week
01

Theory and Practice of Tangible User Interfaces

Introduction

Welcome!

- Introduction
- Tuesday and Thursday curriculum
- Course requirements
- Course survey

Instructors

Kimiko Ryokai

Elizabeth Goodman

Patrick Goodwill

Reza Naima

Kimiko

Instructors

Elizabeth Goodman
PhD candidate
School of Information

“Design Research Guru”

Patrick Goodwill
PhD candidate
Bio Engineering

“Tech and Fab Guru”

Reza Naima
PhD candidate
Bio Engineering

“Tech and Fab Guru”

Office Hours

Kimiko Ryokai

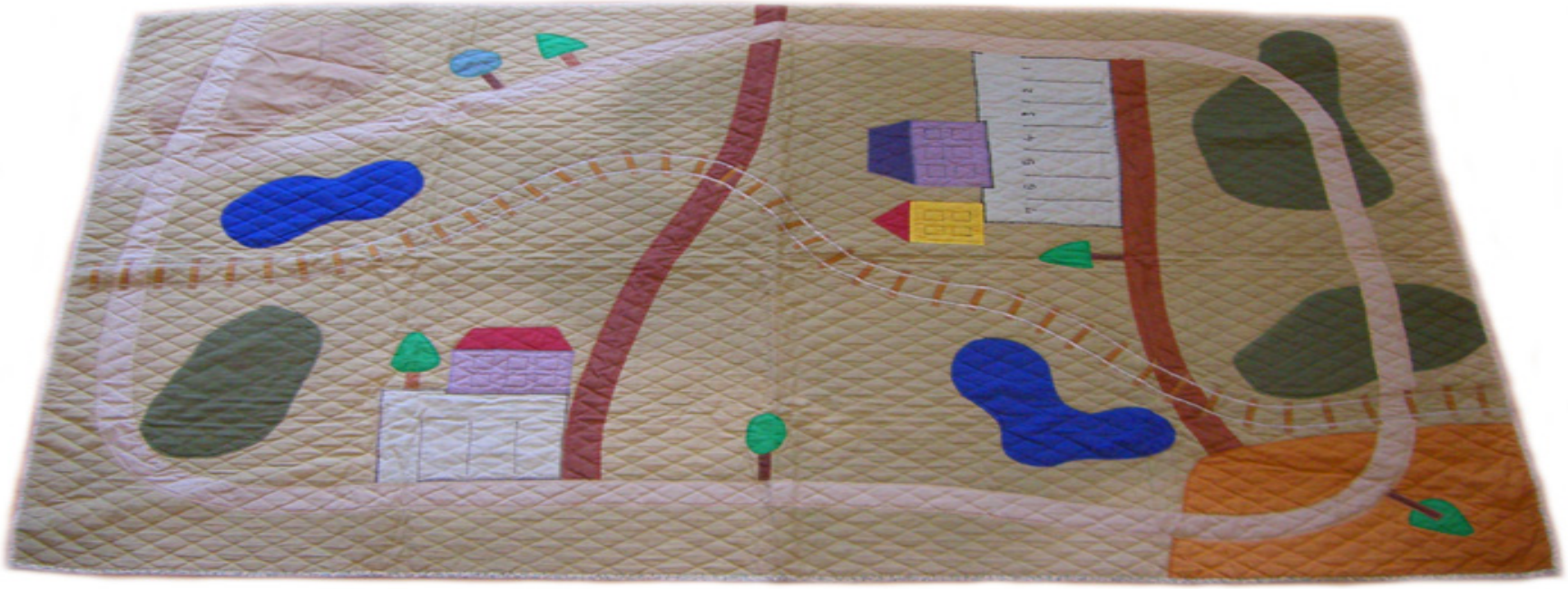
Elizabeth Goodman

Patrick Goodwill

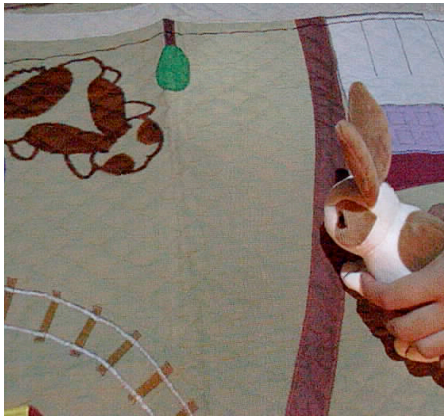
Reza Naima

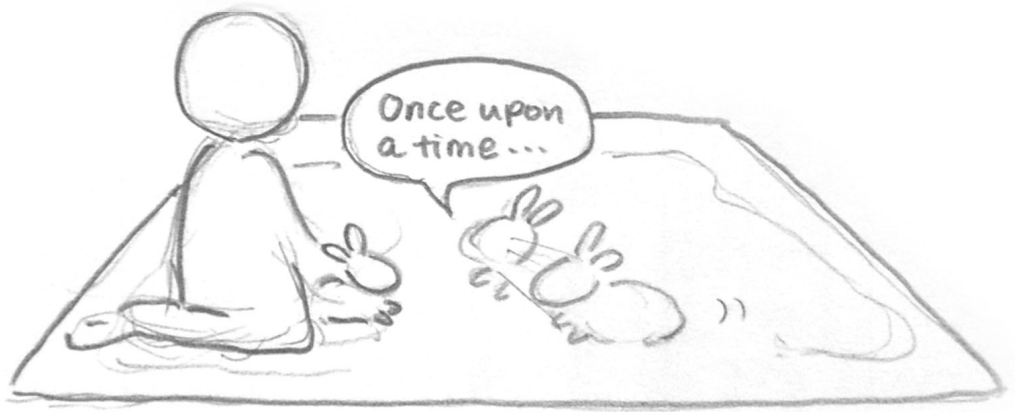
My Childhood Object

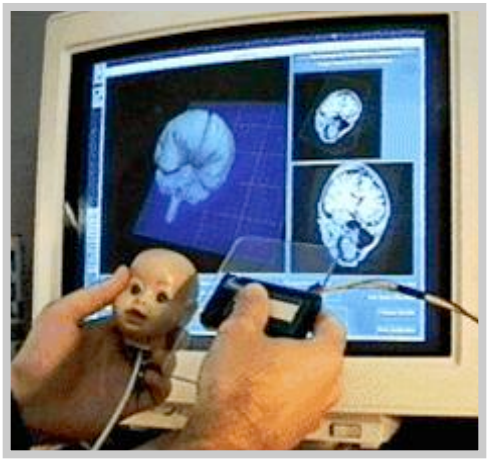
If my mat could tell a story…

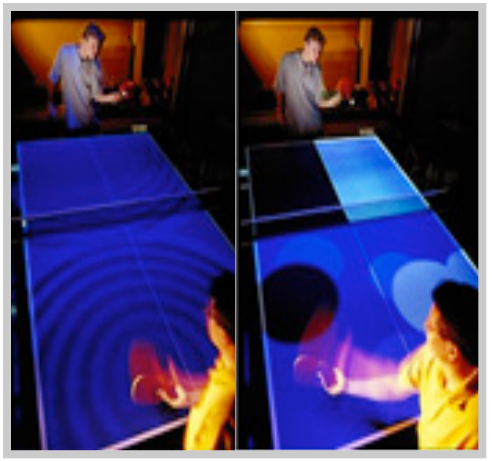


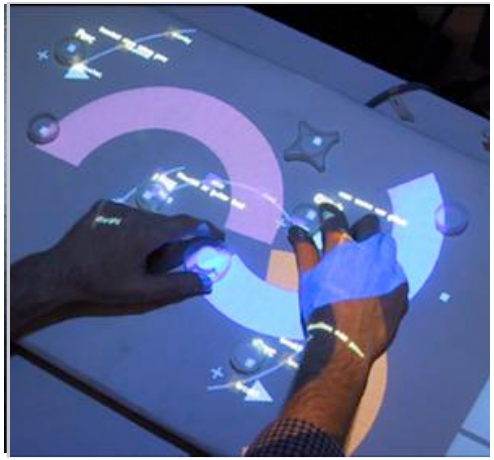
StoryMat (1999)












Wii

What are Tangible User Interfaces?

- Theory?
- Taxonomy?
- Design principles?
- Enabling technologies?
- Evaluation?

