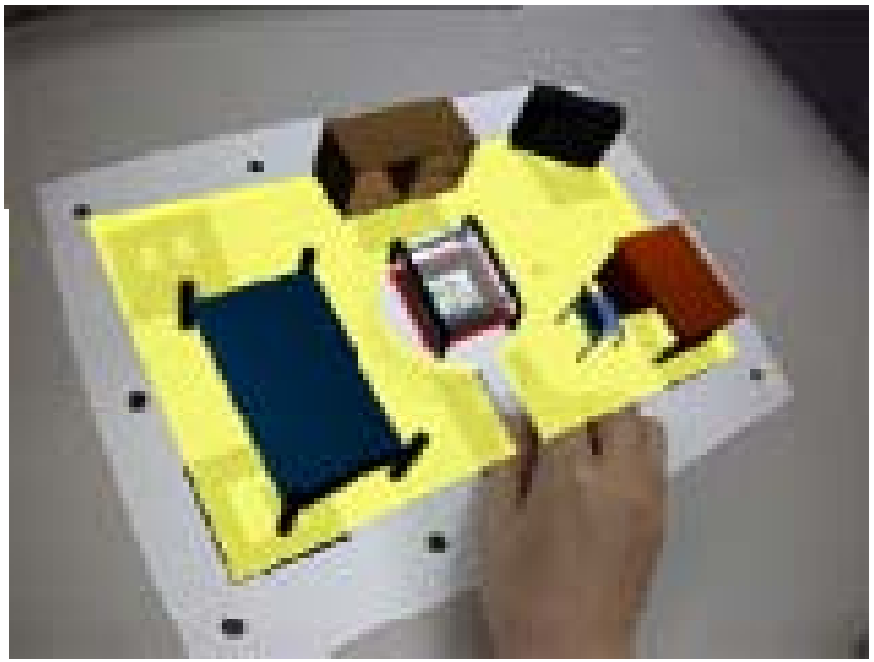
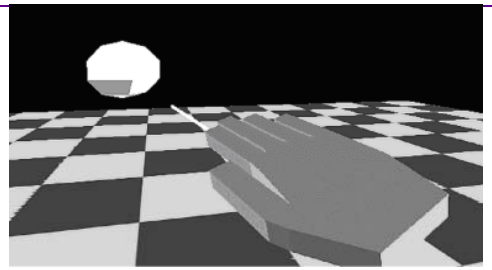
VU Augmented Reality on Mobile Devices

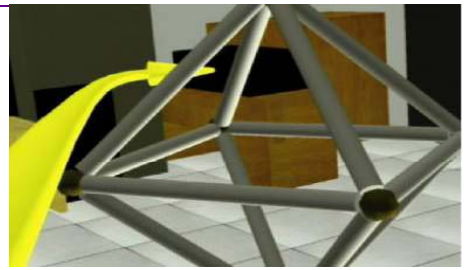
- Introduction – What is AR
- Interaction Techniques
- …

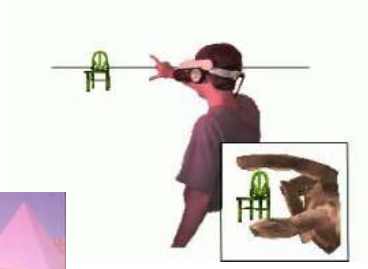


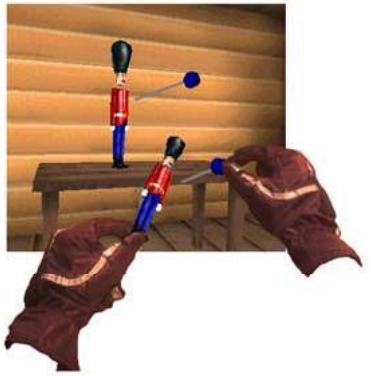
Examples of 3D UI

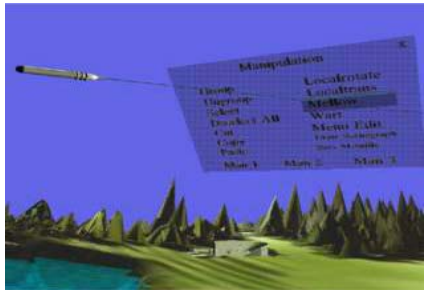
- Selection
  - Raycasting
  - Flexible pointer
- Manipulation
  - Image plane techniques
  - Duplication, scaled copy
- Navigation
  - Physical
  - Virtual
- System control & Symbolic input

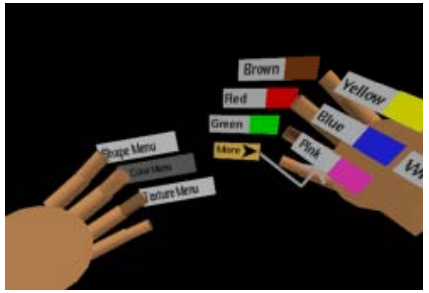












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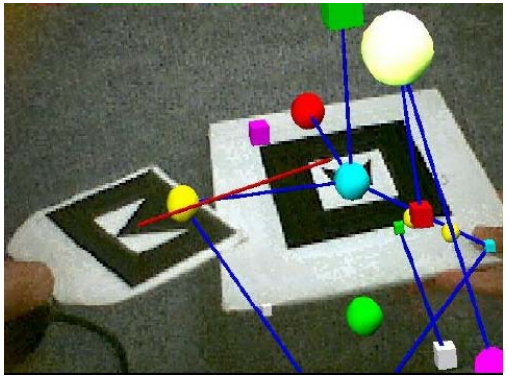
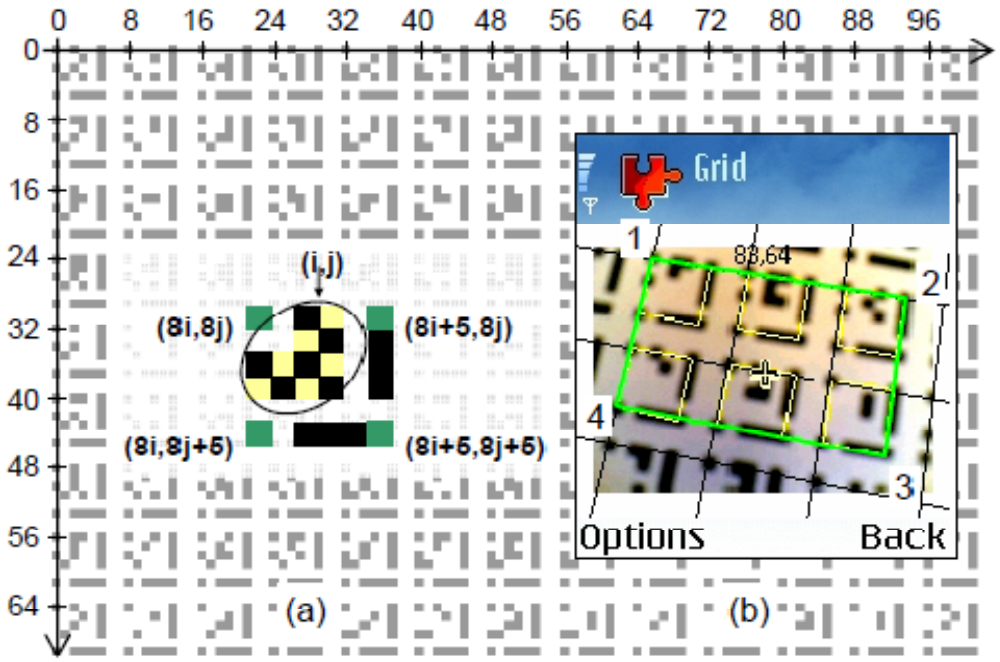
Interaction Techniques for Mobile Devices

- Embodied Interaction
- Tangible Interaction
- Hand/Foot Interaction



Navigation Zoom/Pan

- Moving mobile device is a natural navigation interaction technique
- Zoom/Pan might be over-accelerated



Mixed Interaction Space

- Mobile device movements relative to target are used for input 4 DOF

Layered Pie Menus

- Mobile device movements relative to head/target are used for menu selection
- Head movements relative to device

