

# *Interaction with Everyday Objects*

CTHCI SS 2013

Christian Corsten  
RWTH Aachen University



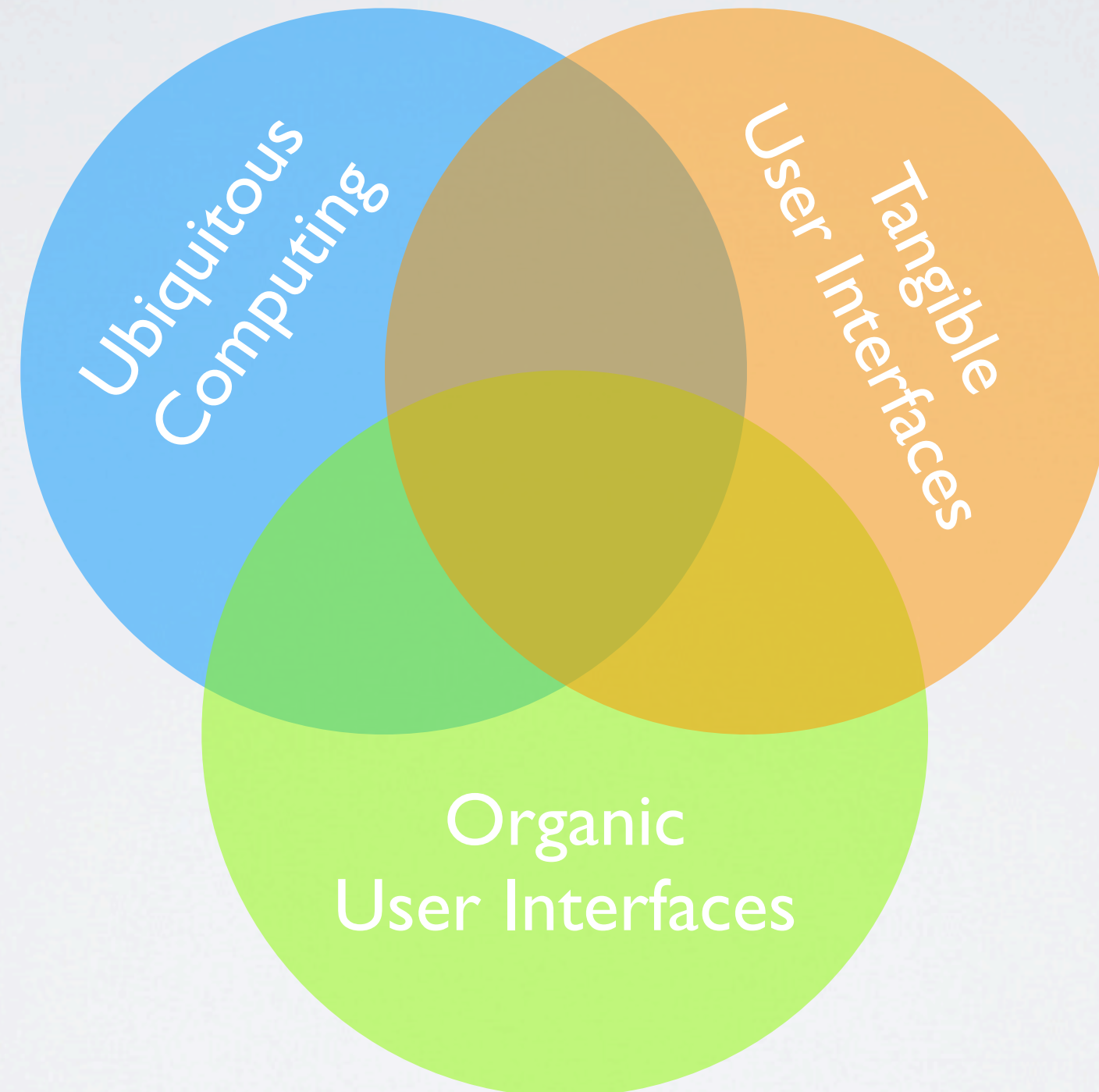
# Learning Objectives

- At the end of this lecture, you will have learned:
  - How interaction with everyday objects relates to HCI
  - Benefits and interaction design for everyday object interaction
  - Technical solutions for making everyday objects interactive
  - How to make your own everyday objects interactive within minutes

# Agenda

- Everyday objects & HCI
- What are everyday objects?
- Related research projects presented at CHI
- MaKey MaKey: Touch detection for everyday objects (live demo)

# Everyday Objects & HCI





# Ubiquitous Computing

- The Computer for the 21st Century, [Weiser, 1992]
  - “The most profound technologies are those that disappear. They weave themselves into the fabric of **everyday life** until they are indistinguishable from it.”
- Disappearing technology
  - Examples: Pen & paper, glasses, smartphones(?)



Jawbone Up Fitness Bracelet

# Tangible User Interfaces

- Tangible Bits [Ishii et al., 1997]
  - “Tangible Bits allows users to “grasp & manipulate” bits in the center of users’ attention by coupling the bits with **everyday physical objects** and architectural surfaces.”
- The world is the interface
- Physical instantiation of GUI elements



# Tangible User Interfaces

- Tangible Bits [Ishii et al., 1997]
  - “Tangible Bits allows users to “grasp & attention by coupling the bits with **env** surfaces.”
- The world is the interface
- Physical instantiation of GUI elements



# Organic User Interfaces

- Organic User Interfaces, [Holman et al., 2008]
- Motto: “Displays on **real-world objects** allow more realistic user interfaces.”
  - Input Equals Output (users deform the graphics on display)
  - Function Equals Form (affordances)
  - Form Follows Flow (example: clamshell phone)



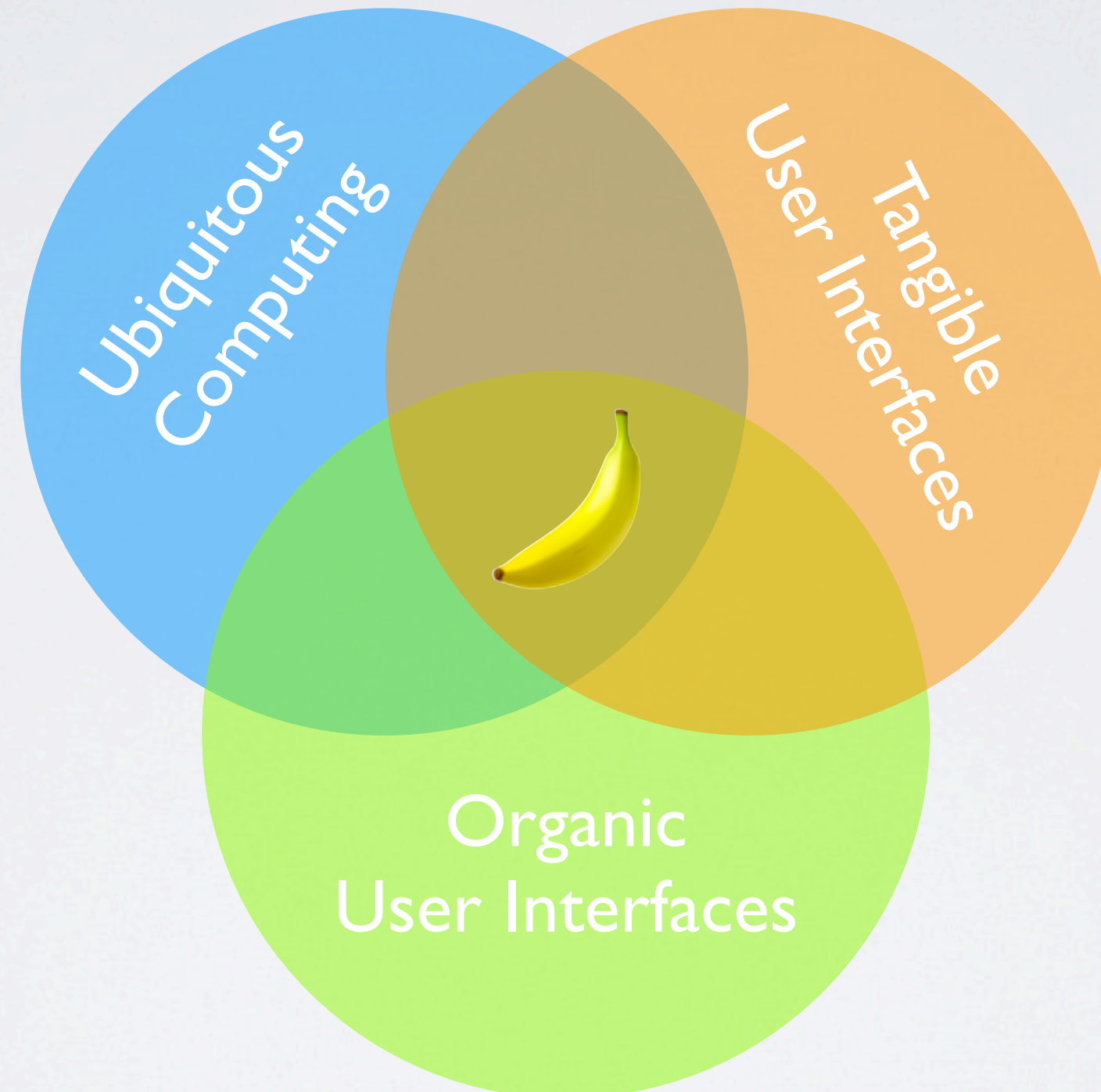
# Organic User Interfaces

- Organic User Interfaces, [Holman et al., 2008]
- Motto: “Displays on **real-world objects** allow more realistic use
  - Input Equals Output (users deform the graphics on display)
  - Function Equals Form (affordances)
  - Form Follows Flow (example: clamshell phone)



DisplayObjects [Akaoka et al., 2010]

# Everyday Objects & HCI





# What Are *Everyday* Objects?

- Which research method to use?
- E.g., photo **diary study**
  - N = 19, but 4 users did not respond
  - 497 objects assigned to 98 categories
  - Workday and weekend, at different times  
(optional SMS reminder service)

Rank	Category	Occurrence
1	Table	28
2	Box	25
3	Paper	23
4	Bottle	22
5	Drinking Vessel	20
6	Pen	18
⋮	⋮	⋮







# Making Everyday Objects Interactive

*How?*

Which technology?

What does *interactive* mean?

*Benefits?*

*Applications?*

What can we do with this?

# Everyday Objects Used in Everyday Life



How to open a letter?



# How to Open a Letter?

What to do when the tool is missing?



Letter Opener

# How to Open a Letter?

What to do when the tool is missing?



Letter Opener



# How to Open a Letter?

A knife ...

- Is ubiquitous
- Has physical affordances similar to a letter opener
- Serves as temporary substitute for a dedicated tool
- Bridges the Gulf of Execution
- Can we lift this to HCI?
  - Repurposing everyday objects to improvise?



