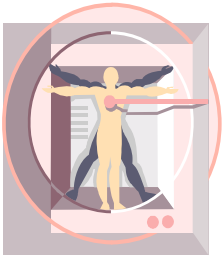

Biomedical Engineering Department Seminar

Friday, March 30, 2007

Location: Cullimore Hall, Lecture Hall 3

Time: 12:00 - 1:00 PM

3-D SIGN LANGUAGE SYNTHESIS

Amanda Irving, PhD candidate, NJIT, Biomedical Engineering

Signed communication developed by deaf communities provides points for research in biomechanics, kinematics, and linguistics. American Sign Language (ASL) is used as a primary method of communication by over 500,000 deaf citizens of North America. ASL is a manual language consisting of upper extremity movements occupying the three dimensional space around the signer's body. All movement may be described by discrete parameters that outline the kinematic movements of the arms. These parameters include key locations, handshapes, orientations of the hand, predefined movement patterns, and multiple end effectors to fine tune the shape of the movements.

These specific human movements can be modeled by using a commercially available tool for the animation of human movement. This tool is UGS's Jack Software that recreates human movement by using joint angle limits and inverse kinematics methods when designating limb movement to a destination. A Python interface to Jack controls the Sign Synthesizer by running program scripts; manual text or output from voice recognition software is inputted to call parameter files with the gesture information. The Sign Synthesizer is a tool that may be used to animate gestures contained within the vocabulary of a sign language acheived by the user's selection of previously defined hand shapes and corresponding positions and the system integration of transitions between these selected positions. Advantages of the Sign Synthesizer include the ability to generate a human avatar in 3-D for implementation in a virtual environment. The Sign Synthesizer also incorporates a number of important features desirable for the development of virtual experiences within experimental protocols. These important features include: a stereo enabled virtual environment, ability to create MPEGs or sequential still images of animation, and a custom Graphical User Interface (GUI) to enable creation of new signs. Being able to include other objects or people in a virtual environment with a signing avatar is a novel feature. Features of the virtual signer such as color, size, and gender may be edited through clicks of the mouse. The basic pull down menus and data inputs of the parameter input requires little technical knowledge to create new gestures. A GUI takes all the parameters identified for each sign and prints them to a file. Animation of sign language is a significant step toward a fully integrated ASL to English translator. The flexibility of the system in addition to the built-in features associated with the Jack software package makes it possible for future applications, such as creating sign dictionaries for other sign languages, using the avatar as a direct translator, and using the parameters in the sign dictionary for comparison in sign language recognition.

Refreshments will be served.