**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 implementation and construction using parametric geometry  Direct interaction with WebGL buffers for efficiency via Three  Models imported as GLTF for efficiency and improved using gltfpack |
| **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 roof), 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 rigged using Blender manually  Implemented SkinnedMesh manipulator with Inverse Kinematics and Forward Kinematics  Implemented Forward Kinematics with direct bone manipulation  Rigged people on trampolines with 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  Model billboarding with level of detail  Configurable level of detail (trigger distance and parametric surface samples)  Configurable parametric surface sample count  Configurable animation quality  Optimisation of GLTF models using gltfpack  Multiple Anti-Aliasing modes (None, FXAA, SMAA)  Real-time dynamic optimisation using target FPS |