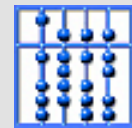


Overview over User Interface Paradigms

TU München

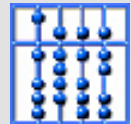
1. 2. 2004

Christian Sandor
sandor@in.tum.de



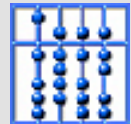
Outline

- Overview over User Interface Paradigms
 - Timeline
 - Criteria
- Presentation of Paradigms



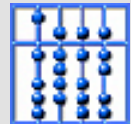
Timeline of User Interface Paradigms

- 1977: Virtual Reality
- 1980: Wearable Computing
- 1981 - 1984: WIMP
- 1991: Hybrid User Interfaces
- 1991: Ubiquitous Computing
- 1993: Zoomable User Interfaces
- 1993: Augmented Reality
- 1997: Tangible User Interfaces
- 1998: Multimodality
- 2000: Attentive User Interfaces



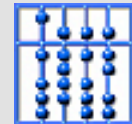
Criteria for User Interface Paradigms

1. Principal paper: first publication
2. Definition: what is it exactly?
3. Spirit: what is the philosophy behind it?
4. Example: how does it look like?
5. Prospects: will it be used in the future?
6. Guru: who is the famous guys today?
7. Relations: how does it relate to other paradigms?



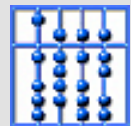
Outline

- Overview over User Interface Paradigms
- Presentation of Paradigms
 - WIMP
 - Ubiquitous Computing
 - Zoomable User Interfaces
 - Augmented Reality
 - Hybrid User Interfaces
 - Tangible User Interfaces
 - Attentive User Interfaces



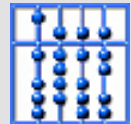
WIMP (1/3)

1. Principal paper:
 - D. C. Engelbart: “Augmenting Human Intellect: A conceptual framework” (1962)
 - Research at XEROX PARC (1970s) and Apple (1981 - 1984)
2. Definition: Windows, Icons, Menus, Pointer
3. Spirit: Copy everyday world
 - Direct Manipulation
 - Desktop Metaphor
4. Example: almost every GUI today



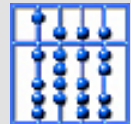
Wimp (2/3)

- PARC developed: Cursor changes to show system mode, Cursor changes to show context, (Popup, Pulldown, Hierarchical) Menus, Overlapped windows, Tiled windows, Icons, Scroll bars, Push Buttons, Radio Buttons, Check Boxes, Dialog Boxes, Multiple fonts & styles in text, Modeless Interaction, Move/Copy/Delete, Cut/Copy/Paste with a mouse, Selection point between characters
- Movie: First public presentation of the mouse (Engelbart 1968)



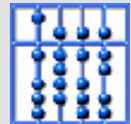
WIMP (3/3)

5. Prospects: still prevailing paradigm for the next couple of years
6. Gurus: Ben Shneiderman (University of Maryland)
7. Relations: shortcomings inspired most other paradigms



Ubiquitous Computing (1/2)

1. Principal paper:
Mark Weiser, "The Computer for the Twenty-First Century", *Scientific American*, pp. 94-10, September 1991
2. Definition:
 - The computer is everywhere and invisible
 - Tabs, pads and boards
3. Spirit:
 - Opposite of Virtual Reality
 - Alan Kay: "3rd paradigm" (after mainframes and PCs)



Ubiquitous Computing (2/2)

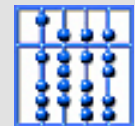
4. Example:

- Stanford Flow Menu (2000)

5. Prospects: Will become most important paradigm

6. Gurus: Terry Winnograd (Stanford)

7. Relations: Reference frame for most newer paradigms



Zoomable User Interfaces (1/3)

1. Principal paper:

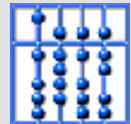
Ken Perlin, David Fox: "Pad - An Alternative Approach to the Computer Interface" SIGGRAPH 1993

2. Definition:

- Content is in a plane in 3D space
- Camera can be moved
- Lenses add additional degrees of freedom

3. Spirit: "We believe that navigation in information spaces is best supported by tapping into our natural spatial and geographic ways of thinking"

