

Tangible Computing & Haptic Interfaces

Filip Kaliszan

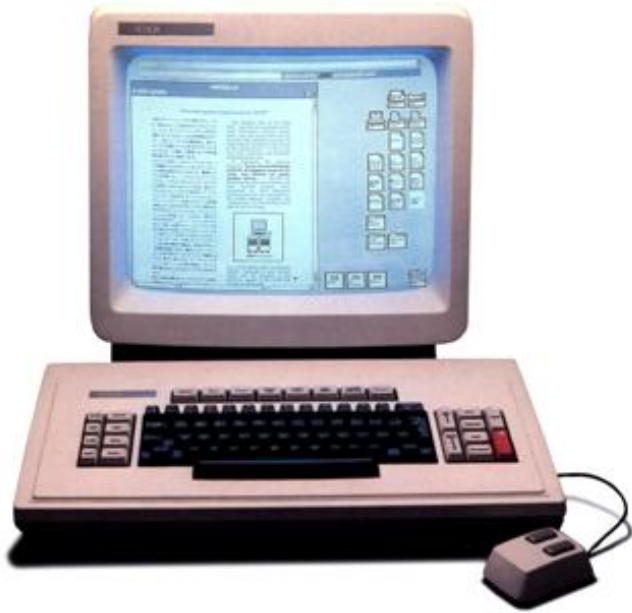
CS 376: Research Topics in Human Computer Interaction

April 9, 2009: Stanford University

Getting In Touch

Dourish, Paul. Where is the Action (2001)

Xerox Alto (1973)



Apple IIc (1984)



iMac (2008)



**has the human-computer
relationship changed?**

IBM 7090 (1970s)



online applications (present)

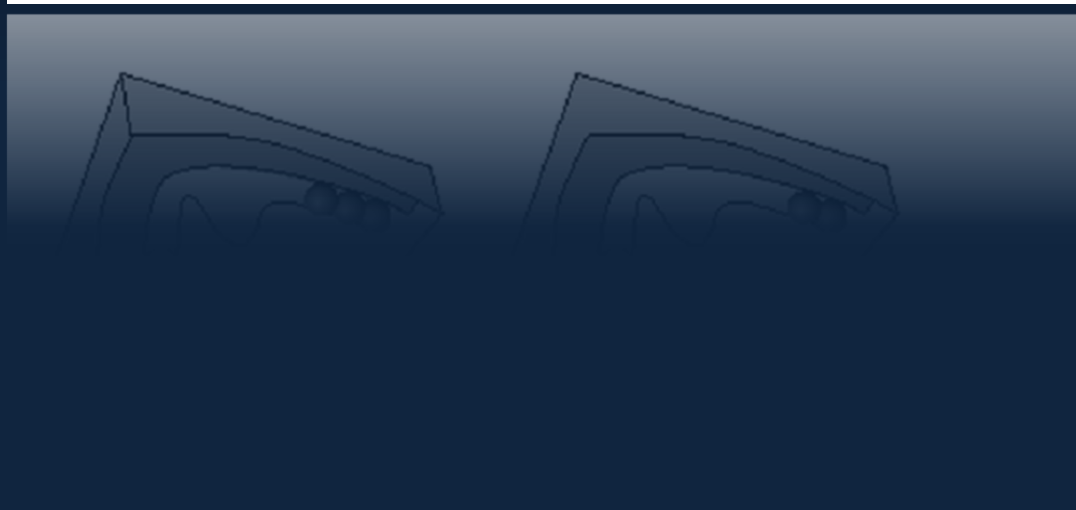
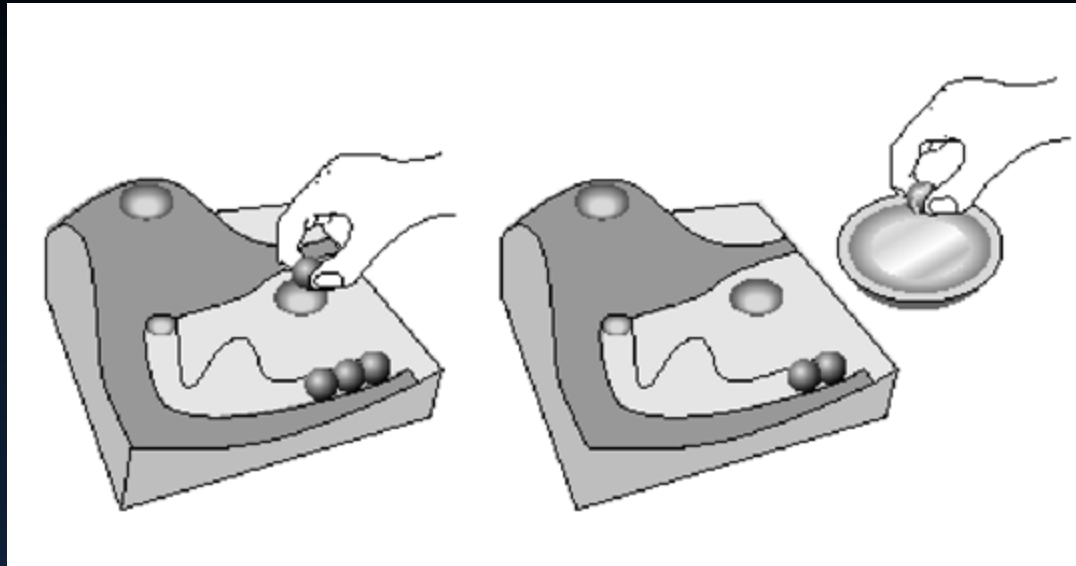


