3D User Interface Symbolic Input Techniques

Lecture #12: Symbolic Input

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Universal 3D Interaction Tasks

- Navigation
  - Travel – motor component
  - Wayfinding – cognitive component
- Selection
- Manipulation
- System control
- Symbolic input

Symbolic Input

- Entering text, numbers, math, symbols, etc...
- Difficult in 3DUIs
  - rarely present in immersive systems
  - don't always have a keyboard

Usage Scenarios

- Design automation
- Filename entry
- Labeling, Annotation, and Markup
- Precise object manipulation
- Setting parameters
- Communication

Features of Symbolic Input in 3DUIs

- Users often standing
- Users may physically move around
- No surface to place keyboard
- Difficult to see in low-light conditions
- Different for different hardware configurations

Symbolic Input Tasks

- Alphanumeric input
- Editing alphanumeric symbols
- Markup input

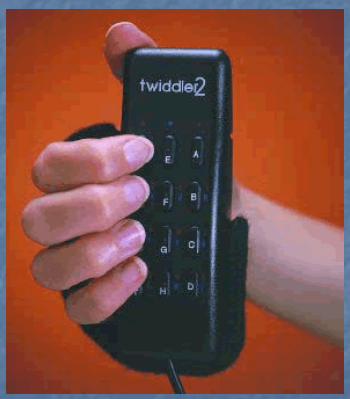
Symbolic Input Techniques

- Keyboard-based techniques
- Pen-based techniques
- Gesture-based techniques
- Speech-based techniques

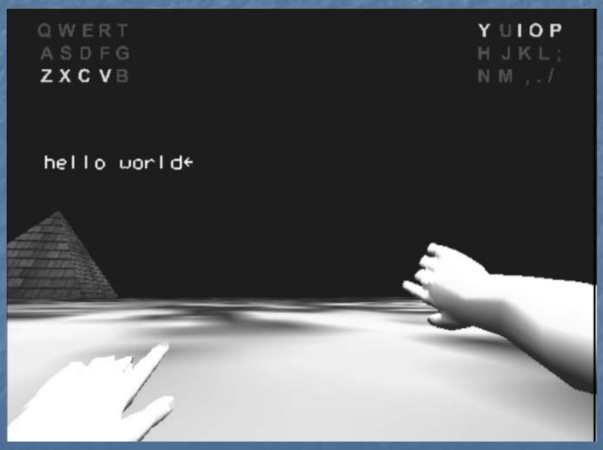
Keyboards – Miniature Keyboards

Keyboards – Low Key Count Keyboards

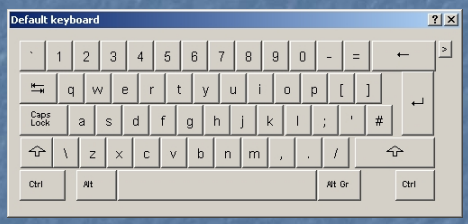
Keyboards – Chord Keyboards



Keyboards – Pinch Keyboard

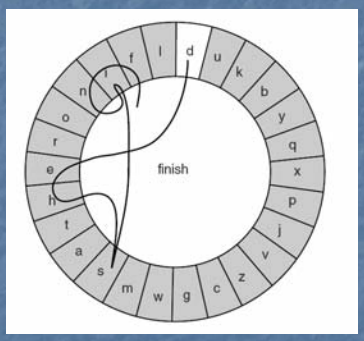


Keyboards – Soft Keyboards

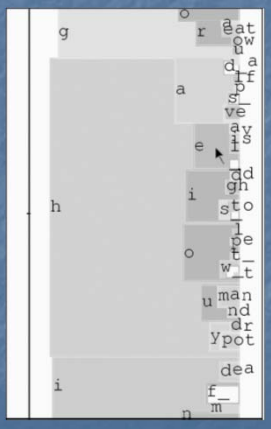


Pen-Based Keyboards

- Pen-stroke gesture recognition



Cirrin soft keyboard (Mankoff and Abowd 1998)



Dasher (Ward et al., 2002)

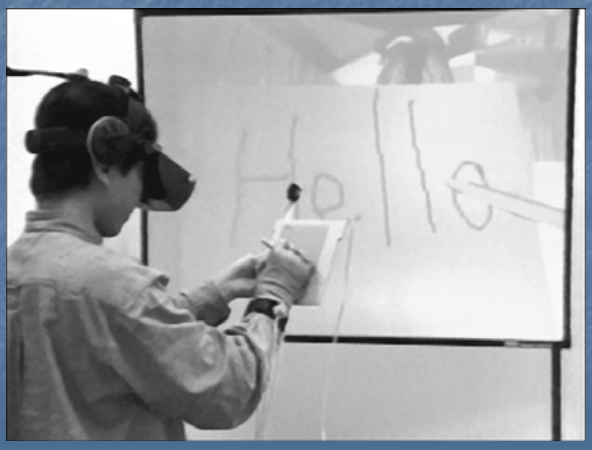
Pen-Based Keyboards – Shape Writer

Zhai and Kristensson 2002

http://shuminzhai.com/shapewriter_research.htm#_Videos

Pen-Based Keyboards – Digital Ink

- Poupyrev et al., 1998



Gesture-Based Techniques

- Sign language
- Numeric gestures
- Instantaneous gestures

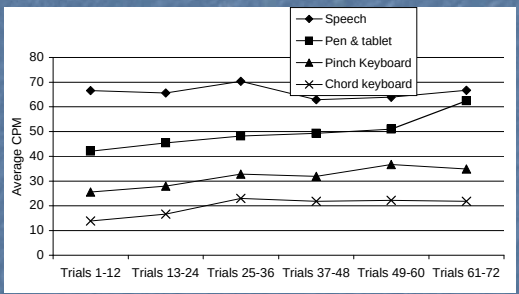
American Sign Language with Kinect
http://www.youtube.com/watch?v=qFH5rSzmgFE

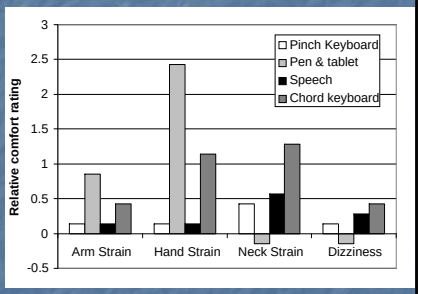
Speech-Based Techniques

- Single character speech recognition
- Whole word speech recognition
- Unrecognized speech input

User Performance

- Bowman et al. 2002





Next Class

- Design of 3D UIs
- Readings
  - 3DUI Book – Chapter 9