4. Examples: next page

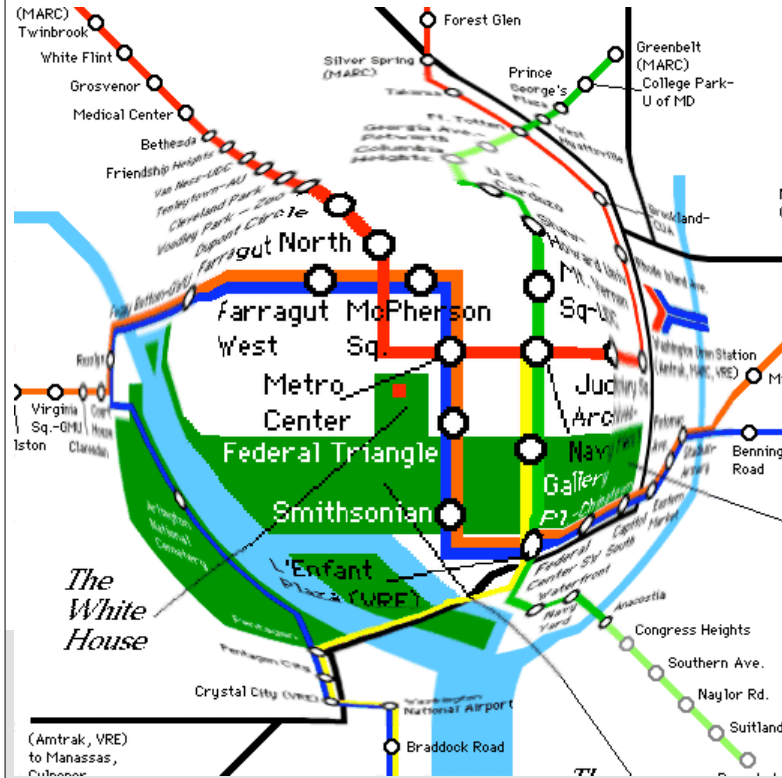
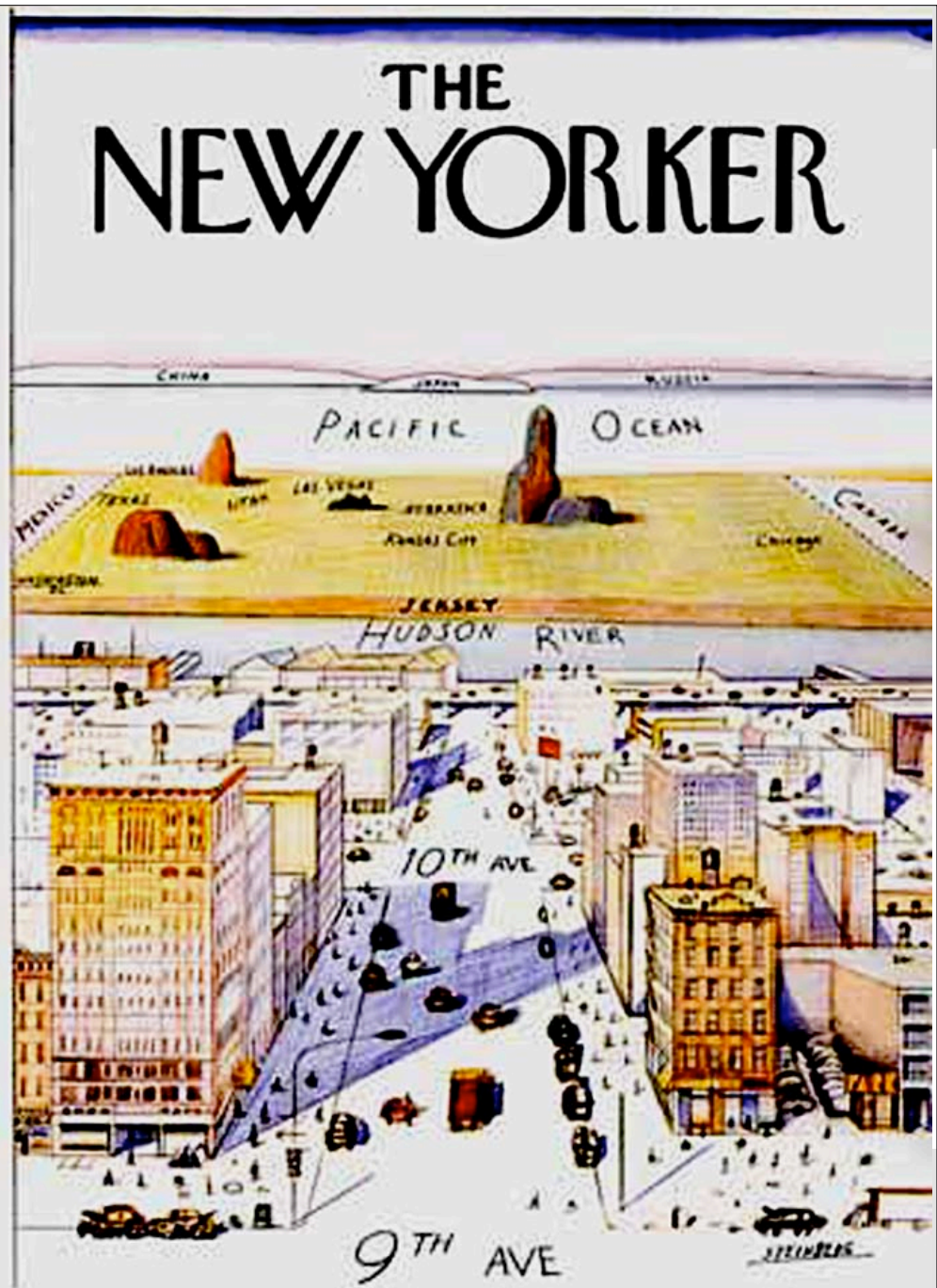


