

3D User Interface Symbolic Input Techniques

Lecture #12: Symbolic Input

Spring 2016

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Universal 3D Interaction Tasks

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

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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



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Keyboards – Chord Keyboards

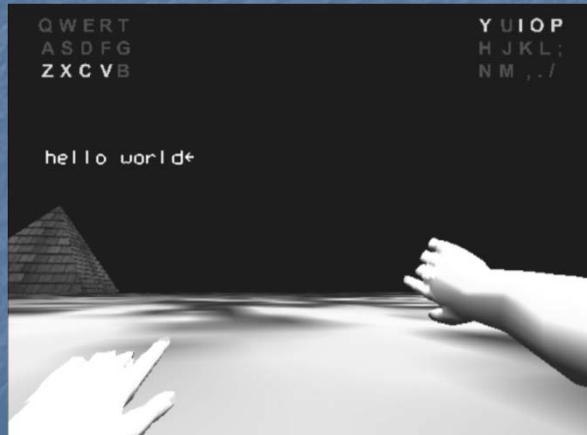


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Keyboards – Pinch Keyboard



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Keyboards – Soft Keyboards



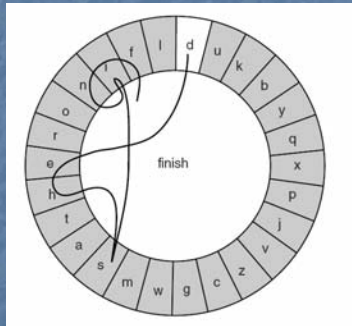
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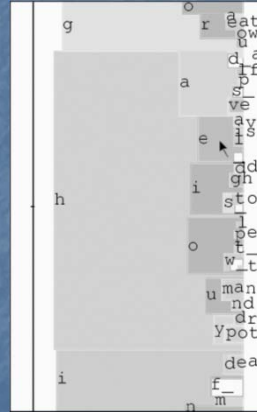
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Pen-Based Keyboards

- Pen-stroke gesture recognition



Cirrin soft keyboard (Mankoff and Abowd 1998)



Dasher (Ward et al., 2002)

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Pen-Based Keyboards – Shape Writer

Zhai and Kristensson 2002



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

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Pen-Based Keyboards – Digital Ink

- Poupyrev et al., 1998



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Gesture-Based Techniques

- Sign language
- Numeric gestures
- Instantaneous gestures

American Sign Language with Kinect
<http://www.youtube.com/watch?v=qFH5rSzmGFE>

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Speech-Based Techniques

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

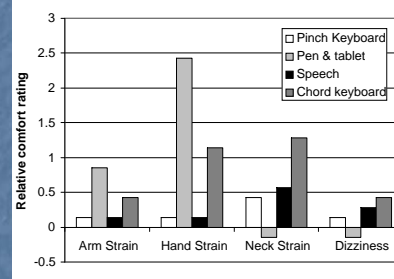
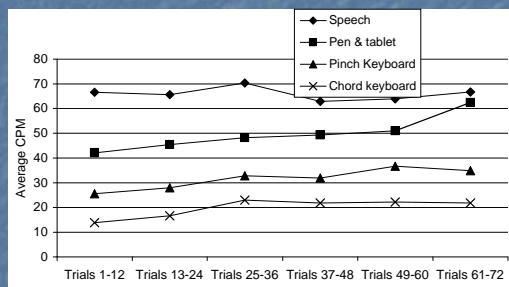
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User Performance

- Bowman et al. 2002



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Next Class

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