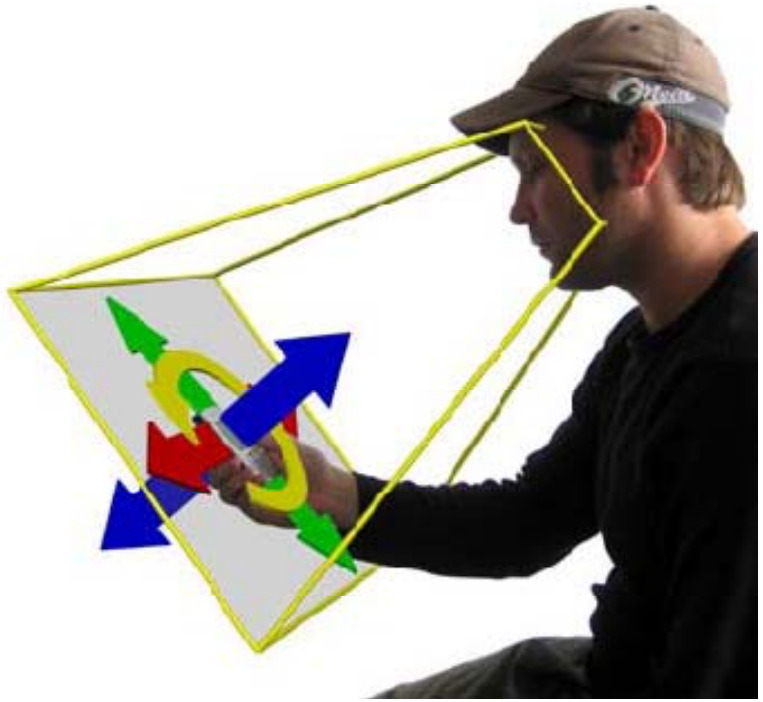
Face Tracking with

Mixed Interaction Spaces

Thomas Riisgaard Hansen

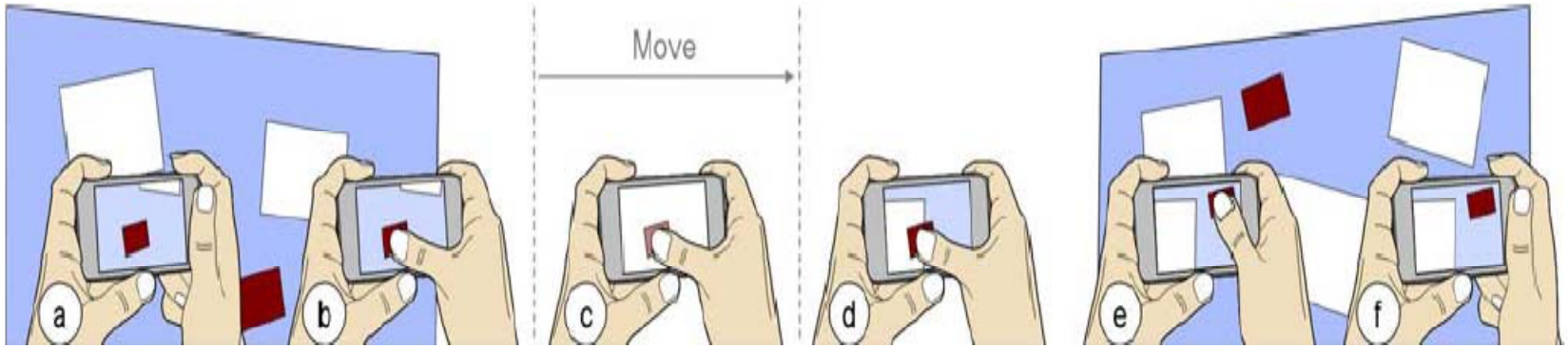
Eva Eriksson

Andreas Lykke Olesen



Point, Grab, Move, Release

- Relative to target 2D

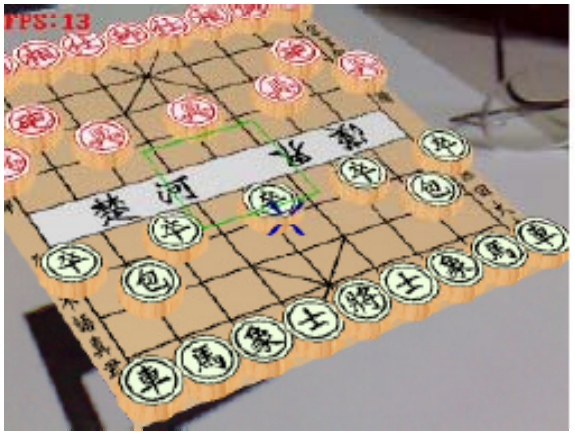


Point, Grab, Move, Release

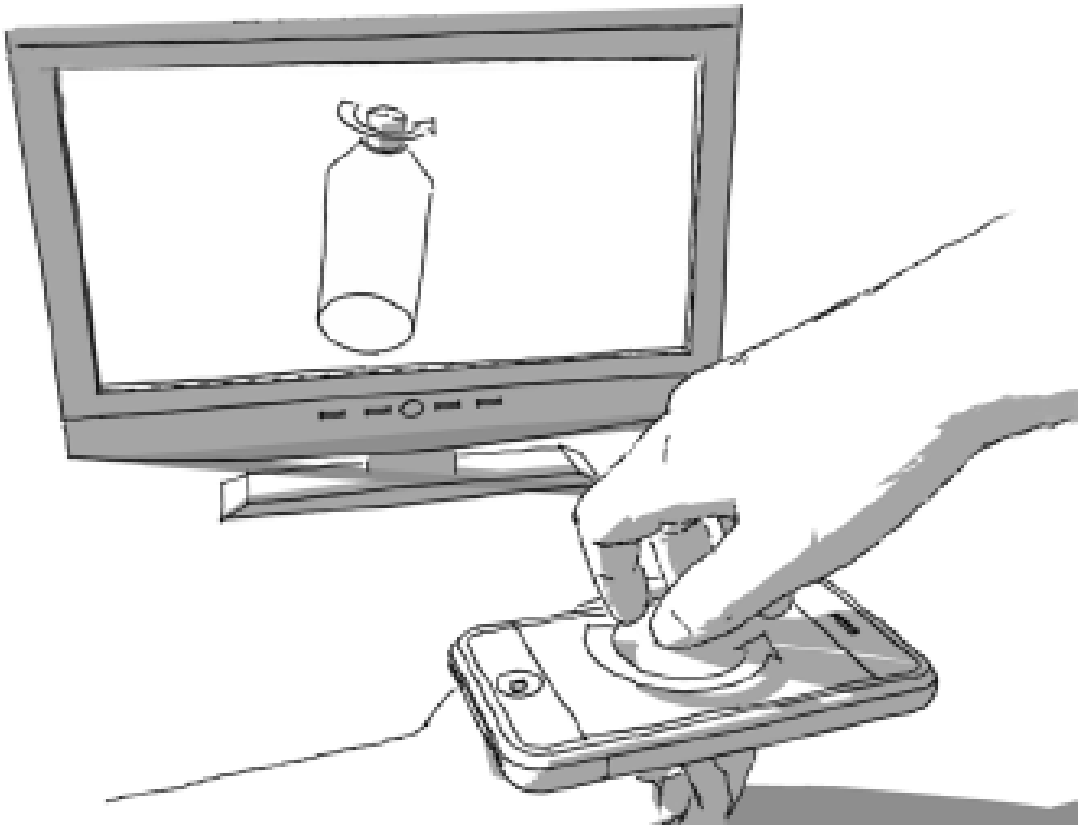
- Relative to „world“ 3D

Point, Grab, Release (Game play)

