

Human-Computer Interaction



Björn Hartmann
University of California, Berkeley
EECS, Computer Science Division
CS10, Fall 2013

| My Background

1997-2002



(cc) SnapsterMax
<http://www.flickr.com/photos/myworldinpixels/558060045>

1999-2004



Jay Haze
Club Milk, Tokyo, 2003

2004-2009



2010



| What is HCI?

Human-Computer Interaction (HCI)

Human

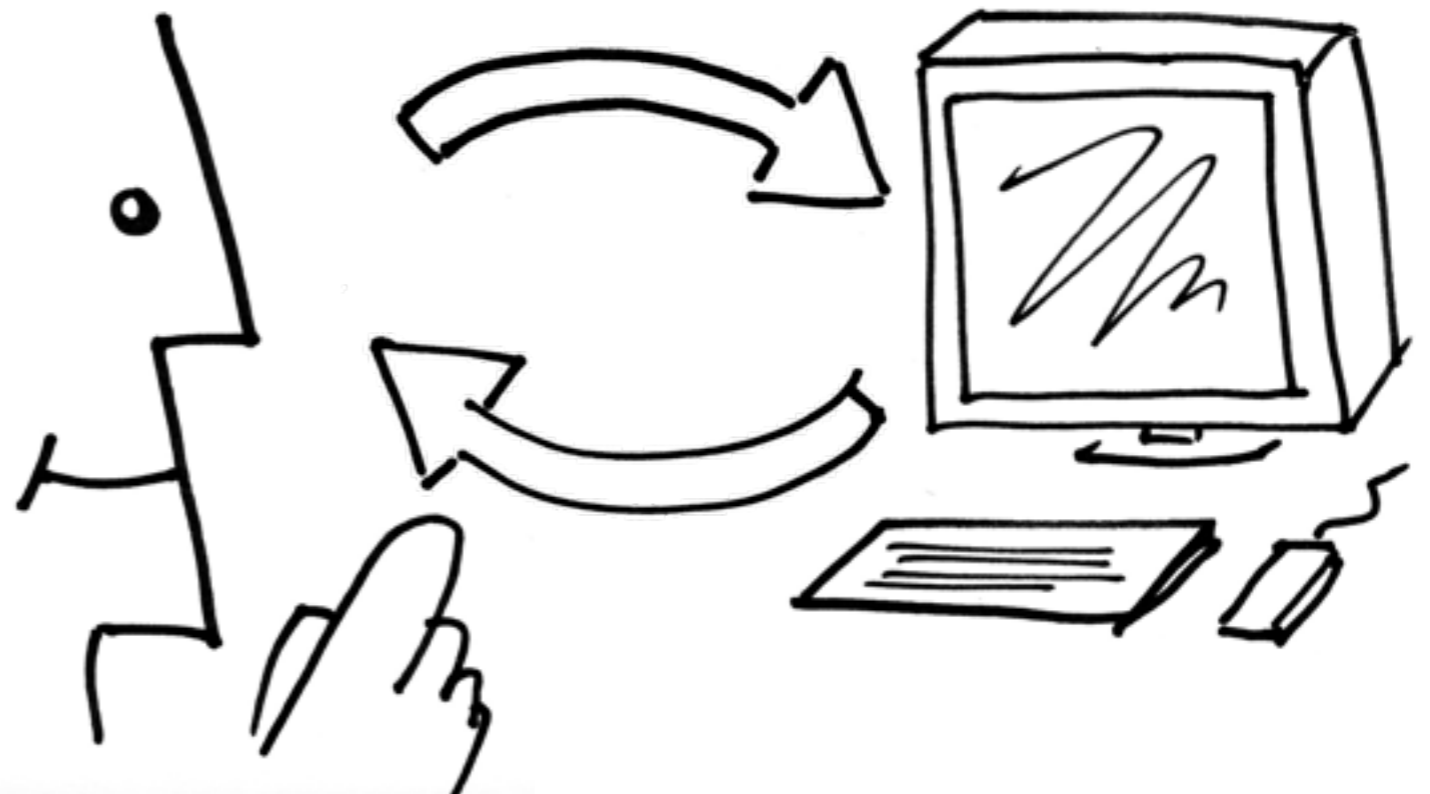
- End-user of program
- Others (friends, collaborators, coworkers)

