

The Explorable Virtual Human (EVH)

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The high-resolution volumetric color data produced from the Visible Human Project can be used to create models of unprecedented fidelity for interactive display. The tasks required to realize these models are substantial, including segmentation and classification, production of polygons, and production of accompanying texture maps from the volumetric data. In addition, the user interfaces required to develop and render derived curriculum in a virtual environment are difficult to create and often complex to use. These factors have combined to prohibit all but the most computer savvy from creating curriculum that nears the envelope of potential from the data. The Explorable Virtual Human (EVH) is a National Library of Medicine sponsored¹ attempt to greatly reduce the barriers between the dataset and those who wish to convey anatomic knowledge.

The EVH is an internet enabled graphic and haptic interface for building anatomic curriculum from Visible Human type data. To accomplish this, the EVH provides for creation and management of three distinct player types: movies, text, and Interactive Anatomic Animations (IAAs). The IAA player and editor combine to give authors the ability to create three-dimensional virtual environments featuring texture-mapped polygonal models derived from Visible Human type data. The following figure is a screenshot showing an IAA, along with associated HTML, used as part of an explanation of the difference between the epicondylar and geometric flexion axis of the knee. Since there is no one view that adequately displays the epicondyles, the ability to see the femur move in three dimensions greatly enhances the user's understanding of the epicondylar axis.

¹ Biomedical Applications of the Next Generation Internet (NGI) – Networked 3D Visible Human Anatomy, contract Number N01-LM-0-3507.

This IAA illustrates the difference between the two axes, which are neither colinear nor parallel.

[Replay](#)

The following IAA shows that the corresponding two planes are neither coplanar nor parallel.

[Click to explore](#)

The angle between the two axes is 6.76 Degrees.

For the CT knees, the angle between the two axes were:

knee1	7.6
knee 2	10.7
knee 3	14.2
knee 4	7.1
knee 5	1.11
knee 6	1.83
knee 7	9.02
knee 8	1.25
knee 9	8.07
knee 10	6.39

Warning: Applet Window

3D View

The right side of the screenshot shows a 3D model of a knee joint with two white lines representing axes. A small orange box is visible in the top right corner of the 3D view.

This talk focuses on the IAA player and editor and demonstrates integration of the three player types through examples.