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Exploring VR Interaction Possibilities: Prototyping the flood simulation in Dong Hoi, Quang Binh Province with SIMPLE's Coupling Tool in Unity and GAMA

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Abstract

This research explores the integration of Virtual Reality (VR) technology with agent-based modelling for environmental education, to simulate the flood in Dong Hoi, Quang Binh province, Vietnam. As part of the SIMPLE project, which aims to raise the youth's awareness of the environment by developing a set of "sustainability metaverses", the research develops a prototype of flood simulation that combines GAMA, an agent-based modelling platform, with Unity, a VR development engine to raise the students' awareness of flood mitigation. The integration enables users to interact with a flood simulation through a VR interface, performing actions such as dyke construction, removal, and repair. A robust data exchange protocol ensures real-time synchronisation between the GAMA simulation and the Unity VR environment. While the technical integration was successful, challenges in visual fidelity and immersion were identified, particularly in water visualisation. The latest VR integration for the Quang Binh flooding project, using placeholder assets and 2D, falls short of providing a fully immersive educational experience as players believe the game graphics are not attractive and they find it hard to follow the game without any tutorials or instructions. After playing, first testers recommended enhancing visual fidelity, developing sophisticated water shaders, incorporating interactive NPC and adding narrative elements to make the game more attractive, which is needed to fully capitalise on VR's potential for creating impactful learning experiences.

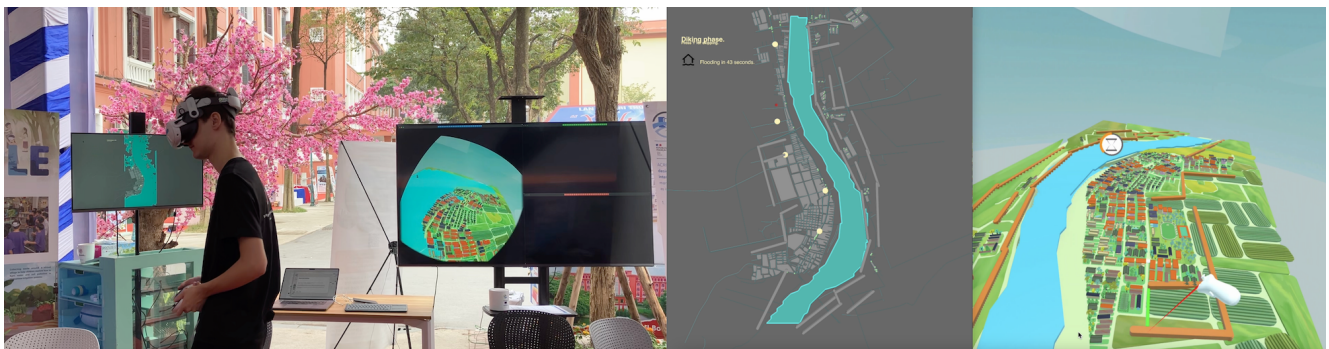


Figure 1: A user playing the LuLut VR Game in an exhibition booth