Interaction with Everyday Objects

CTHCI SS 2013
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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

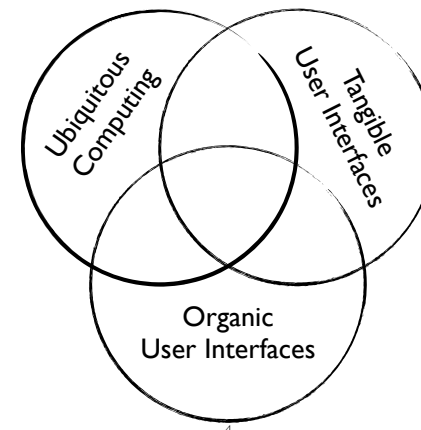 - How to make your own everyday objects interactive within minutes

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Agenda

- Everyday objects & HCI

- What are everyday objects?

- Related research projects presented at CHI

- MaKey MaKey: Touch detection for everyday objects (live demo)

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Everyday Objects & HCI

Ubiquitous Computing

Tangible User Interfaces

Organic User Interfaces

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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

SLAP [Weiss et al., 2009]

Tangible User Interfaces

- Tangible Bits [Ishii et al., 1997]

  - "Tangible Bits allows users to "grasp & attention by coupling the bits with **ev** surfaces."

- The world is the interface

- Physical instantiation of GUI elements

SLAP [Weiss et al., 2009]

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)

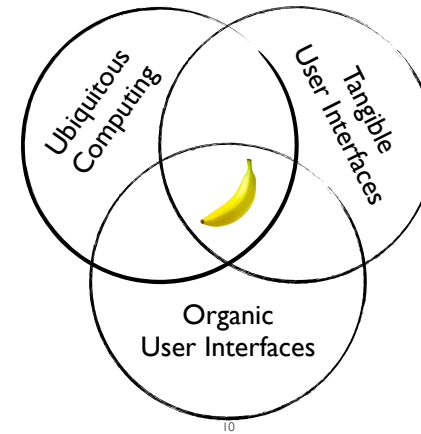DisplayObjects [Akaoka et al., 2010]

Organic User Interfaces

- Organic User Interfaces, [Holman et al., 2008]

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  - Input Equals Output (users deform the graphics on display)

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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
⋮	⋮	⋮

What Are *Everyday* Objects?

Making Everyday Objects Interactive

How?
Which technology?

What does *interactive* mean?

(*Benefits*?)
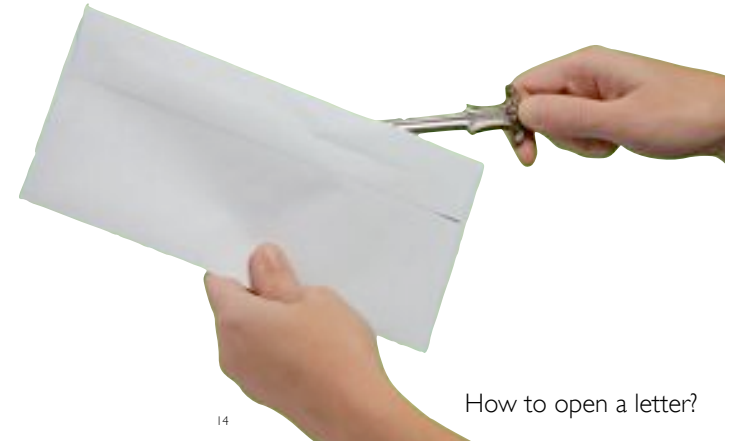
Applications?
What can we do with this?

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Everyday Objects Used in Everyday Life

How to open a letter?

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How to Open a Letter?

What to do when the tool is missing?

Letter Opener

Gulf of Mexico

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How to Open a Letter?

What to do when the tool is missing?

Letter Opener

Gulf of Execution

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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]

