Superimposed Displays

Medieninformatik Hauptseminar
Sommersemester 2009
„Interactive Surfaces“
Motivation
Outline

1. Connection
2. Tracking
3. Projection
4. Navigation
5. Other Forms of Interaction
1. Connection

User View:
- Bump devices together
- Enter a password
- Press the same key simultaneously
- Visual pattern
- Gesture recognition
- NFC/RFID tags
- „Stitching“: draw a line across the devices‘ displays

Figure: Stitching [12]
1. Connection

Technical View:
- Bluetooth
- Infrared port
- WLAN
- Other wireless technologies
- Combinations for disambiguation

2. Tracking

- (Matrix of) NFC/RFID tags
- Infrared (passive / active)
- Light emission (handheld screen or flashlight)
- Ultrasonic tracking
- Camera tracking
- Inertial tracking

*top: LightSense [1], bottom: Smart Phone [2]*
3. Projection

Front projection:
- Occlusion
- Setup and maintenance is usually tedious
- Seamless integration
- Shadow as depth cue
- AR applications (HUD)

3. Projection

Rear projection:
• Self-contained system
• Requires more space
• More expensive
• Switchable diffuser → two images at once

top: LightSense [1], bottom: SecondLight [5]
next page: Map Navigation with Mobile Devices [6]
4. Navigation

Problem 1: Small screen estate
Usual solution: Scrolling („static peephole“)
→ defies spatial memory
Better: „dynamic peephole“
4. Navigation

Problem 2: Locating objects
Usual solution: Panning → slow
Better: Zooming and halo

4. Navigation

2D Movement:
- Move cursor with trackpad or joystick
- Tilt (accelerometer)
- Camera tracking
- Optical Flow Analysis

3D Movement:
- Position and orientation
- Gesture tracking

Figure: Smart Phone [2]
5. Other Forms of Interaction

- Orientation
- Selection
- Drag-and-Drop
- Pathing
- Quantifying
- Text Input

Figure: Boom Chameleon [13]
5. Other Forms – Selection

- RFID, NFC, visual tags
- Camera image of desired object
- Pointing device
- Speech / gesture recognition
- Typing name of desired object
- Programmed function keyboard
5. Other Forms – Drag-and-Drop

• Finger metaphor on tabletops
• „Hold“ object and move handheld
• Store object in a GUI element
• Two planes: drawing and clipboard

Figure: Peephole Displays [8]. Previous page: Smart Phone [2]
5. Other Forms – Drag-and-Drop

Options:
- Pick-and-Drop (+)
- Press-and-Flick
- Corresponding Gestures
- Slingshot
- Pantograph
- Radar View (++)

Figure: Multi-Display Reaching [9]
5. Other Forms – Text Input

- Usually key mapping with multi-press or dictionary (T9)
- Enhancement through concurrent chording: tilt or press multiple keys at once
- Writing on handheld screen: small size → huge benefit from dynamic peephole

*top: Chording and Tilting [10], bottom: Peephole Displays [8]*
Thanks for your attention!

Questions?