

Transformations in HCI: From Human Factors to Human Values

Abigail Sellen

Principal Researcher

Microsoft Research Cambridge, UK

Overview

Human-Computer Interaction

What is it?

Why is it important?

How has it changed (and why is it more important than ever)?

An example

From GUIs to NUIs to Ubiquitous Computing

HCI for the 21st Century

Goals of Human-Computer Interaction

- To *understand* the relationship between people and technology
- To design better technology through *testing it* with people
- To *invent* new technologies people will want and be drawn to



The Roots of HCI: Human Factors Engineering

- Measure human capabilities (cognitive and physical)
- Model human “operators” mathematically
- Design the system to fit the human
- Make systems safer, more efficient, reliable



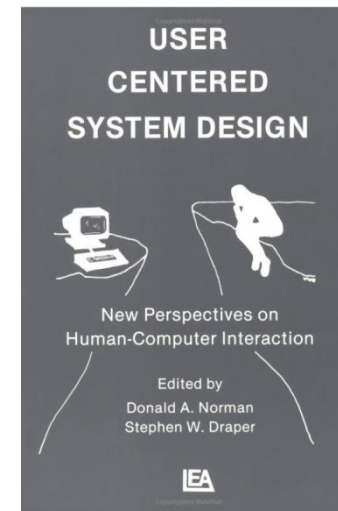
The Birth of HCI as a field

Don Norman (early 1980s)

Computers should be designed so that they are usable by everyone, not just computer hackers and engineers

Good interfaces should be:

- ✓ Effective and useful
- ✓ Efficient
- ✓ Safe
- ✓ Easy to learn
- ✓ Easy to remember

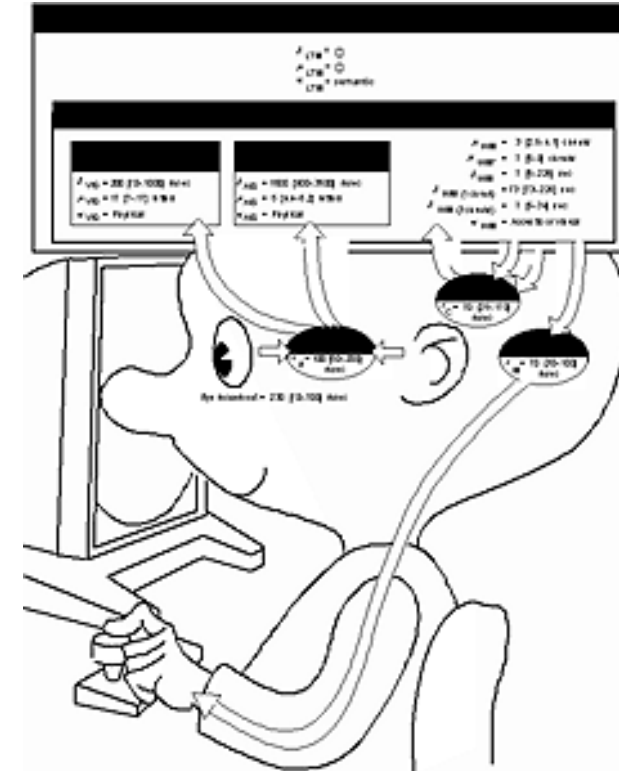


First Wave HCI

(or The Era of Personal Computing)

- Study users in front of computers
- Model how users think about and do tasks
- Find out where they have trouble and why
- Design quicker, better more “user friendly” systems
- Optimize the user-machine fit

