

# 3D User Interface Symbolic Input Techniques

Lecture #11: Symbolic Input

Spring 2011

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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



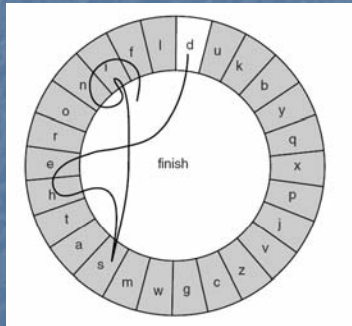
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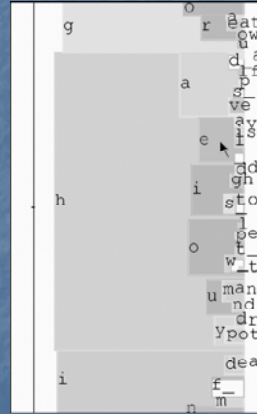
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# Pen-Based Keyboards

- 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



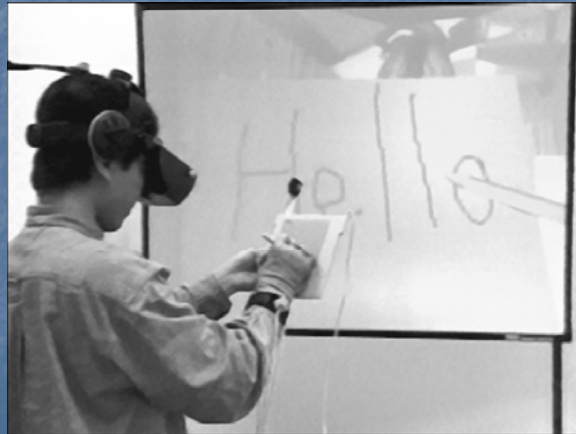
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## Pen-Based Keyboards – Digital Ink

- Poupyrev et al., 1998



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## Gesture-Based Techniques

- Sign language
- Numeric gestures
- Instantaneous gestures

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# Speech-Based Techniques

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

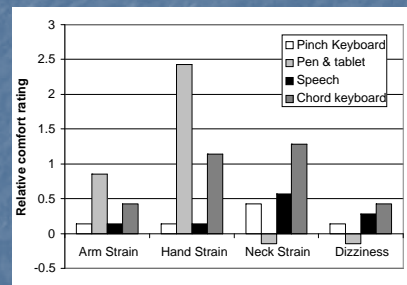
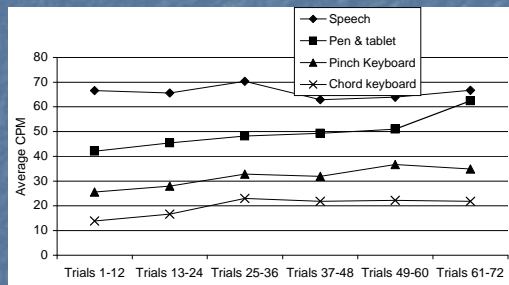
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# User Performance

- Bowman et al. 2002



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# Next Class

- System Control
- Readings
  - 3DUI Book – Chapter 9