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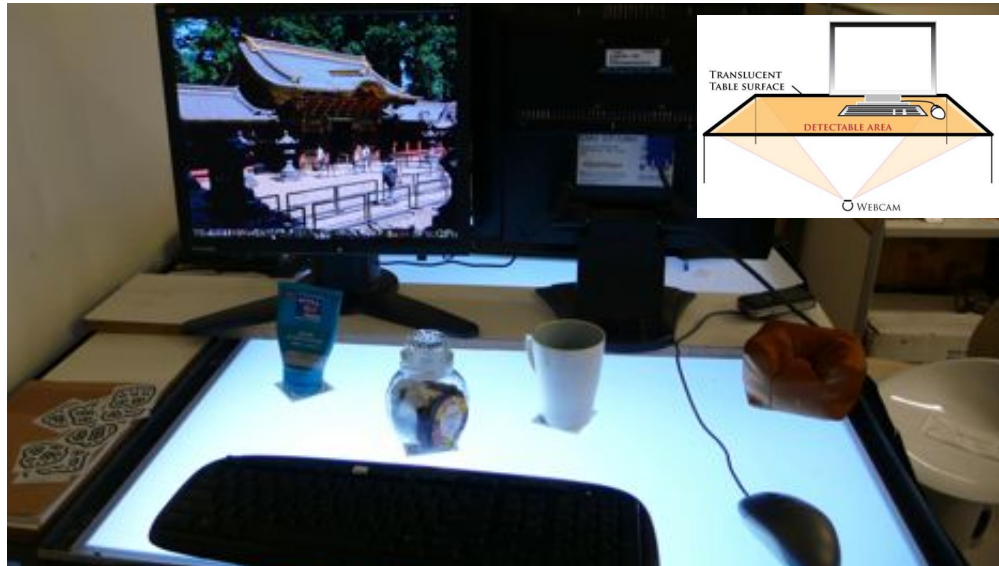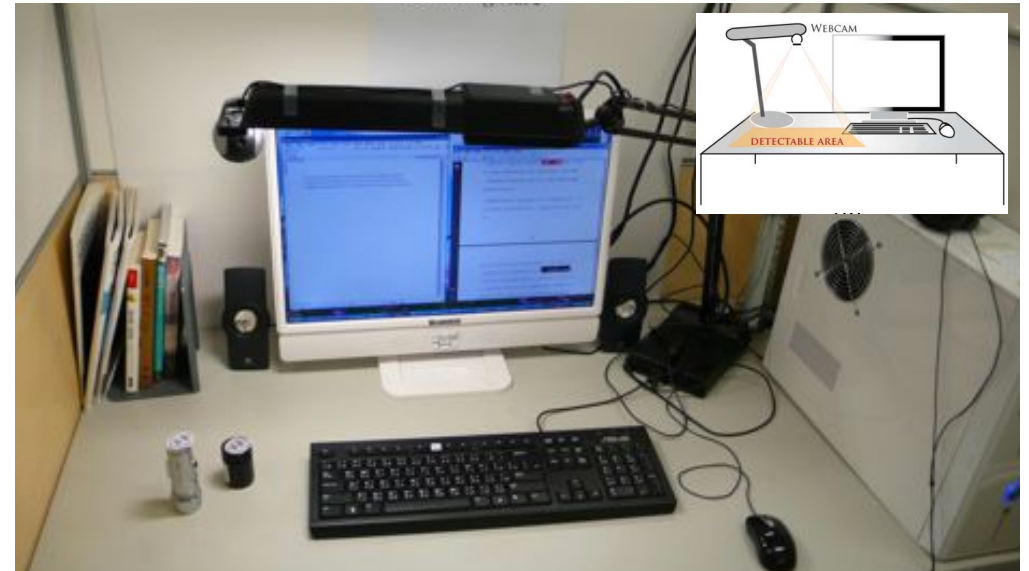
iCon

[Cheng et al., 2010]

iCon

[Cheng et al., 2010]
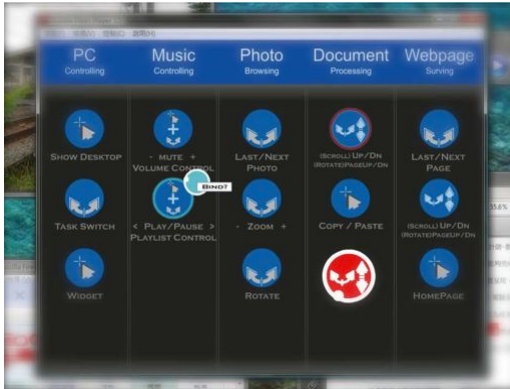
- Hypothesis:

  - *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]

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Smarter Objects

[Heun et al., 2013]

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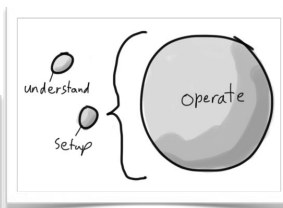
Smarter Objects

