3D Sorting Algorithm Visualization using Python & Blender

Student Details

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Course	Graphics and Visual Computing
Tools Used	Python, Blender API (bpy), Emission Materials
Project Type	Individual

Objective

To visually demonstrate Bubble Sort as a 3D animated sequence using Python scripting in Blender, showcasing graphics concepts such as modeling, viewing transformation, projection, shading, lighting, animation, and rendering.

How It Works

• Random integer values are converted into scaled 3D cubes.
• Python implements Bubble Sort and tracks compare/swap steps.
• Each event changes block color and position using keyframes.
• Camera, lighting, and animation are fully script-controlled.
• Final animation is rendered as a 3–5 minute video.

GVC Concepts Demonstrated

• Modeling: Cubes scaled based on array values.
• Viewing Transformation: Camera positioned via Python.
• Projection: Perspective camera with custom FOV.
• Shading & Lighting: Emission materials and Sun light.
• Animation: Keyframe interpolation of swaps and comparisons.
• Rendering: Final timeline exported to video.

Color Legend

• Blue: Default state
• Yellow: Comparing
• Red: Swapping
• Green: Sorted (final state)

Submission Contents

• Python script (.py)
• Demo animation video (3–5 min)
• 1-page project poster (PDF)

• README with screenshots and code overview
• GitHub/Drive link to source files

Future Enhancements

• Add Merge, Quick, and Heap Sort visualizations.
• Include orthographic projection comparison.
• Add GUI controls for algorithm selection.
• Embed swap count and live annotations in render.

Acknowledgement

This project was completed as part of Graphics and Visual Computing, demonstrating sorting logic through Blender-based animation and core computer graphics principles.