Computer

- Machine program runs on
- Often split: clients & servers

Interaction

- User tells the computer what they want
- Computer communicates results



User Interfaces (UIs)

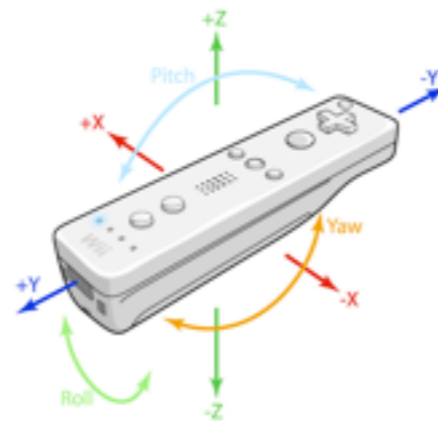
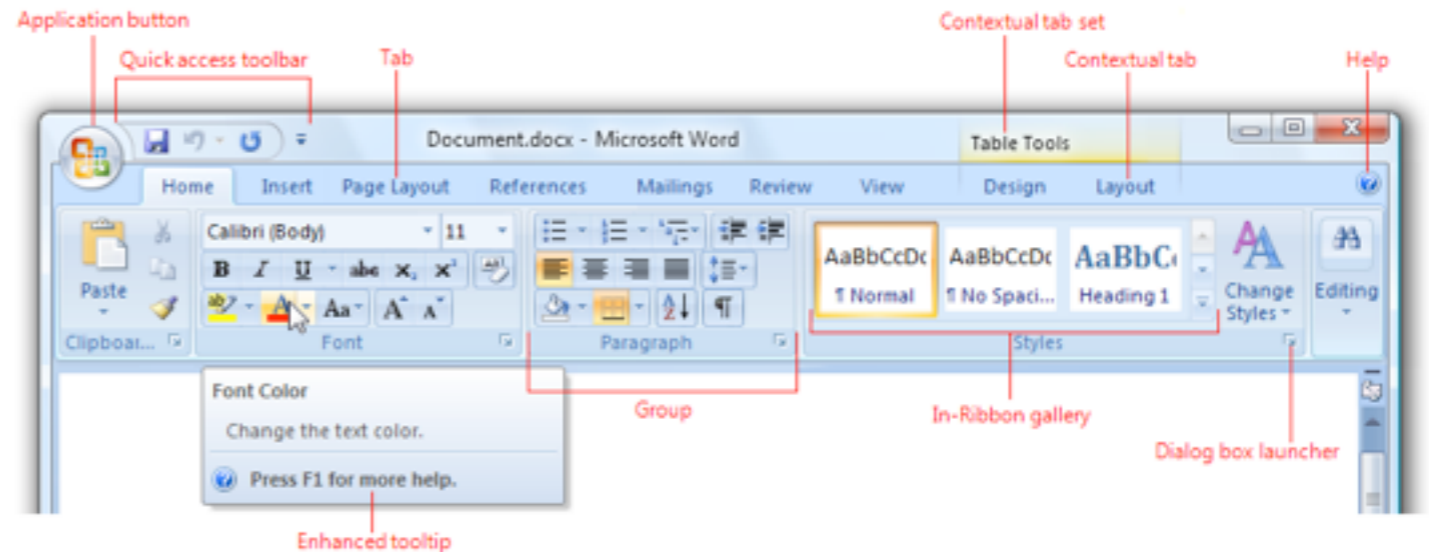
Part of application that allows