*“The Psychology of Human-Computer Interaction”,
Card, Moran & Newell (1984)*



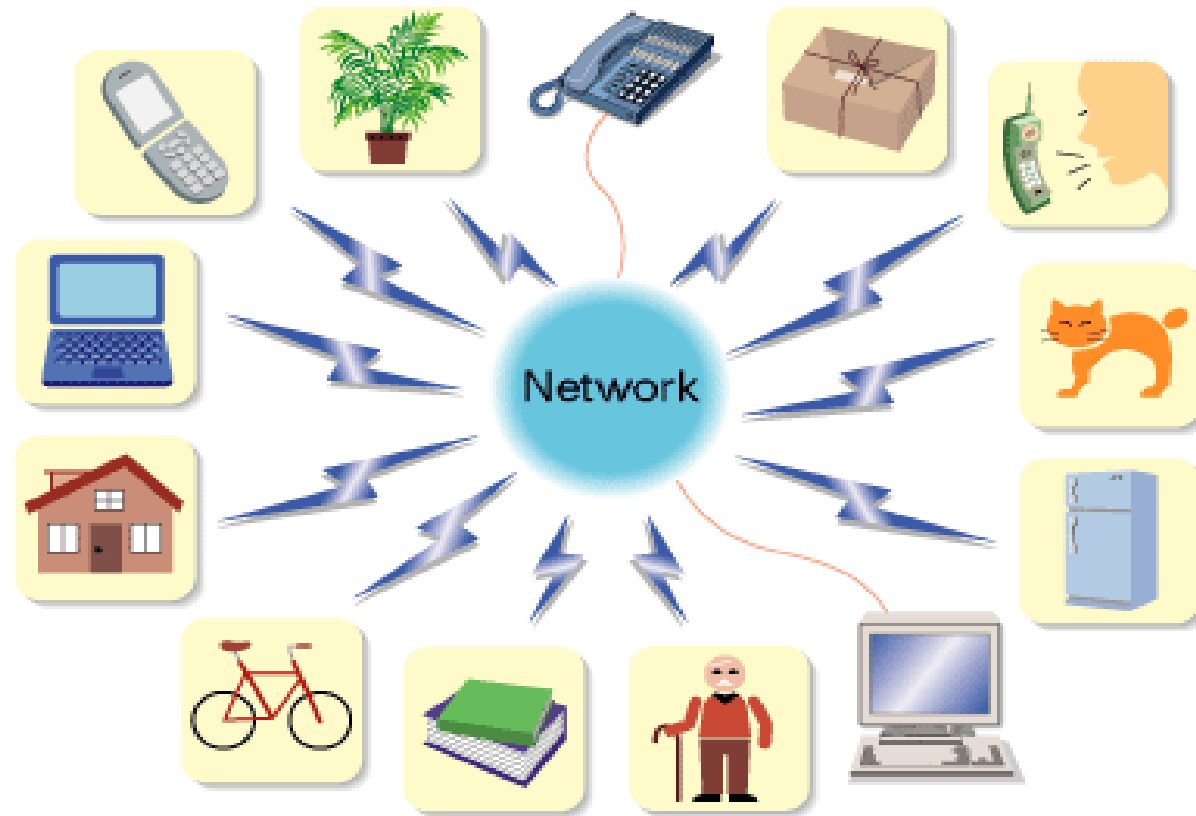
Second Wave HCI

(or The Era of Group Work)

- A preoccupation with teams working with many applications, systems and artifacts
- A focus on designing in context, for existing work practices, with the people involved
- Fieldwork as important as lab studies
- Drew in sociologists, anthropologists and designers



Third Wave HCI (or The Era of Ubiquitous Computing)



What is a Computer?



Who is the User?

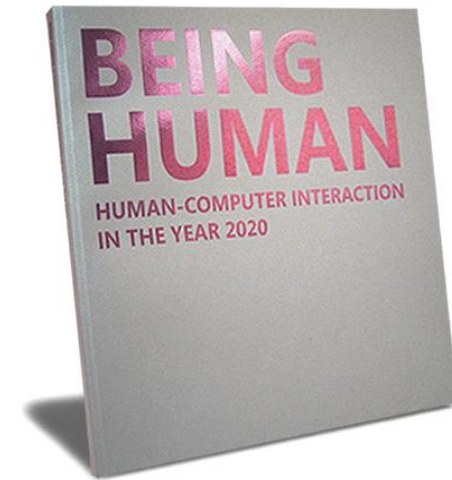


And What Does it Mean to Interact?



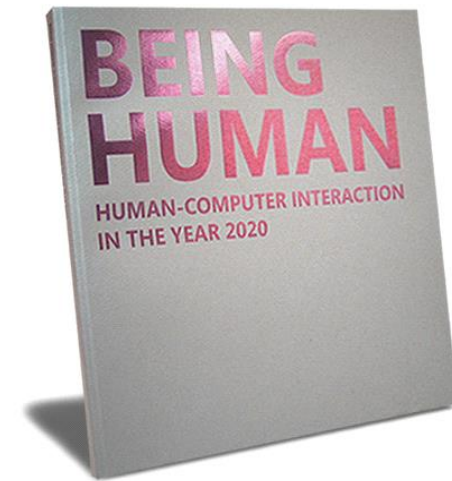
5 Transformations

- The end of interface stability
- The growth of techno-dependency
- The growth of hyper-connectivity
- The end of the ephemeral
- The growth of creative engagement



5 Transformations

- **The end of interface stability**
- The growth of techno-dependency
- The growth of hyper-connectivity
- The end of the ephemeral
- The growth of creative engagement



From GUIs to NUIs to Ubiquitous Computing

- Multi-touch and gesture-based interaction paradigms bring computing out of the desktop and into the world
- Extension of the input space (could include voice, eye gaze, even brain waves...)
- Changing our choices about how we interact with computers

