



Virtual Human Upper Body for Gross Motion Palpation Training

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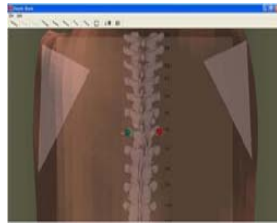
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Introduction:

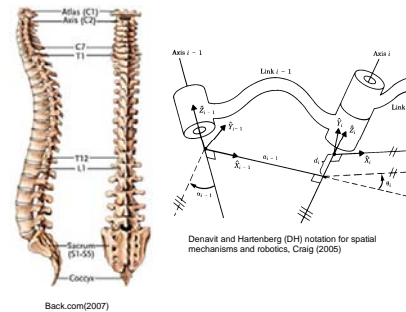
The Virtual Haptic Back (VHB) research project creates virtual human back for training Osteopathic medicine student palpation techniques. Our current virtual human back is a static 3D model with haptic feedback.



VHB screen capture and hardware setup.

In the real diagnostic situation, Osteopathic doctor usually uses one hand to move patient's upper body and the other hand to palpate. This technique is using gross motion of human upper body to create spine movement in order to find abnormal vertebrae. This research is to create a user movable virtual human upper body (71 degrees-of-freedom branching serial chain virtual model) and incorporate with haptics technology for training Osteopathic medicine student to use gross motion technique. A Microsoft Side-Winder force feedback joystick is used to move the virtual human upper body and a Sensible technology Phantom is used to palpate.

Methodology:



Back.com(2007)

We model the 71 DOF virtual human upper body using the Denavit-Hartenberg (D-H) representation method.

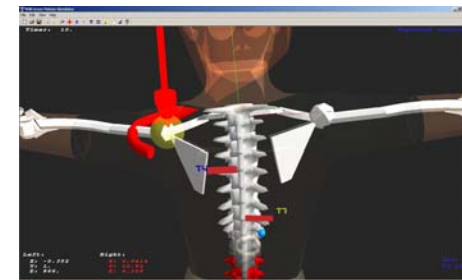
We can find the end effector coordinates from joint angles:

$$\vec{X} = f(\vec{\theta})$$

This is also called forward kinematics. Virtual Haptics Human Upper Body is focus on moving the end effector in order to find all the joint angles. This procedure is called inverse kinematics:

$$\vec{\theta} = f^{-1}(\vec{X})$$

$\vec{\theta}$ is used in every simulation step for calculating spine, skin and haptic movement.



Screen Captures of the program.

Conclusion:

The Virtual Haptics Human Upper Body is currently under development. This work is a major addition to VHB Haptic feedback. Our model will be validated with biomechanical human data, feedback from student doctors and physicians in the near future.