# Repurposing

- *“To give a new purpose or use to”* [Merriam Webster]
- *“Adapt for use in a different purpose”* [Oxford Dictionary]
- *“To use something for a different purpose to the one for which it was originally intended”* [Cambridge Dictionaries Online]





# In-Class Exercise: Brainstorming

Benefits of Making Everyday Objects Interactive

# Current Topics in Everyday Object Interaction

Selected Papers Presented at CHI

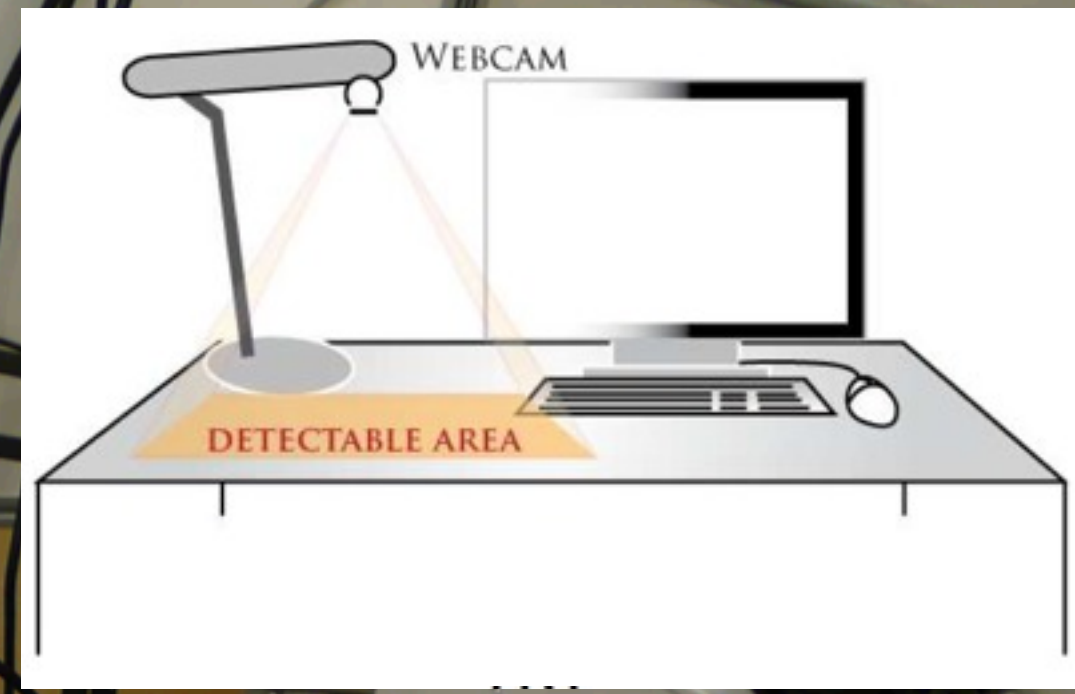
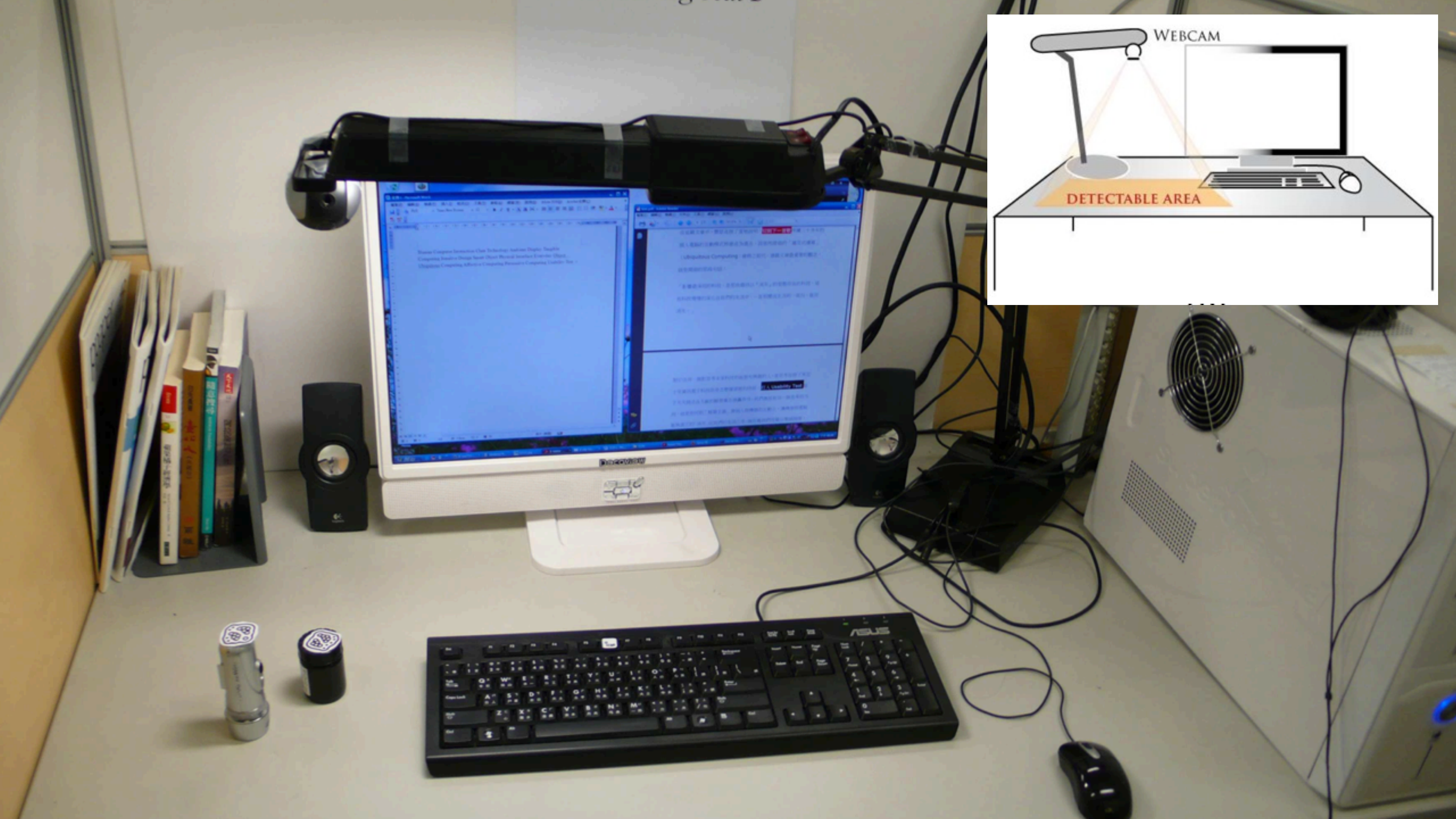


# iCon

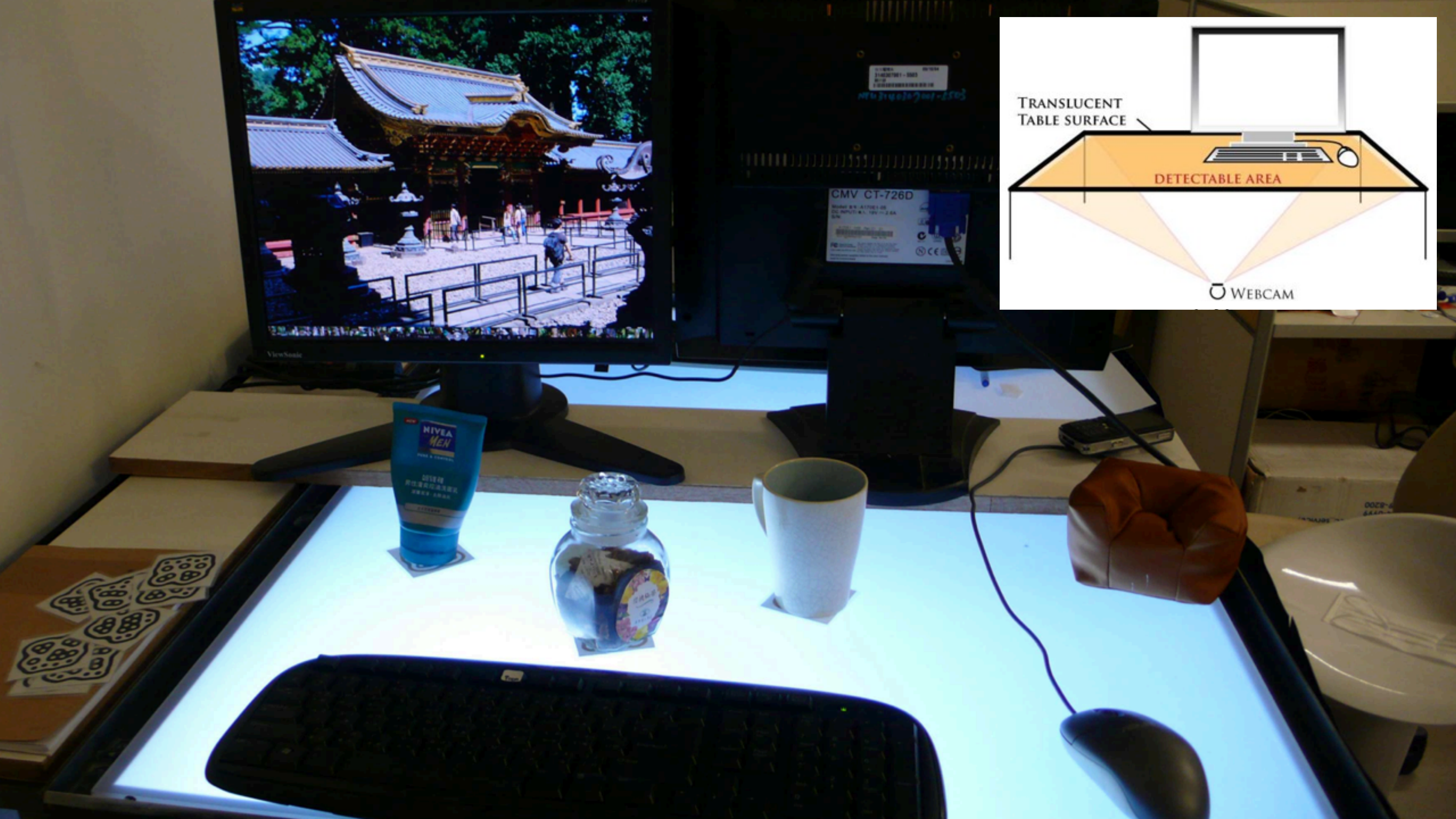
[Cheng et al., 2010]











TRANSLUCENT  
TABLE SURFACE

DETECTABLE AREA

WEBCAM



# iCon

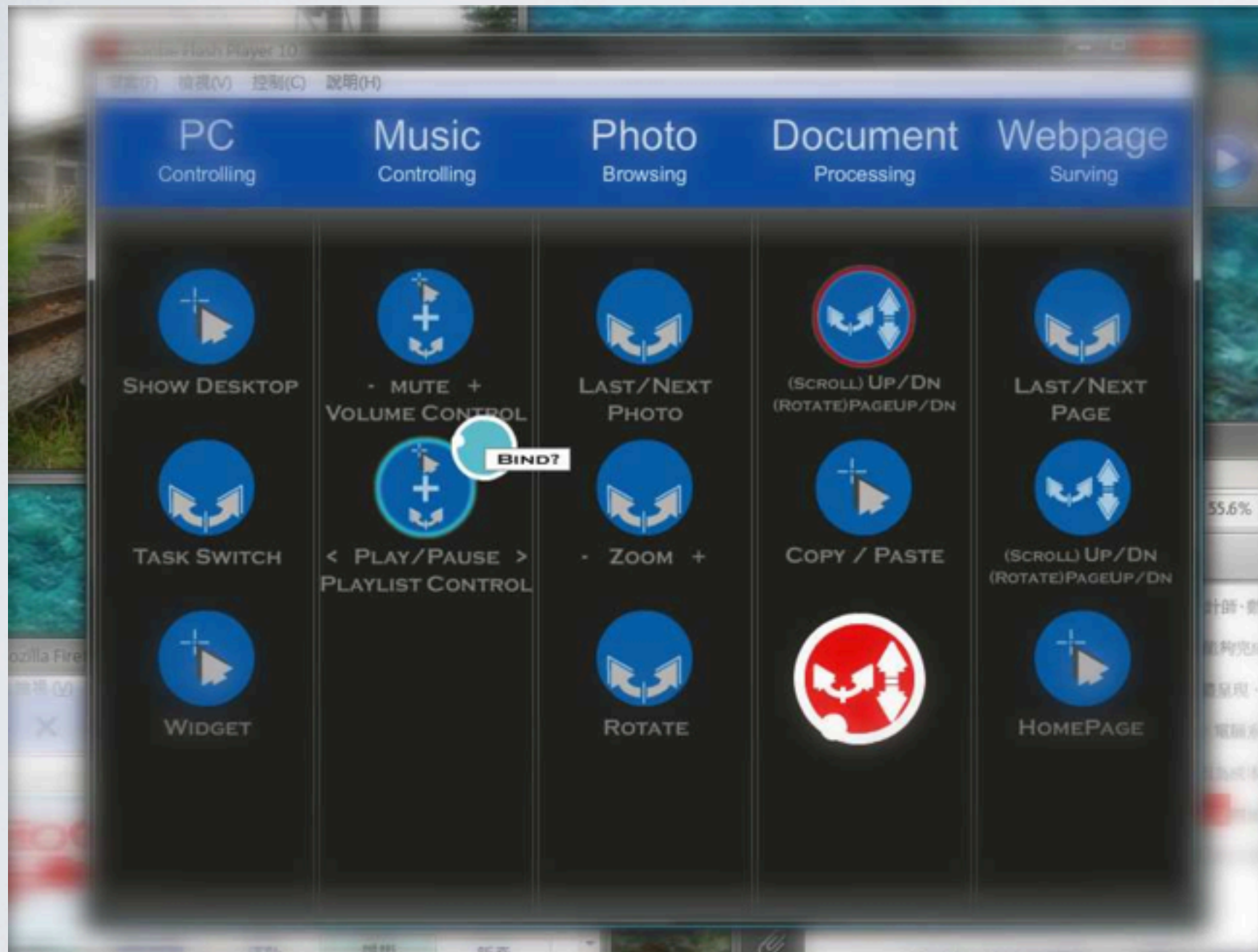
[Cheng et al., 2010]