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Week 2	09/02	Activity Theory and HCI	09/04	Introduction to Physical Computing
Week 3	09/09	Tangible Bits	09/11	Digital I/O with Arduino Boards
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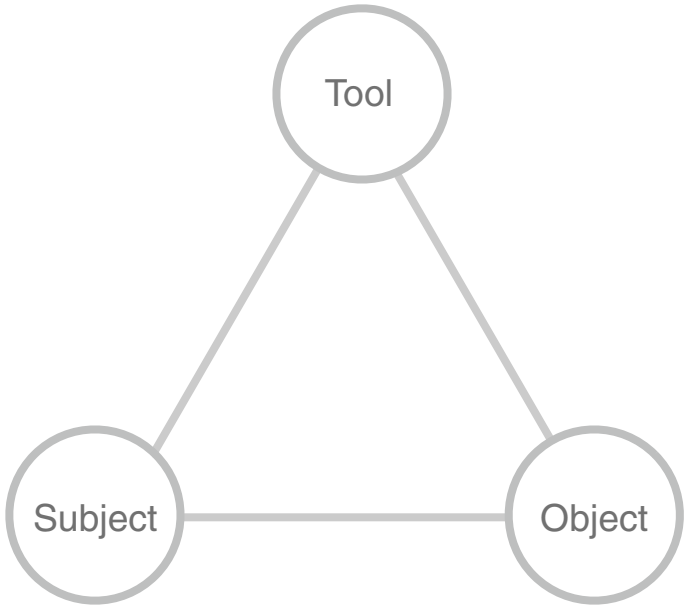

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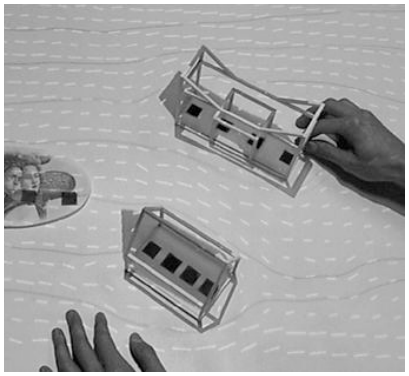

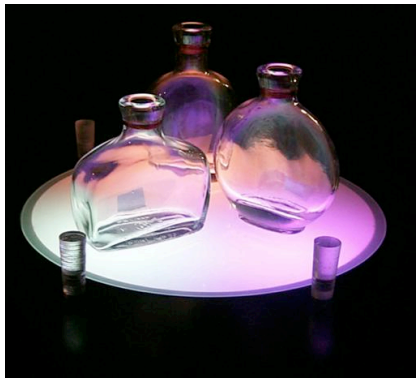

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Empathy Tool from
IDEO Method Cards

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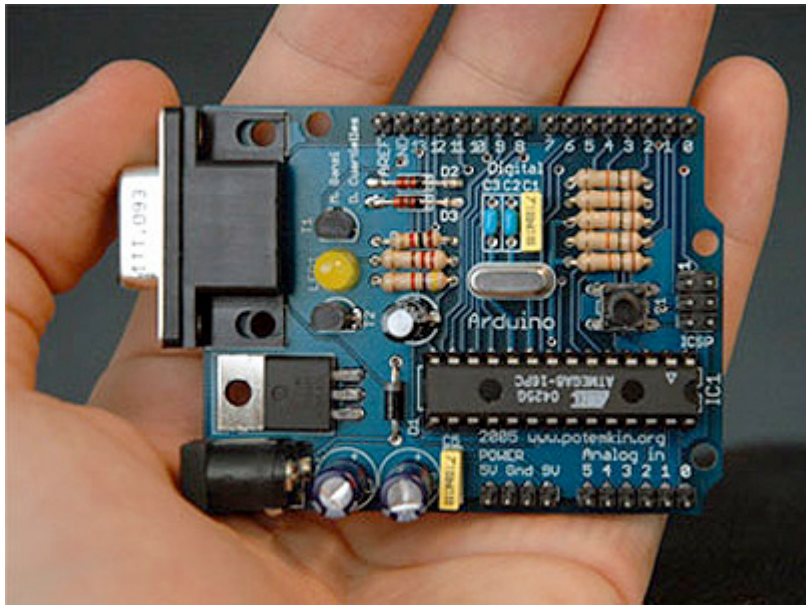

