

Multimodal Interfaces in Virtual Reality

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Why Multimodal Interaction?

- Gives the user a more natural interface
- Using more than one modality allows the user to make a choice of how to interact with the computer
- Allows the user to interact even when both hands are occupied
- More than one input stream helps the interface determine what the user wants to do
 - important when dealing with speech, hand, and gesture recognition

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Multimodal interaction can be defined as the combination of multiple input modalities to provide the user with a richer set of interactions compared to traditional unimodal interfaces. The combination of input modalities can be divided into six basic types: complementarity, redundancy, equivalence, specialization, concurrency, and transfer.

Complementarity. Two or more input modalities complement each other when they combine to issue a single command.


Redundancy. Two or more input modalities are redundant when they simultaneously send information to the application.

Equivalence. Two or more input modalities are equivalent when the user has a choice of which modality to use.

Specialization. A particular modality is specialized when it is always used for a specific task because it is more appropriate and/or natural for that task.

Concurrency. Two or more input modalities are concurrent when they issue different commands that overlap in time..

Transfer. Two input modalities transfer information when one receives information from another and uses this information to complete a given task.




3D User Interface Design
functional techniques, theory and practice

Flow Visualization App (1)

- **VE for visualizing fluid flow about a dataset**
- **Combines hand gestures and speech**
- **Allows user to create, drop, pickup and remove visualization tools**
- **Dataset and visualization tools can be manipulated simultaneously**
- **Users can save important viewpoints**
- **Has recording and playback of visualization animations**
- **VIDEO**

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This slide describes MSVT, the Multimodal Scientific Visualization Tool. For more information, see the MSVT paper in the papers section of the course notes.



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Flow Visualization App (2)

- **Developed at the Technology Center for Advanced Scientific Computing and Visualization (TASCV)**
- **Artery visualization tool**
- **Combines hand gestures and speech**
- **Allows the user to create streamlines and dust particles**
- **Uses notion of the control buoy**
- **Allows for visualization of stress and pressure on the artery wall**
- **VIDEO**

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This slide describes the Artery Visualization System.

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Conceptual Room Layout

- VE for room layout and interior design
- Combines hand gesture and speech
- Use a point, speak, and cycle interaction metaphor
- VIDEO



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2000

This slide describes Room Designer, an application for conceptual room layout and interior design. For more information see the note in the papers section of the course notes.