Agenda

- Organisation of this course
- Interfaces
- Multi-User, Multi-Touch
  - Generic examples
  - Multi-Touch-Table h_da
  - Multi-Touch interfaces
- Goals
- (Demo)
• 20.04. Organisation, introduction + demo
• 28.04. - 30.06. Practical part 1 – 4 & start of client implementation
• 07.07. & 14.07. Finalization and submit deadline
• ??? Oral exam
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Interfaces

- CLI
  - Textual
  - Abstract
  - Keyboard

- GUI
  - Graphical
  - Indirect
  - Mouse/Pointer

- NUI
  - Physical
  - Direct
  - Gestural

Command Line Interface

Graphical User Interface

Natural User Interface
Speech Recognition

Deleting passages of text

Let’s delete a longer passage of text. To do this, you must first select the text, and then delete it.

- Say “Select When through Phrases”
- Say “Delete that”
- Say “Undo that”
- Say “Clear selection”
Face Recognition

D:\Vorlesungen\Multitouch\Multitouch SS2015\Video\faceAPI - We Track Faces.MPG
Wiimote
"Time of Flight" Camera

D:\Vorlesungen\Multitouch\Multitouch SS2015\Video\PMD.MPG

http://www.youtube.com/watch?v=ZkovpI8nJek
Kinect

- Processing of 2D and 3D Data, “tracking”

http://www.youtube.com/watch?v=-_j7BzSmlfU
Oculus Rift VR Device + “Treadmill”
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Ipad (tablet, smartphone, ...)

![Ipad Image]
Microsoft Surface
CNN's „Magic Wall“
Heineken Experience bar

D:\Vorlesungen\Multitouch\Multitouch SS2015\Video\Heineken.MPG

http://www.youtube.com/watch?v=RLgGO86hgXA
Apple
Magic Mouse

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http://www.youtube.com/watch?v=PlL4LFTwZzE
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Multi Touch Table

D:\Vorlesungen\Multitouch\Multitouch SS2015\Video\multitouch_fbi.MPG

http://www.youtube.com/watch?v=n6iGn5_8ZFg
h_da
Interactive Floor

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http://www.youtube.com/watch?v=4hGNFL0ySsU
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Capacitive Touch Screen

Image processing controller → Continuous re-imaging of touch profile

Image of changes in electrostatic field caused by touch

Touch screen (sensor)

Controller resolves touch profile to actual touch point

Coordinates fed back to operating system
smartphones
Resistive Touch Screen

- Spacer dot
- ITO conductive coating
- Bottom circuit layer
- Glass or acrylic backing panel
- PET film
- Top circuit layer
- ITO conductive coating

Touch creates contact between resistive circuit layers, closing a switch

Controller determines between layers to get touch coordinates
Optical sensors
"Touch Sensor", Rear Illumination
"Touch Sensor", Frustrated Total Internal Reflection
"Touch Sensor", Diffused Surface Illumination
Optical Multi Touch Interface
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Goals

- Theory
  - Areas of application
  - Hardware solutions (optical and non-optical)
  - Calibration procedure
  - Real-time video processing
    - Segmentation
    - Image processing filters
    - Object tracking
Goals

- Practice

Input

Processing

Output

Your program

Segmentation
Image processing
Object tracking
...

Touch points

(X1,Y1)
(X2,Y2)
(X3,Y3)
...

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