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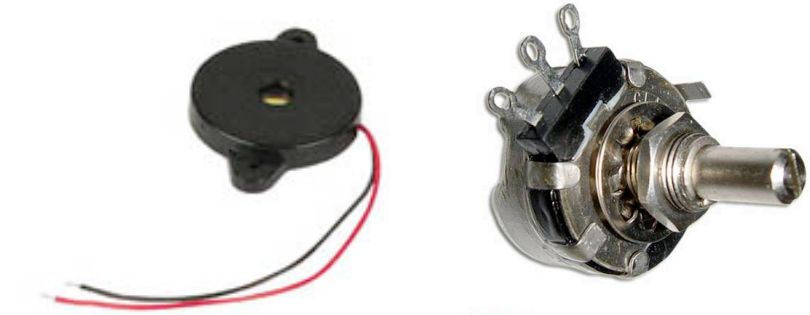

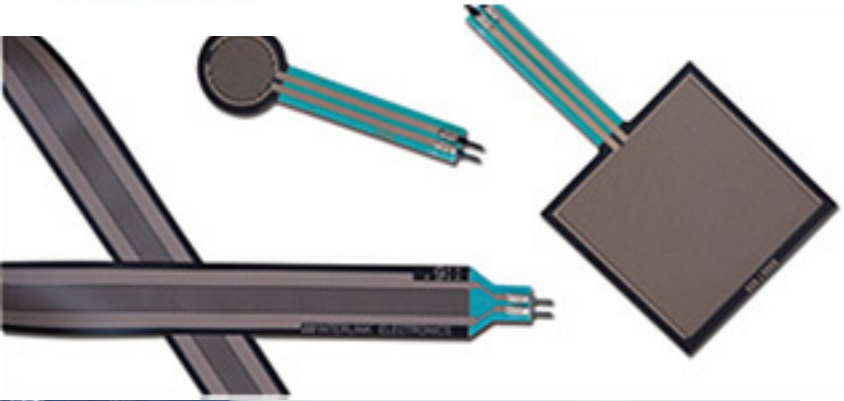

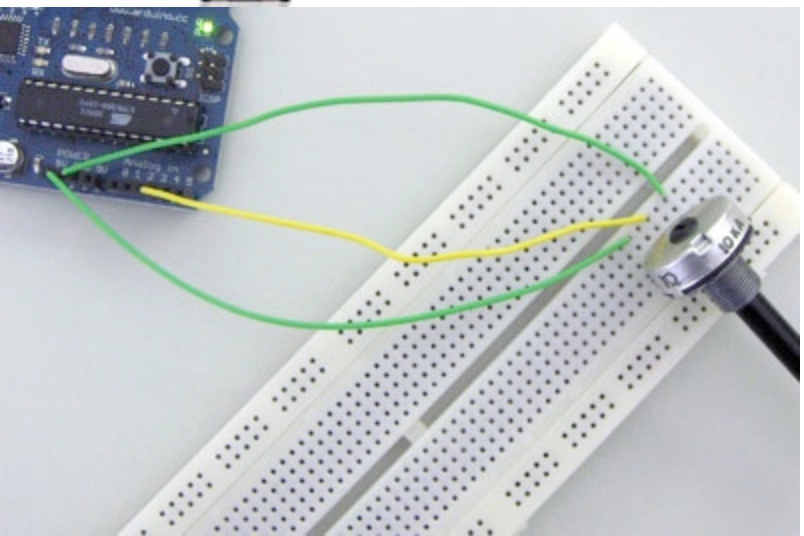

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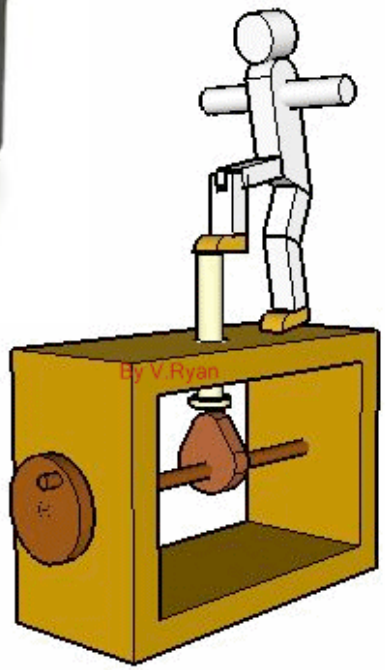