# iCon

[Cheng et al., 2010]



- Hypothesis:

- Using everyday objects as assistant controllers is more efficient than without them while under a context switching scenario.*

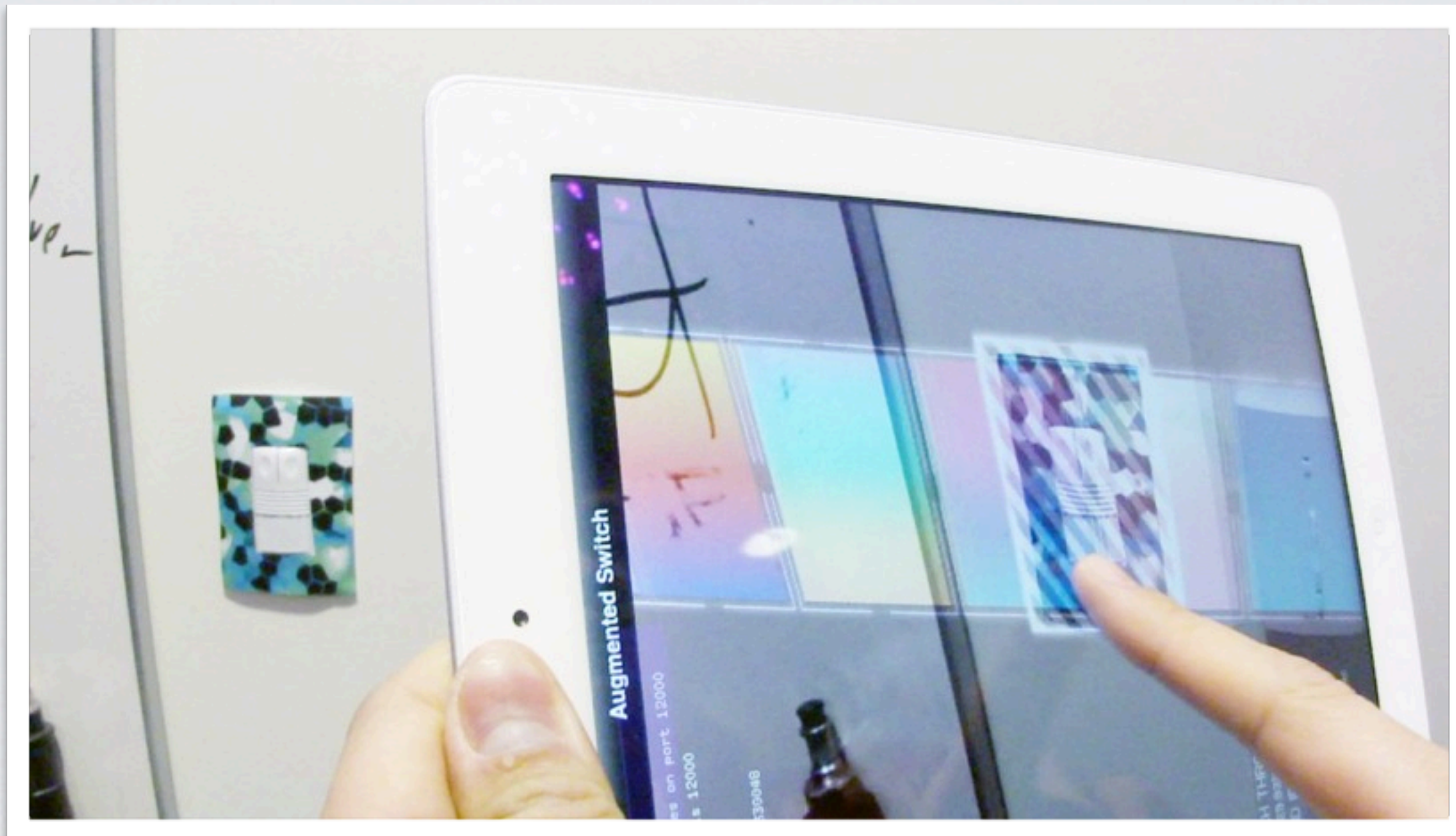
	M	SD
iCon	7:52	1:55
w/o iCon	7:23	1:37

Improvement 6.67 %

$N = 22, p = 0.009 < 0.01$

# Smarter Objects

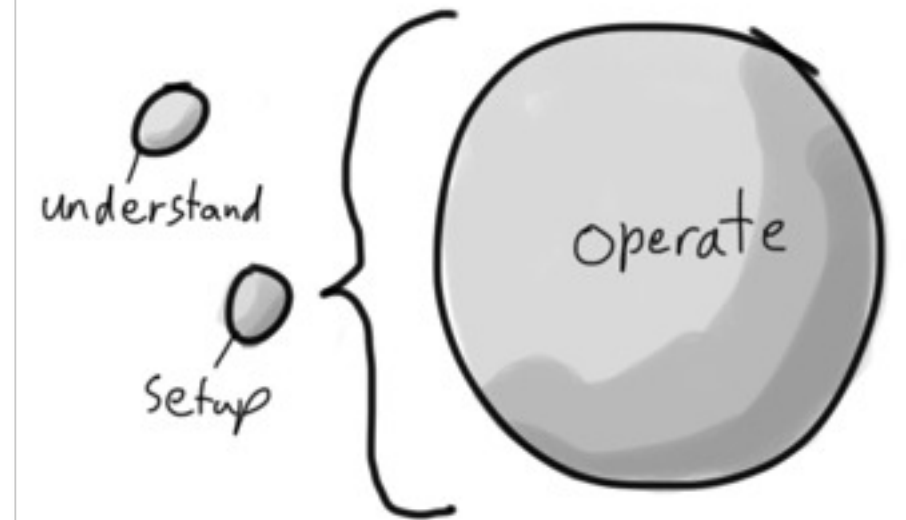
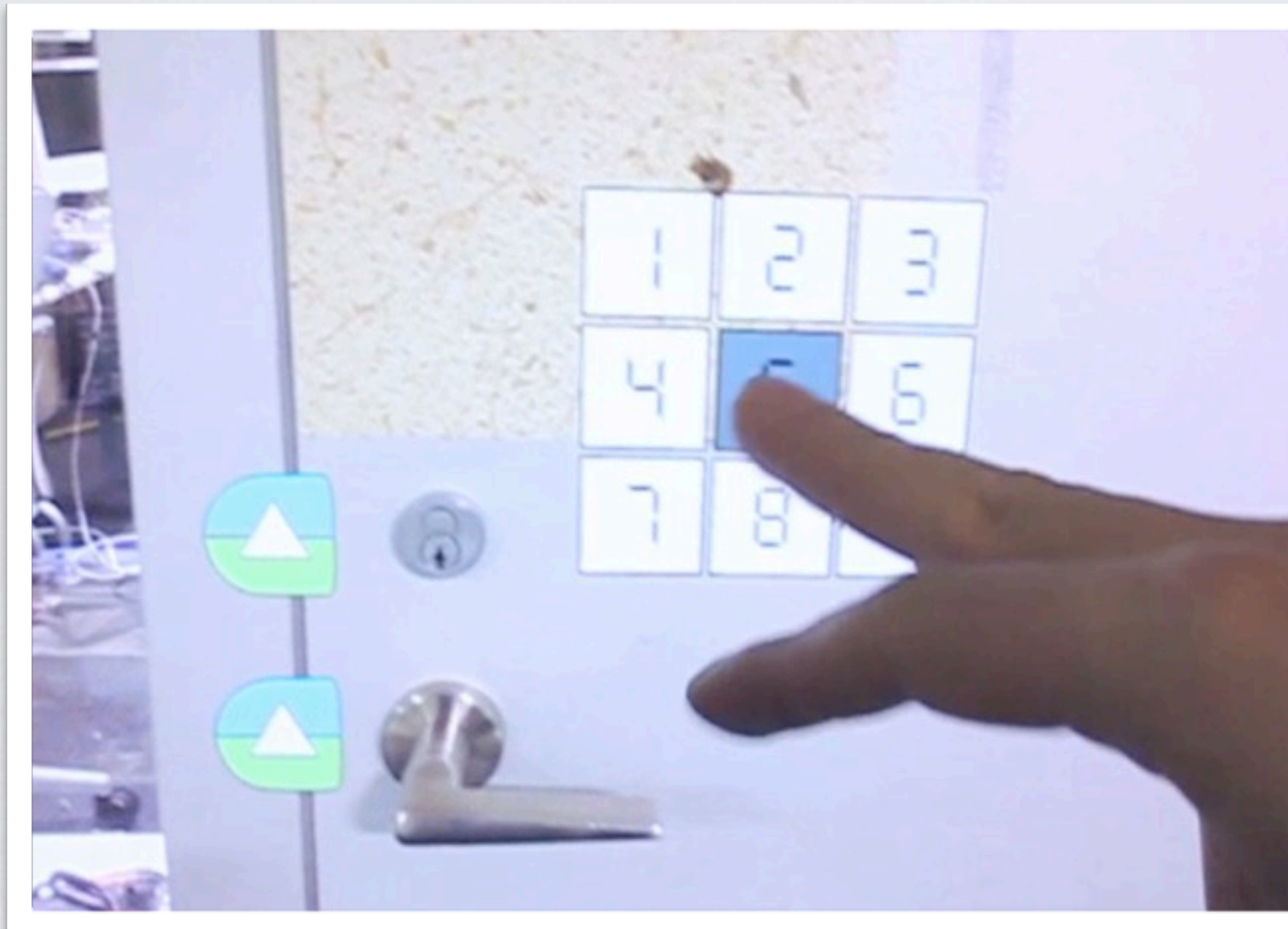
[Heun et al., 2013]





