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Research Abstracts

Chat-GPT Powered eXtended Reality for Surgical Education

Panagiotis E. Antoniou; Konstantinos Tagaras; Irene Asouhidou; Alkinoos Athanasiou; Panagiotis D. Bamidis; and Georgios Tsoulfas, MD, PhD, FACS

Aristotle University School of Medicine, Thessaloniki, Greece

Introduction: Virtual Reality (VR) has been applied in surgical settings, supporting the procedures with advanced visualization. Surgical education requires, beyond visualization, contextual support based on a valid knowledge base. Generative AI, with Chat-GPT, has proven its capacity to provide valid information, able to support, but not substitute the expert in a field. This work presents a proof-of-concept integration of an educational, surgical anatomy virtual environment with a ChatGPT powered chatbot agent.

Methods: The educational virtual environment was developed in Unity3D. It features a series of navigable 3d visualizations of surgical anatomy structures. The OpenAI application programming interface was used to link the environment with Chat-GPT and Meta's framework was implemented for speech-to-text-to-speech operation. This resulted in a VR environment where the user asks natural speech questions and receive voiced answers from the Large Language Model (LLM). A pilot, Problem Based Learning (PBL) educational setting is designed to test the environment with resident or specialist surgeons.

Results: During the design of the PBL pilot, significant insights have been garnered by the design team, regarding the strengths and weaknesses of this proof-of-concept training platform. Core strength is the augmentation of 3d information, with real time feedback. The ChatGPT powered responses can facilitate better understanding and clarifications. Core weakness is the risk of inaccurate information from the generative LLM. Thus, the presence of a facilitator is required to critically guide the process. Technically, the deployment of a dedicated instantiation of the LLM, pretrained in a dedicated corpus of surgical anatomy data would further increase the reliability of the model.

Conclusions: This work demonstrated that an AI powered VR environment is feasible and technically fit for purpose. The PBL pilots will evaluate efficacy and acceptance. Technical refinements will increase reliability and support self-learning scenarios.