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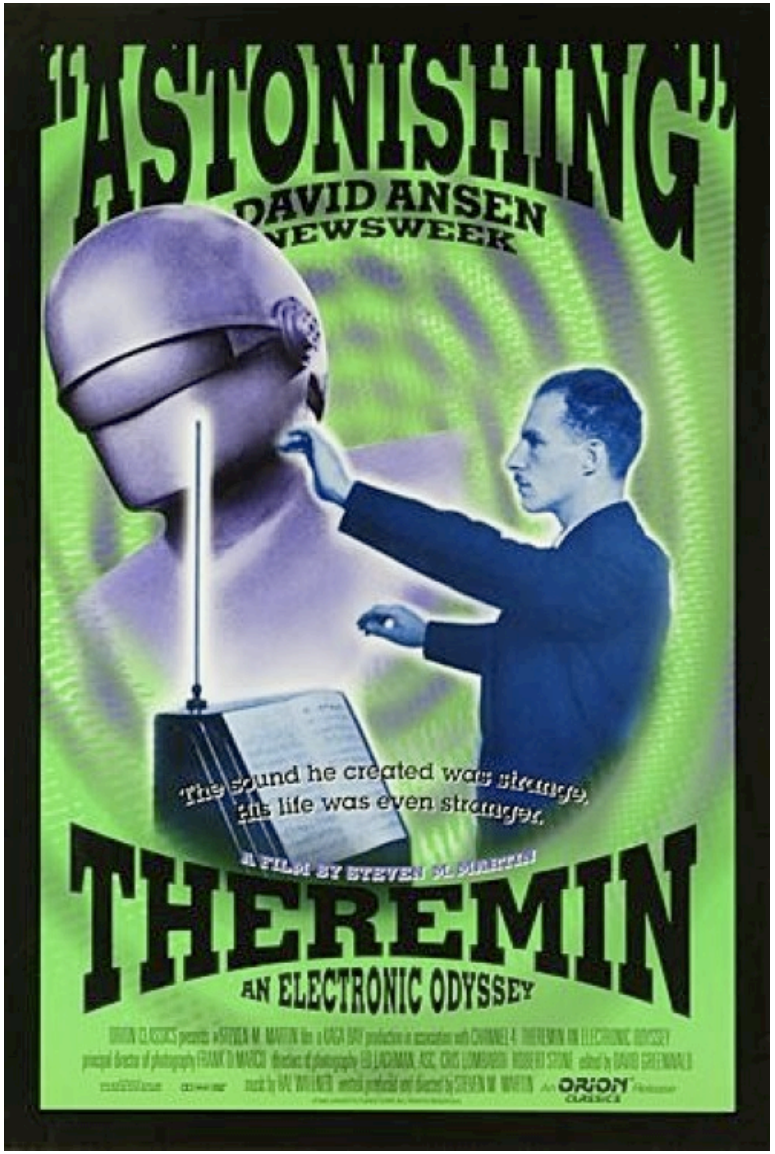

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Course Kit

Arduino NG, SparkFun #Arduino-USB	$31.95
Solderless breadboard, Digikey #23273-ND	$ 7.37
USB cable (3ft), Jameco #222607	$ 1.39
Blue LED, Jameco #183222	$ 2.95
Green LED, Jameco #334473	$ 1.45
Red LED, Jameco #33481	$ 0.27
Piezo buzzer, Jameco #336314	$ 1.26
5.1V zener diode, Jameco #179047	$ 0.04
220 ohm, 1/8W resistors (bag of 100), Jameco #107941	$ 0.69
10k ohm, 1/8W resistors (bag of 100), Jameco #108126	$ 0.69
1M ohm, 1/8W resistors (bag of 100), Jameco #108265	$ 0.69
1K ohm, 1/4W resistors (bag of 100), Jameco #690865	$ 0.69
10k ohm potentiometers, Jameco #255662	$ 0.95
Photocells - 100 grab bag, Jameco #169578	$12.95
TIP120 Jameco#:32993	$0.45
1N4004 diode Jameco#:35991	$0.05
AA Batteries	$1.00
2-AA battery holder Digikey #BC22AAW-ND	$0.51
DC motor, 16K RPM@3V Jameco#:154923	$1.01
RC Servo - standard, HobbyPeople #759310	$ 9.99
22 gauge solid hookup wire in red, black, and yellow	$ 5.00
Force sensors	$ 10.00