Internet Explorer browser window showing the Seattle Times website. The address bar displays <http://seattletimes.nsource.com/timeline>. The page header includes "The Seattle Times" logo and "FRIDAY September 25, 2009".

The main content area features several news articles with a circular callout highlighting an "UPDATES" section:

- UPDATE 10:50 PM: Teen marketers can keep calling, for now**
They are free to make sales pitches to people who registered for the do-not-call list, the government said today.
- UPDATE 10:13 AM: Poverty rate rises for second straight year**
17 million more people dropped below the poverty line and median income is down.
- UPDATE 10:10 PM: Government issues recall for all Segway scooters**
A Segway technician is fixing the City of Seattle's fleet of 15 scooters.
- UPDATE 10:09 PM: Prep football: Huskies hold off No. 1 Bellevue**
EMP gets the blues in a big way and shows it off, Chicago style.
- UPDATE 10:00 PM: Remains of Green River victim found**

Other visible headlines include "High Holy Days a time of out-of-control partying" and "Mountlake Terrace police confiscate about 100 birds used in illegal cockfights".



Zoomable User Interfaces (2/2)

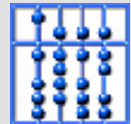
4. Examples:

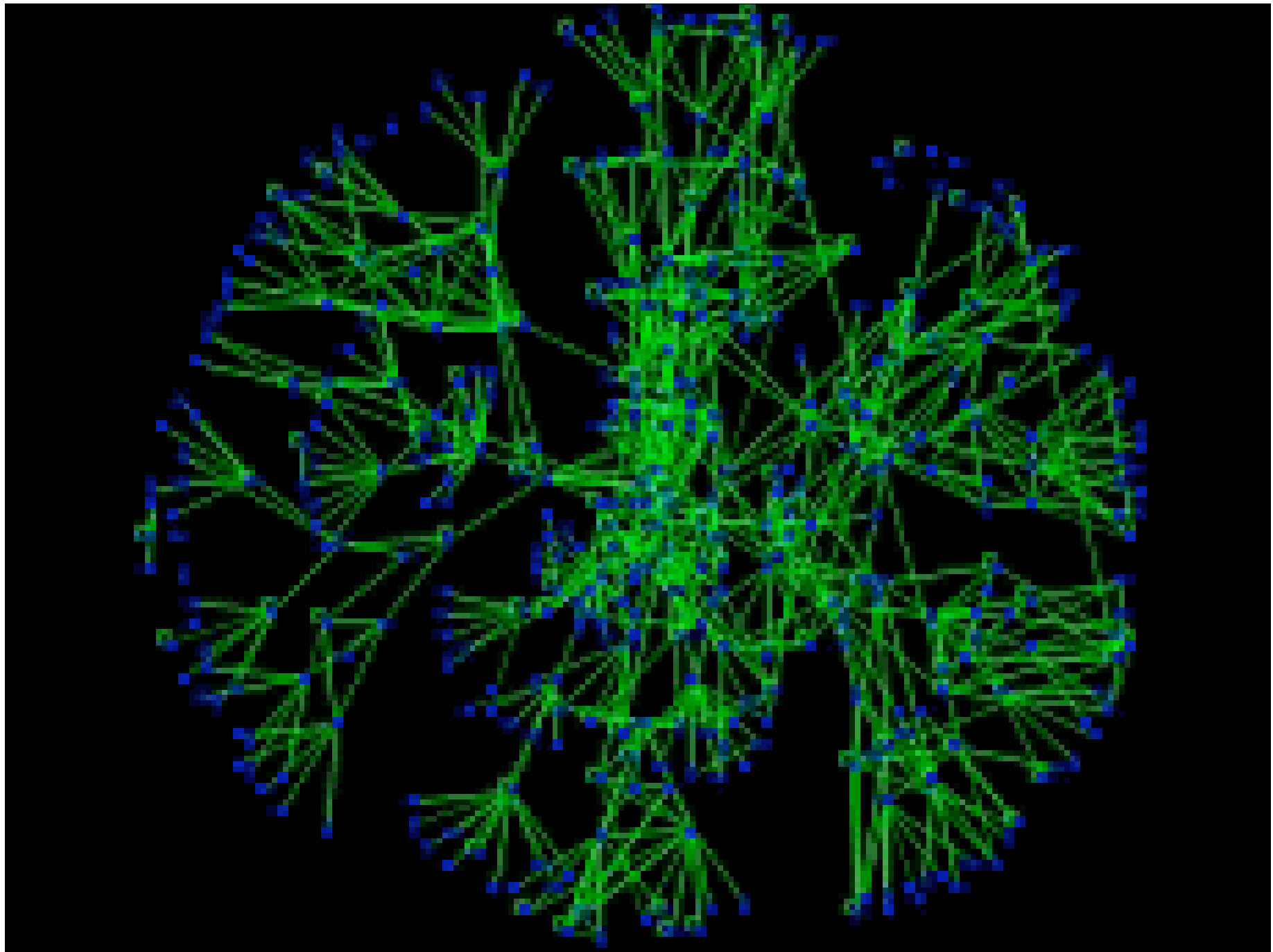
- MacOS X: Expose, Magnification of Dock
- Perlin's Fibonacci machine
- HP's zoomgraph