- Point, Grab, Release used for board gaming

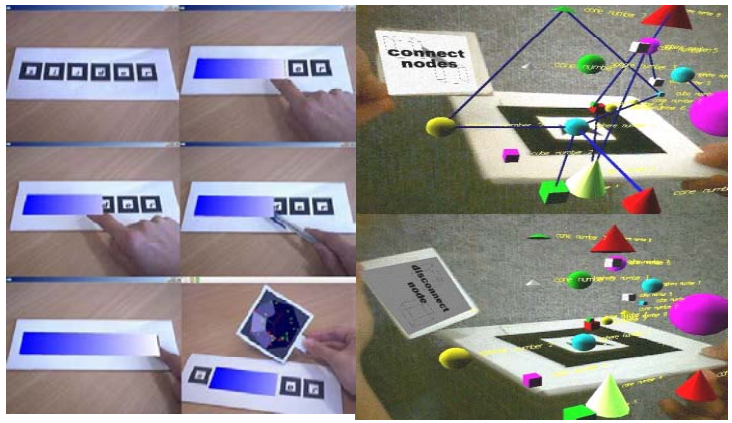


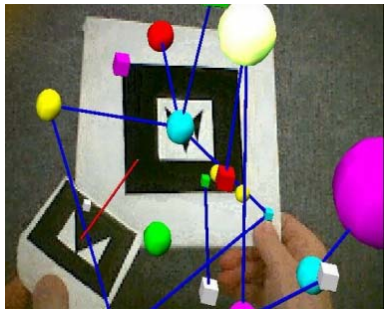
Indirect object manipulation via device movements

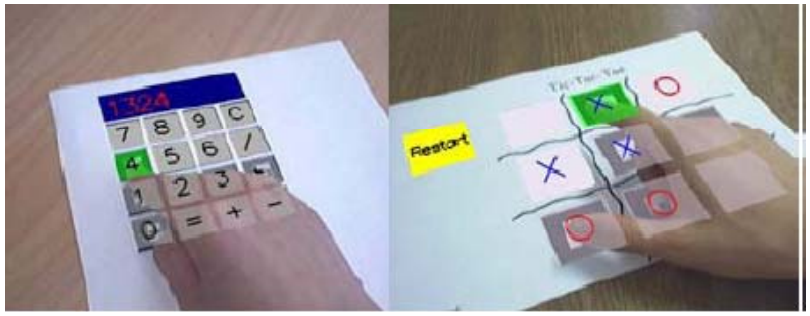


Tangible User Interaction

- Virtual Buttons
- Toggle buttons using Markers
- Proximity



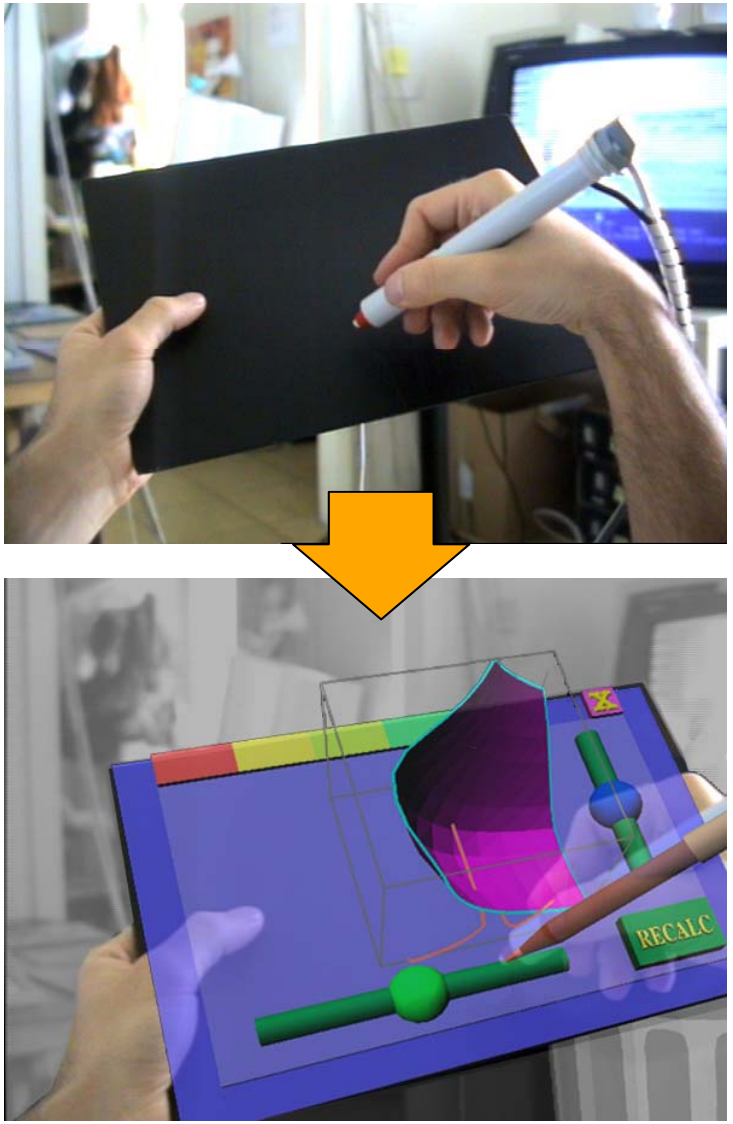




Personal Interaction Panel (PIP)

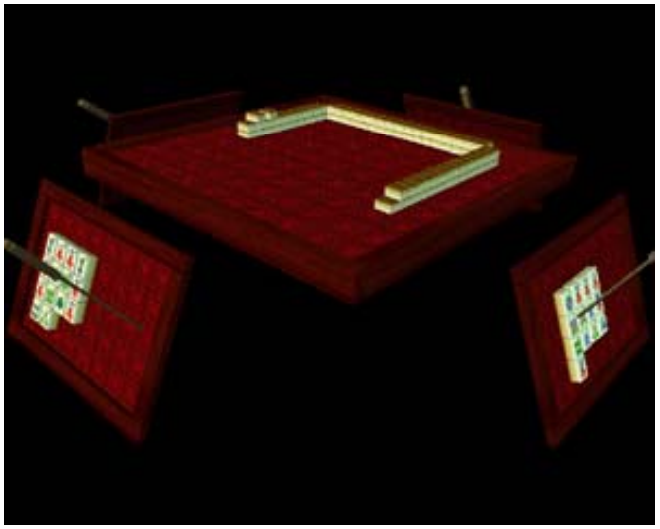
- Pen & tablet metaphor
- Simple & cheap
- Augmented graphics
- Two-handed
- Tangible feedback
- General-purpose
- Elegant embedding of 2D in 3D

- System Control !



[Szalavari'97]