TOTAL $75.00 ~

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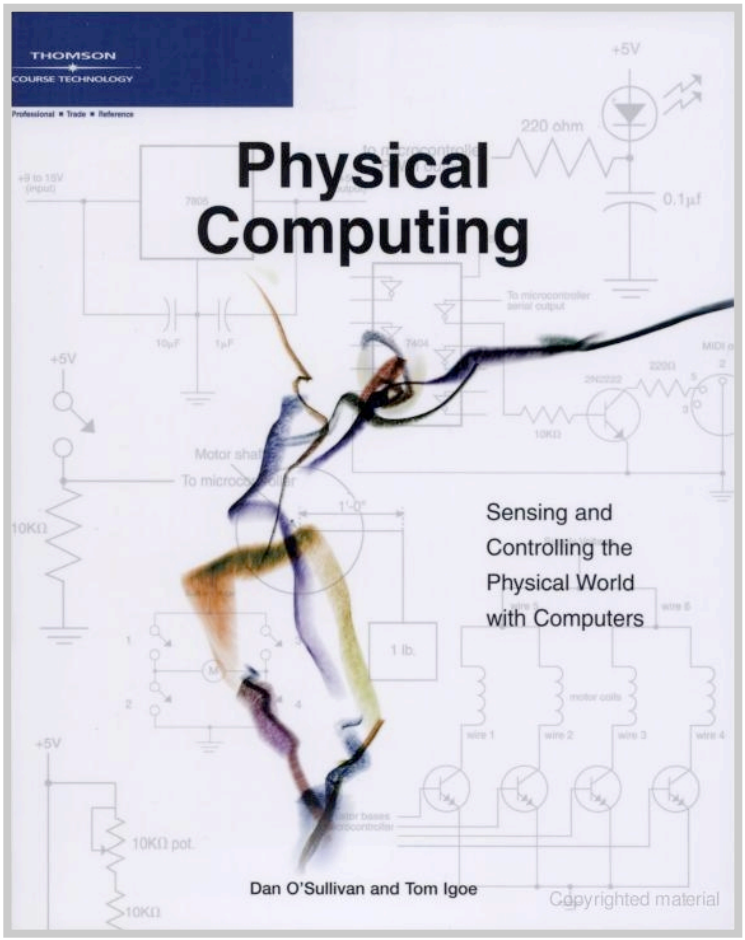
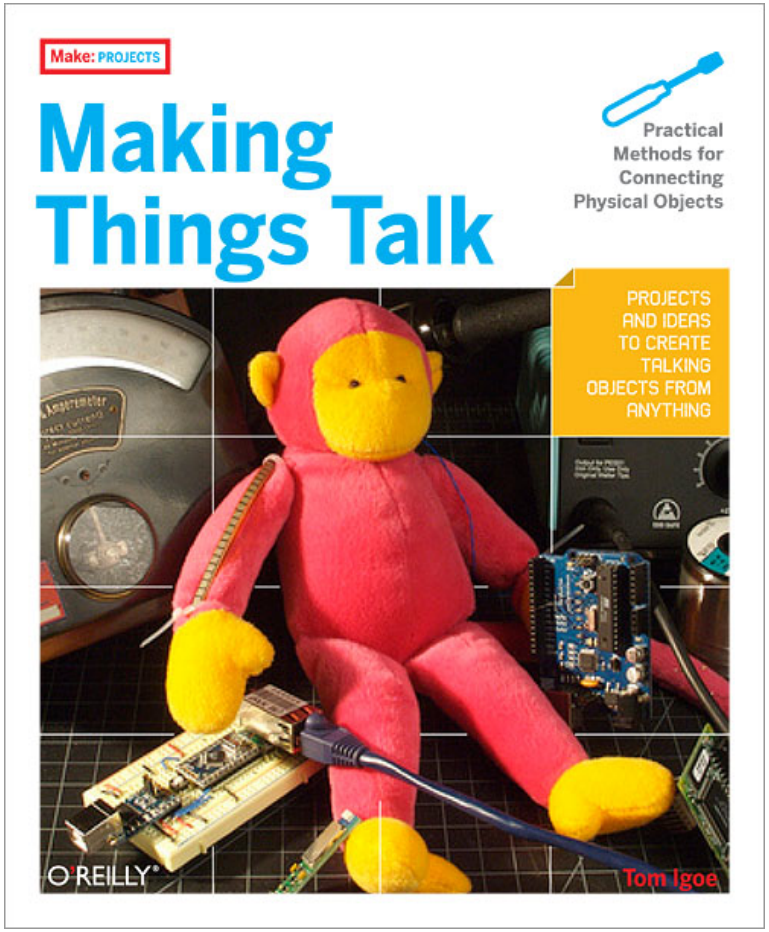
Lab Textbook

