



CSE 190: 3D User Interaction

Lecture #14: Symbolic Input
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Announcements

- Homework assignment #4 due Friday, March 8th at 1pm in Sequoia lab 142
 - Grading starts at 12:30
 - Does everyone have a Kinect?

Paper Presentations Next Lecture

- Kevin: TBD
- Nico: Increasing Agent Physicality to Raise Social Presence and Elicit Realistic Behavior
- Justina: Breaking the status quo: Improving 3D gesture recognition with spatially convenient input devices

Paper Presentations Today

- Alisha: Simultaneous categorical and spatio-temporal 3D gestures using Kinect
- Alvin: 3D-2D spatiotemporal registration for sports motion analysis
- Edward: Digits: freehand 3D interactions anywhere using a wrist-worn gloveless sensor

Universal 3D Interaction Tasks

- Navigation
 - Wayfinding – cognitive component
 - Travel – motor 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

- Filename entry
- Labeling, annotation, markup
- Precise object manipulation
- Design annotation (e.g., architecture)
- Setting parameters numerically
- Communication via text messages
(collaborative applications)

Boundary Conditions 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 entered alphanumeric symbols
- Markup entered text: highlighting, font specification, text color, etc.

Symbolic Input Techniques

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

Miniature Keyboards



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PRODUCT FOR A WIRELESS LIFE



PDA GOLD
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Low Key Count Keyboards

- Reduced number of physical keys
 - Example: mobile phones



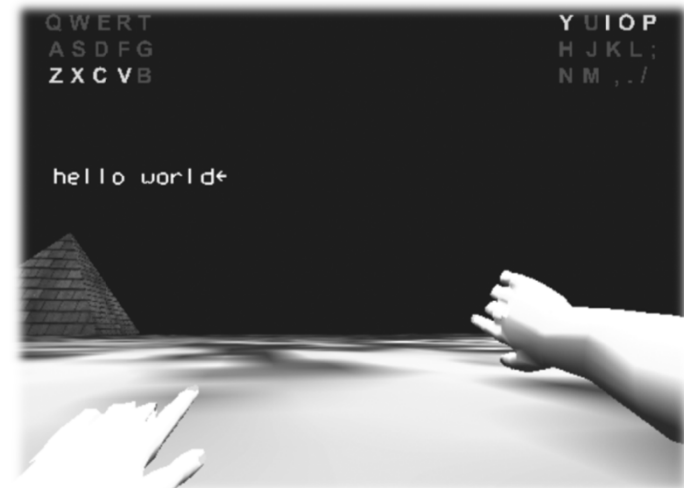
Chord Keyboards

- Keyboard with functionality of a full-sized keyboard, but using many fewer keys
- Often requires pressing multiple keys at the same time (chord)



Pinch Keyboard

- Bowman et al. 2001
- Pinch with a finger and the thumb represents a key press by same finger
- Uses rotation of hand to reach “inner keys”
- Uses hand distance from body to distinguish keyboard rows



Soft Keyboard

- Keyboard implemented in software: virtual keys
- Does not use physical keys

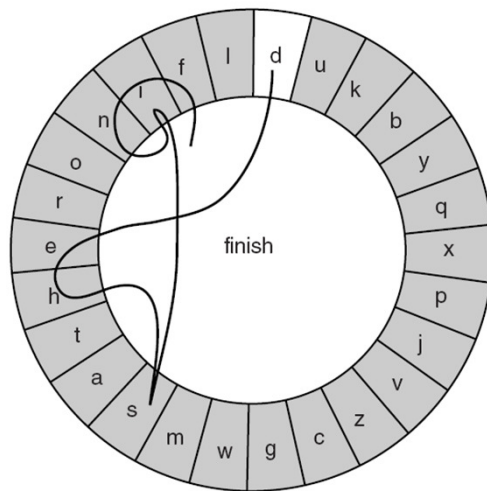


FloatOmeter (Kreiser, Schulze, Forsberg 2005)

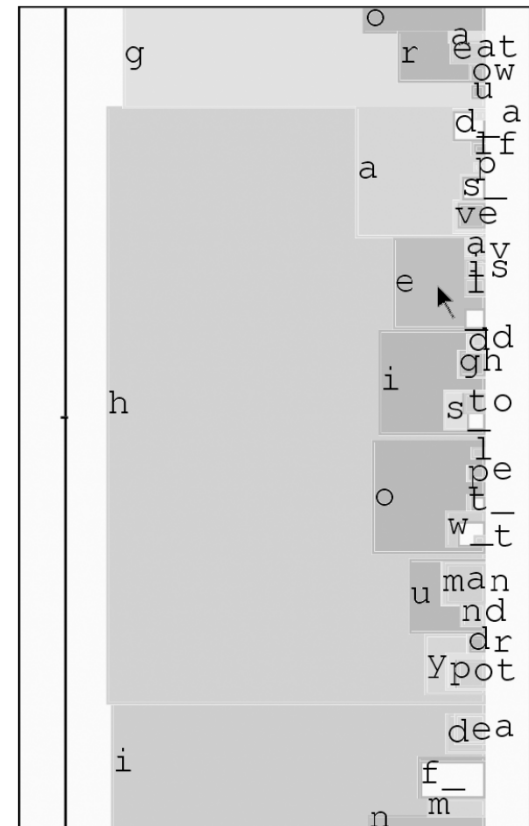


Pen-Based Keyboards

- Pen-stroke gesture recognition



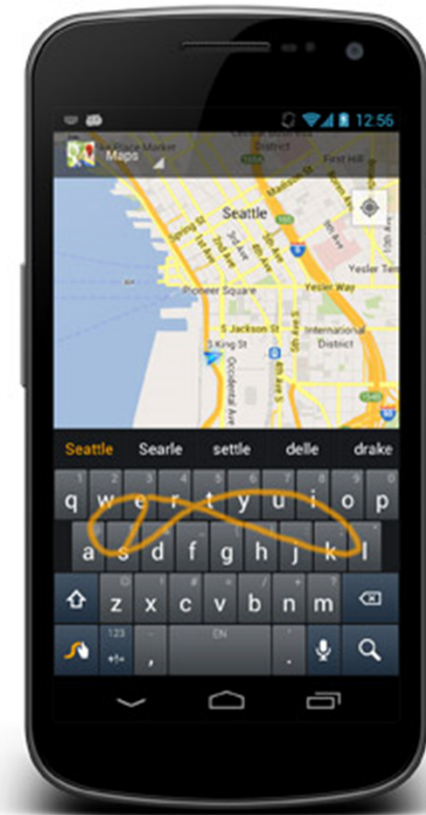
Cirrin soft keyboard (Mankoff and Abowd 1998)



Dasher (Ward et al., 2002)

Pen-Based Keyboards –Swype

- Typing by continuous finger or stylus motion across the screen keyboard



www.swype.com

Pen-Based Keyboards – Digital Ink

- Poupyrev et al., 1998
- Write with “digital ink”



Gesture-Based Techniques

- Sign language
 - Example: *American Sign Language Recognition using Kinect Skeleton features*
 - <http://www.youtube.com/watch?v=qFH5rSzm-gFE>
- Numeric gestures: one finger raised = 1

Speech-Based Techniques

- Single character: words entered by spelling them out
- Whole word: unreliable without training
- Unrecognized speech input: e.g., annotations by audio recordings

User Performance

● Bowman et al. 2002