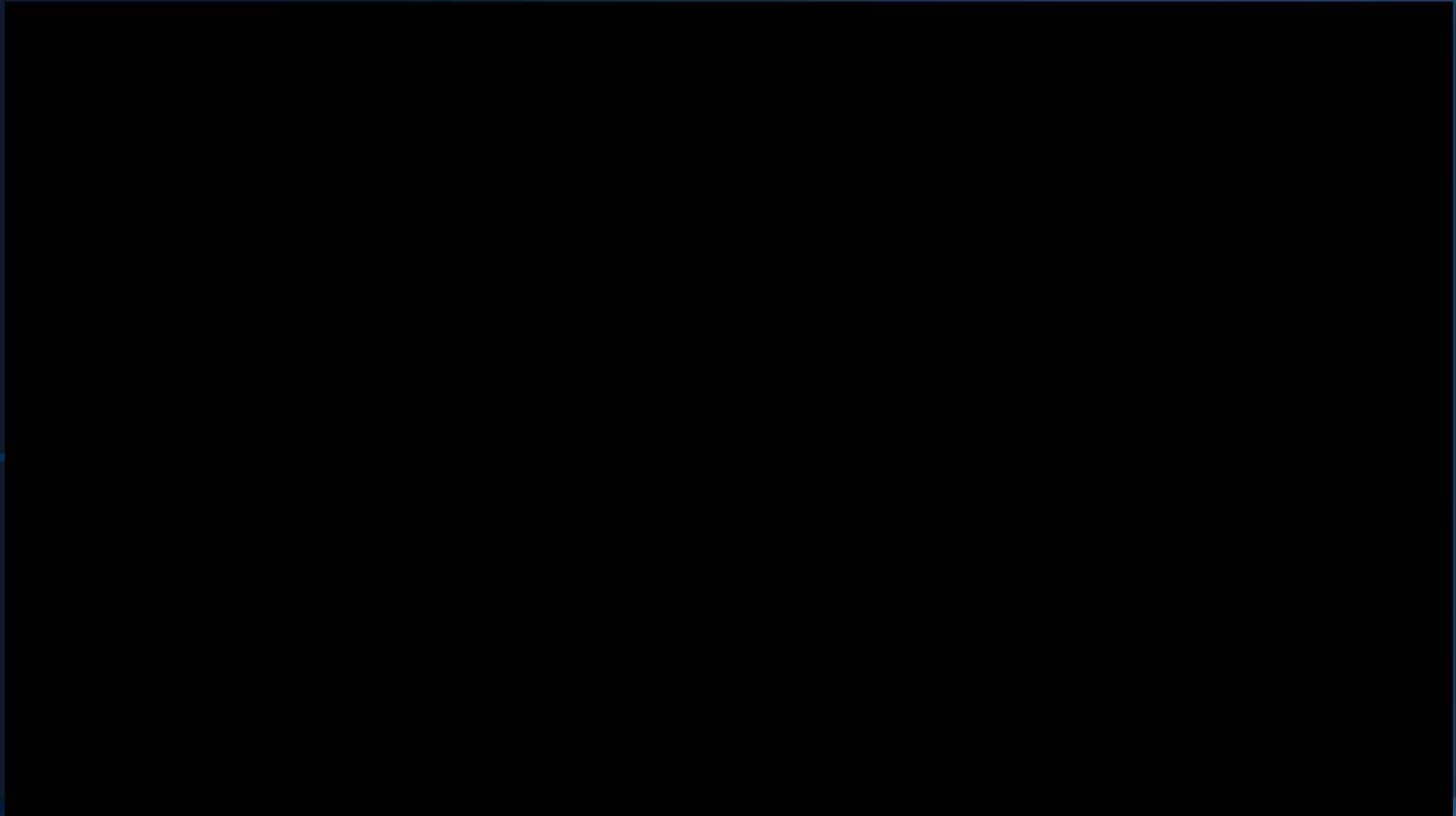


Gestural Interaction in Surgery



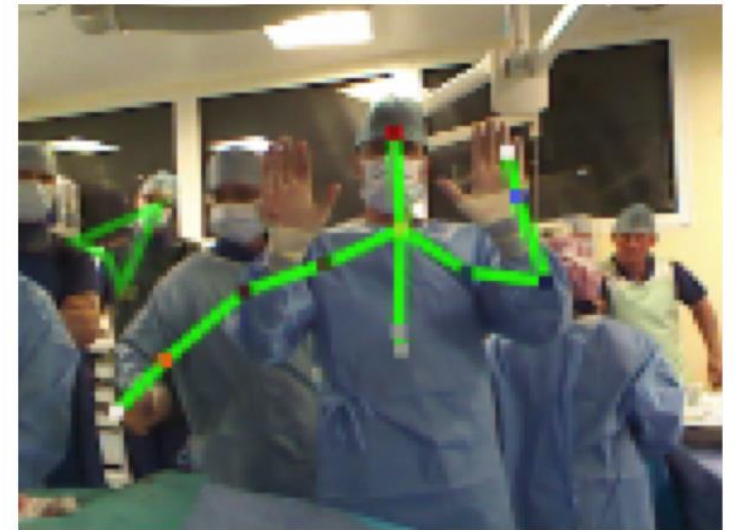
Video

Touchless Interaction in Surgery



Multiple Interfaces in Medical Practice

- Getting the interaction right
 - Defining a good vocabulary and ergonomically sound system
 - Design to distinguish gestures for the system from ordinary gesturing
- Designing for teamwork
 - Distinguishing gestures for collaboration from gestures for control
 - Hierarchies hold
- Multiple input zones mean multiple interfaces