- People to interact with computer
- Computer to communicate results

Can include hardware design

- Buttons, sliders, other sensors

**HCI =
design,
prototyping,
implementation &
evaluation of UIs**



<http://www.reactable.com>



Design

Computer Science

Applied Psychology

artist



scientist



designer

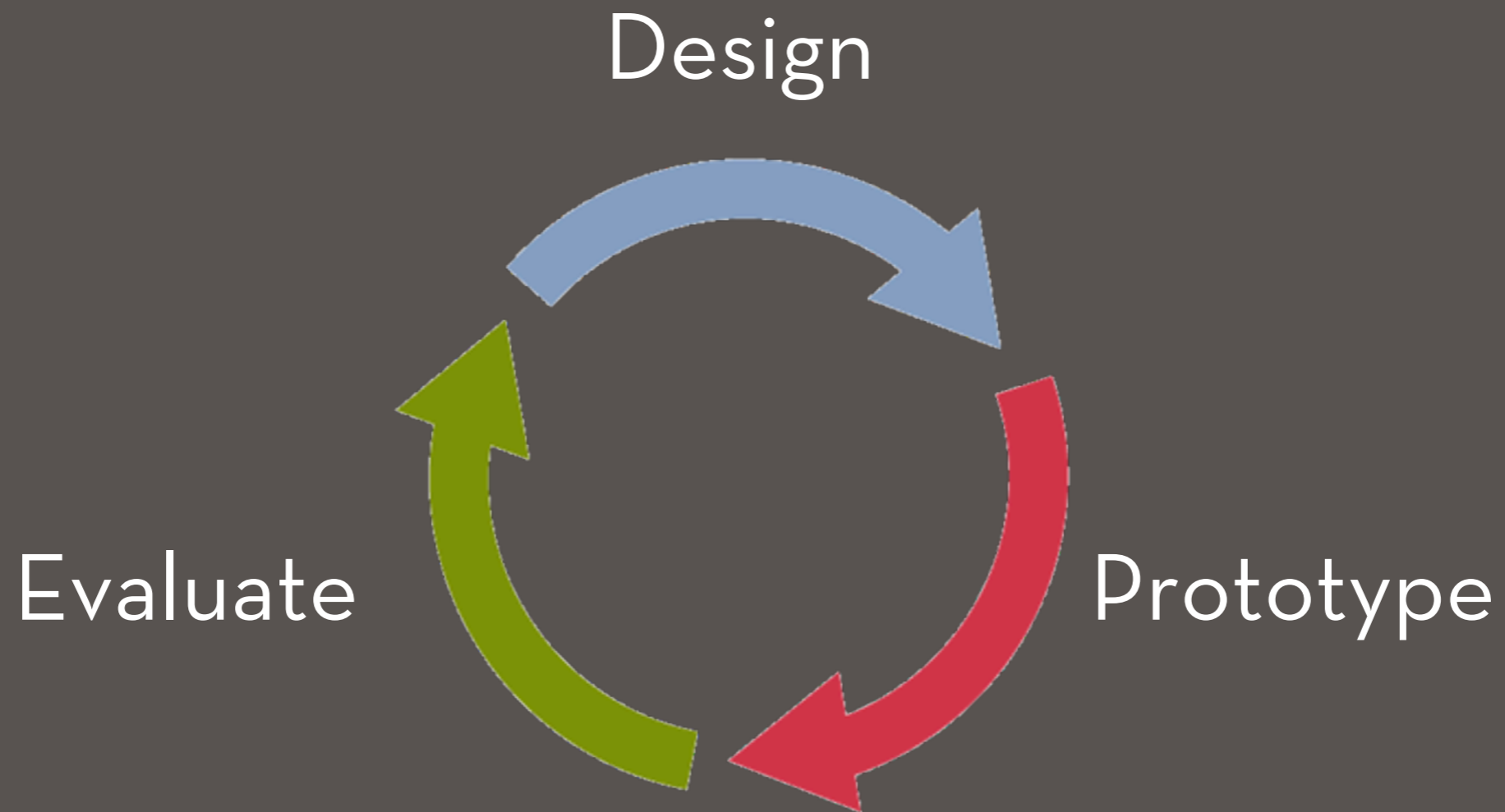


engineer



Rich Gold, *The Plenitude*, MIT Press

| Iterative Design Cycle



Getting it right the first time is hard!

