- Scalable, modular design using state-of-the-art LLM frameworks.

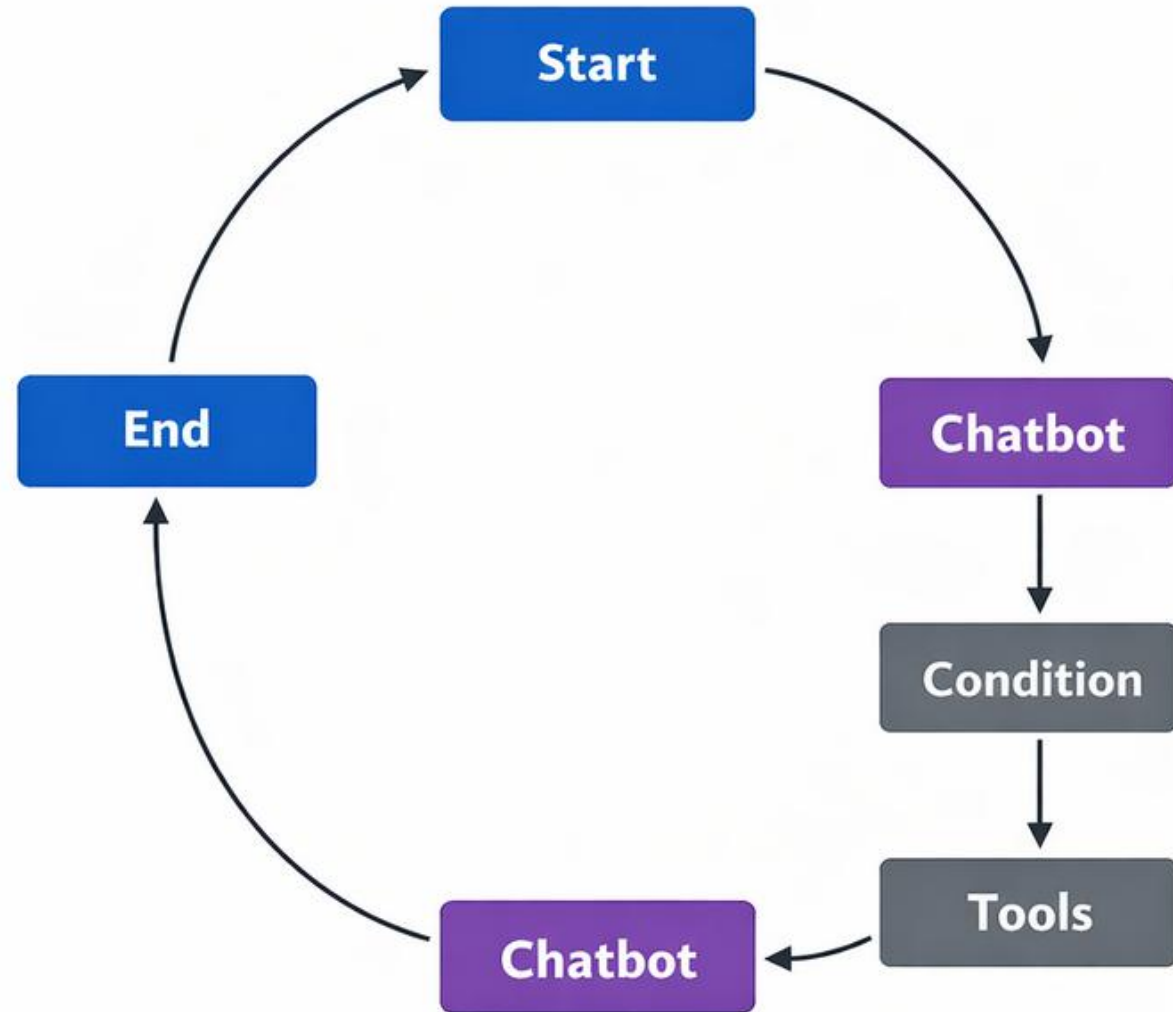
High-Level Architecture

- **User Interface:** Streamlit (Web) & CLI (Terminal).
- **Orchestration Engine:** LangGraph (State Machine).
- **Brain:** Google Gemini 2.5 Flash (Fast, High Context).
- **Memory:** Short-term conversation history persistence.