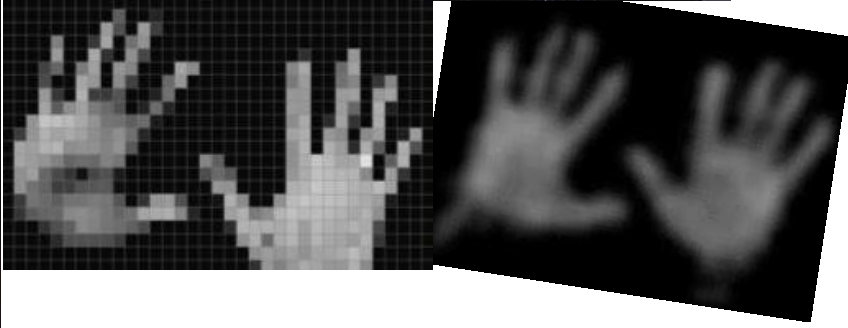
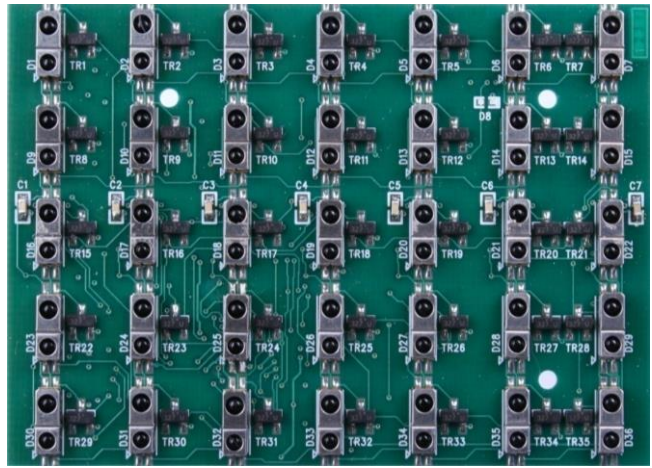
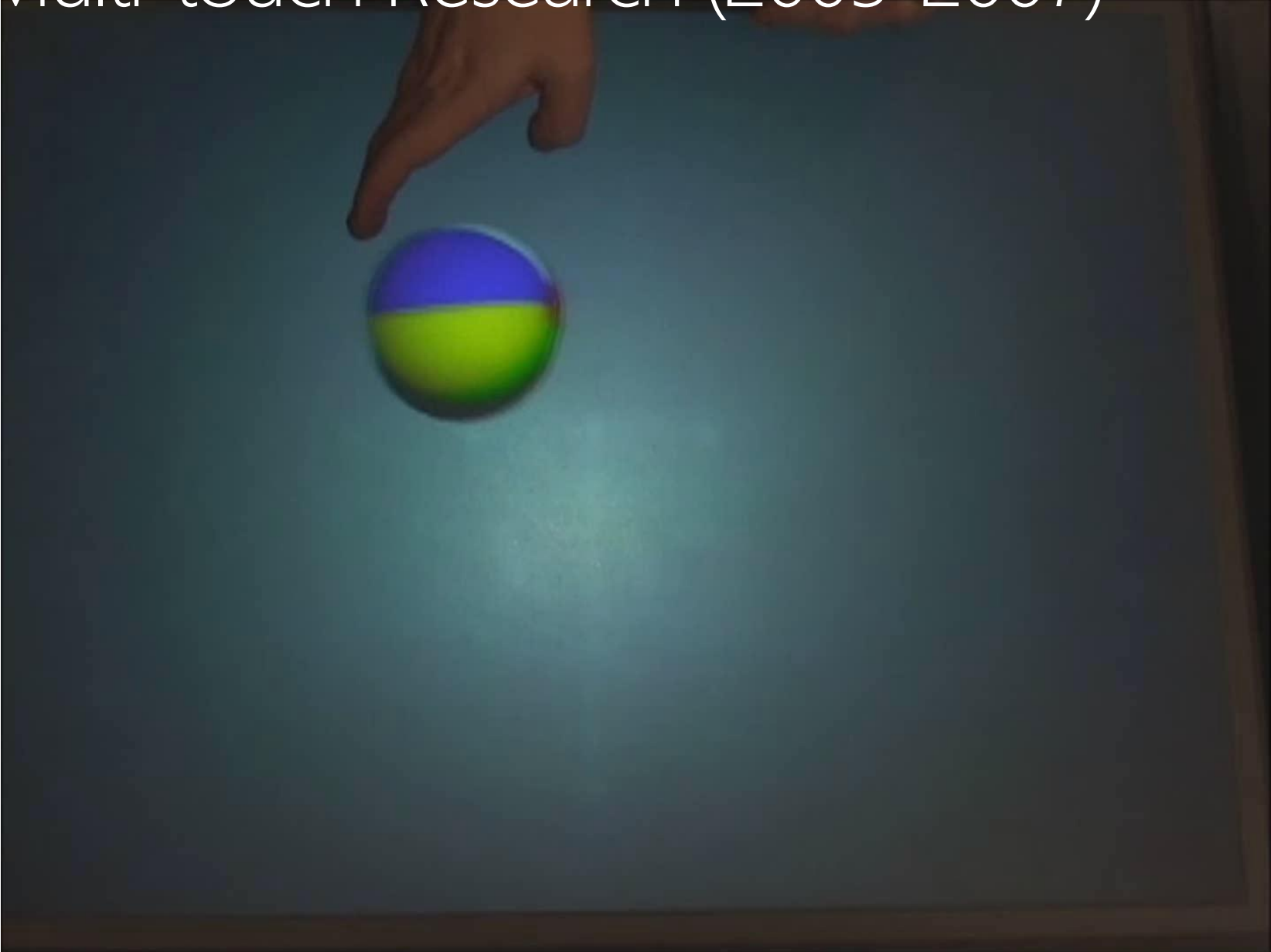


