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City University of Hong Kong

Integrating Artificial Intelligence and Virtual Reality in Physics Education for Medical Students

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Principal Investigator: Prof. Xin WANG

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Abstract:

The world has witnessed rapid development of Artificial Intelligence (AI) and Virtual Reality (VR). AI models such as ChatGPT has been vastly successful in many fields ranging from medicine to finance, transforming industries and enhancing human capabilities. VR, on the other hand, has revolutionized entertainment, education, and training, offering immersive experiences that were once thought impossible. Together, AI and VR continue to push the boundaries of innovation, promising a future where the digital and physical worlds seamlessly intertwine.

This project re-envisions the “PHY2400 - Advanced Physics for Biologists” course by integrating Artificial Intelligence (AI) and the Apple Vision Pro’s spatial computing capabilities to enhance physics education for medical students. The rapid development of AI in the medical field necessitates equipping future medical professionals with knowledge and skills to harness these technologies effectively. Although the existing PHY2400 curriculum covers fundamental physical phenomena and technological applications in biology, there is a significant opportunity to deepen the educational experience through innovative tools and methodologies.

The proposed educational framework will introduce an engaging curriculum with AI-centric lectures, practical projects, and immersive learning experiences utilizing the Apple Vision Pro. Students will partake in constructing AI models and engage with Machine Learning (ML) algorithms to solve medical-related problems. The curriculum will connect the theoretical knowledge acquired in class to practical applications such as drug delivery systems, electrocardiography, MRI, and PET scans, through the immersive and interactive environments provided by the Apple Vision Pro.

By adopting Apple Vision Pro’s high-resolution visual and Spatial Audio capabilities, students will explore and interact with complex physical phenomena in a 3D virtual space, fostering a deeper understanding of the subject matter. For example, students can delve into earth’s magnetic field and experience the original of aurora, ionization of air molecules due to solar wind, gaining practical experience on “field”, a very abstract concept; they can also see from inside the heart on how electrocardiography is generated, enhancing their understanding of electrical fields. They can also have a 3D picture on various medical imaging techniques, including X-ray, MRI and PET. These hands-on approaches are aimed at developing their capabilities to apply AI technologies in medical physics and prepare them for advanced studies in related fields.

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The “PHY2400 - Advanced Physics for Biologists” course will thus offer a comprehensive education that aligns traditional physics concepts with cutting-edge AI applications and immersive technologies. As a result of the project, we prepare students for the dynamic developments in the medical field and empower them to contribute to the advancement of medical sciences and technology.