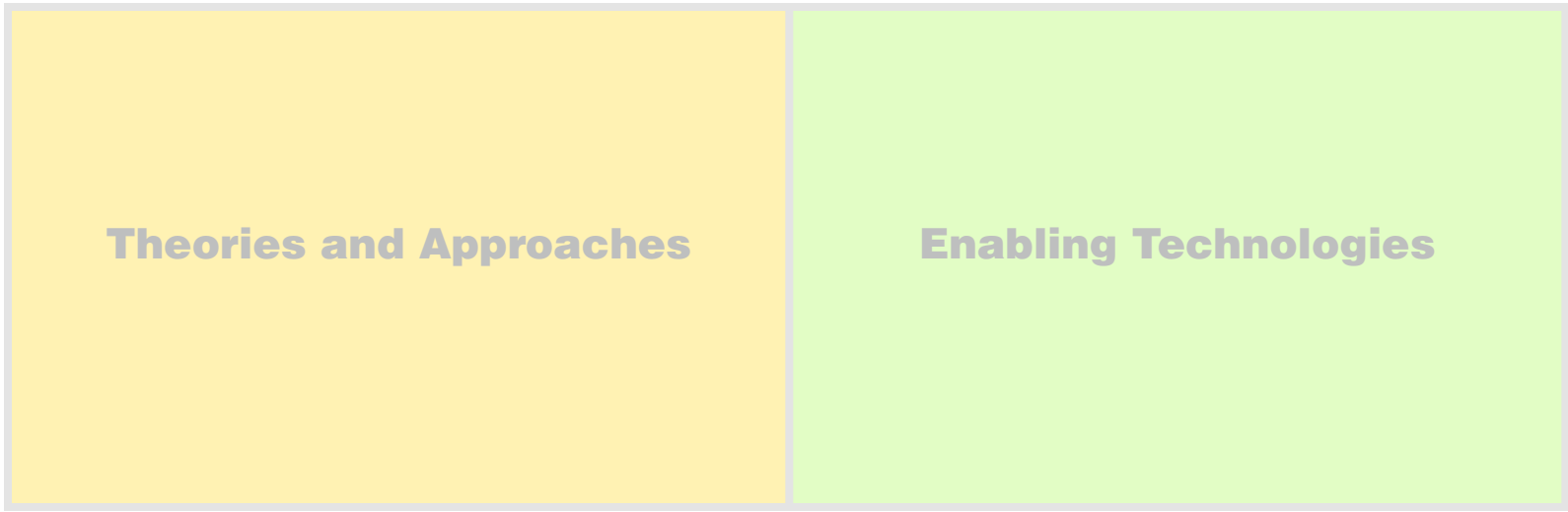


Physical Computing by O'Sullivan and Igoe

Recommended book



Making Things Talk by Igoe


Theories and Approaches
Enabling Technologies

Your original IDEA!

Theories and Approaches

Enabling Technologies

Course Requirements

- Midterm Project (10%)
- Final Project (30%)
- Lab (25%)
- Homework (25%)
- Participation (10%)

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Midterm Project

Design a Tangible User Interface that takes advantage of your hands to manipulate digital information. Apply it to a topic of your research interest (e.g., tool for communication, learning/education, design, etc.). Your project may be based on a completely new design or redesign of familiar everyday objects.

- 9/25 Form a group (maximum of 3 members) for your project and write a 1-page proposal and post it on the course website
- 10/9 Progress sketches due (post your sketches on the course website)
- 10/14 In-class midterm project presentation. Present your poster and optional mockups

Final Project

You may expand your midterm project, or take a new approach. You may continue to work as a group (maximum of 3 members) or as an individual. If you work in a group, be clear about each member's role in the project.