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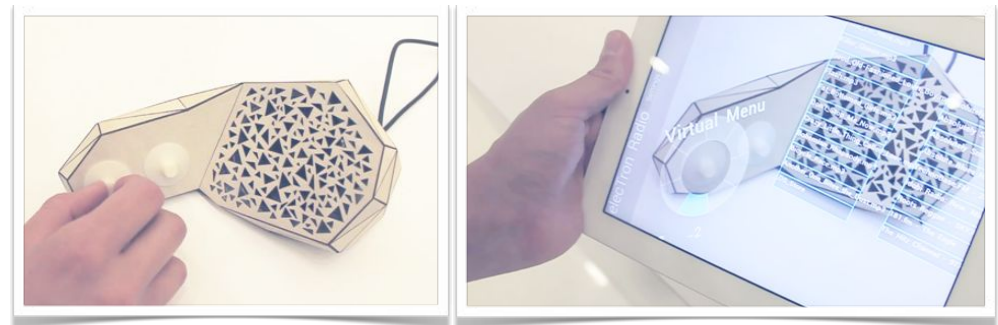
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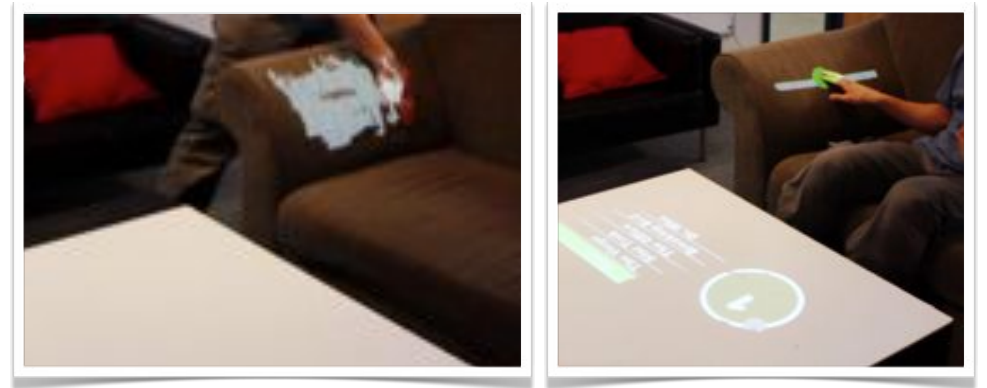
World Kit
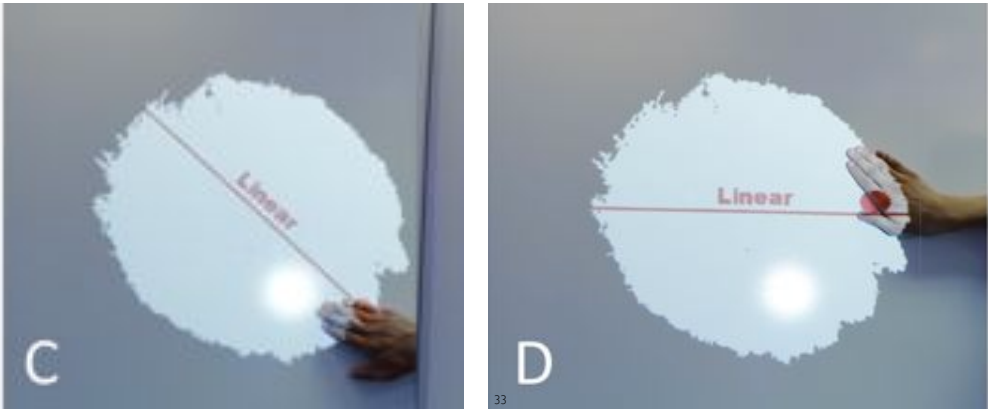[Xiao et al., 2013]

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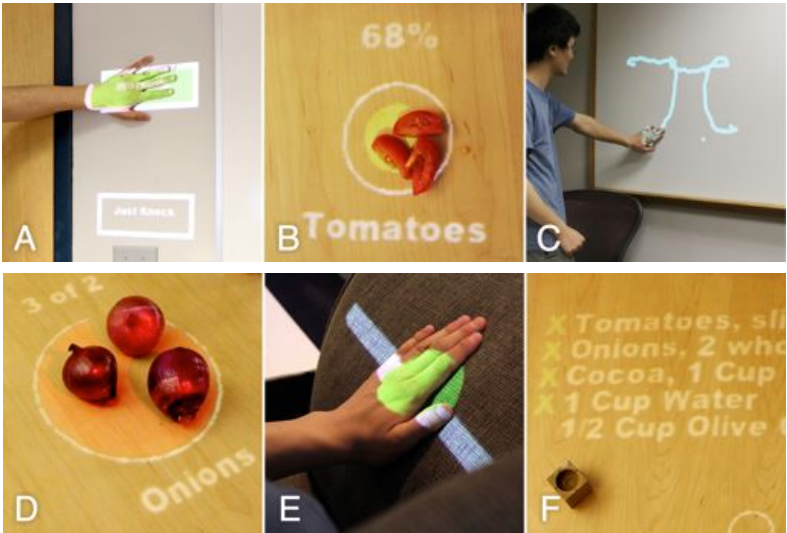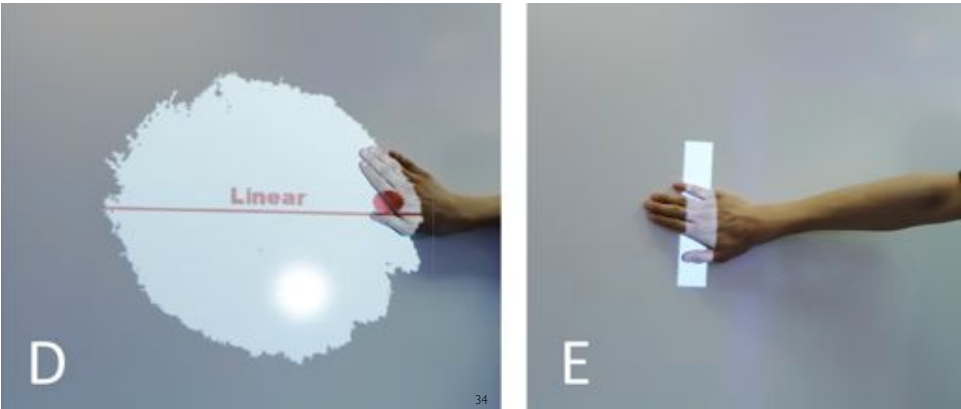