Collaborative Gaming in Augmented Reality



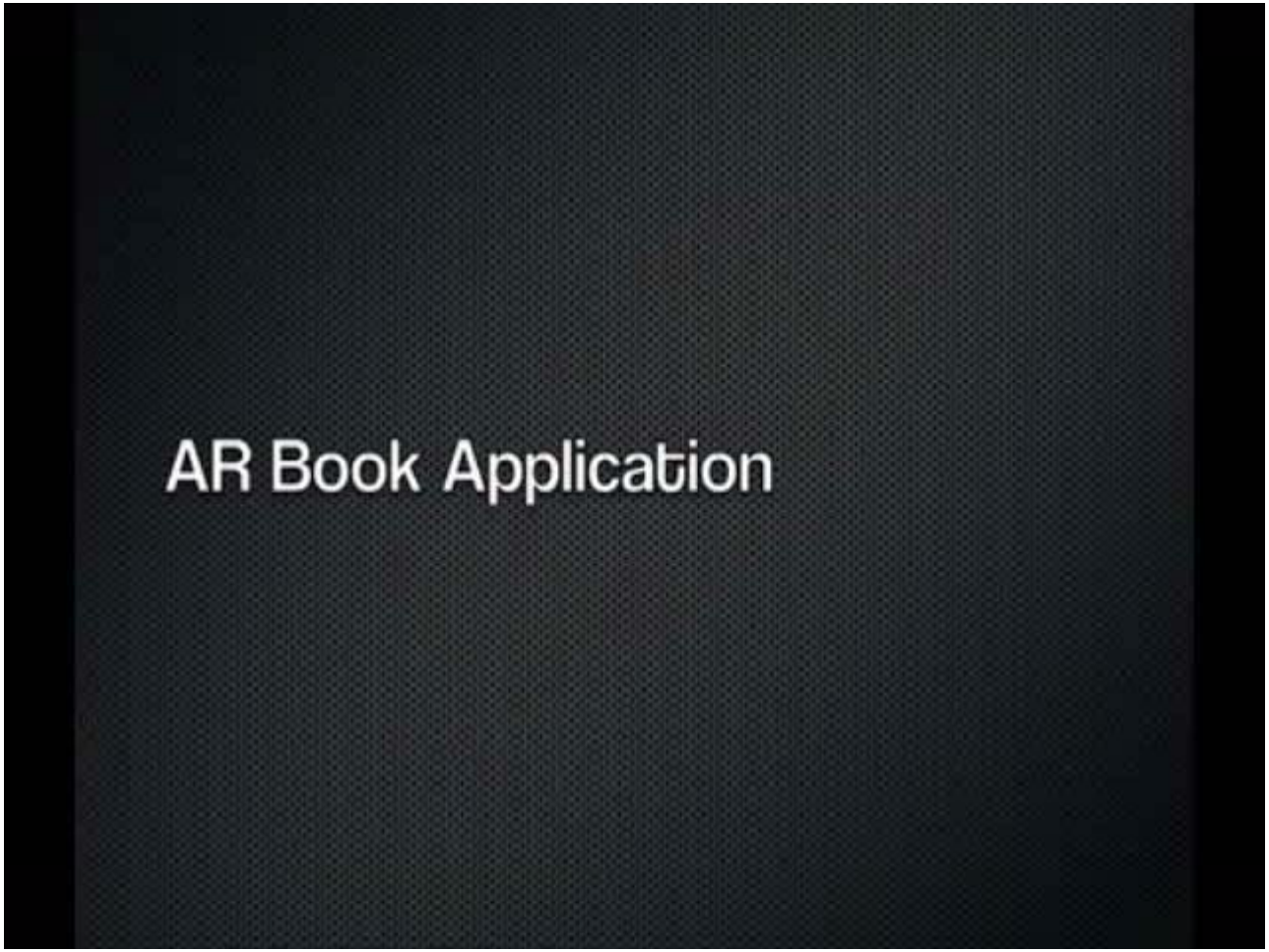
SIGGRAPH '98

MAH-JONGG

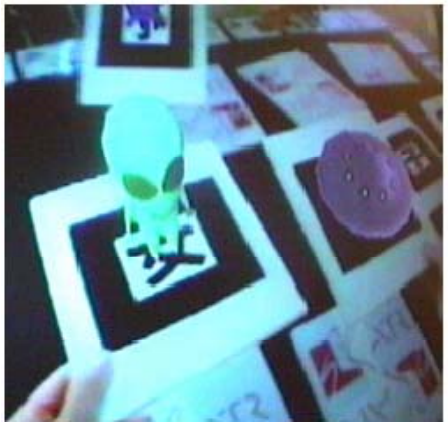
Zsolt Szalavári
Erik Eckstein
Michael Gervautz

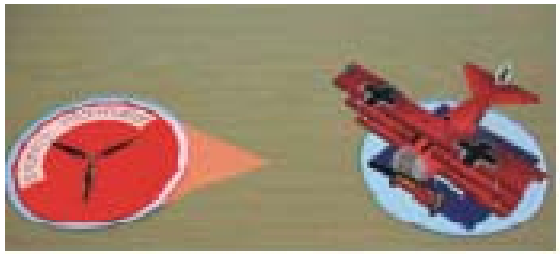
Appear/Disappear – Magic Books

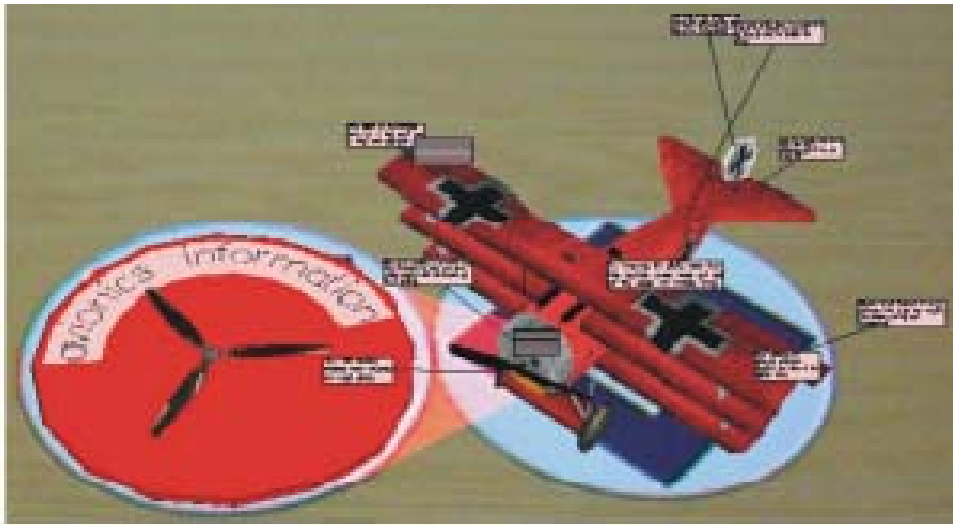
Appear/Disappear – Magic Books



Proximity and relative distance

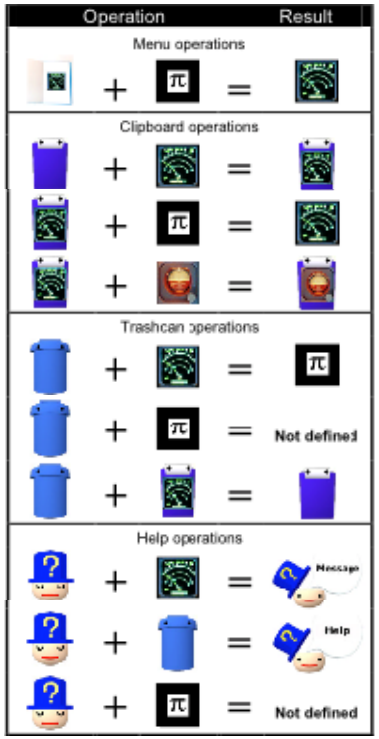






Proximity to trigger abstract command

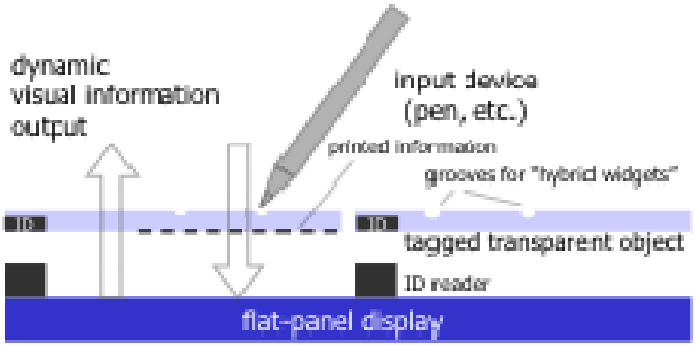
- Tangible markers
  - data
  - operations
- Integration with real world
  - annotations
- See through HMD
- Collaborative

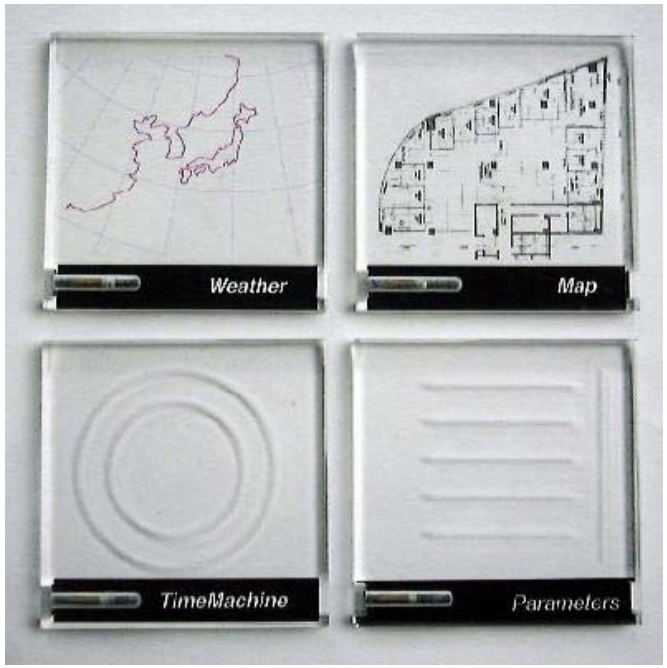


[Poupyrev'01]