# Smarter Objects

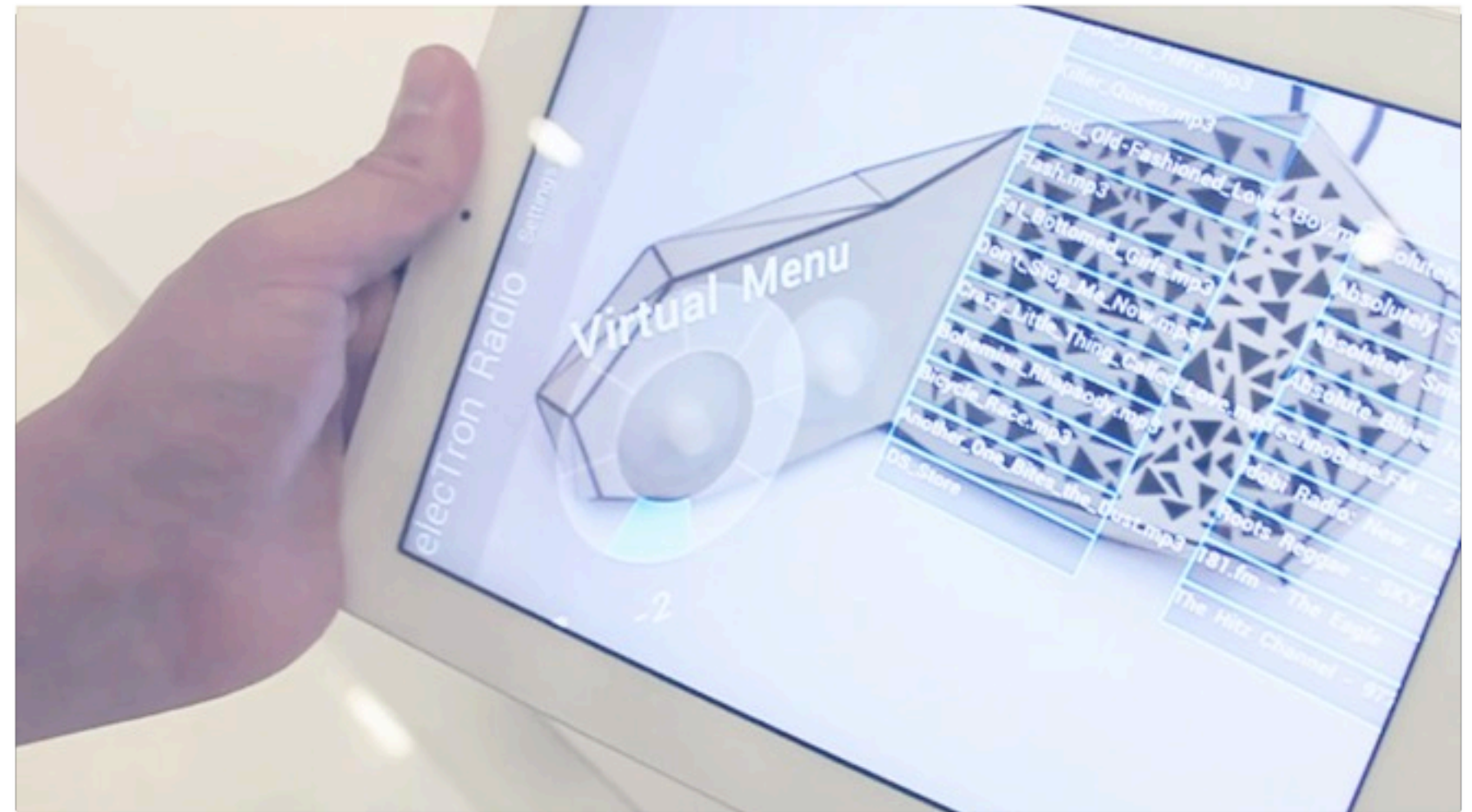
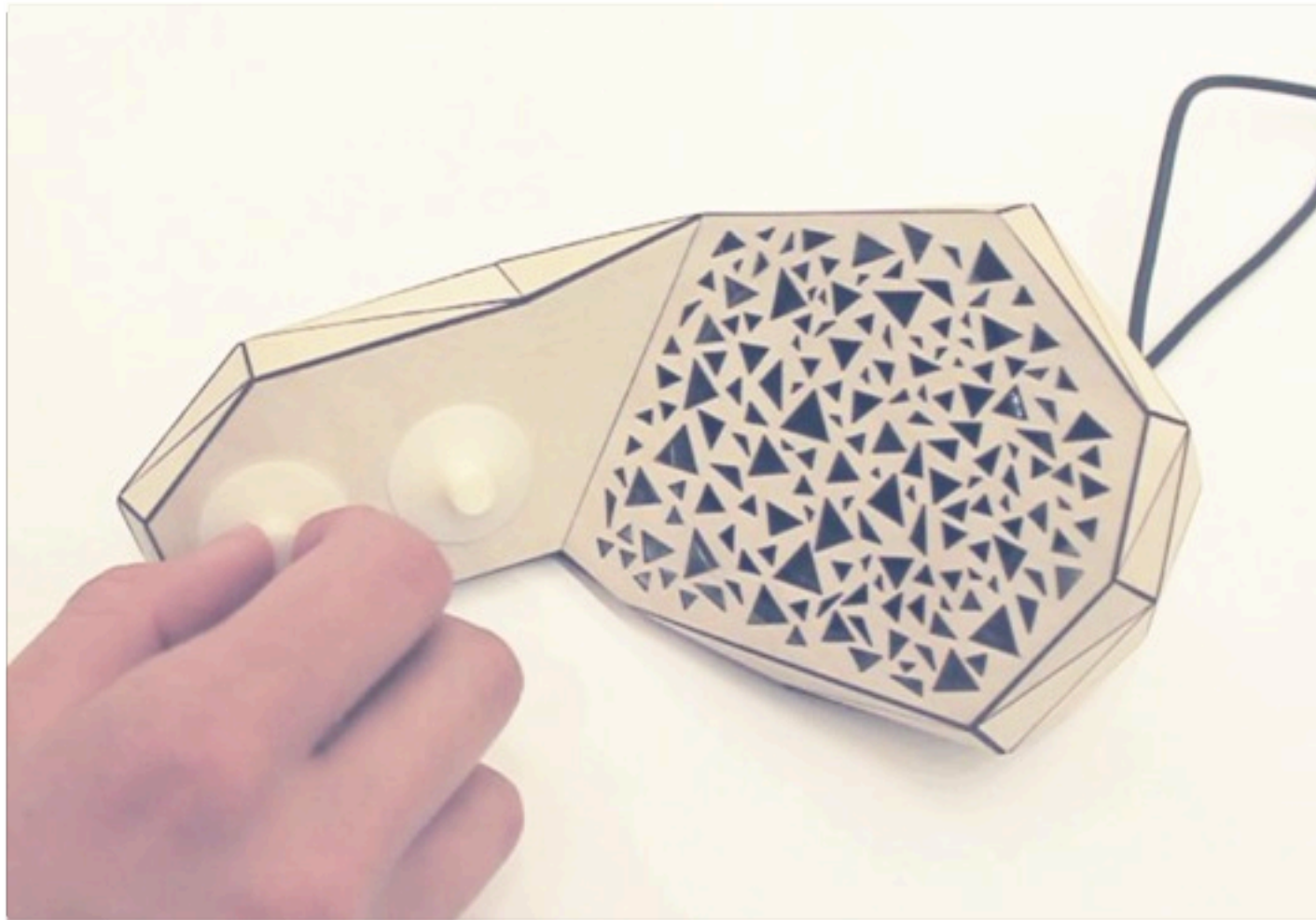
[Heun et al., 2013]





# Smarter Objects

[Heun et al., 2013]







# World Kit

[Xiao et al., 2013]



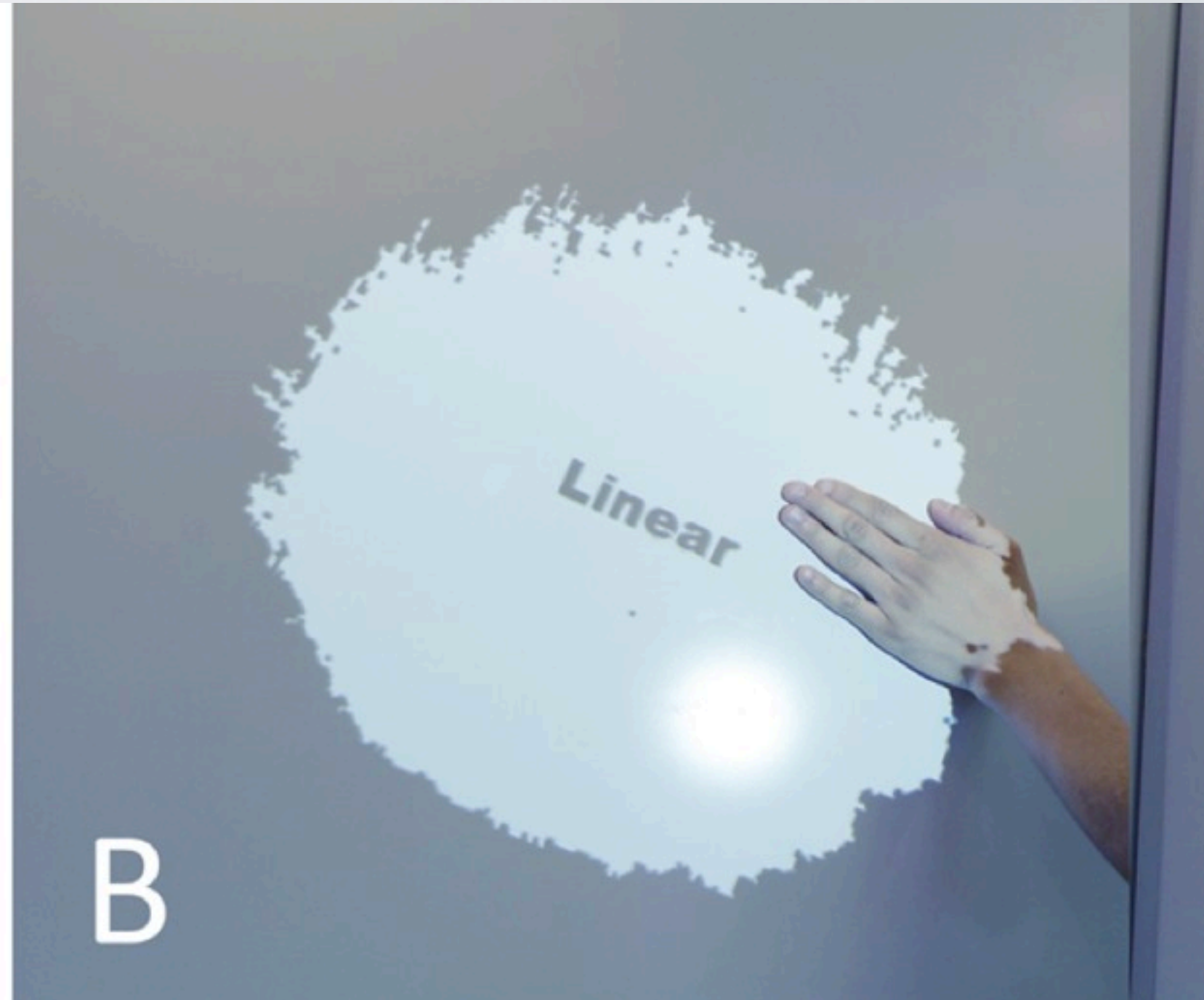
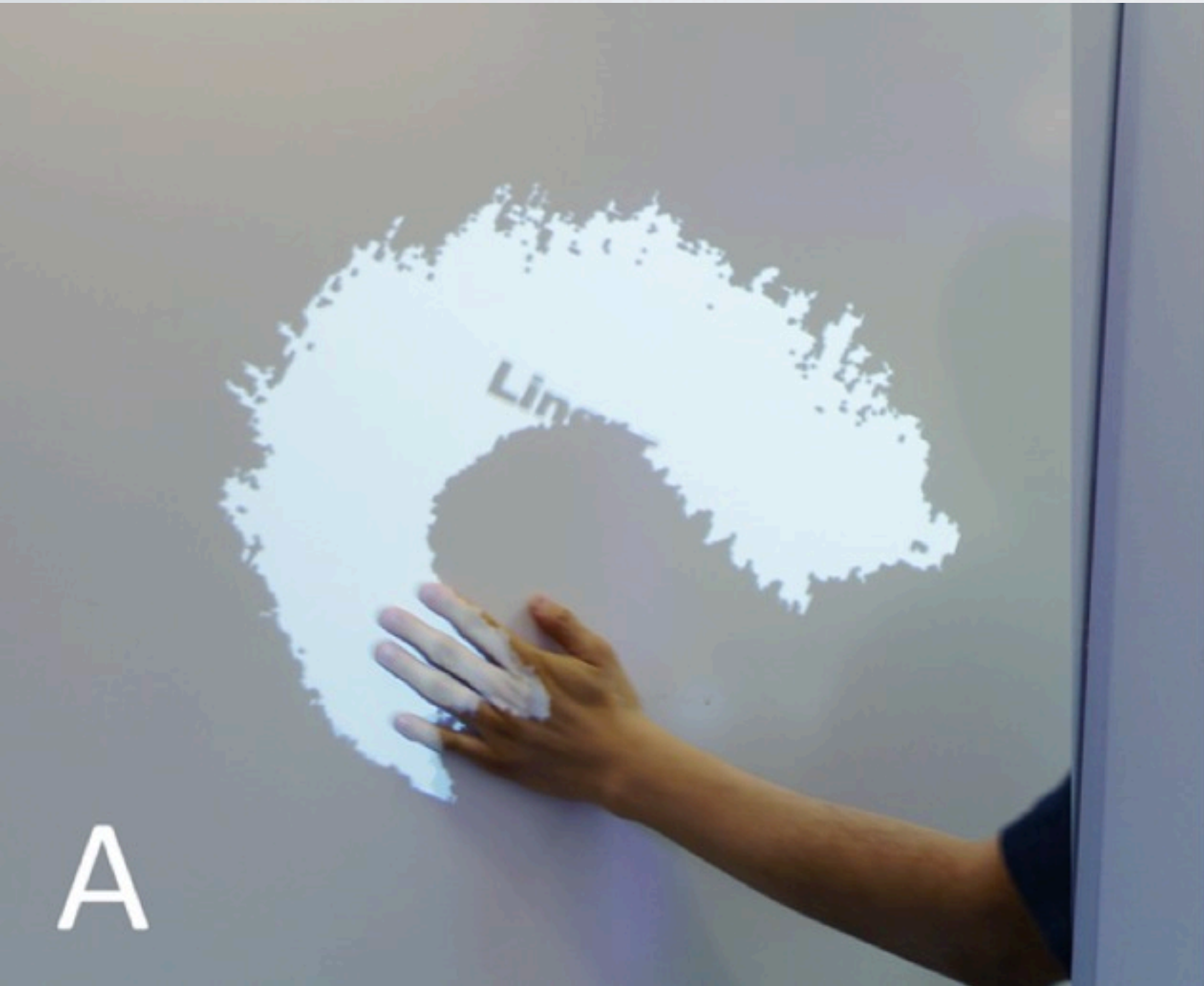






