UROP Ad-Fall 2024

Using Conversational AI Agents to Develop Vocabulary Skills in Children

Term:
Fall

Department:
9: Brain and Cognitive Sciences

Faculty Supervisor:
John Gabrieli

Faculty Email:
gabrieli@mit.edu

Apply By:
As soon as possible

Contact:
Email Fabio Catania (fabiocat@mit.edu) and Ola Ozernov-Palchik (oozernov@mit.edu) with your resume or CV attached

Project Description:
This project aims to develop and evaluate a speech-based, AI-driven conversational tutor designed to enhance vocabulary skills in young children from diverse backgrounds. Recognizing that vocabulary knowledge is a key predictor of academic success, the research focuses on addressing the socio-demographic gaps in vocabulary acquisition that traditional approaches have not effectively closed. The AI tutor will provide personalized, interactive learning experiences, incorporating best practices in vocabulary instruction through digital read-aloud sessions. Additionally, the project will compare the performance of AI tutors with human tutors and assess the usability and effectiveness of the AI system in real-world settings

Responsibilities may include:

- Assisting in the development and refinement of the software architecture for the AI tutor.
- Supporting the creation and evaluation of specialized Automated Speech Recognition (ASR) systems tailored for child speech.
- Contributing to the evaluation of large language models (LLMs) in vocabulary instruction, including developing metrics to measure their effectiveness.
- Designing and implementing empirical studies, including analyzing data from tutoring sessions to assess the performance of AI versus human tutors in educational settings.

Pre-requisites:
We are seeking a UROP student skilled in full-stack software engineering with experience in TypeScript, React, Python, and API development. The ideal candidate should have a background or interest in optimizing low-latency tools through techniques like multithreading and streaming. While not mandatory, knowledge of natural language processing (NLP), large language models (LLMs), or audio signal processing is advantageous. Familiarity with Blender and JavaScript animation is a plus but not essential.

Mentorship and Development:
You will be part of a team that supports your learning and development in both research and technical skills.