The "Agentic" Workflow

- **Why not just a standard LLM?**
- Standard LLMs are linear. Our Agent is a **Graph**.
- **Nodes:**
 - Chatbot: Decides what to do (Talk or Act).
 - Tools: Executes code (Search vector DB, Save to JSON).
- **Loop:** The agent loops between Chatbot and Tools until the task is done.



Key Pipeline 1 - RAG (Information Retrieval)



« What are the main courses in DIA A5? »



Ingestion: PDFs broken into 1000-char chunks → Embedded via embedding-001 → Stored in **ChromaDB**.



Retrieval: User Query → Vector Search (Top 5 matches).



Generation: Gemini synthesizes the answer using *only* the retrieved context.

Key Pipeline 2 - Registration (Action)

"I want to sign up."

Intent Detection: Agent recognizes desire to register.

Slot Filling Loop:

- Agent checks History: *Do I have Name? Email? Interest?*
- **If missing:** Ask user specifically for that piece of info.
- **If complete:** Call save_registration tool.

Completion: Data saved to data/registrations.json and confirmation sent.

Implementation & Tech Stack

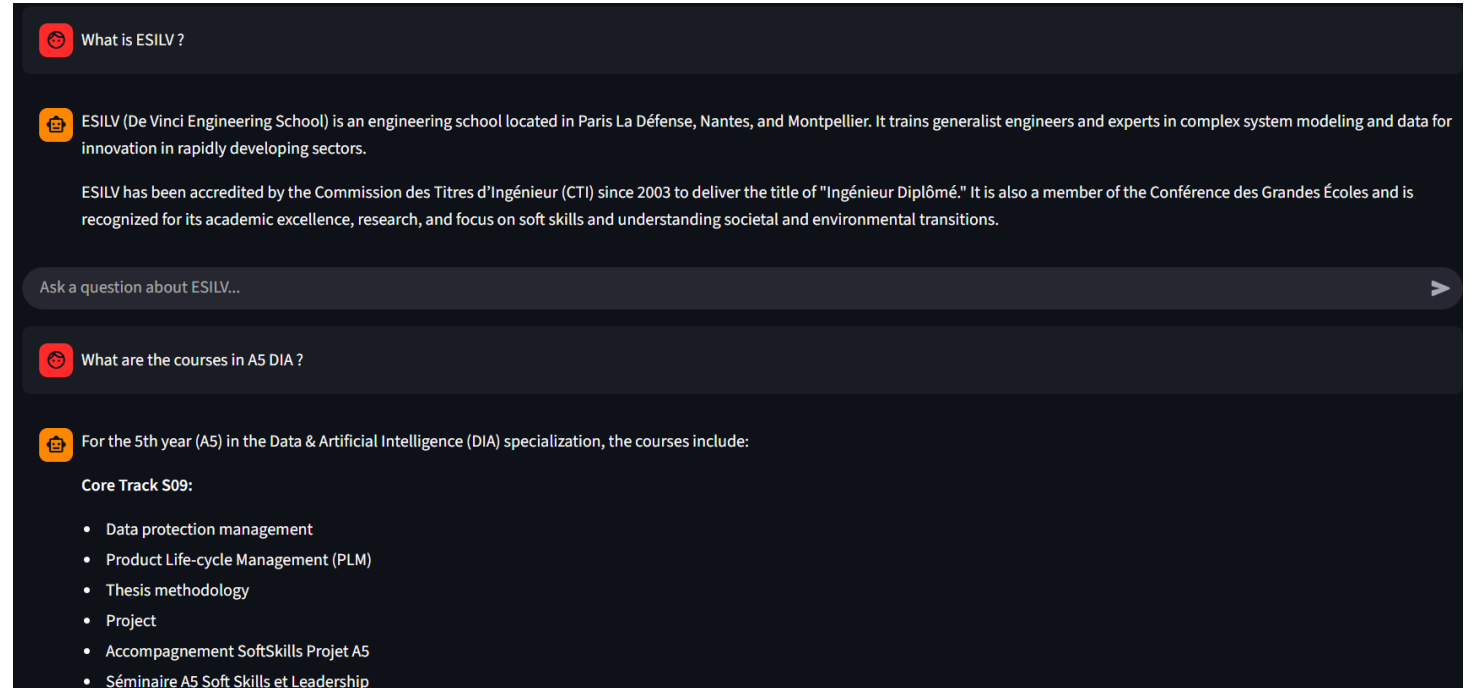
- **Language:** Python 3.9+
- **LLM:** Google Gemini 2.5 Flash
- **Frameworks:**
 - **LangChain / LangGraph:** For logic and tool binding.
 - **Streamlit:** For the frontend interface.
- **Database:**
 - **ChromaDB:** For vector storage (Knowledge Base).
 - **JSON:** For lightweight tabular storage (Registrations).



