**COMP4097 Advanced Computer Graphics Coursework Submission Form**

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Information about how marking criteria is met is provided below, each criterion is described in at most 50 words.

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| **Virtual Environment Construction (15%)** | Most models custom made (classrooms, chairs, tables) including custom level of detail models made in SketchUp  Mix of polygon models and parametric surfaces  Custom surface construction using parametric geometry  Direct interaction with WebGL buffers for efficiency via Three  Models imported as GLTF for efficiency and improved using gltfpack and DRACO |
| **Application of Multi-Resolution Modelling (20%)** | Custom level of detail models (e.g. tables, computers)  Applied level of detail to parametric surfaces (bike shed, curved roofs)  Custom implementation of mesh simplification using quadric error with edge collapse  Progressive meshes with network streaming, automatically rebuild the mesh as incremental data is received  Billboarding (e.g. trees) at long range |
| **Application of Parametric Curves and Surfaces (20%)** | Custom implementation of Bezier Surfaces (classroom roofs), B-Spline Surfaces (sports hall room), NURBS Surfaces (trampoline, pond) using basis functions  Efficient updating of NURBS surface when control points moved using incremental rendering method  Combined with level of detail (no. of samples increases/decreases with distance)  Parametric curves to define skeletal animations |
| **Application of Skeletal Animation (20%)** | Custom humanoid people rigged using Blender manually  Implemented SkinnedMesh manipulator with Inverse Kinematics  Forward Kinematics  Rigged vehicles use skeletal animations  Rigged people on trampolines for surface deformation  Skeletal animations combined with level of detail and billboarding (trees)  Variable skeletal animation quality  Skeletal animation paths defined using Bezier curves |
| **Visual Quality Control (15%)** | Render distance  Level of detail configuration with inline updates  Parametric surface sample count  Optimisation of GLTF models using gltfpack and DRACO  Multiple Anti-Aliasing modes (None, FXAA, SMAA, …)  Dynamic optimisation using render draw calls and target FPS  Manual optimisation using settings menu, updates the scene in real time |