VTutor: An Open-Source SDK for Education with Generative AI-Powered Animated Pedagogical Agents

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ABSTRACT:

VTutor is an open-source Software Development Kit (SDK) designed to integrate Animated Pedagogical Agents (APAs) with generative AI capabilities into web applications, aiming to enhance learning experiences through a multi-model feedback process. By leveraging large language models (LLMs) and text-to-speech APIs, VTutor enables the dynamic generation of voice and gesture-based responses, creating a human-like interaction that engages students in real-time.

Our SDK is built with Unity WebGL, facilitating simple integration through an iframe and API calls that control agent actions and voice generation from frontend JavaScript. This setup makes VTutor scalable, cost-effective, and accessible on any browser-enabled device. During the demo, we will also explain how to set up iframe-based WebGL integration to ensure VTutor works seamlessly across all front-end framework, especially some tricks for overcoming some browser-specific permission challenges.

VTutor empowers educators and researchers to measure the impact of APAs on learning by providing tools to easily build applications for data collection. Early collaborations with math and language tutoring platforms indicate VTutor's potential for real-world applications in tutoring, dialogue training, and virtual instruction, providing new insights into the role of APAs in educational settings. VTutor thus supports a scalable, research-friendly environment, advancing learning analytics and enhancing data-driven educational practices.

Our code, demo, and video can be accessed via https://vtutor.vercel.app.

Keywords: AI in Education, Animated Pedagogical Agents (APAs), Multimodal Feedback, Human-Computer Interaction (HCI), Unity WebGL

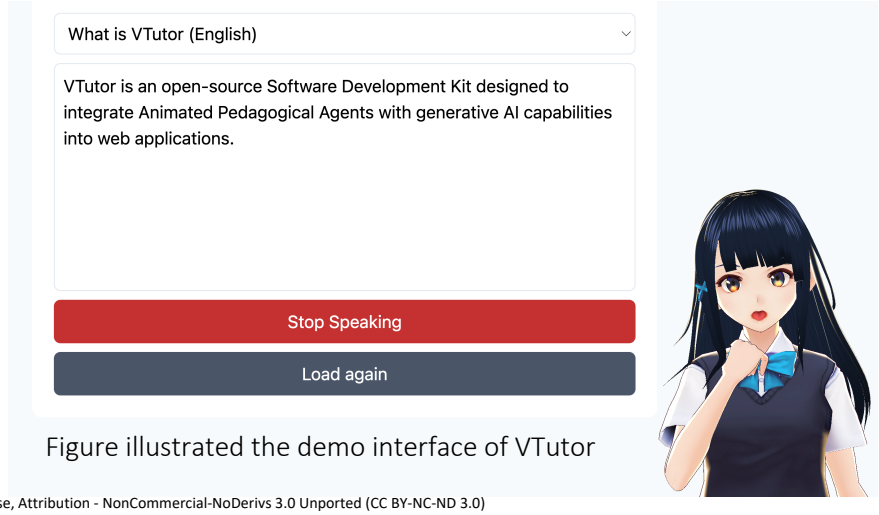

Figure illustrated the demo interface of VTutor