

Assessment Criteria

Virtual environment construction

The virtual environment is a sci-fi/cyberpunk city made using a mixture of free online assets (buildings, objects, textures) and custom assets (walkways, some buildings) made in blender. I have implemented a custom asset loader and manager to handle scene loading and construction (for both static and moving entities).

Application of multi-resolution modelling

There are two main uses of multi-resolution modelling. Firstly, to demonstrate algorithm-level understanding, a runtime implementation of the Three.js SimplifyModifier is provided to generate LODs for complex meshes at runtime. Secondly, other models in the scene are manually simplified in blender to produce LODs for simpler meshes.

Application of parametric curves and surfaces

Parametric curves and surfaces are used in a few places. The bridge to the island was modelled in blender using Bezier curves. The island itself is a parametric surface made at runtime using non-uniform rational B-splines. Mathematics-level understanding is demonstrated through an original runtime Bezier curve implementation for camera movement.

Application of skeletal animation

To demonstrate understanding of the concept, a custom-rigged hard-coded robot barrier asset is included with it performing some animated movement in a fixed loop. To demonstrate advanced skeletal animation, a pre-rigged soldier model is included using online-sourced animations to idle, walk, and run (with support for animation blending).

Visual quality control

To ensure visual quality within the scene, antialiasing is used to reduce jagged edges, some shadow mapping, plus ambient, hemispherical, and diffuse lighting is used to provide realistic a more realistic view. To prevent low-precision z-fighting at far distances, a logarithmic depth buffer is used.