# World Kit

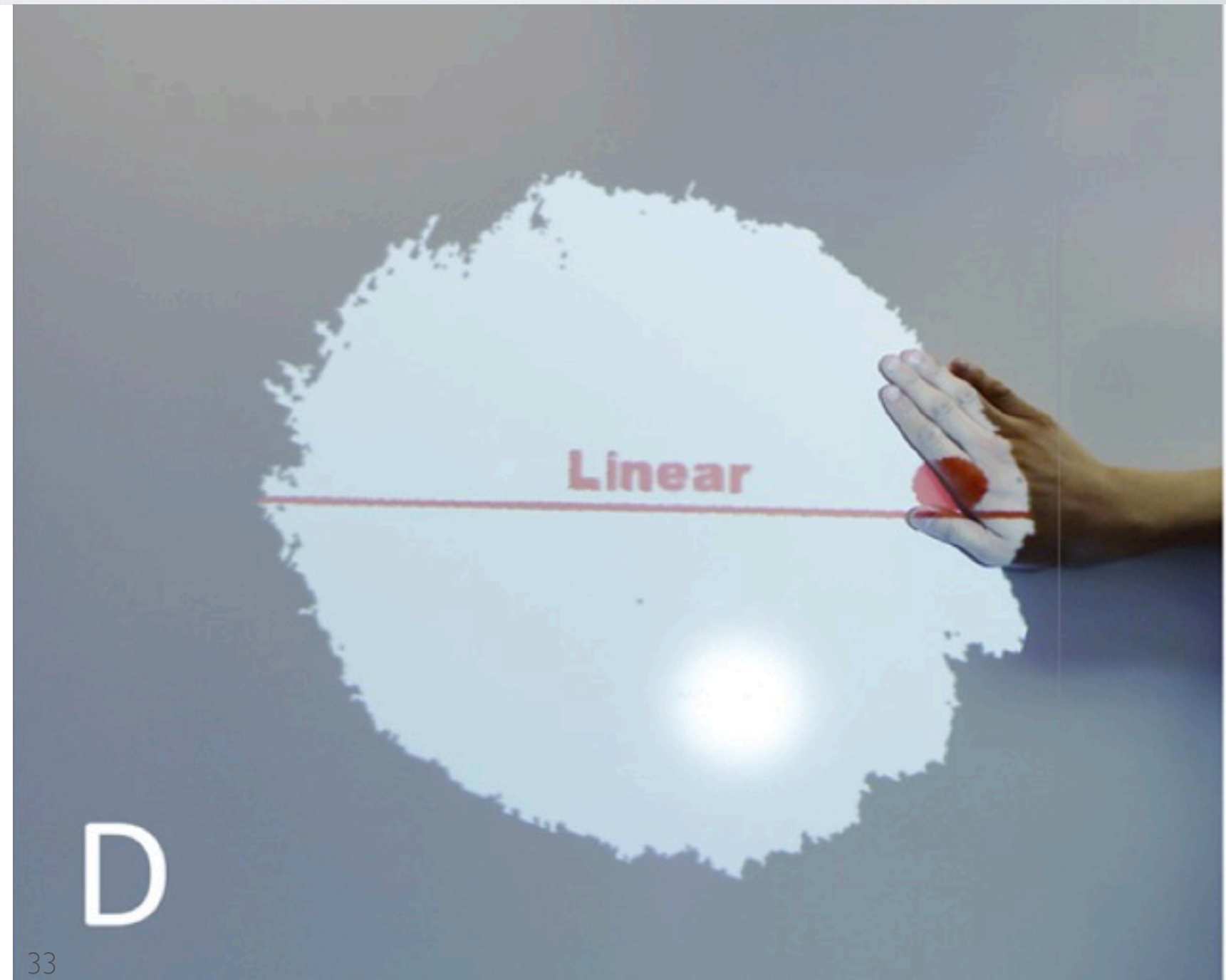
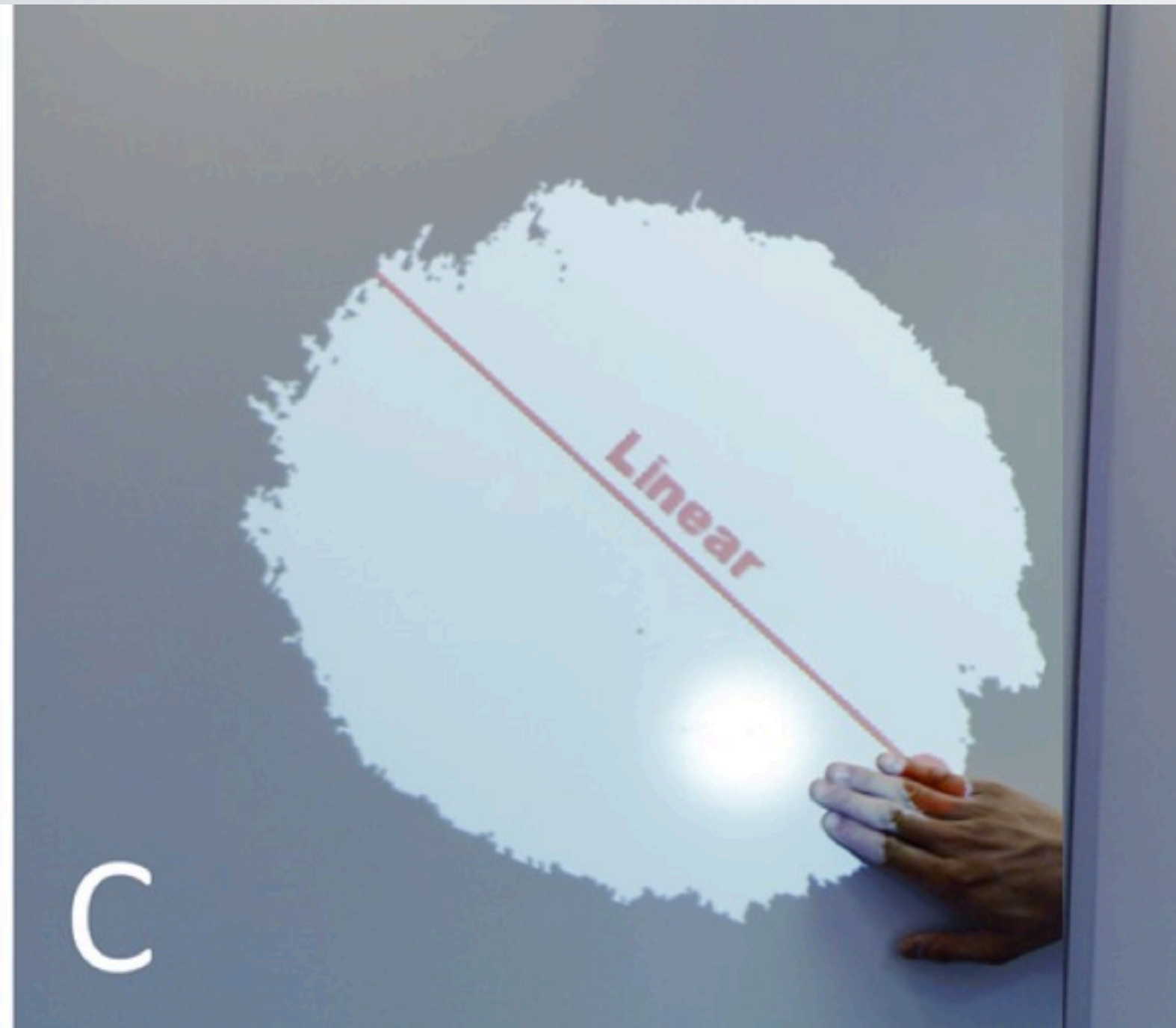
[Xiao et al., 2013]