Data tiles

- Transparent tiles + display
- Tiles are widgets
- Interaction with tiles

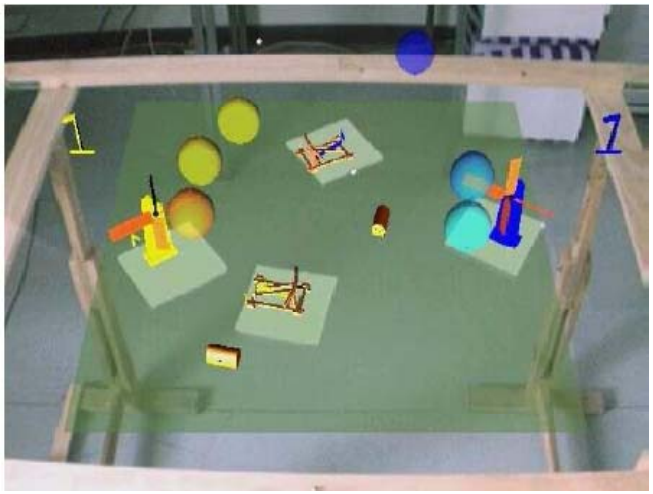


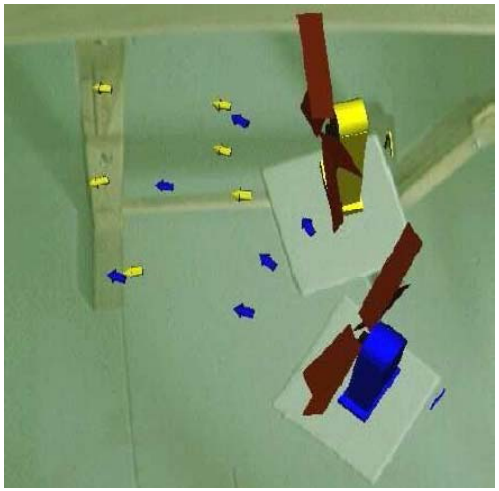


[Rekimoto'01]