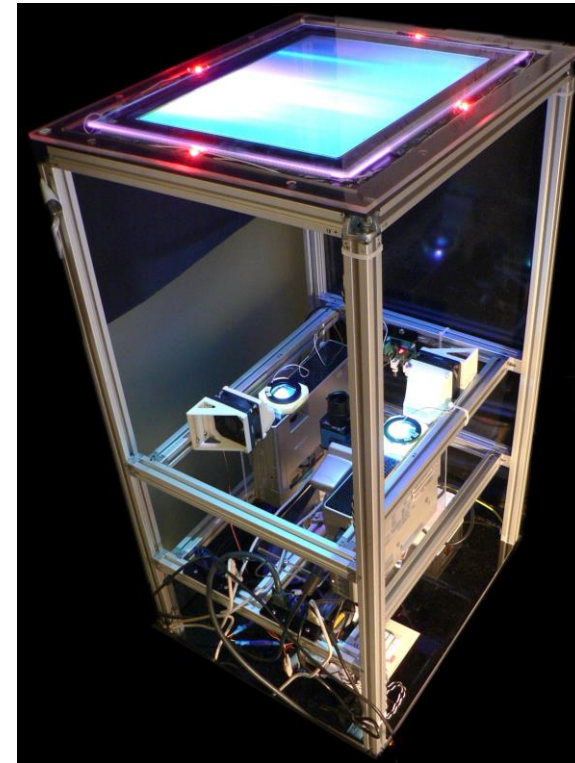
Blurring Boundaries

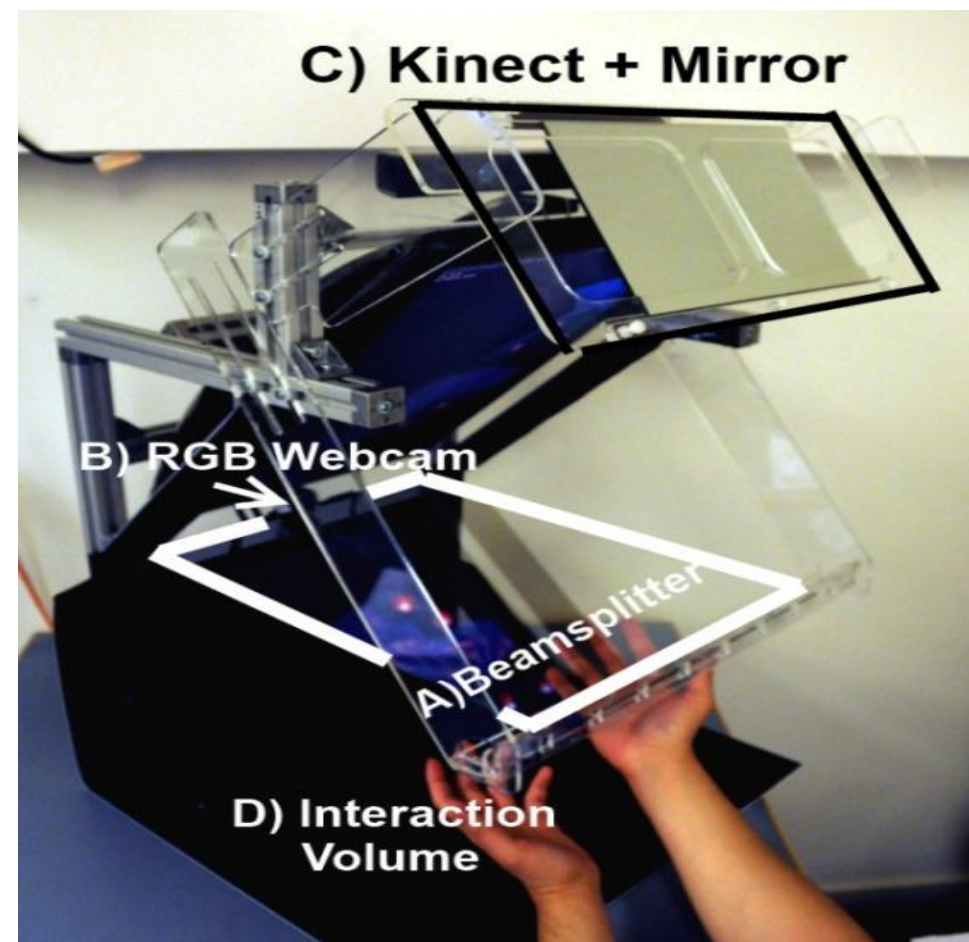
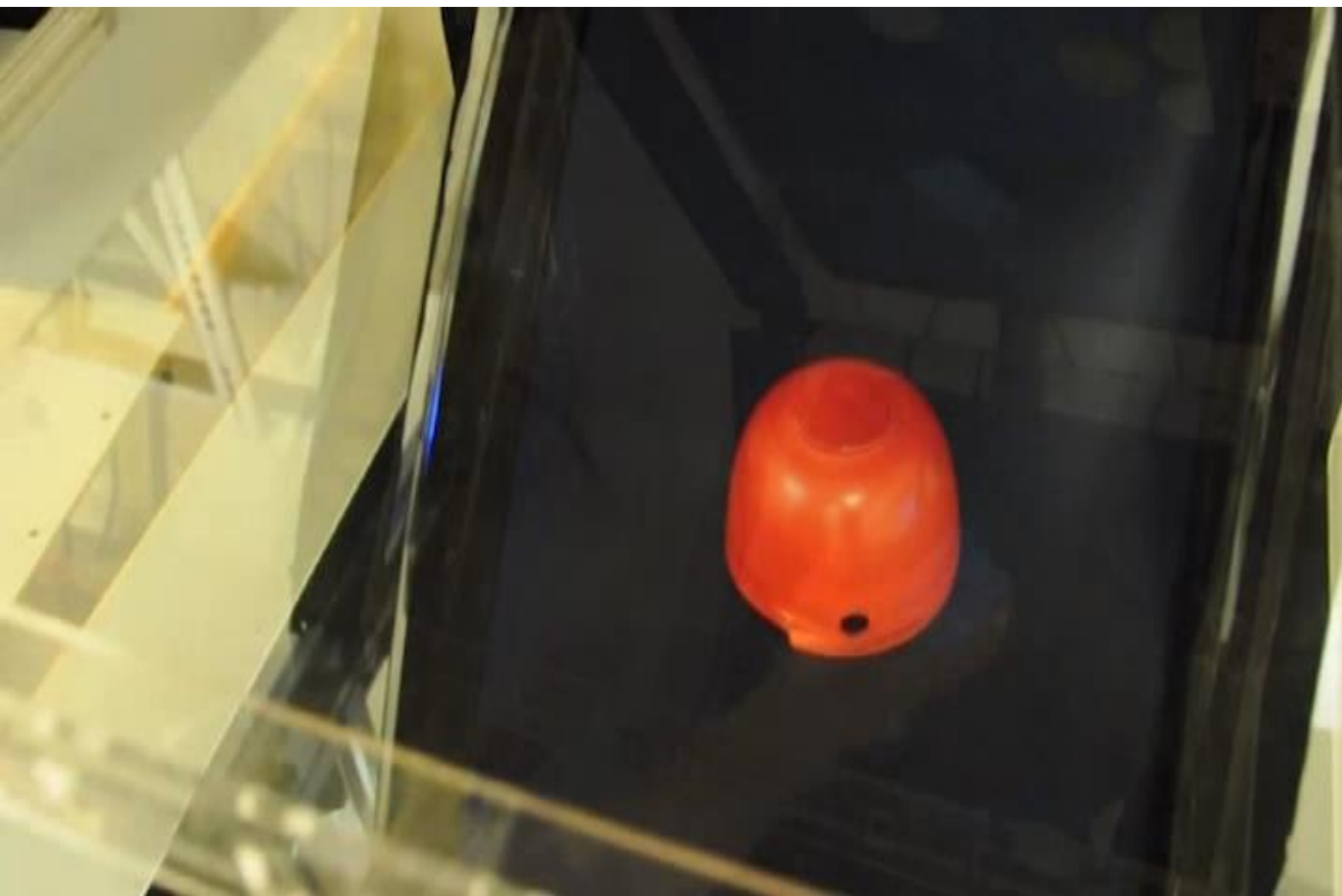
- New input techniques often go hand in hand with new output techniques
- Research from our Sensors and Devices Group shows how interaction in the digital world alters in startling ways when we blur the boundaries with the physical world



