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## Abstract

This project develops video games and Virtual Reality applications to teach science and fieldwork. The landscape of the game is based on data exported from a Geographic Information System (GIS).

## Description

Gamification is the process of creating games for traditionally non-gamable material. The goal is to engage users, increase participation rates and improve knowledge, skills or collaboration. In a collaboration between the Université de Sherbrooke and the University Centre in Svalbard, we have developed several small video games to prepare students better for their field activities in the high Arctic. Aside from exploring the landscape, students are taught what type of notes they need to take while in the field, how to set up instrumentation and what to do with the collected data afterwards.

During the first step of creating a game, we use a Geographic Information System (GIS) to extract a Digital Elevation Model (DEM) and a texture. Due to the nature of GISs, this could be any georeferenced source (satellite observations, drone flights, etc.). Whereas the DEM is a black-and-white image to extract the 3D information, the texture can be anything ranging from an image of the surface to a GIS-based analytical map.

“Blender” is a software for 3D modelling. We use it to create the 3D-model of the landscape (DEM-based). We utilise Blender’s Virtual Reality (VR) and holographic display capabilities to inspect and modify the landscape where it is needed.

Then we import the model into the “Unreal Engine 5”, a modern video game engine. After overlaying the texture, we adjust the scale and orientation of the model. This is followed by designing the rest of the world and creating the scientific content. Whereas in-game instructions are implemented via videos or Non-Playable Characters (NPC), we add theory sections with slides into the game menu.



**In-game screenshot showing the glacier Bogebreen (Svalbard) in the back while the player receives video instruction on how to do a glacier mass balance calculation.**