| Understanding Users

Observe existing practices

Create scenarios of actual use

Build models to gain insight into work processes



CS247, Stanford, 2006



<http://www-personal.umich.edu/~chrisli/m2.html>

Prototyping Interfaces

Rapidly build a mockup
of your UI

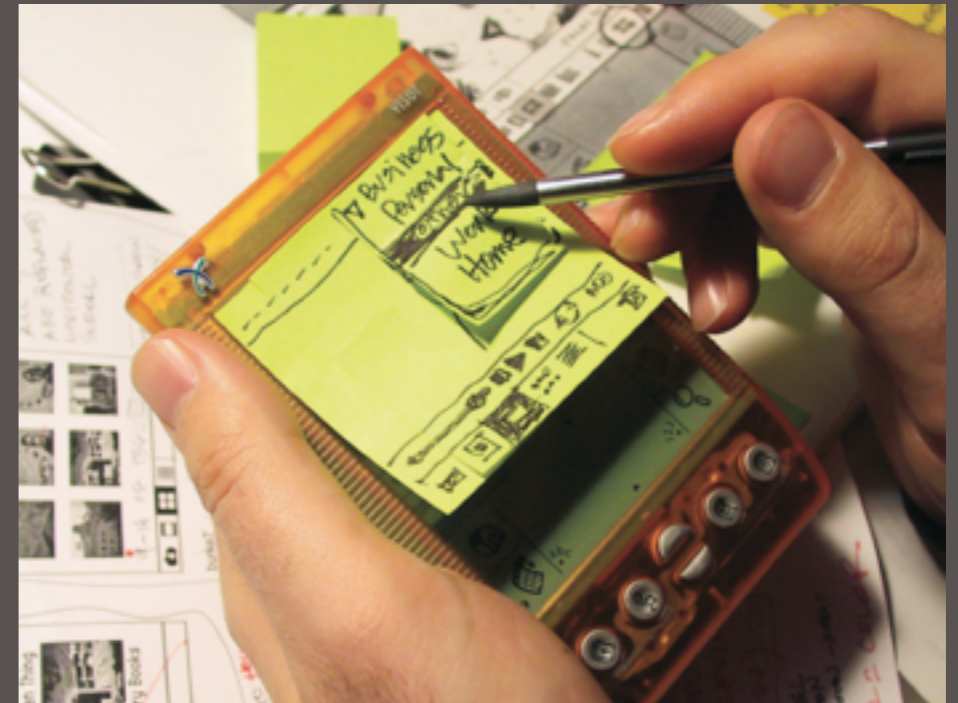
Low-fidelity techniques:

Paper prototyping

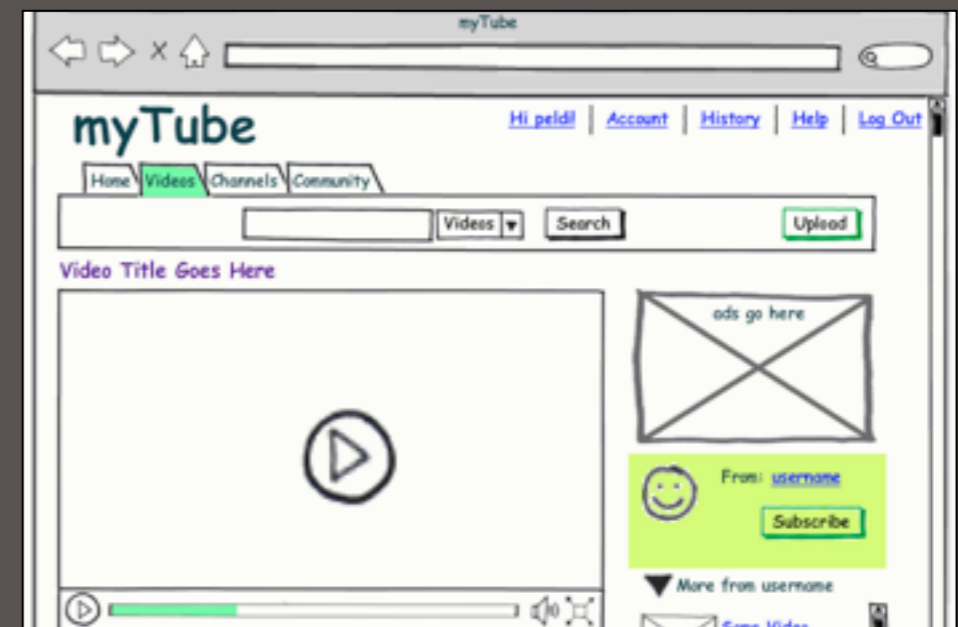
Video prototypes

Interactive prototypes:

HTML, Javascript, Flash, ...