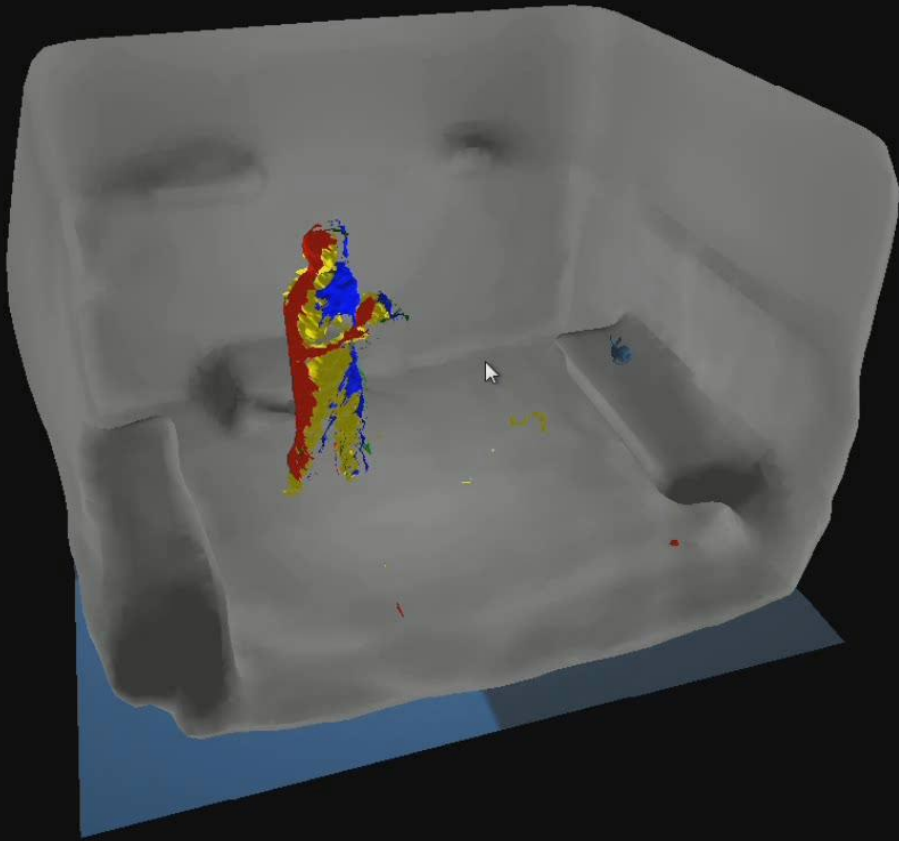
Virtual Reality Research (2005-2007)