- An interactive prototype to be exhibited at the final course exhibition on Dec 9, 2008. Your prototype is to demonstrate your original idea for a Tangible User Interface that takes advantage of your hands to manipulate digital information, and
- A write-up due Dec 15, 2008 in the ACM SIGCHI Extended Abstract format (6-8pgs)

Grading

Based on both the quality and originality of your work

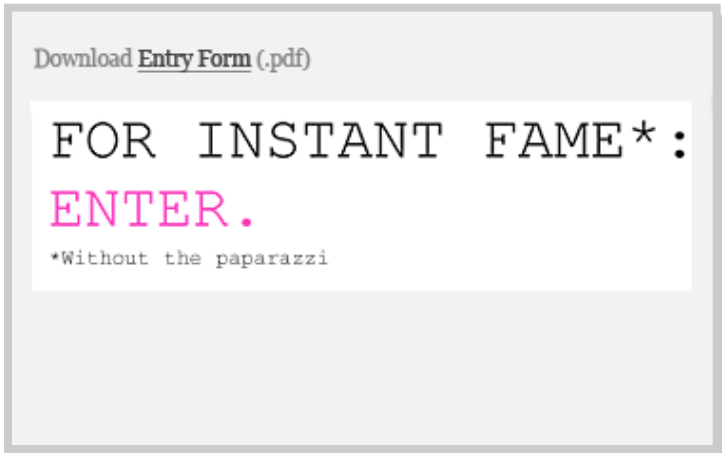
Beyond the Course: Possible Venue 1

Conference paper submissions

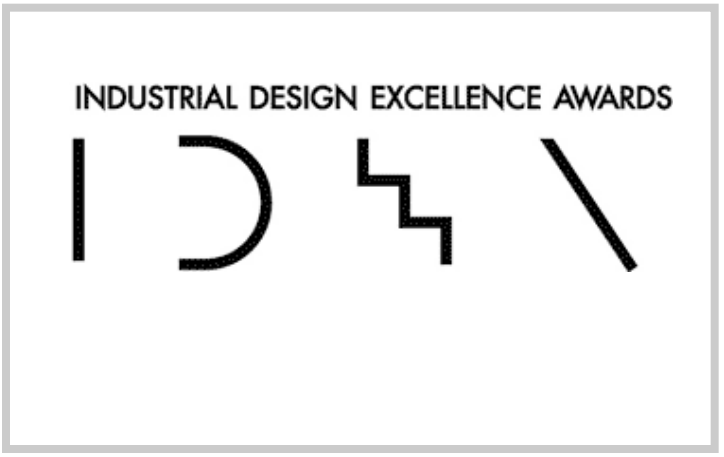
- **CHI** (Alt CHI, deadline Jan 7, 2009, and full paper for fall 2010)
- **UIST** (around March 2009)
- **Ubicomp** (around March 2009)

Beyond the Course: Possible Venue 2

Student design competitions



ID Magazine Student Competition
Deadline February 2009



Industrial Design Excellence Awards
Deadline early spring 2009

Beyond the Course: Possible Venue 3

Maker Faire

May 3 & 4 San Mateo Expo Center

Jug Hero

Bubblegum Sequencer

Making Music With Candy

What is the Bubblegum Sequencer?

The Bubblegum Sequencer is a physical step sequencer that lets you create drumloops by arranging colored balls on a tangible surface. It generates MIDI events and can be used as an input device to control audio hardware and software. Finally, people can't claim anymore that electronic music isn't handmade.

Here's how it works: A grid of holes, consisting of several rows with 16 holes each is the canvas. On it, you arrange colored gumballs. The 16 columns represent the 16th-notes in a measure. Each color is mapped to a specific sample.

Because the output is generated in the form of MIDI events, the Bubblegum Sequencer can be used to control any kind of audio hardware or software.

If you'd like to know more about the Bubblegum Sequencer, read our course paper.

Demo

Here's a video showing some of the Bubblegum Sequencer's current features:

(Download video as .mov file)

News

New: German electronic music magazine De-Bug covers Bubblegum Sequencer (PDF)

See us at Maker Faire 2008, May 3-4 in San Mateo!

course website

For Tuesday, September 2

- Read
  - *Acting with Technology* (chapters 1, 2, & 3)
    by Victor Kaptelinin and Bonnie A. Nardi
  - *Where the Action Is* (chapters 1 & 2) by Paul Dourish

For Thursday, September 4

- Get the Physical Computing book
- Read the Intro, Chapters 1, 2, & 3 of Physical Computing book
- On Thursday, bring $75 for the lab kit (cash or check)

Q&A