

A. Project Definition

Develop a stand-alone software using Unity HDRP for glass visualization from CT Scan and MRI inputs utilizing advance's features of Unity HDRP with advantages over current available visualization tools and output corresponding dissertation document in Latex as a research of master of science thesis.

B. Delivery phases

1. 3D Modeling & Scene Setup in Unity

- Create a new Unity project (use HDRP for advanced rendering).
- Import medical imaging data (e.g., DICOM, nifti and other needed file fromats) to convert data into Unity-compatible formats
- In Unity, assemble the 3D brain model, adding layers like the skull, brain tissue, and blood vessels.
- Apply materials and shaders (use transparent shaders for the “glass” effect or other requested shaders or material).
- Set up lighting and cameras to enhance 3D visualization.

2. Volume Rendering & Visualization Techniques

- Implement volume rendering for layered brain views using shaders or specialized plugins (like Volume Rendering Toolkit).
- Apply transparency, slicing tools, and clipping planes to allow users to “see inside” the brain.
- Integrate color mapping and labeling and naming for different tissues (e.g., gray matter, white matter) and highlight anomalies if needed.
- Any additional features as per supervisor comments

3. User Interactivity & Control Features

- Develop C# scripts for navigation controls (rotate, zoom, pan).
- Implement UI elements for toggling layers, adjusting transparency, and selecting brain sections.
- Add tools for slice viewing (axial, sagittal, coronal) and interactive annotations.

- Changes and additional control or features based on supervisor comments and suggestion
- Dissertation draft completed

4. Testing, Optimization & Deployment

- Use Unity's Profiler to optimize performance, especially for complex 3D data.
- Test user interactions and ensure accurate visualization against real MRI/CT data.
- Deploy to your desired platform (PC, VR headsets for immersive experiences, or WebGL for online use).
- Dissertation finalized document

C. Deliverables

1- developed software by Unity HDRP, including proper comments in source code

2- weekly reports, a weekly written report in PPT is needed during whole project duration to share “progress”, “research findings”, “next week plan” and “currently developed research and application”.

3- Dissertation in Latex and needed template