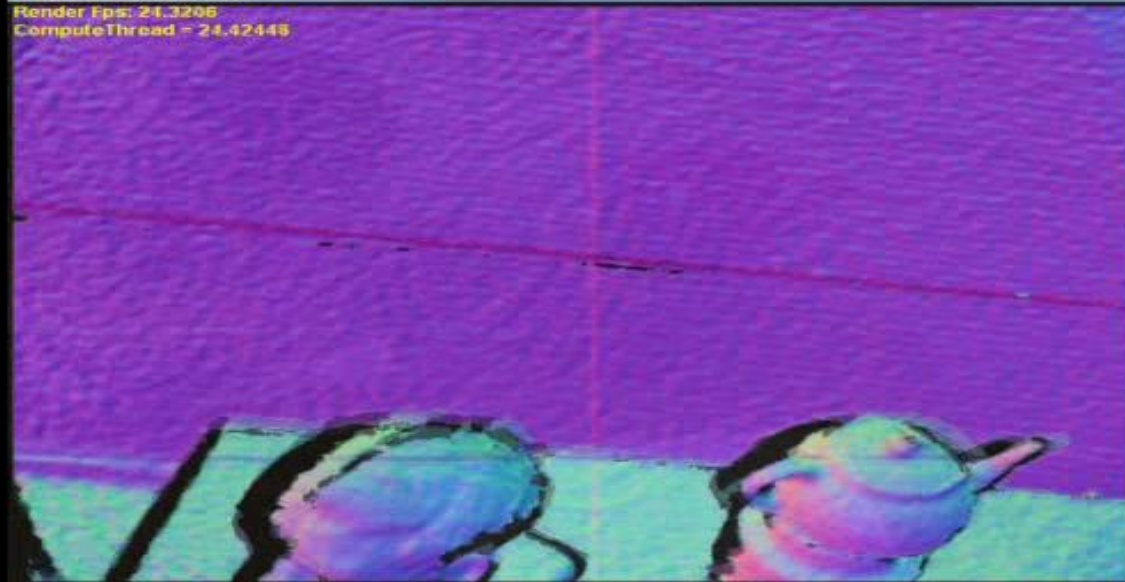


CameraMode = Orbit [Space to change]
Physics FPS: 34.32 Bodies: 1909 Timestep: variable
Draw: 33.48
Filter Graphs: 34.33, 34.35, 34.29, 34.3, IR: 33.48