Marker/Target transformation

- Targets/Markers are used to drag catapults and wind sources around





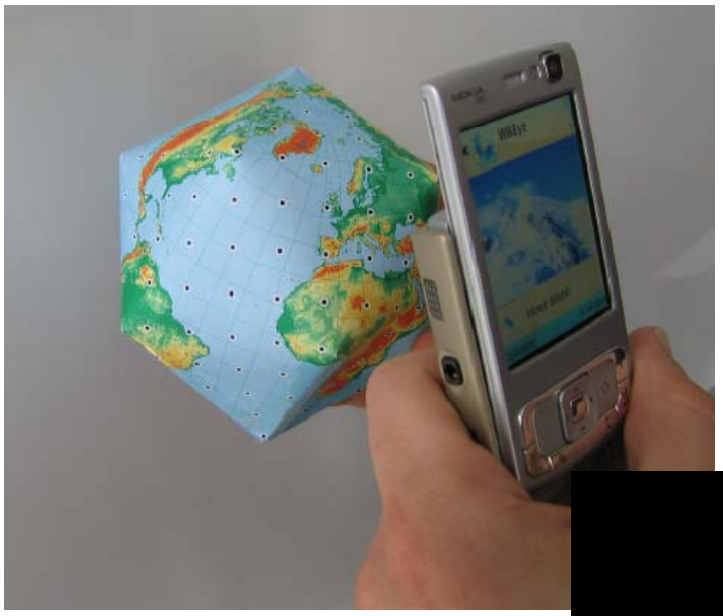
Marker/Target Cube Manipulation

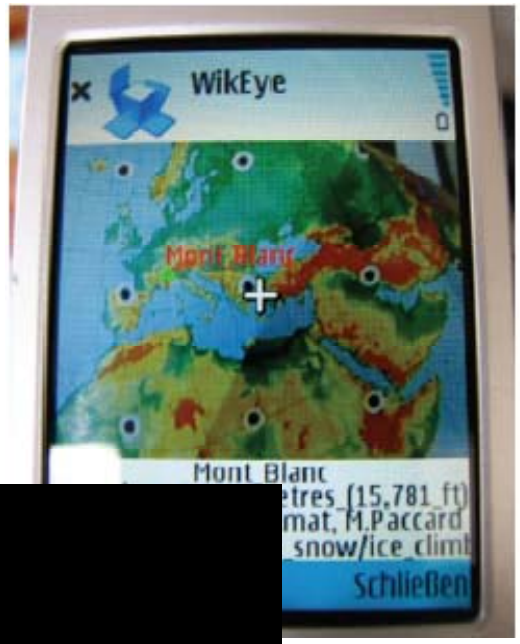
- Magic Cube

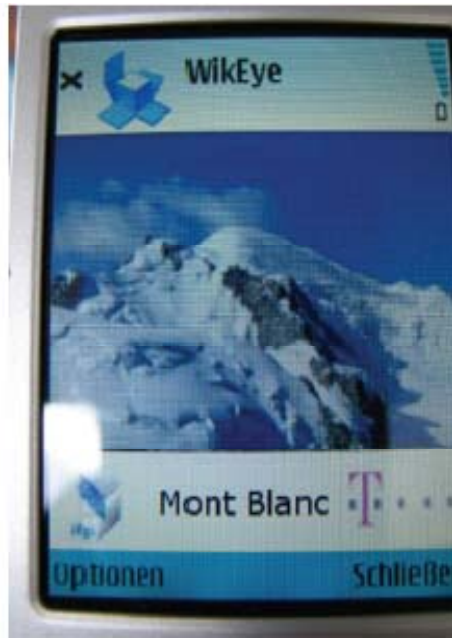
Cube Speed Run

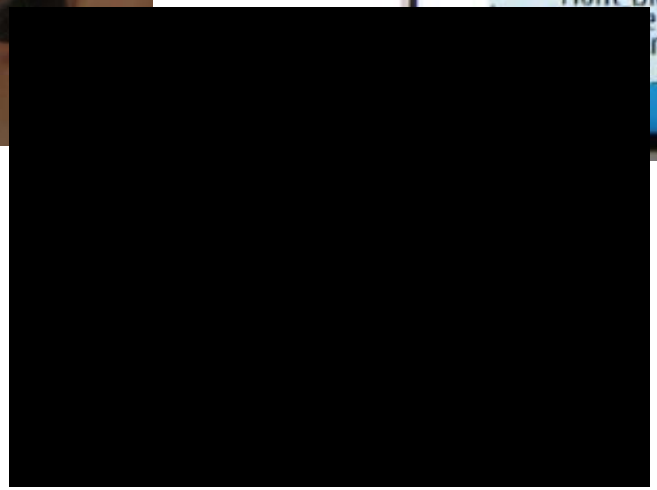
Crosshair selection

- Crosshair and „Button“ press _> Selects specific spot

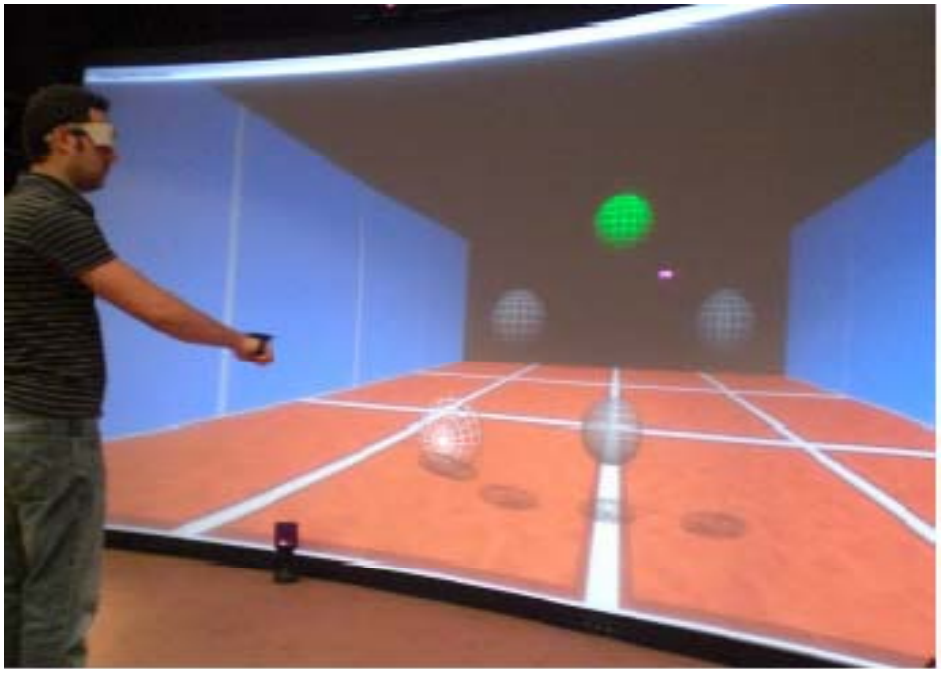