World Kit
[Xiao et al., 2013]

A   B

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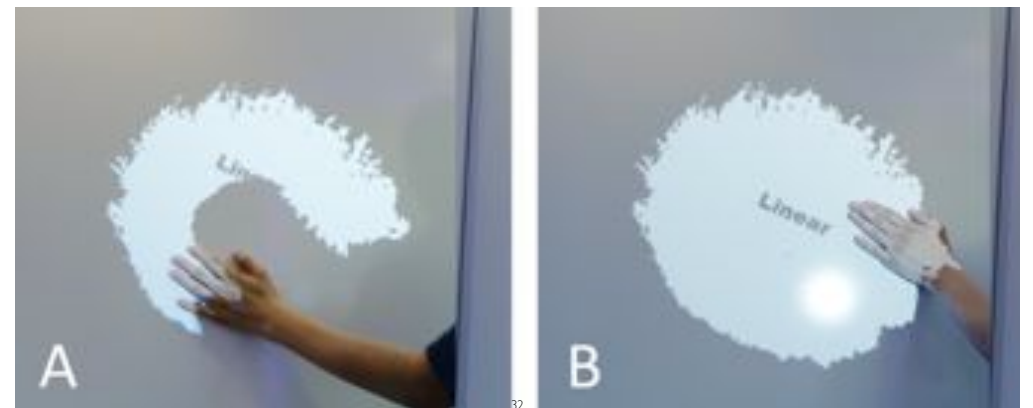
World Kit

World Kit

	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
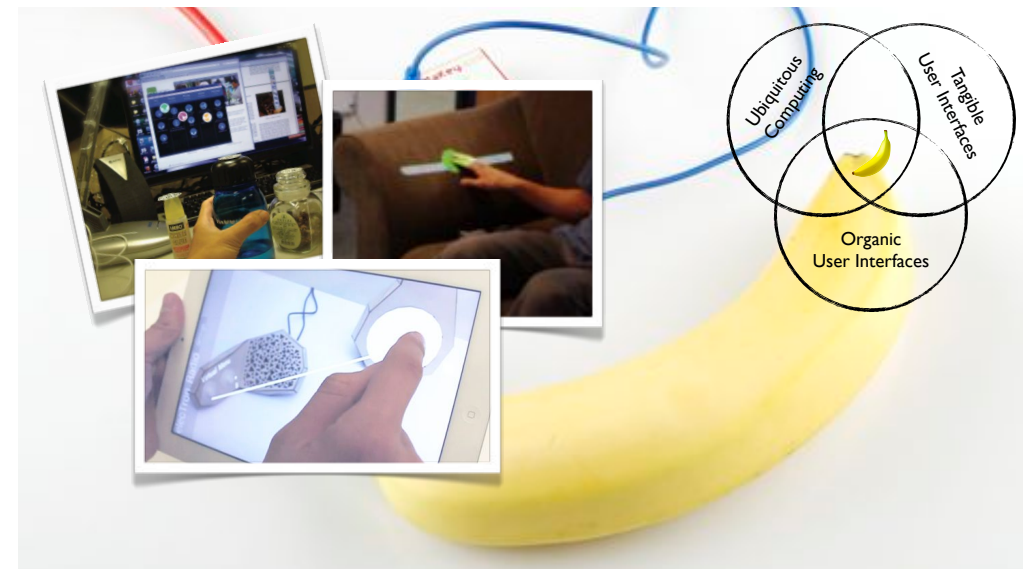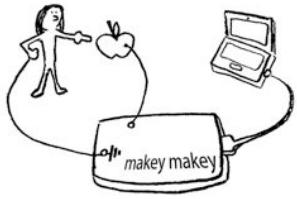
CHI 2012 Paper Video Figure

Disney Research
Pittsburgh

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!

Ubiquitous Computing

Tangible User Interfaces

Organic User Interfaces

MaKey MaKey