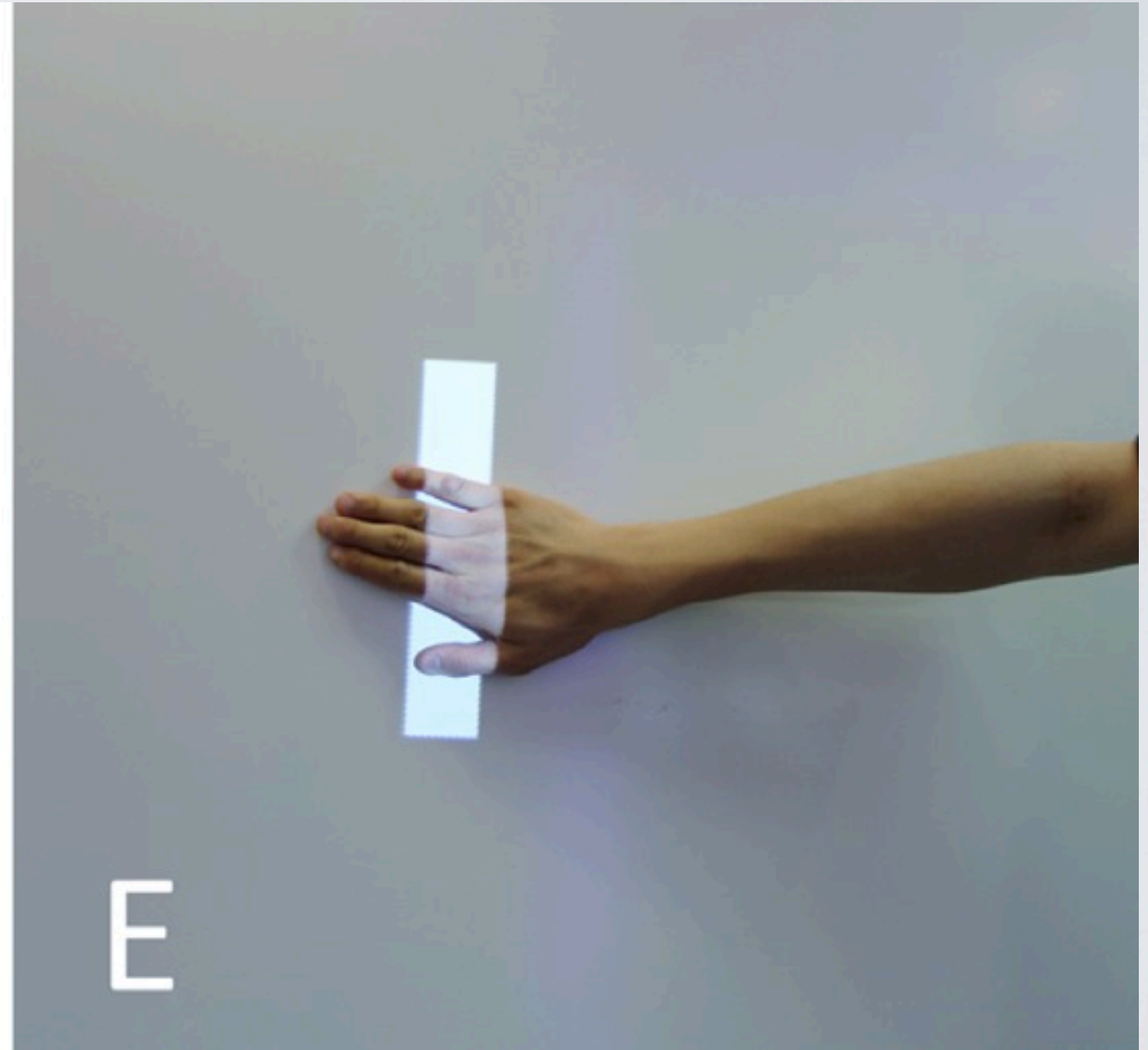
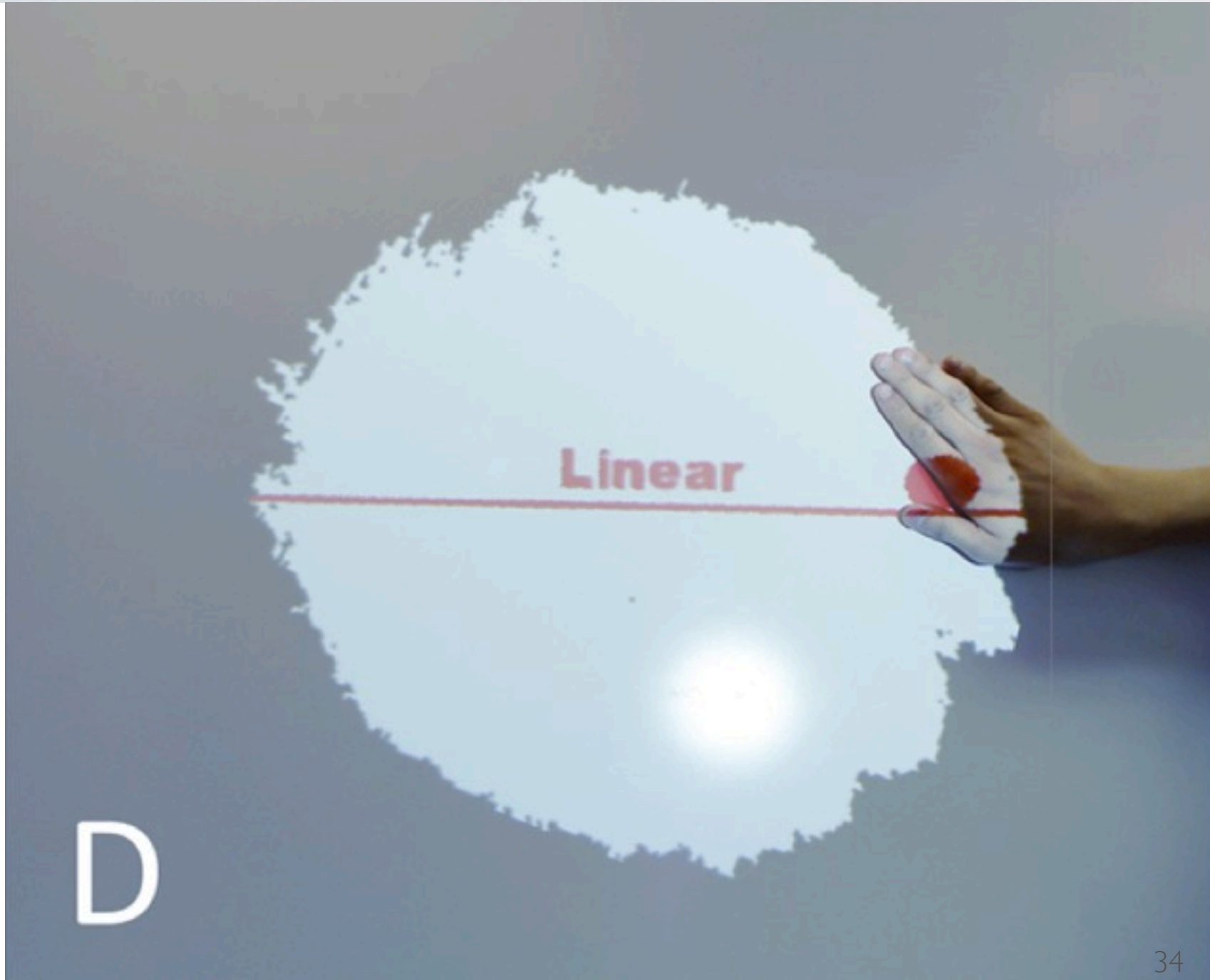
# World Kit

[Xiao et al., 2013]

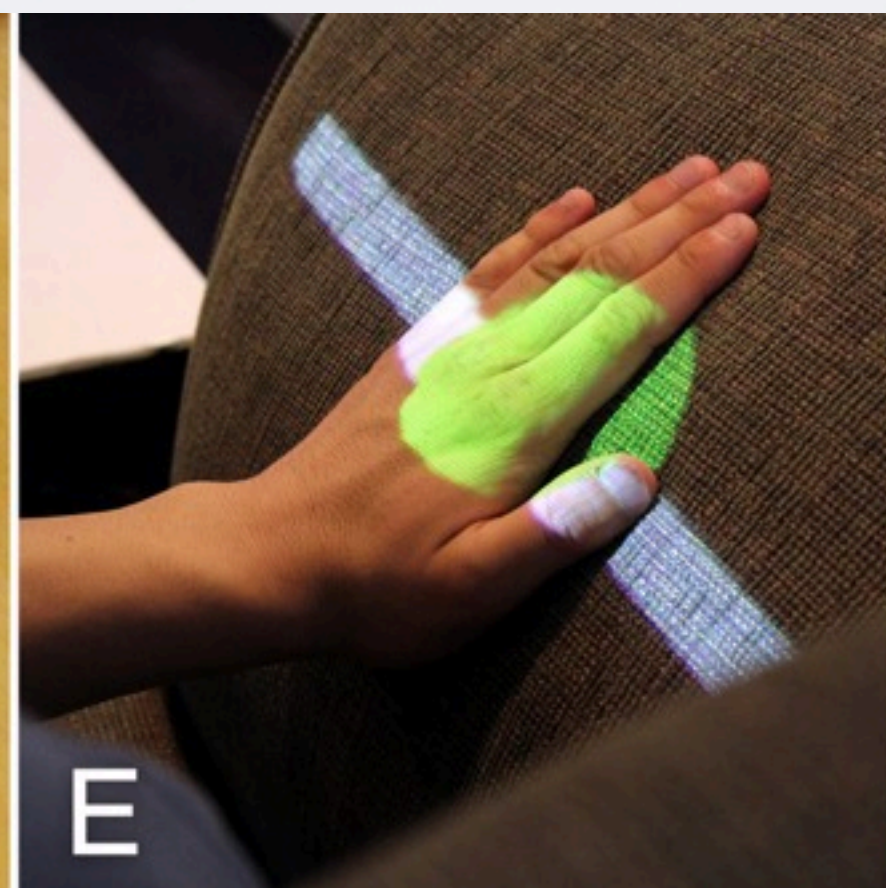
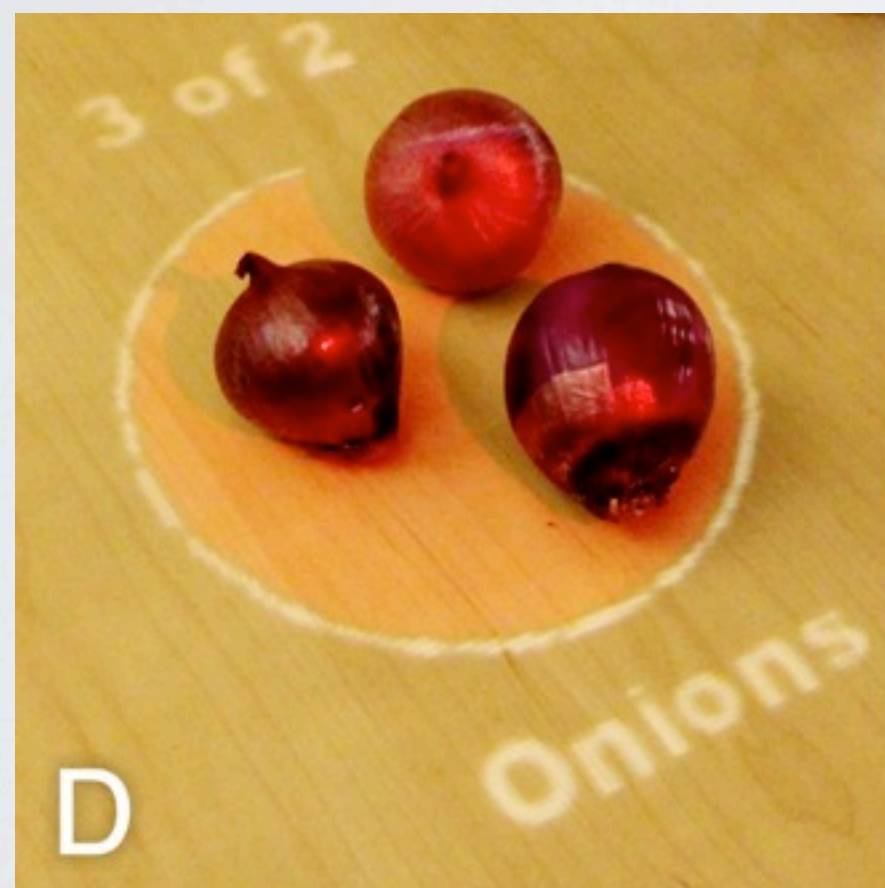
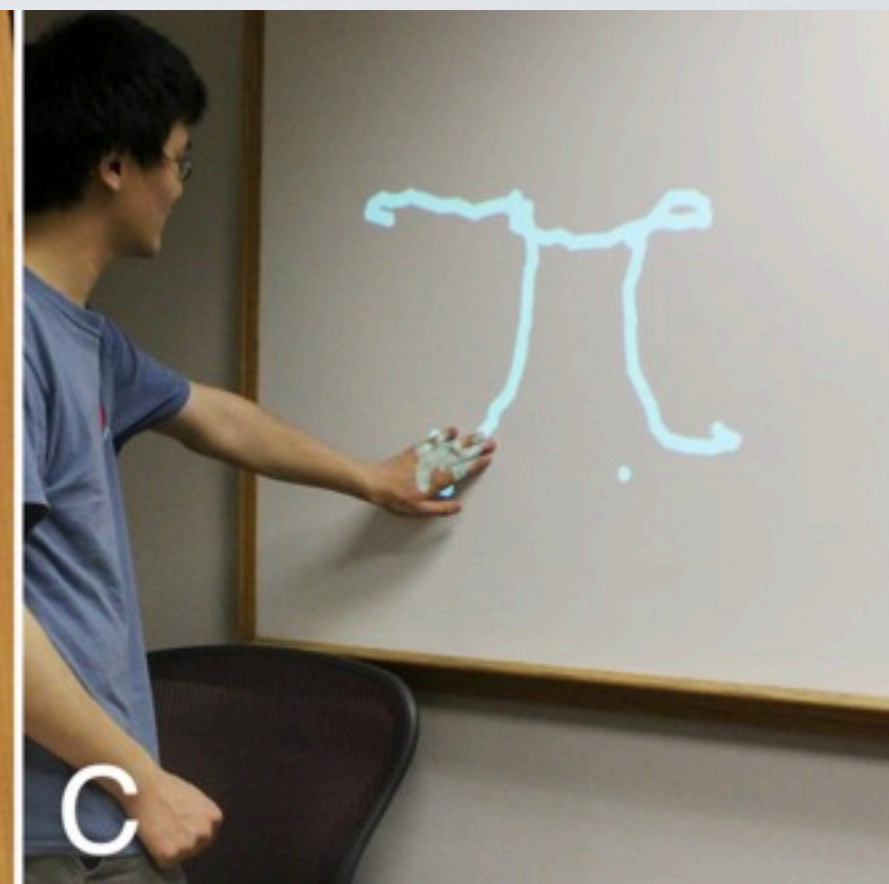
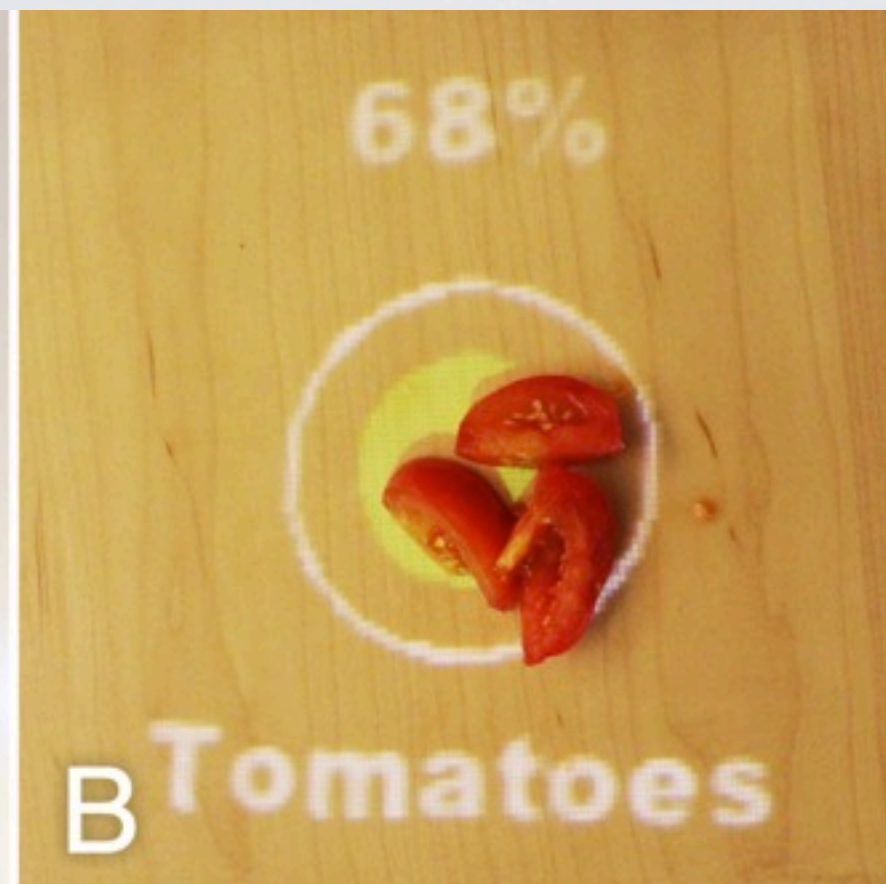
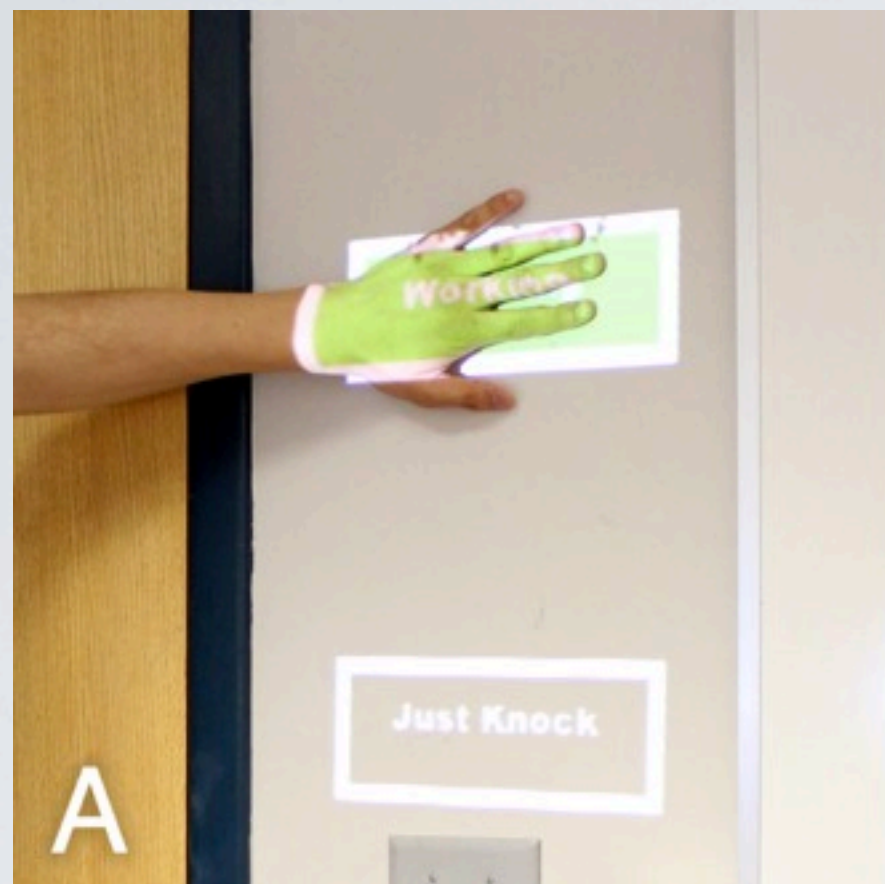


