AR/VR Uses in the Faculty of Environment

Colour Codes

Green – MAD Ideas

Orange - GP487 Student Ideas

Red – MAD VR/AR Workshop Ideas

Course Work

ENVS

Beginning in 2020, the use of AR/VR has been used be the Faculty of Environment (FoE) to recreate the Spongy Lake field trip from ENVS 200 for those who cannot attend the trip. As suggested by students who have attended the virtual trip, it is recommended that the field trip be expanded upon, specifically to includes: additional seasons, more 360 photos, images of abiotic features, and simplistic instructions. It is important to note that students do not feel that this simulation fully replaces the field trip, however, the suggestions recommended having physical objects from Spongy Lake be brought into the lab when the simulation takes place to create a more immersive experience.

This concept can also be expanded upon to include plant and species identification which can be implemented through various methods.

Mozilla Hub

Mozilla Hub allows for users to create rooms, holding up to 25 people, and add in 3D objects that are created in Spoke. This can be utilized by the FoE to create rooms in which ENVS 200 students can enter rooms and identify species within the room. This can also be used in a group assignment where they identify species together in Mozilla Hub, which can also facilitate conversation online between the group. This will prove beneficiary in situations in which the group cannot meet for this assignment but still allow all group members to be present and work together.

360 Viewing

ENVS 200 has an assignment in which the students on three separate occasions visit a site on campus and identify plant and animal species. This assignment can be replicated by taking high quality 360 photos of the sites on three separate occasions that can be used by students to identify the flora and fauna. This would be in a similar format to the already existing Spongy Lake field trip.

GEM

Aviation

In the MAD AR/VR workshop, it was suggested that AR/VR be used for flight simulation and safety training. Organizations, such as Slight Safety International, have already created AR/VR simulations for flight training and safety training, including 360 display systems. If the FoE wishes to create their own system, it is suggested that they utilize Microsoft Flight Simulator (MFS).

Microsoft Flight Simulator

MFS is a simulator on Steam that provides users with virtual experience inside an aircraft with additional downloadable content (DLC) that can be used to enhance this experience. The DLCs can be additional airspaces or aircrafts that can allow the user to have virtual flight experience outside of Canada. As of December 22, 2020, MFS supports VR headsets, specifically Windows Mixed Reality headsets (including the HP Reverb G2), Oculus, Valve, and HTC headsets.

Minimum system requirements: (for MFS: Steam edition)

- OS: Windows® XP Service Pack 2 or later
- Processor: 2.0 Ghz or higher (single core)
- Memory: 2 GB RAM
- Graphics: DirectX®9 compliant video card or greater, 256 MB video RAM or higher, Shader Model 1.1 or higher (Laptop versions of these chipsets may work but are not supported. Updates to your video and sound card drivers may be required)
- DirectX: Version 9.0c
- Network: Broadband Internet connection
- Hard Drive: 30 GB available space

Geography of Tourism

The use of AR/VR can be implemented in tourism courses such as GEOG 233 in which students immerse themselves in 360 images to conceptualize key course concepts. This can be done similarly to the Spongy Lake field trip from ENVS 200.

Geomatics/Spatial Analysis

AR/VR can be used in the study of Geomatics through the visualization of spatial data. An example of this would be visualizing contour lines and other local data. This can be utilized with imported files from SketchUp into A-Frame. This technology can also be used in classes such as GEOG 310 in which students can visualize contour lines and the placement of total stations along terrain that is not found on campus. An example of this would be creating mountainous terrain in SketchUp and import it into A-frame with different specific sites in which the students would test for elevation between the sites. Lastly, AR/VR can be used to visualized map projections and 2D to 3D distortion.

Physical Geography

In AR/VR, time series can be heavy utilized to simulate climate change modelling and visualize disasters. This can include time series of water levels on near cities, CO2e emissions, and other related incidents. Classes such as GEOG 303, Physical Hydrology, and GEOG 201, Fluvial Geomorphology, can use AR/VR in simulating water flow in watersheds using the AR Sandbox and use time series to illustrate ecological events such as the process of eutrophication. On a larger scale, AR/VR can be used in classes such as GEOG 207 to visualize the rotation and movement of Earth and its affects on global climate.

KI

The use of AR/VR can be implemented in the courses using 360 snapshots of KIX and virtual museums. This has already been done with KIX 2017 and 360 photos have been taken during the 2018 and 2019 exhibits.

PLAN

In the field of Planning, the AR/VR can be utilized in the visualization of development and infrastructure projects, such as in the design studio courses and PLAN 484, Physical Infrastructure Planning. By exporting files from SketchUp and importing them into A-Frame, students can visualize developments and make improvements. Such improvements can involve changing the placement of parts of the development due to the direction of light from the Sun, visualizing wind movements, and viewing the development in the context of its surrounding environment. In the study of transportation planning, AR can be used to visualize intersections and address course concepts, such as visualizing interactions with various lanes and permissible lefts. Similarly, PLAN 414, Heritage Planning Workshop, integrates a walking tour in the curriculum, which can be transferred to AR/VR with 360 photos or imported SketchUp files. This can be used on rainy days or by students that could not attend the walking tour. Lastly, AR/VR can be used to create simulations for planners to test and conceptualize census projections.

SERS

AR/VR can be used in ERS 340, Ecosystem Assessment, specifically in its training courses and modules. In the class, the course requires students to complete certain certificates before specific dates, including identification of species. AR/VR can enhance those modules and create 3D visualizations that would allow for a faster transition between course and training content and field work. In ERS 383, Tropical Ecosystems, AR/VR and story maps can be used to convey a story about tropical ecosystems and anthropomorphic impacts. This can be used in the class' case study examples, visualizing such things as succession, timber harvest, impacts of farming, etc..

SEED

AR/VR can be used in courses such as ENBUS 203, Green Entrepreneurship, for prototyping products. This can be done by importing files into A-frame and rendering prototypes and visualizing iyt in different environments.

General Ideas

These ideas of creating AR/VR content can expand outside of the FoE, such as incorporating engineering and architecture courses. This could include creating VR site tours, development projects, and visual representation of spatial analysis.

A possible way to access this information is through QR codes in an open-source library or through a restricted-access portal. This would allow students to engage with content outside of their faculty or school and explore the use of AR/VR in an academic setting.