tangible computing

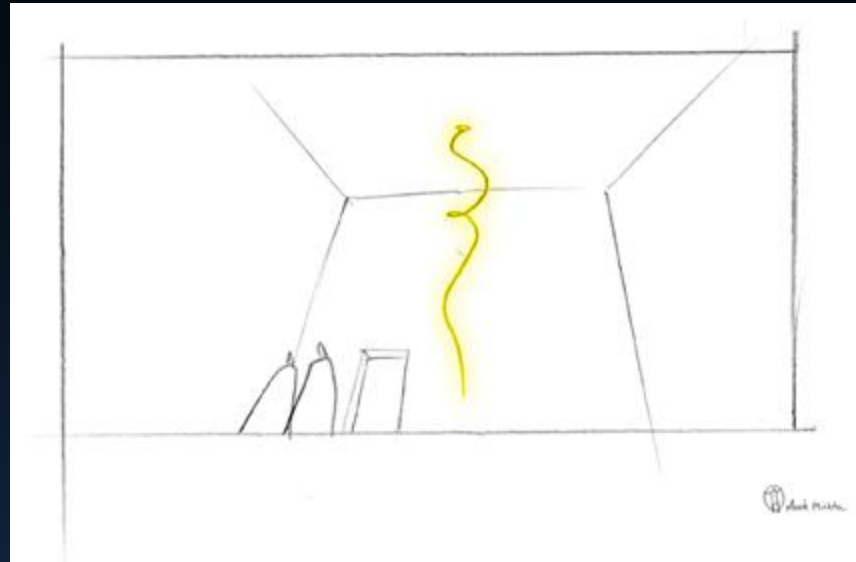
brings computing to **physical space**

rather than immersing user in **virtual reality**

Marble Answering Machine, Bishop (1995)



LiveWire, Jeremijenko (1994)



tangible computing

vs

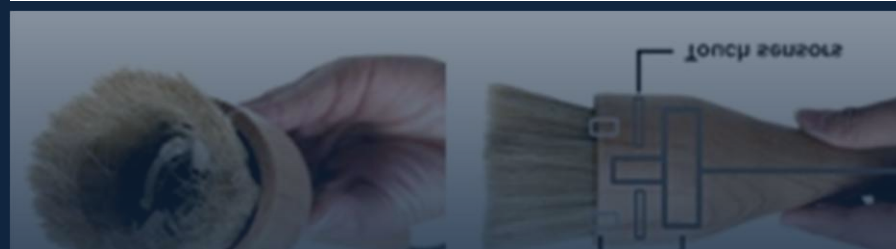
virtual reality



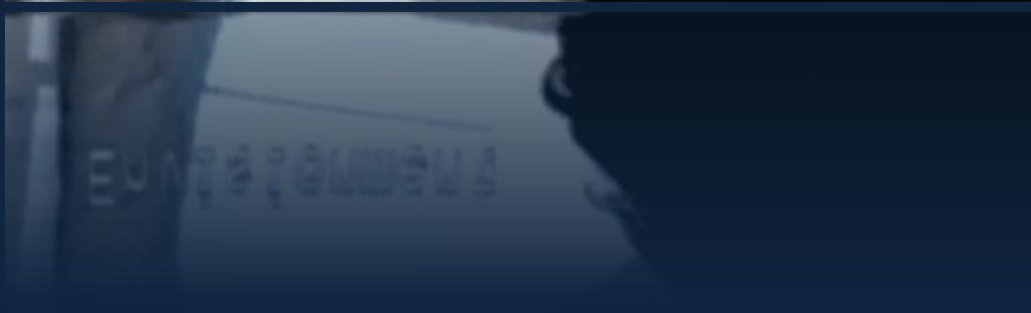
I/O Brush (2003)



[\[Video \]](#)



Working
prototype
6/91



**is tangible computing
scalable?**

Claytronics

[video]



**what challenges do we need to
address for tangible computing
to become widespread?**

tangible computing

brings computing to **physical space**

focus on **communication**

at-a-glance **readability**

Haptic Techniques for Media Control

Snibbe, Karon, Shaw, Roderic,
Verplan, Scheeff (2001)

haptic controls

clutch

fisheye

frictionless shuttle



Digital Turntable

**why is haptic feedback
effective in media control?**



Logitech VX evolution Mouse: multi-mode scroll wheel



**why is absolute positioning
ineffective?**

**what are the limits of
haptic interfaces?**

**is haptic feedback applicable
outside of media control?**



G650

Gulfstream

haptic feedback

promises simplification

textures better than forces

hand-tuning necessary

high power requirements