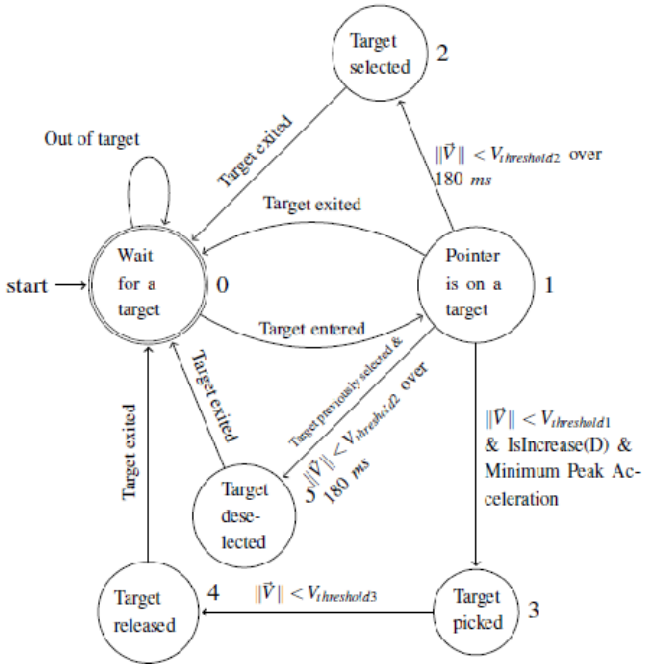




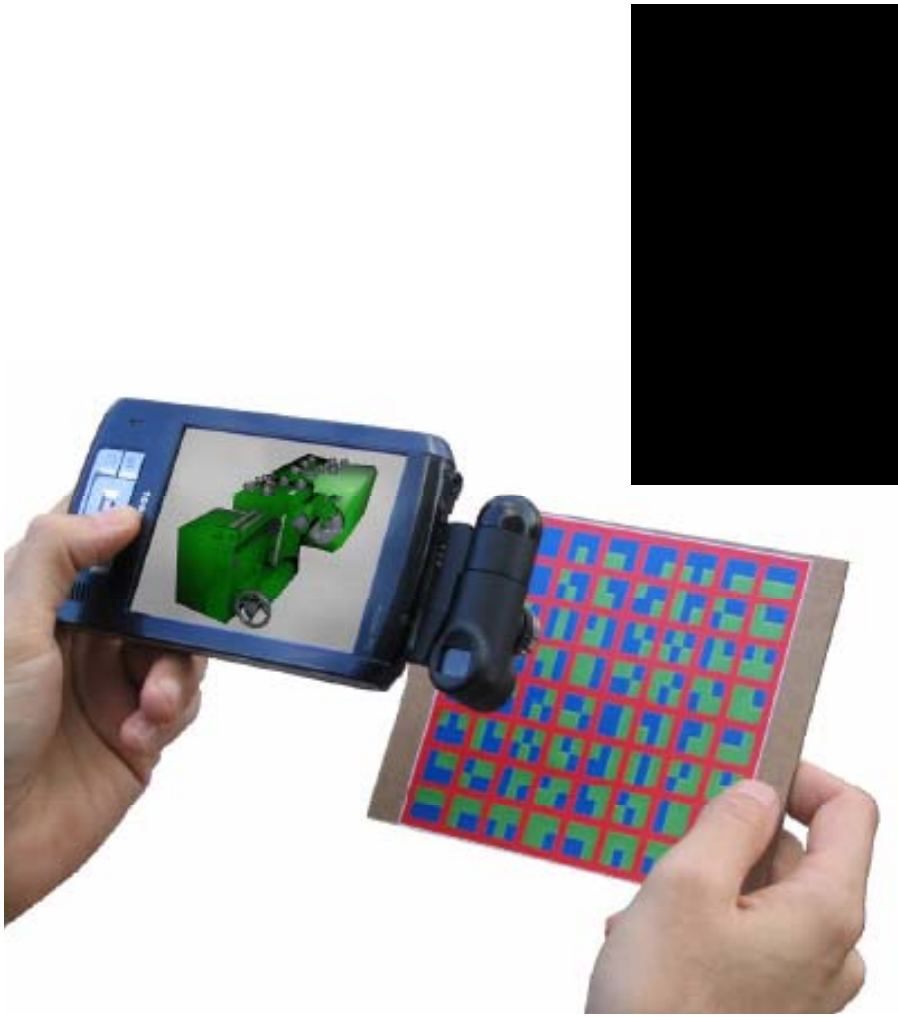


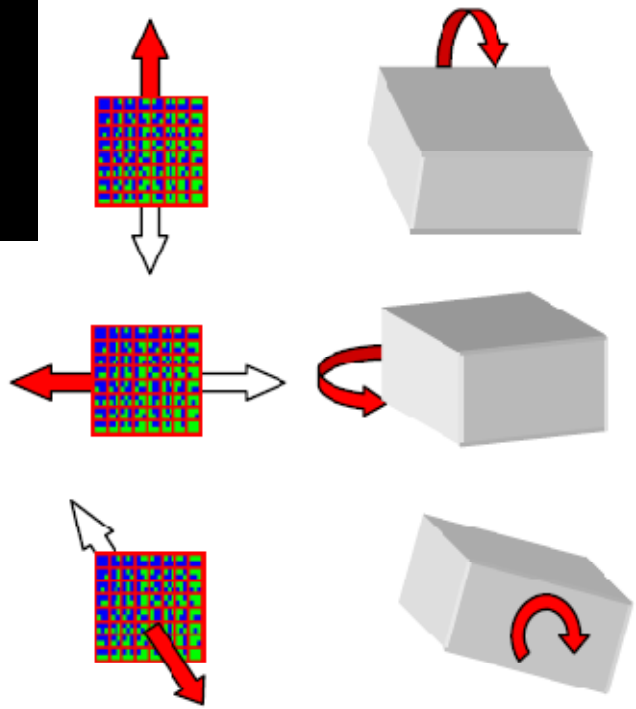
Selecting Objects with no button



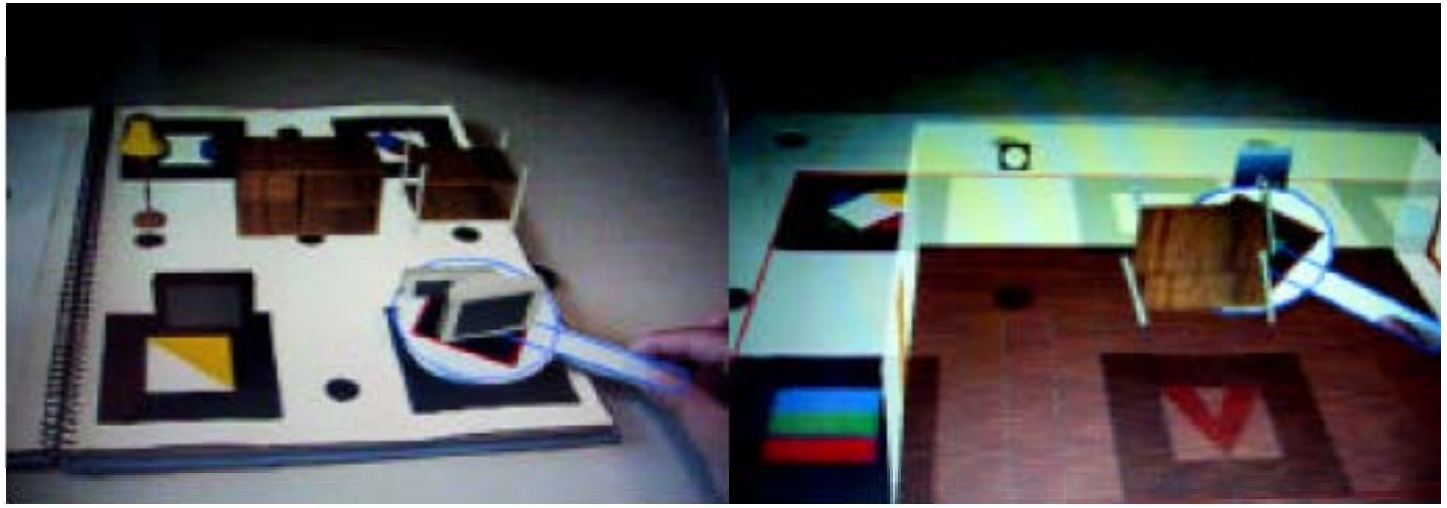


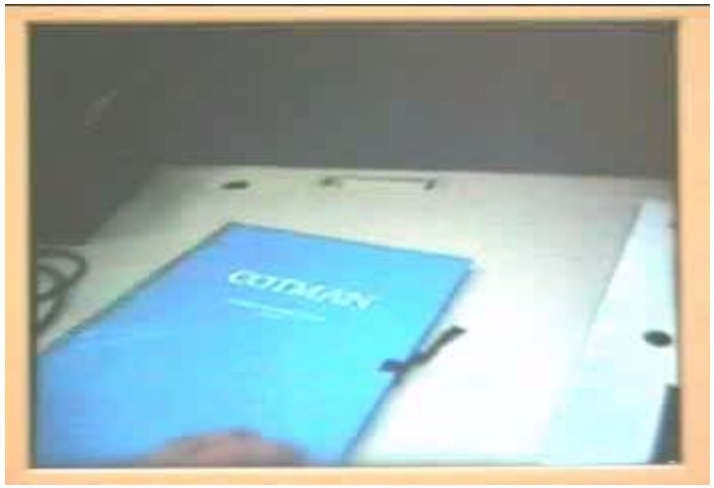
Indirect object manipulation via target movement





Wand based interaction



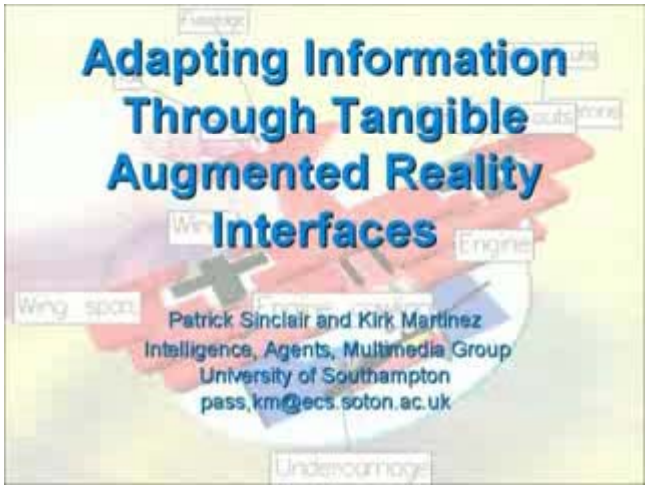


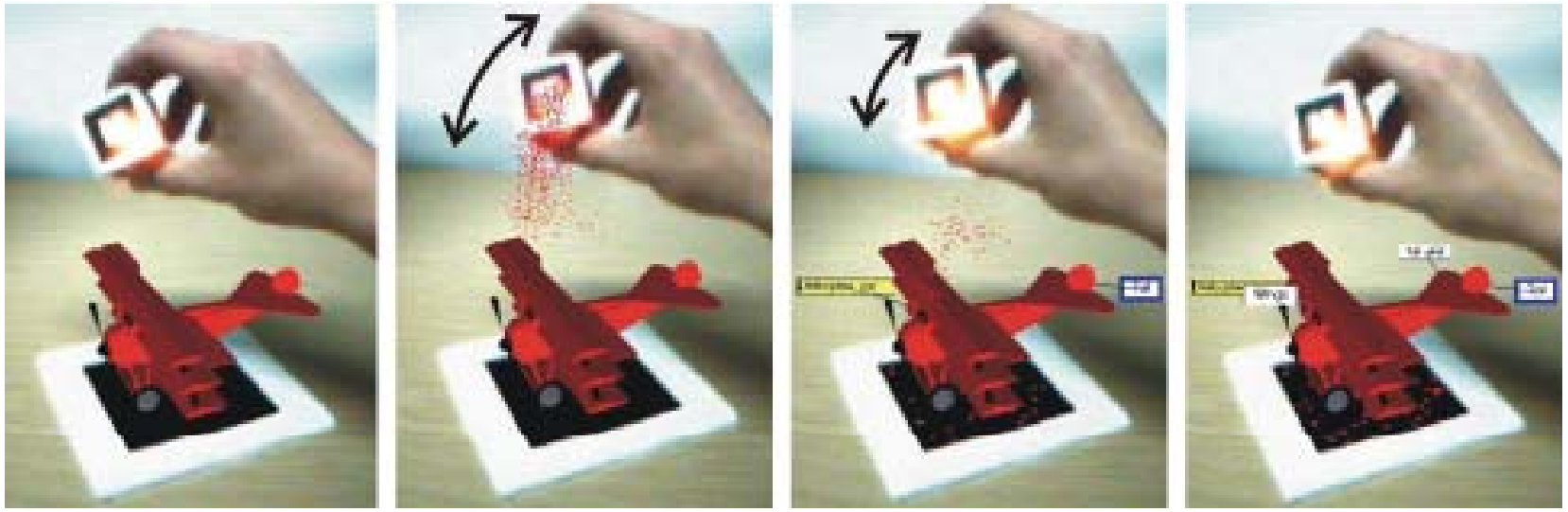
[Kato'00]

