CSE 190: 3D User Interaction

Lecture #13: System Control 3
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Announcements

- Homework assignment #4 due Friday, March 8th at 1pm in Sequoia lab 142
- Grading starts at 12:30
- Sign out Kinect in my office
Paper Presentations Next Lecture

- Alisha: Simultaneous categorical and spatio-temporal 3D gestures using Kinect
- Alvin: 3D-2D spatiotemporal registration for sports motion analysis
- Edward: TBD
Paper Presentations Today

- Kristina: The acute cognitive benefits of casual exergame play
- Miguel: The King-Kong Effects: Improving Sensation of walking in VR with visual and tactile vibrations at each step
- Andrew: Biofeedback game design: using direct and indirect physiological control to enhance game interaction
System Control Cont’d
Graphical Menus – Design

- Placement
  - world-referenced (freely in world)
  - object-referenced (centered to object in world)
  - head-referenced (view centered)
  - body-referenced
  - device-centered

- Selection
  - Degrees of freedom, constraints

- Representation and structure
  - form, size, space
  - hierarchy: functional and semantic grouping, context sensitivity, control coding
Voice Commands

- Speech recognition
- Spoken dialogue techniques
- Requires
  - speech recognition engine
    - speaker dependent vs. independent
    - varying vocabulary size
  - good microphone
- Invisible to the user
- Push to talk
Gestural Commands

- One of the first system control techniques
- Posture – static hand configuration
- Gesture – dynamic movement
Gesture Command Types

- Speech connected gestures: spontaneous gesticulation while talking
- Mimic gestures: directly describe a concept
- Symbolic: e.g., thumbs up
- Sign language: artificial vocabulary
Tools

- Provide directness of interaction
- Familiar (real-world devices)
- Physical tools
  - real physical objects (props)
  - may have graphical representation
- Virtual tools

*CavePainting* (Keefe 2001)
Tools – Virtual Tool belt
Tools – Tricorder

- Physical input device has virtual representation
- Functionality changes according to selected tool
Tools – Tangible User Interface

Reactable (Jorda, 2005)
Multimodal System Control

- More than one input modality (speech, gesture, facial expression, etc...)
- Advantages
  - Allows decoupling of interaction modes
    - Avoids switching between, e.g., navigation and other interaction mode
  - Error reduction and correction
  - Flexibility and complementary behavior
  - Control of mental resources: reduce cognitive load
Multimodal Interaction – Examples

Hand gestures and speech [Van Dam et al. 2000]