

School of Computing and Information Sciences

Fall 2024 Senior Design Project

STARSGPT

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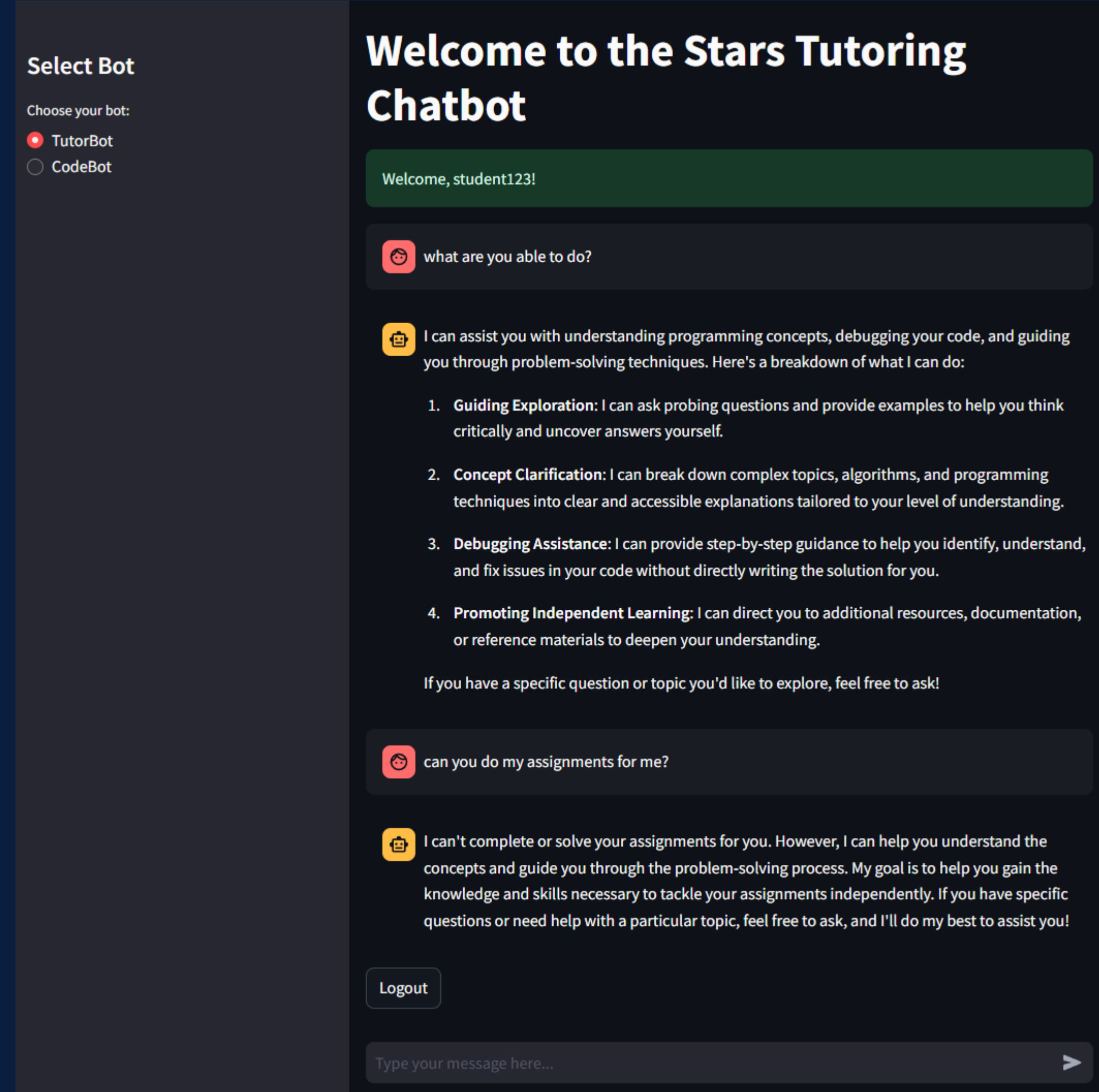
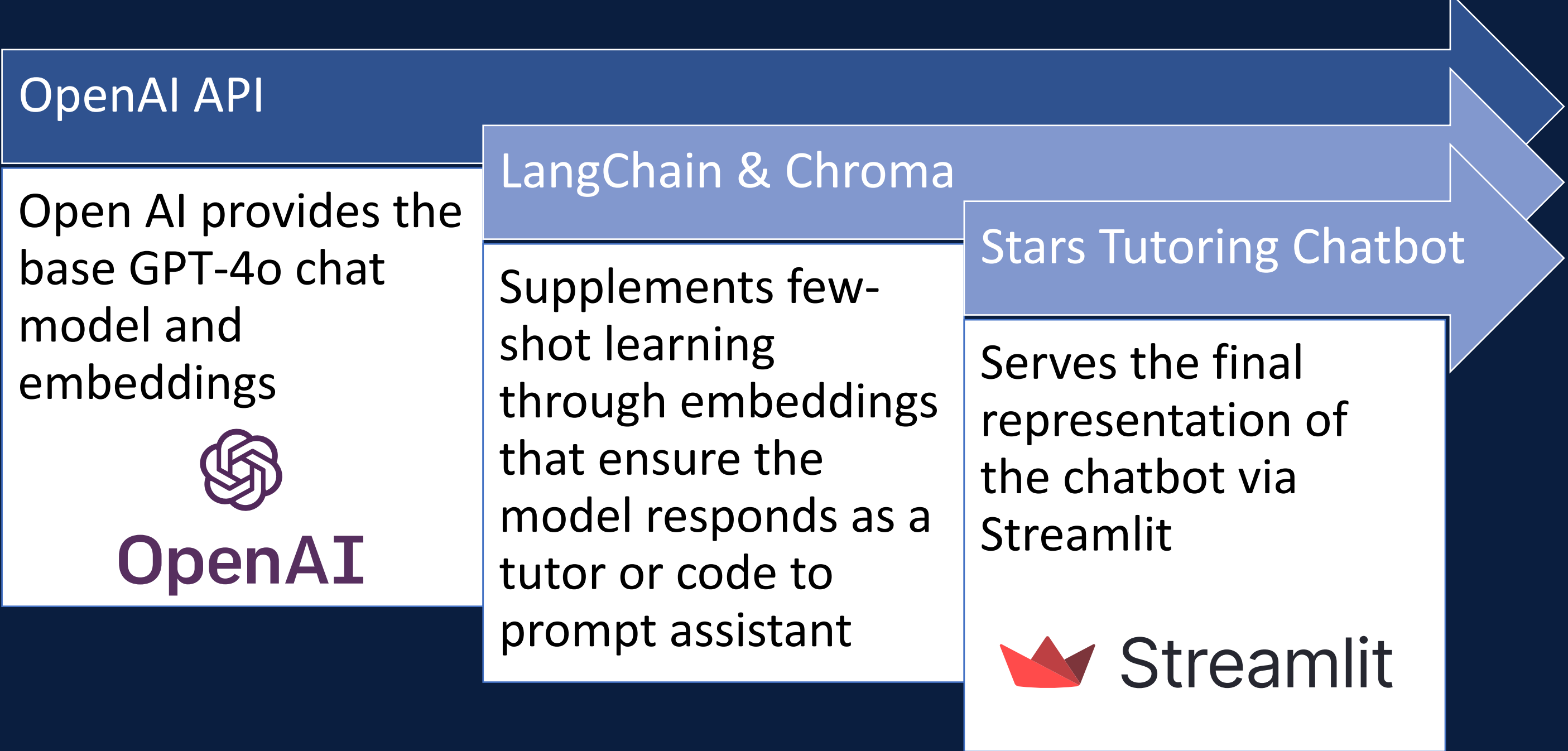
Mentor: Dr. Patricia McDermott-Wells