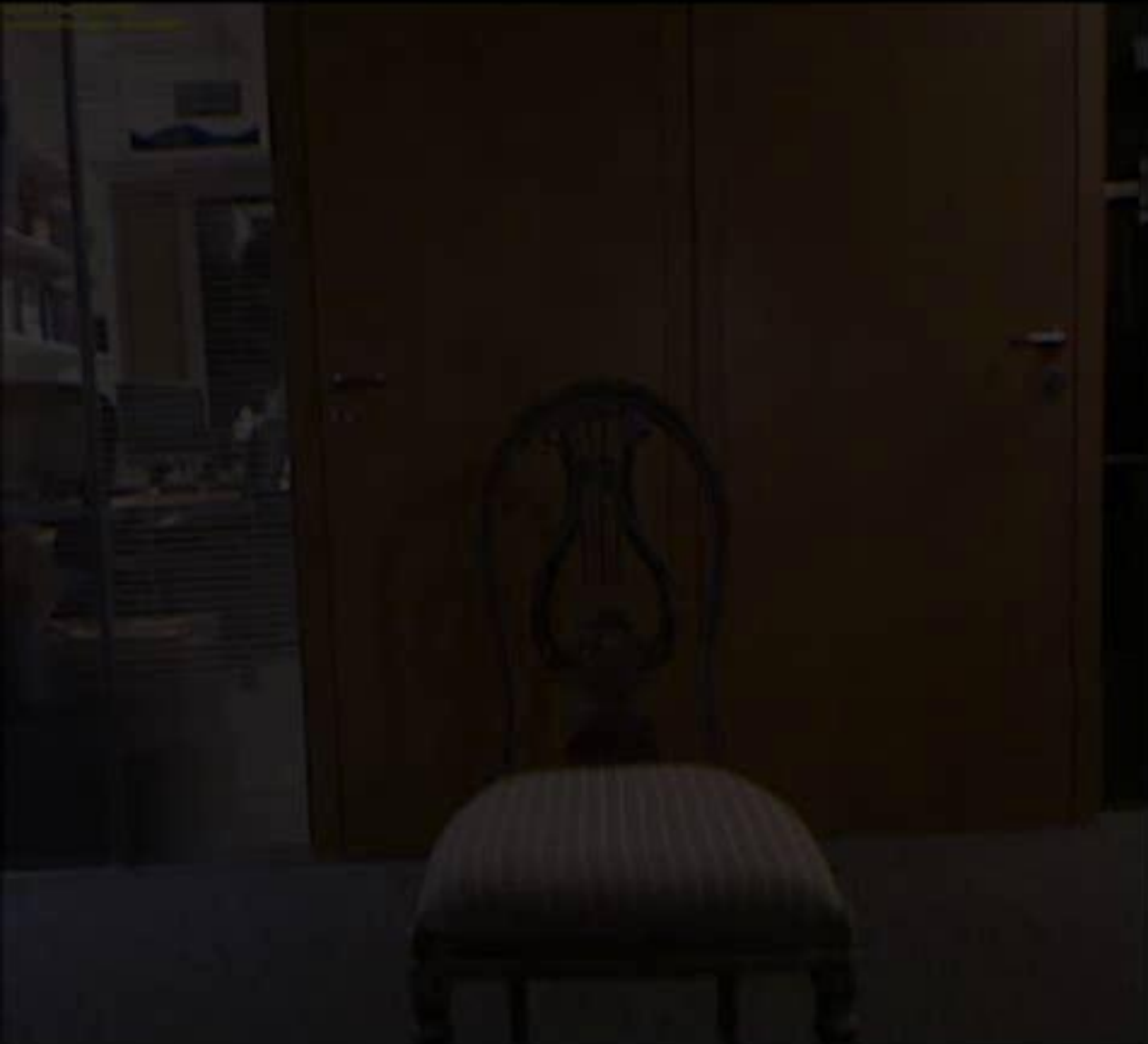


Render Fps: 24.3206

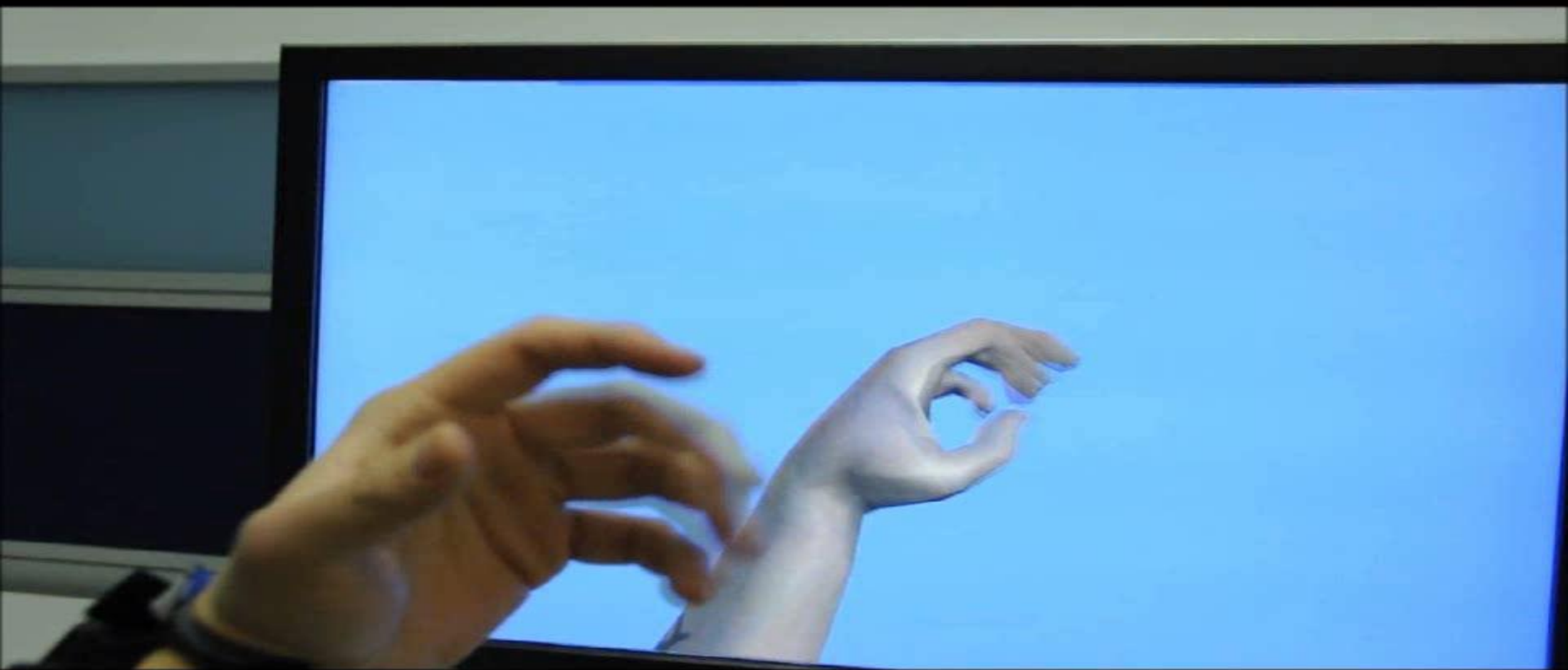
Render Fps: 24.3206
Compute Thread = 24.42448



KinEtre



Chen, Izadi, Fitzgibbon, Animating the world with your body, UIST 2012



Blurring the boundaries is already happening



New Questions for 21st Century HCI

How will these new paradigms shift our work practices and our daily lives?

How do we merge old skills with new?

Will the increasing ubiquity of computing changes our perceptions of the physical world as well as the digital?

Will they impact not just our personal productivity, but also change how people participate or work together in these spaces?

Do we have a responsibility to work with our organisations to explore the longer term impact of these systems?

Should people be able to opt out of these new technologies?

21st Century HCI

"Technology is not positive or negative, nor is it neutral."

