Lab 1, Friday 29/10
2 sessions: [9-12] & [13-16]
Lab halls: Vit & Magenta

1) Get Windows data account from Delphi
   - Osquars Backe 2, ground floor
2) Preparation assignment: before the lab!
3) Software should be in: courses/dt2140

interactive surfaces

multimodal interaction & interfaces
course notes

Alex Olwal
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videos & material from lecture (+more):
www.csc.kth.se/~alx

previously: AR/MR

definition
- real + virtual in real environment
- interactive & real-time
- register virtual w/ real

realities

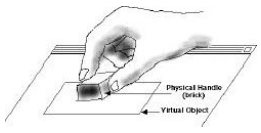

- reality – augmented reality – augmented virtuality – virtual reality

issues
- display technology (HMD, handheld, projector)
- tracking/registration

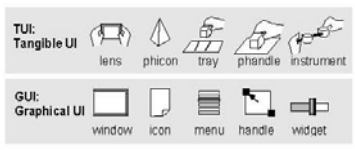
motivation for interactive surfaces

- non-intrusive technology
- natural workspace
- tangible objects
  - interact
  - touch & manipulate
- sufficient to sense on surface? (& a bit above)
- display in 2D

Bricks – Graspable Interfaces
Fitzmaurice, Ishii & Buxton 1995



Tangible Bits
Ullmer & Ishii 1997



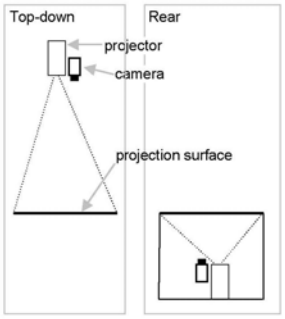
interactive surfaces

display
- computer graphics

sensing
- touch (fingers)
- objects

display

projector
- avoids interference with sensing
- configuration
  - front (top-down)
  - rear
- takes up space
  - need distance if using camera



display

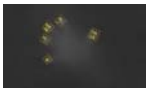
LCD
- incompatible w/ many sensors
- remove backlight
  - transparent
  - sense through
- takes up less space
  - need distance if using camera

sensing: touch

- traditional touch-screen overlays
  - typically single-touch...
  - ...or requiring specific input device (e.g., stylus)
- vision-based
- capactive
- other (e.g., audio)

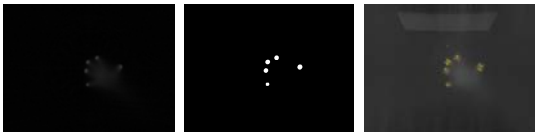
sensing: touch

- vision-based
  - camera
    - computer vision
    - image processing
  - recognize & track finger blobs
  - performance
    - on the surface?
    - hover?
    - drag?



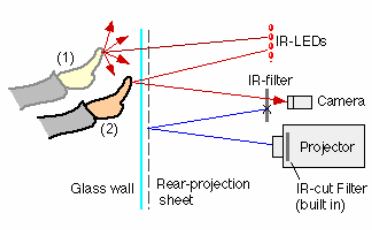
sensing: touch

- vision-based
  - background subtraction
  - binarization
  - noise reduction
  - connected component analysis



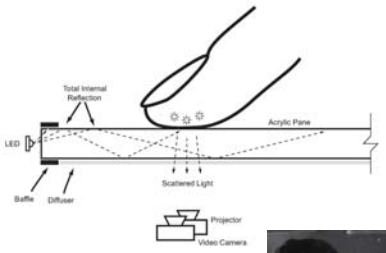
HoloWall

Matsushita & Rekimoto 1997



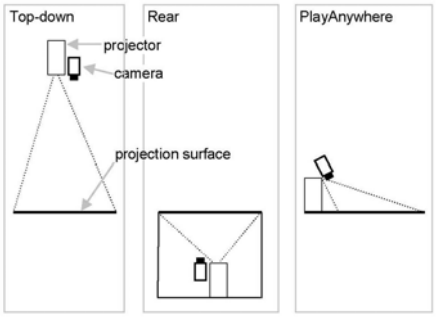
Multi-Touch with FTIR

Han 2005



PlayAnywhere & PlayTogether

Wilson 2005; Wilson & Robbins 2006



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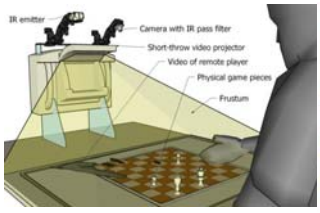
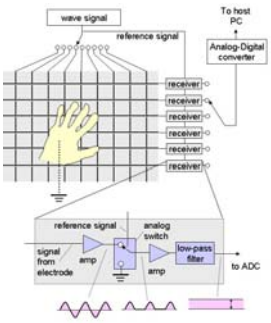


sensing: touch

- capacitive
  - compact
  - dedicated electronics
  - senses human touch only
    - not objects (desirable or undesirable)
  - not as scalable