Results

Qualitative Results:

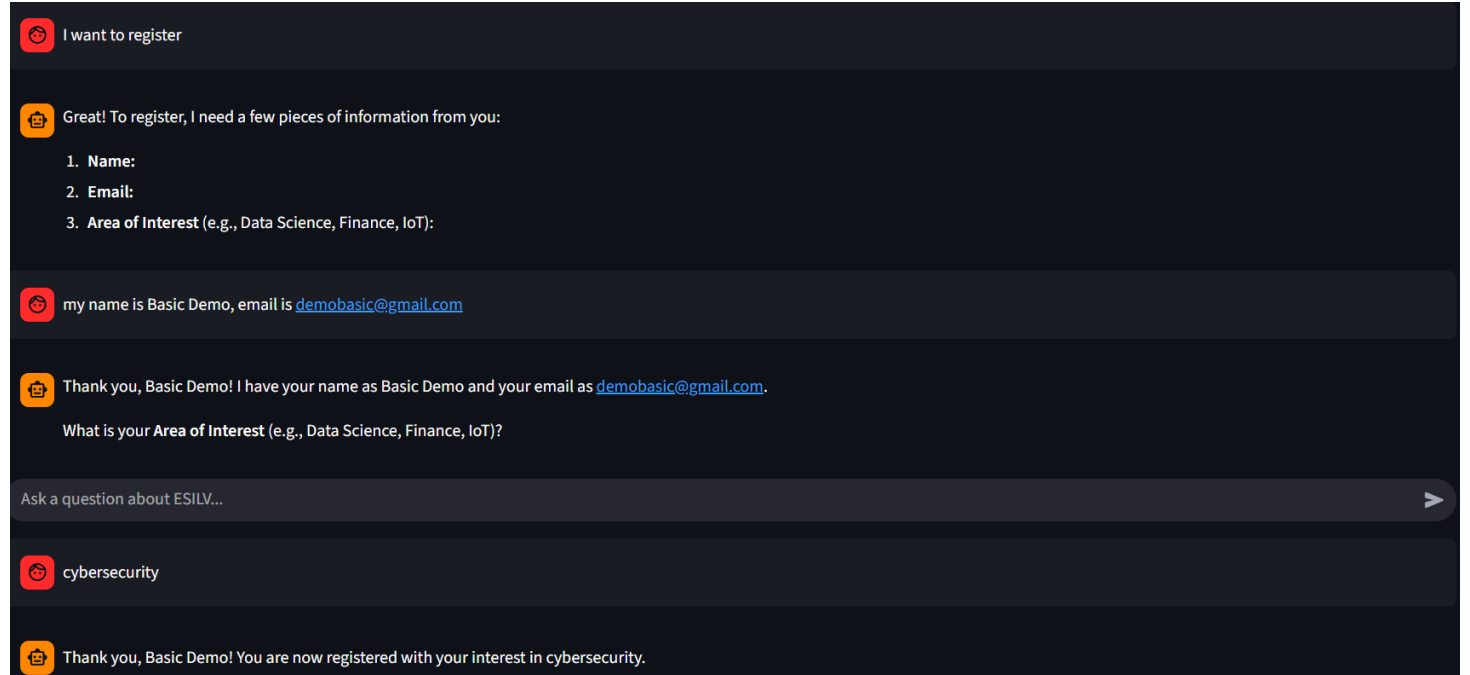
- **Accuracy:** RAG successfully retrieves specific major details (e.g., IoT, Finance).
- **Speed:** Responses are fast



Registering

Results:

- **Robustness:**
Registration agent handles out-of-order inputs and corrections and asks all the necessary informations



I want to register

Great! To register, I need a few pieces of information from you:

1. Name:
2. Email:
3. Area of Interest (e.g., Data Science, Finance, IoT):

my name is Basic Demo, email is demobasic@gmail.com

Thank you, Basic Demo! I have your name as Basic Demo and your email as demobasic@gmail.com.
What is your Area of Interest (e.g., Data Science, Finance, IoT)?