# World Kit

[Xiao et al., 2013]









Technology

Mapping

Benefit



iCon

webcam,  
fiducials

GUI (desktop)

assistant  
controllers for  
efficiency



Smarter  
Objects

AR, fiducials

GUI (tablet)

customization,  
connect objects



WorldKit

depth camera,  
projector

?

ad-hoc interactive  
surface,  
convenience



# DEMO

Video available at: <http://www.youtube.com/watch?v=E4tYpXVTjxA>

# Touché:

Enhancing Touch Interaction on  
Humans, Screens, Liquids, and Everyday Objects

Munehiko Sato, Ivan Poupyrev, Chris Harrison


CHI 2012 Paper Video Figure





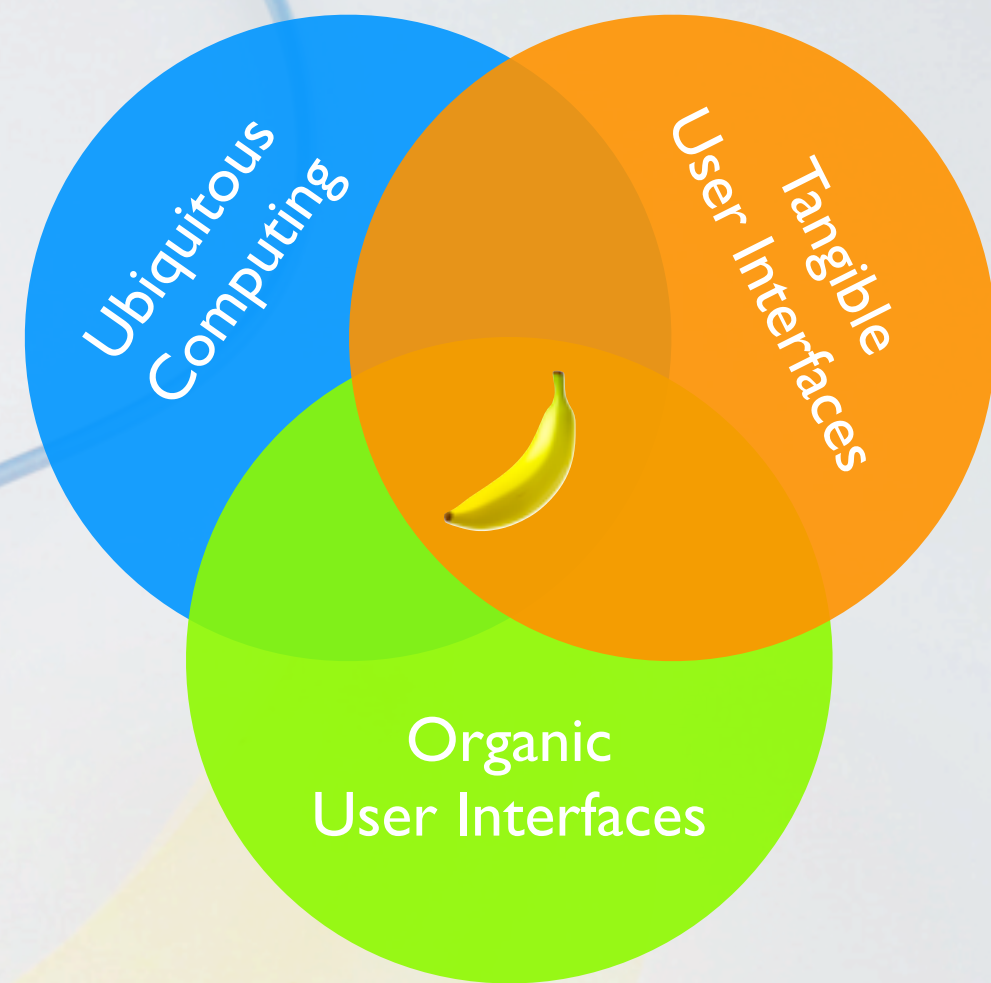
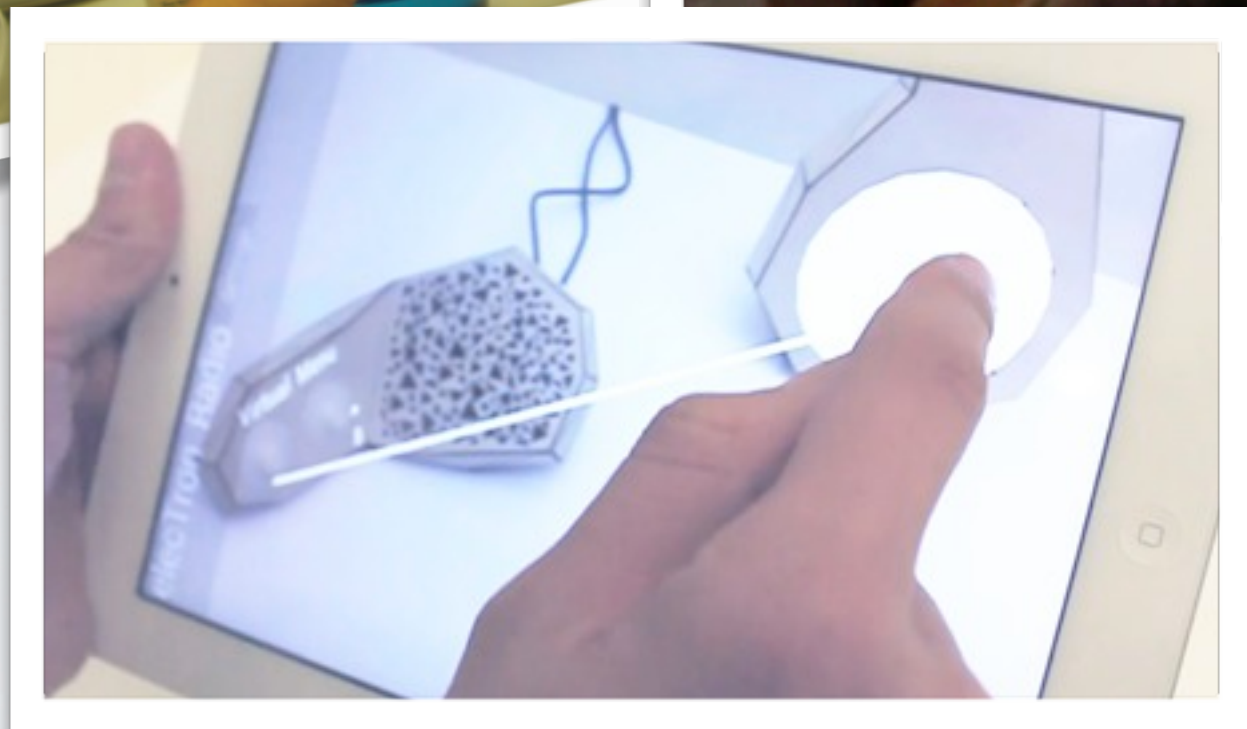
# Learning Objectives