5. Prospects: Useful technique, gaining importance

6. Gurus: Ben Bederson (University of Maryland)

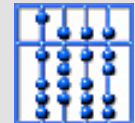
7. Relations: ZUI is subclass of 3D User Interfaces





Augmented Reality (1/2)

1. **Principal paper:** Wellner, P., Mackay, W. & Gold, R. Eds. Special issue on computer augmented environments: back to the real world. Communications of the ACM, Volume 36, Issue 7 (July 1993).
2. **Definition:**
 - Registered in 3D
 - Realtime
 - Mixing real and virtual
3. **Spirit:** Making the unseen visible
4. **Example:** ARToolkit Demo



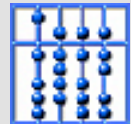
Augmented Reality (2/2)

5. Prospects:

- With HMDs: only very limited applications
- Projection-based AR is the future

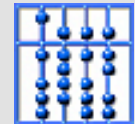
6. Gurus: Lehrstuhl Navab/Klinker (TU München)

7. Relations: Connected with VR through MR (Milgram)

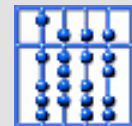


Hybrid User Interfaces (1/3)

1. **Principal paper:** Steven Feiner, Ari Shamash: "Hybrid user interfaces: breeding virtually bigger interfaces for physically smaller computers". UIST 1991
2. **Definition:** Usage of 2D displays combined with AR
3. **Spirit:** Attacking screen space problem with coordinated display through several modalities
4. **Example from original paper (next page)**



Hybrid User Interfaces (2/3)

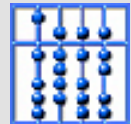


Hybrid User Interfaces (3/3)

5. Prospects: If AR catches on, Hybrid User Interfaces will too.

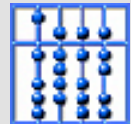
6. Gurus: Steven Feiner, Christian Sandor ;-)