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Motivation and Goal

Large Language Models (LLMs) are transforming corporate and academic landscapes, enhancing productivity and innovation. However, their integration into education presents a challenge: ensuring students use these tools effectively without bypassing learning. Our project leverages OpenAI and LangChain, using methods like few-shot learning and embeddings to develop tailored educational tools.

Our System



We previously developed TutorBot, an LLM designed to assist students with debugging and concept reinforcement without completing assignments for them. Building on this foundation, we introduced CodeBot, a complementary LLM aimed at teaching students effective prompt engineering for coding tasks while encouraging incremental development practices. Together, these systems guide students toward active engagement and skill acquisition, ensuring that LLMs enhance educational outcomes without undermining the learning process. This evolution aligns LLM functionality with academic goals, bridging the gap between leveraging cutting-edge AI tools and preserving the integrity of education.

TutorBot

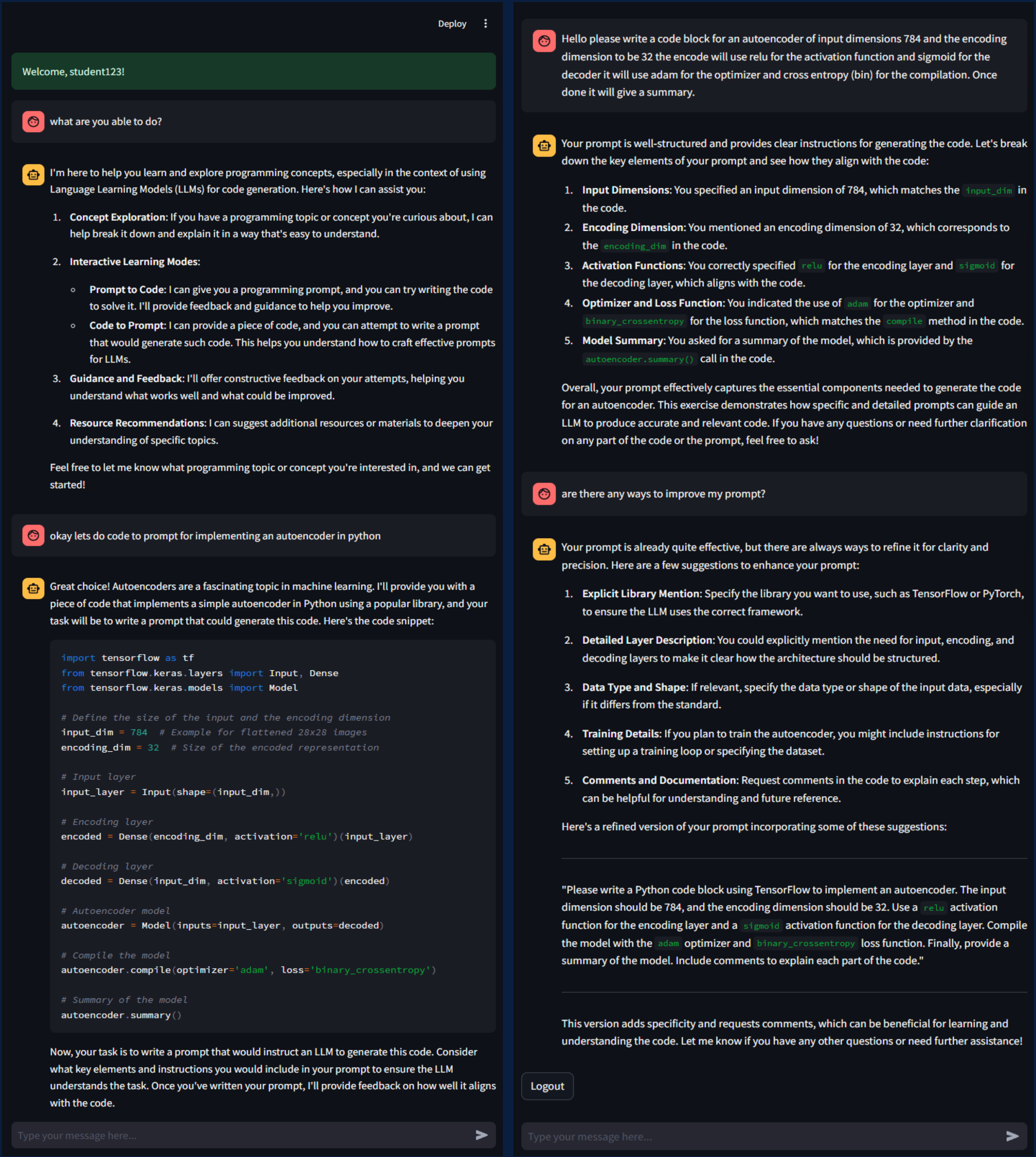
Research with TutorBot highlighted debugging and concept clarification as critical needs, as identified by the STARS tutor program. These insights guided enhancements to TutorBot, enabling it to offer targeted support for troubleshooting and concept reinforcement while fostering independent problem-solving skills. This refinement ensures that TutorBot addresses key educational priorities effectively.

CodeBot

Using OpenAI's embedding model and Chroma as a vector store, CodeBot processes stored examples of code and prompts to select the most relevant few-shot examples based on semantic similarity. By employing embeddings, CodeBot bridges the gap between static instruction and dynamic interaction, encouraging students to explore programming concepts deeply. For instance, CodeBot generates context-aware feedback, suggests improvements, and evaluates the effectiveness of user-submitted prompts or code. Its ability to integrate relevant examples dynamically enhances its educational value, reinforcing concepts and guiding students toward a better understanding of prompt engineering and code development processes. An accompanying interface example on the left shows CodeBot actively generating prompt suggestions and offering guidance, illustrating its role in shaping students' interaction with LLMs for educational success.

Conclusion

With TutorBot and CodeBot, our project empowers students to develop programming skills while maintaining active engagement. These tools ensure LLMs enhance education as facilitators of learning rather than substitutes for effort, bridging the gap between innovative AI and meaningful education.



ACKNOWLEDGEMENT

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