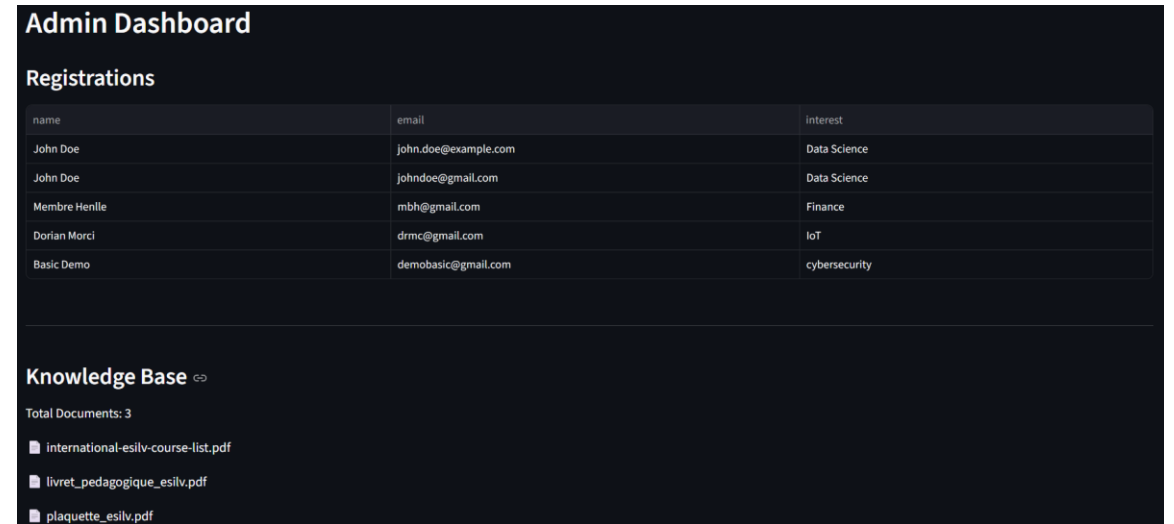
Ask a question about ESILV...

cybersecurity

Thank you, Basic Demo! You are now registered with your interest in cybersecurity.

Admin tab

- **Objective:** To provide administrators with full transparency into the chatbot's data collection and knowledge sources.
- **Feature 1: Lead Management (Registrations)**
- **Feature 2: Knowledge Base Audit**
- **Business Value:** Closes the loop between AI conversation and administrative action.



The screenshot shows an 'Admin Dashboard' with two main sections. The 'Registrations' section contains a table with 5 rows of user data. The 'Knowledge Base' section shows a list of 3 documents.

Admin Dashboard		
Registrations		
name	email	interest
John Doe	john.doe@example.com	Data Science
John Doe	john.doe@gmail.com	Data Science
Membre Henlle	mbh@gmail.com	Finance
Dorian Morcl	drmc@gmail.com	IoT
Basic Demo	demobasic@gmail.com	cybersecurity

Knowledge Base ⇄	
Total Documents: 3	
📄	international-esilv-course-list.pdf
📄	livret_pedagogique_esilv.pdf
📄	plaquette_esilv.pdf

Knowledge Upload

- **"Dynamic Knowledge Management"**
- **Function:** Allows administrators to update the bot's brain without coding.
- **Key Features:**
 - **Drag-and-Drop:** Simple interface to upload new brochures (PDFs).
 - **Real-time Ingestion:** Immediately processes files (Split -> Embed -> Store).
 - **Feedback:** Provides instant success/failure notifications.

ESILV Smart Assistant

Chat Upload Knowledge Admin

Upload New Knowledge

Upload specific PDF documents to add them to the chatbot's knowledge base.

Choose a PDF file



Drag and drop file here

Limit 200MB per file • PDF

Browse files



THANK YOU!

Thank you for
listening

- **Repository:** github.com/Raphoum/llm_genai_project