Marker/Target Gestures

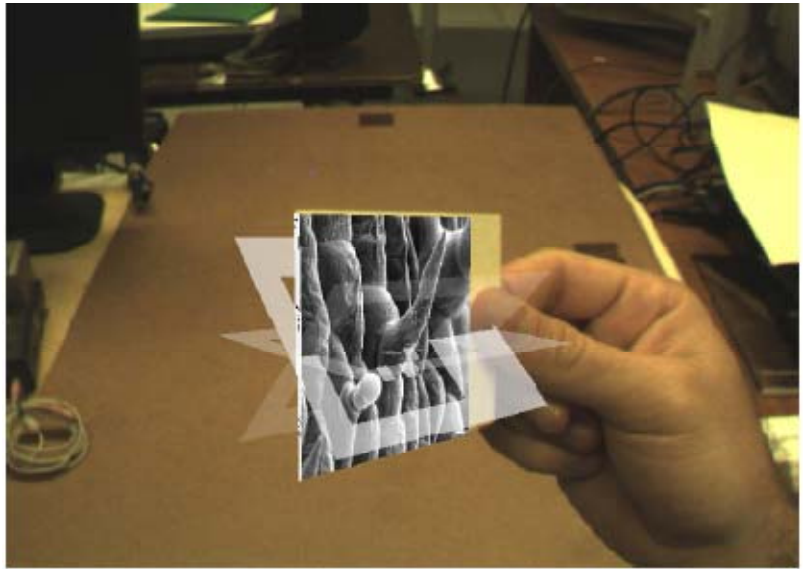
- Shake Menues

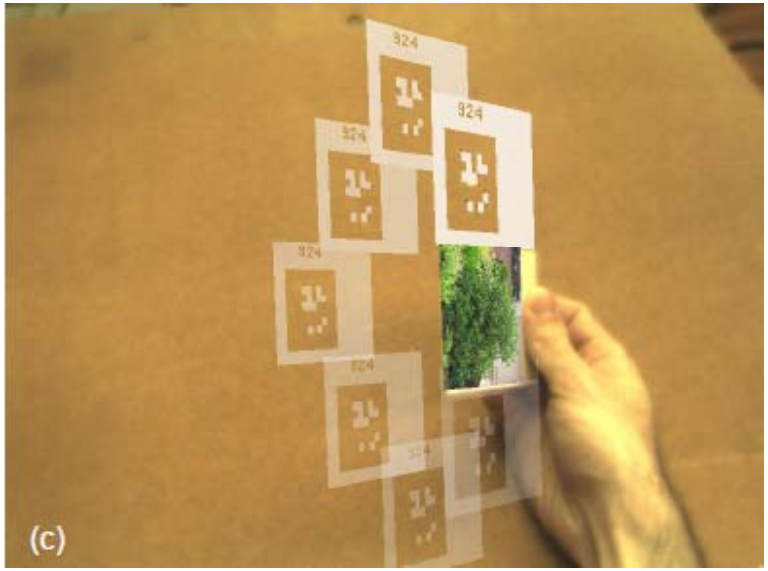
Spilling like gesture





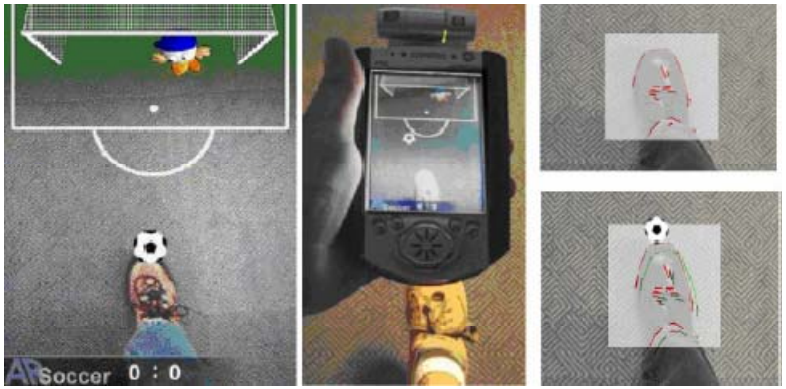
Marker/Target Gestures Learning Hints





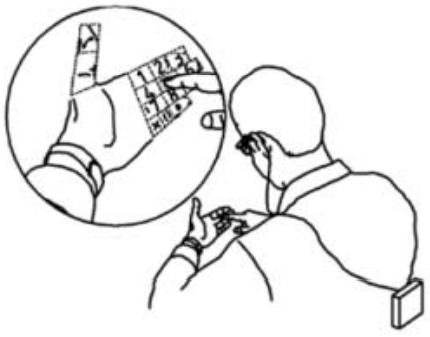
Direct Hand/ Foot Gestures

- Hand Interaction / Gesture
- Foot Interaction / Gesture



MARISIL- Mobile Augmented Reality Interface Sign Interpretation Language

[Antoniac ‘05]



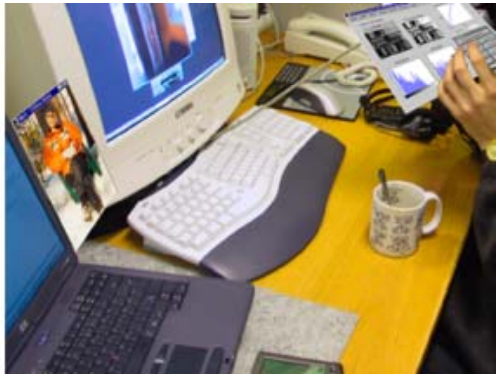
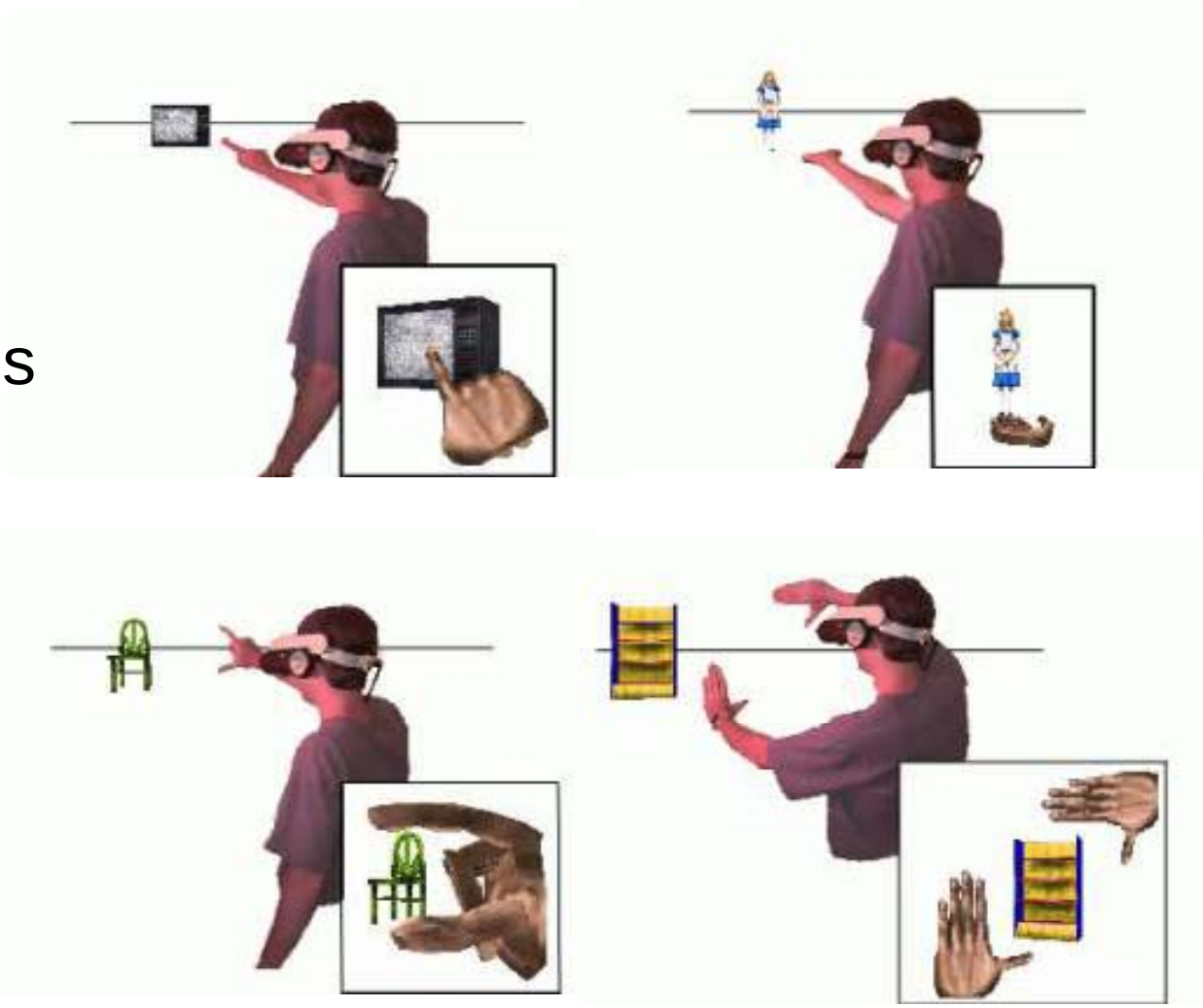


Image plane interaction

- Selection and manipulation
- Different gestures
  - Sticky finger
  - Lifting arm
  - Head crasher
  - Framing



Handy AR