SmartSkin

Rekimoto 2002



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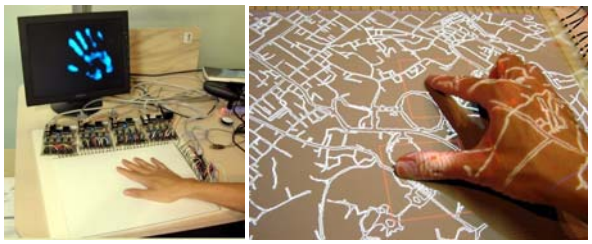


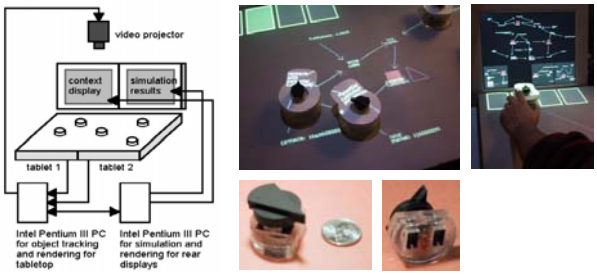
sensing: objects

- RF
- camera
  - fiducials
  - shape

Sensetable

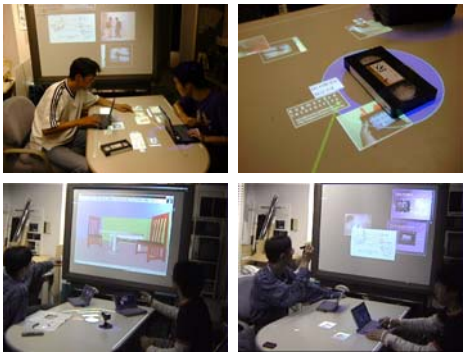
Patten, Ishii, Hines, Pangaro 2001

- id + 2D position + 1D rotation



Augmented Surfaces

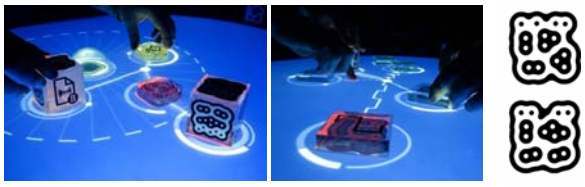
Rekimoto & Saitoh 1999



reacTIVision / reacTable

Kaltenbrunner & Bencina 2007
Kaltenbrunner, Jordà, Geiger, Alonso 2006

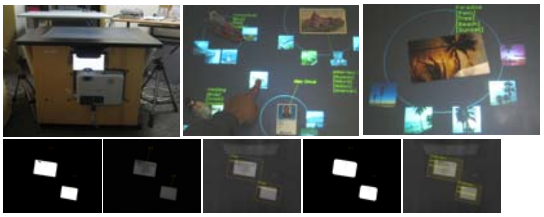
- 2D + rotation



SurfaceFusion

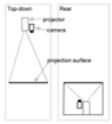
Olwal & Wilson 2008

- Sensor fusion
  - vision → shape & location
  - RFID → id

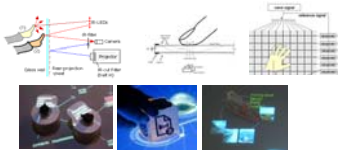


interactive surfaces

display
- projector (rear/front)



sensing
- touch
- objects



project proposals

- evaluation
- new applications
  - design
  - implement
- new techniques
  - design
  - implement

- your own ideas!

Touch-screen techniques for small devices

- evaluate techniques
- design application scenarios
- test on new devices

LightSense + 3D tracking

scenarios:
- Multi-user
- Tangibles
- 3D

Mobile NFC-RFID interaction

- 2-way RFID
- location & id

3D interaction/graphics on interactive surface

- Senses objects
- Senses touch
- Add 3D visualizations & interaction

3D-camera (Z-cam)

- Similar technology to that which is used in MS Kinect
- RGB + Z!
- Gesture recognition for 3D camera

AR prototype on Android

- Compass, accelerometers, GPS + video overlays
- Similar to Layar / Wikitude approaches
- Proof-of-concept

Touch-screen interaction w/ ARToolKit on Nokia N900

project proposals

- evaluation
- new applications
  - design
  - implement
- new techniques
  - design
  - implement
- your own ideas!

augmented reality & interactive surfaces

videos & material from lecture (+more):
www.csc.kth.se/~alx

Individual projects in interactive computer graphics (can start anytime): 3D graphics, augmented/virtual reality, touch screens, or anything else you might be interested in...

> DD2465, advanced individual course in computer science, 4 p
> DD2464, higher advanced individual course in computer science, 6 p
> DH2466, advanced individual course in human-computer interaction, 4 p

> DM2904, individual course in media technology, 4 p
> DM2905, individual course in media technology, 5 p

>Master's thesis project