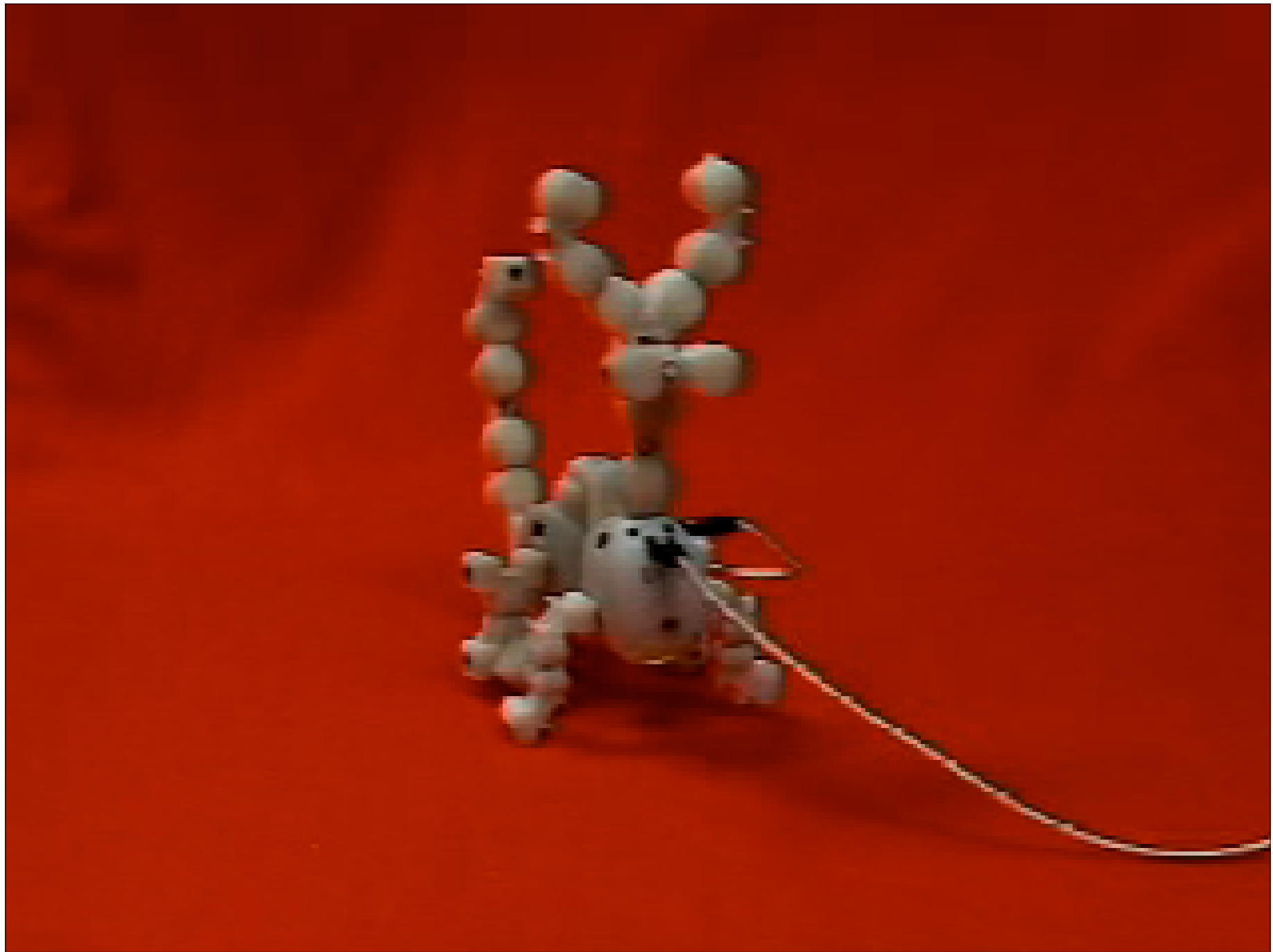
7. Relations: uses AR



Tangible User Interfaces (1/2)

1. **Principal paper:** Hiroshi Ishii and Brygg Ullmer: “Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms” CHI 1997
2. **Definition:** Abacus analogy
3. **Spirit:** Follow century long tradition of specialized tools
4. **Example:**
Ishii’s Topobo (2004)



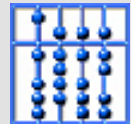


Tangible User Interfaces (2/2)

5. Prospects: Powerful concept; Applicability unclear

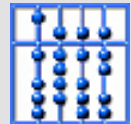
6. Gurus: Hiroshii Ishi (MIT Media Lab)

7. Relations: Used as input channel for several other paradigms



Attentive User Interfaces

1. **Principal paper:** Roel Vertegaal: “Attentive User Interfaces” in Communications of the ACM, March 2003 / Vol. 46, No. 3
2. **Definition:** Measure user’s visual attention and adapt User Interface accordingly
3. **Spirit:** Model social interactions
4. **Example:**
 - Vertegaal’s video player
 - Improving the dock (Shumin Zhai)
5. **Prospects:** Gains importance in Ubicomp
6. **Gurus:** Shumin Zhai (IBM), Roel Vertegaal(QueensU.)
7. **Relations:**can be combined with other paradigms



Conclusion

Thank you for your attention!

Questions?

5 minute break now



Christian Sandor
(sandor@in.tum.de)

Introduction to Augmented Reality
TU München