- What you have learned today
  - How interaction with everyday objects relates to HCI (UbiComp, TUI, OUI)
  - Benefits and interaction design (iCon, Smarter Objects, WorldKit, Touché)
  - How to make your own everyday objects interactive (MaKey MaKey)

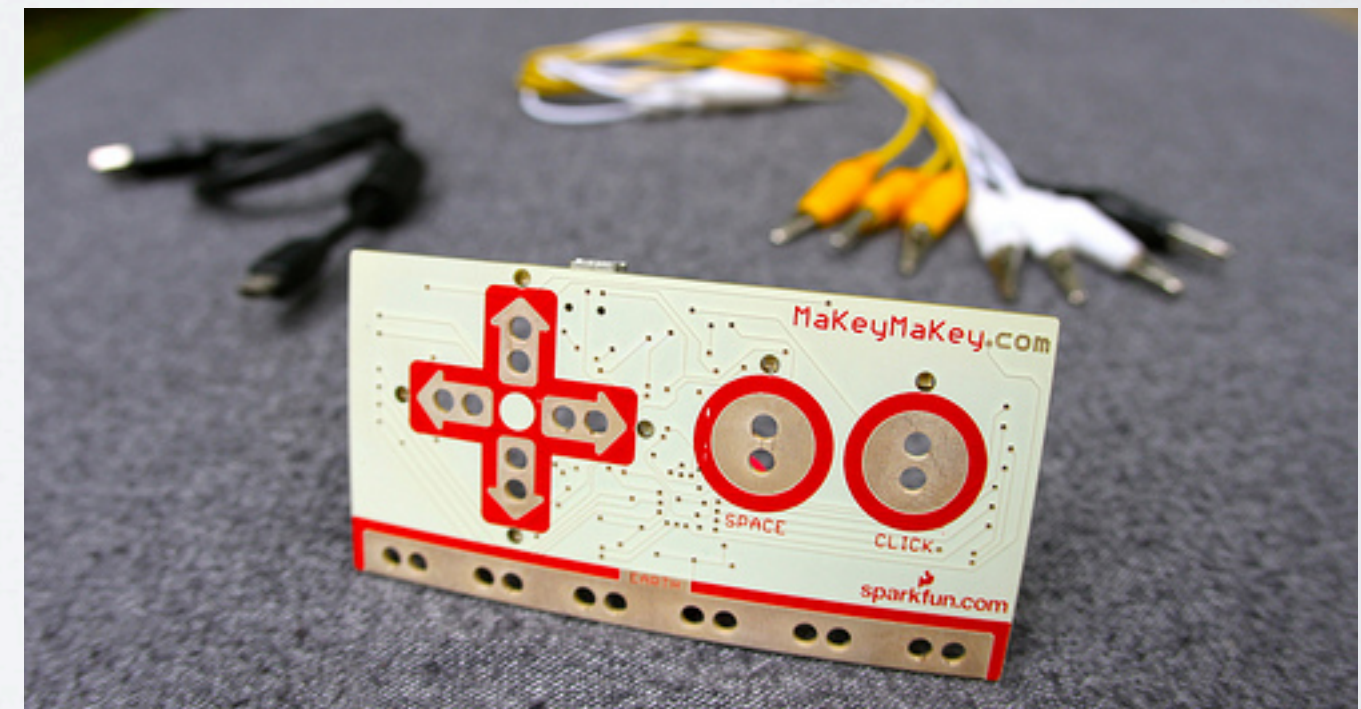
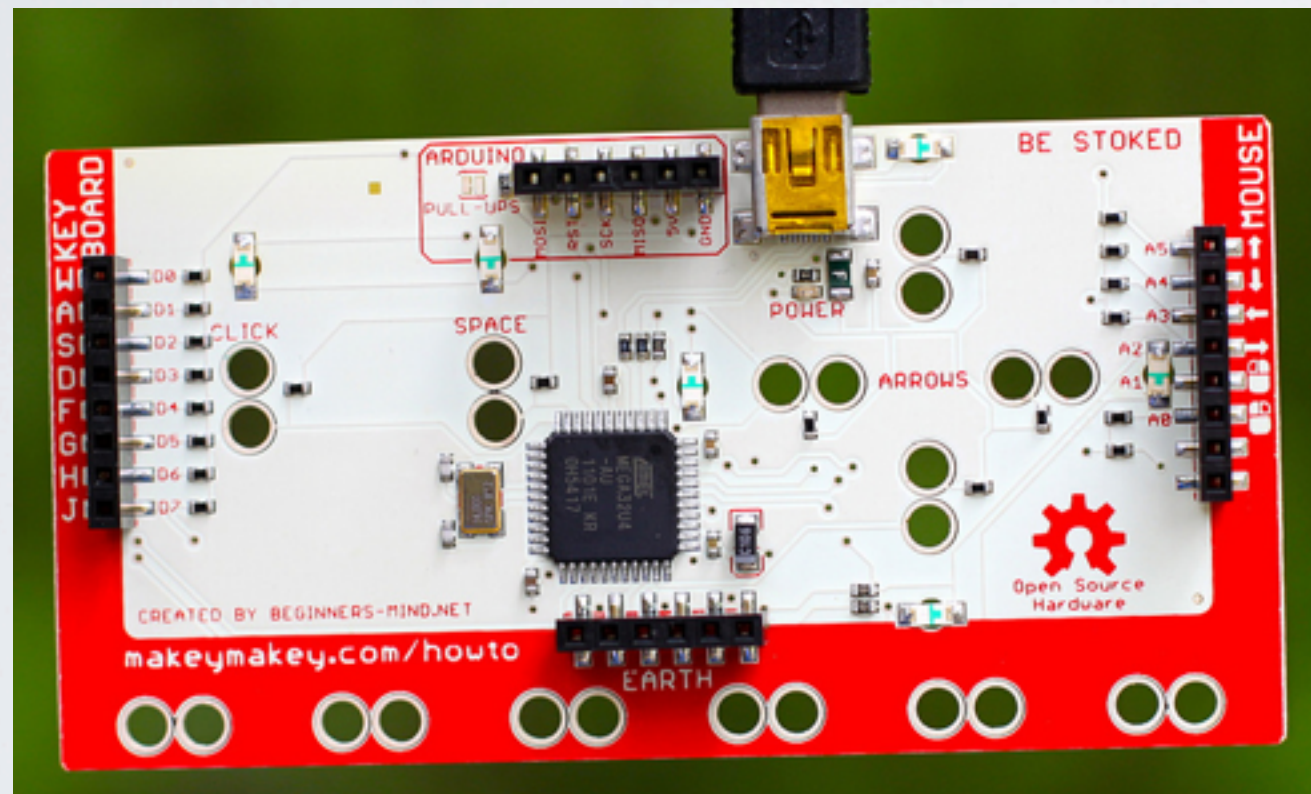
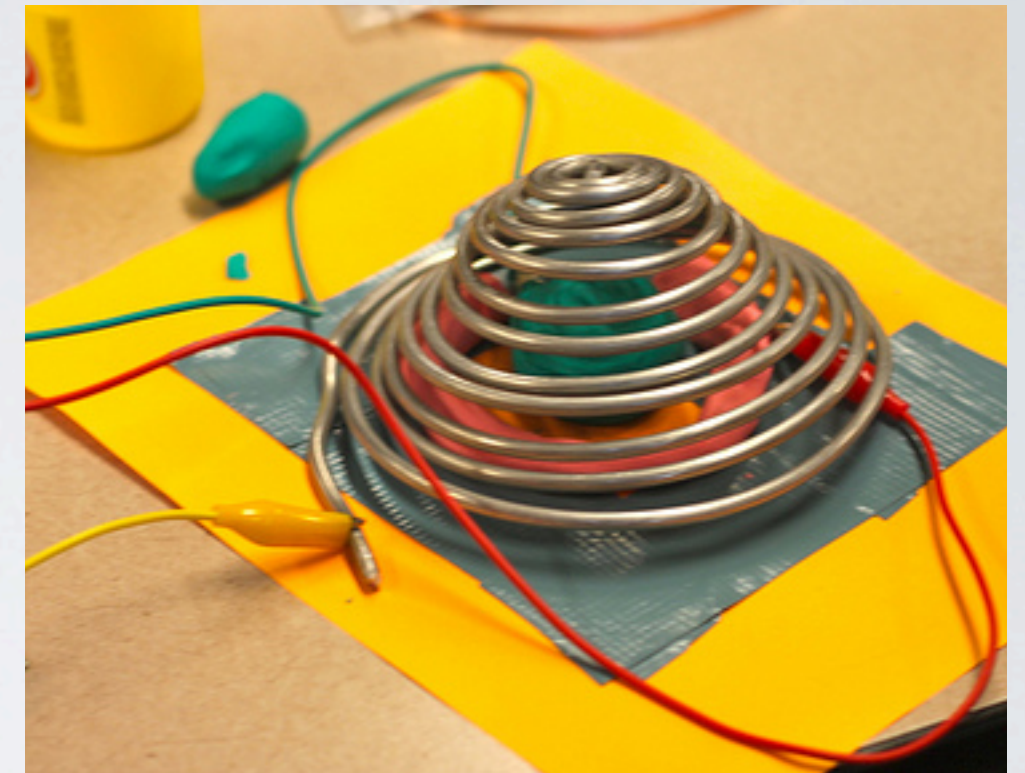
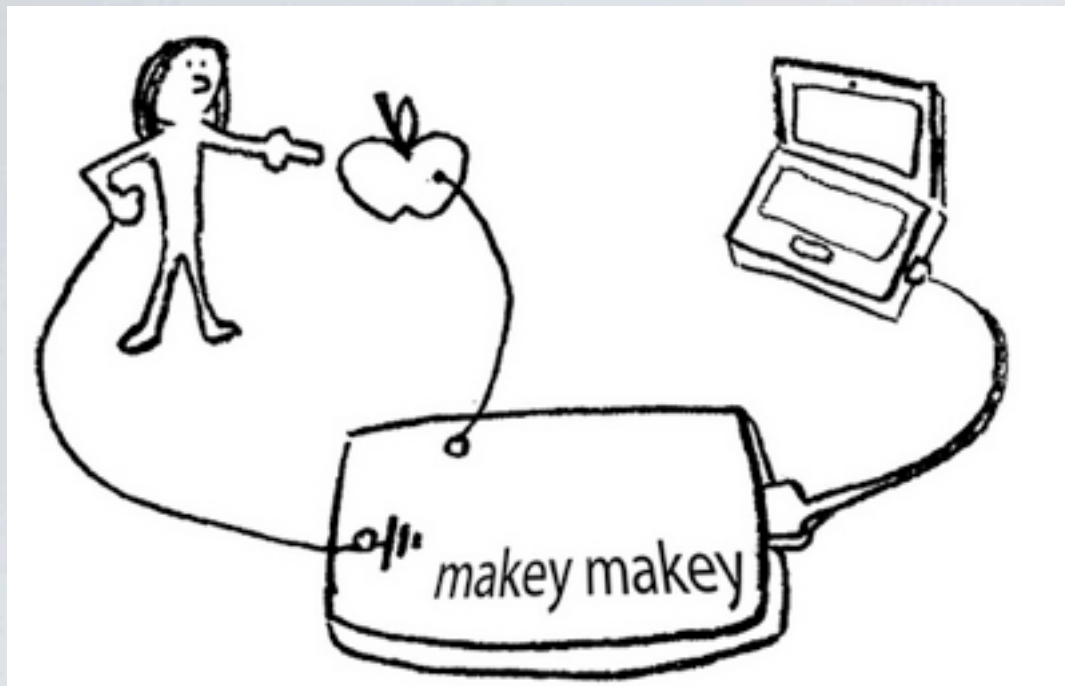


Right now after the lecture!









MaKey MaKey