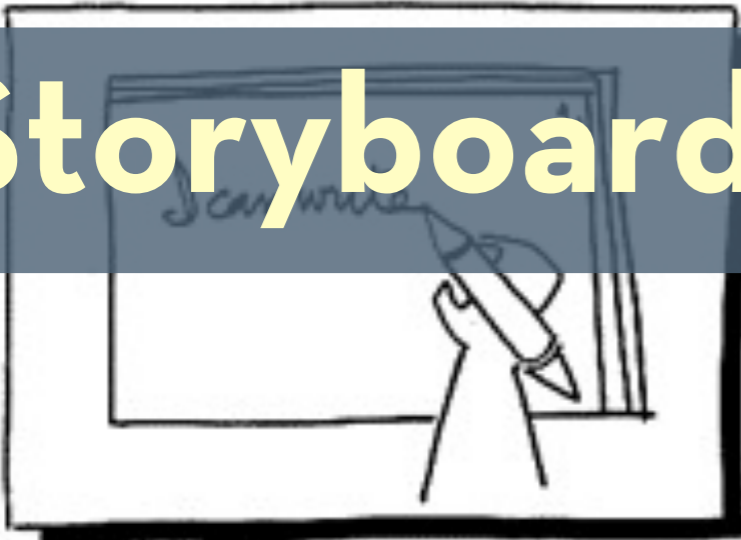


Moggridge, Designing Interactions, p.704

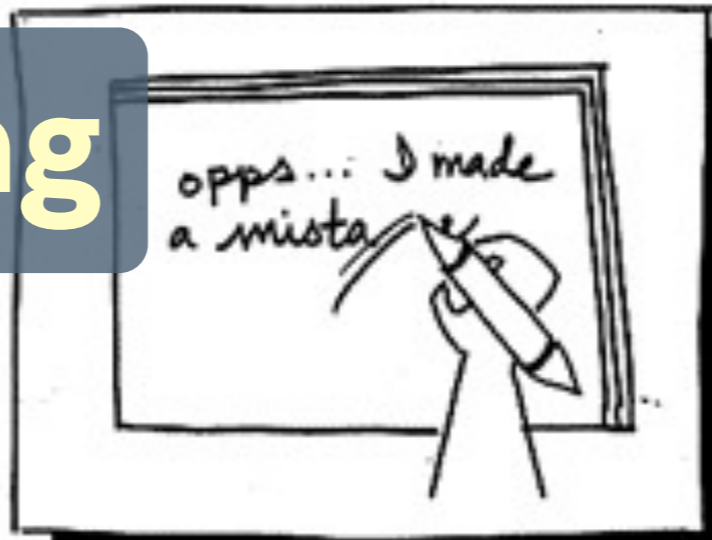


<http://www.balsamiq.com/products/mockups/examples#wiki>

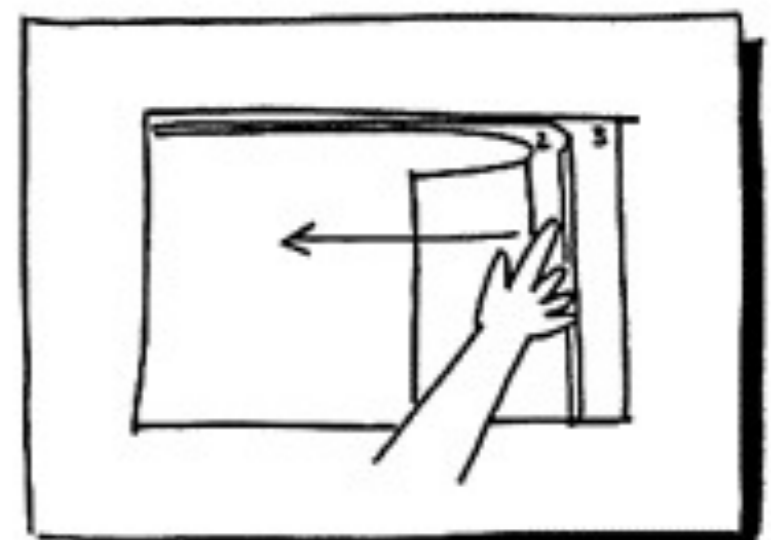
Storyboarding



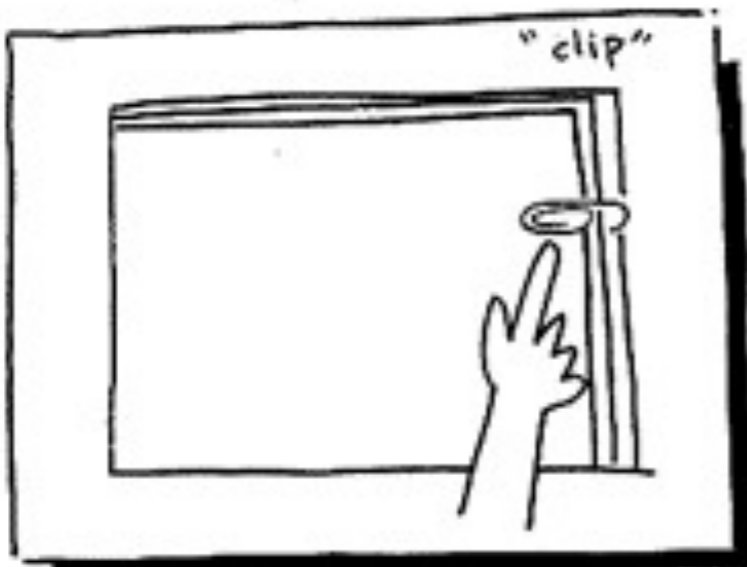
L. can write into her notebook.



She can flip over her pen and erase!



L. can flip to the next page.



L. marks her place.



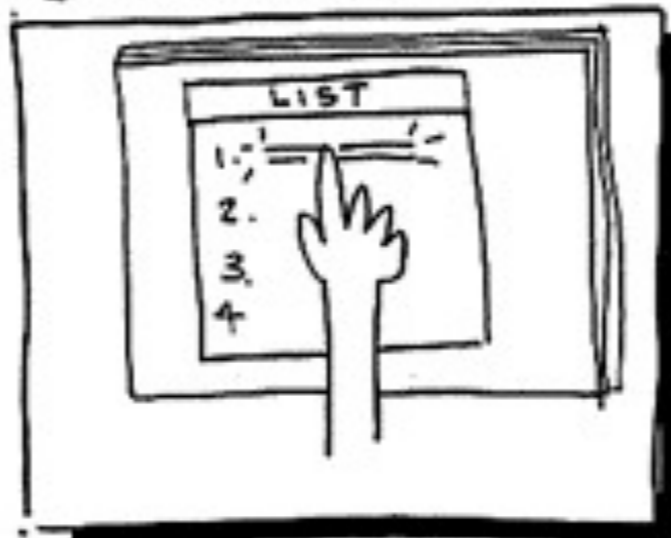
L. marks a phone number.



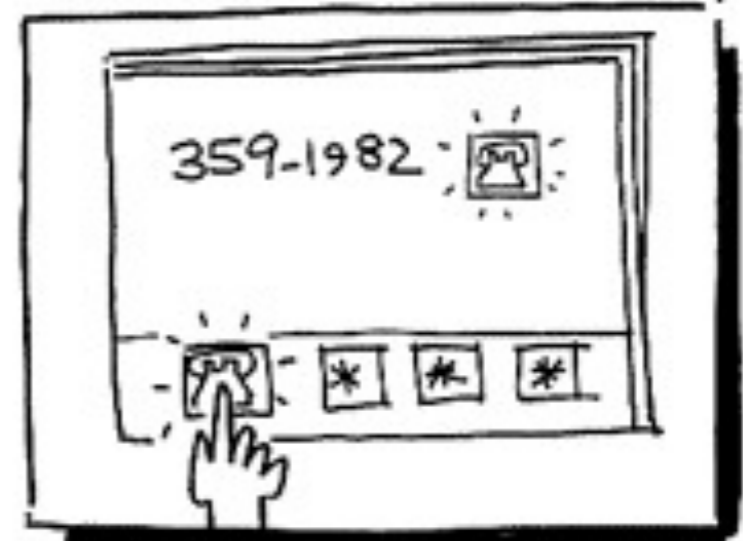
L. shifts to the InBox Section.



L. adds comments



L. brings up a list.



L. looks for phone numbers.



| Evaluation

Formative

Are we building the right thing?

What should be different in the next iteration?

Summative

Does it work? Is it better than existing solutions?

Can this teach us something about how people or the world work?



<http://www.laurasmith.info/UsabilityTest.jpg>

Techniques

Analytically, expert walkthroughs, laboratory studies,...

| Why study user interfaces?

How much of an application's source is devoted to user interface code?

A. 10%

B. 20%

C. 35%

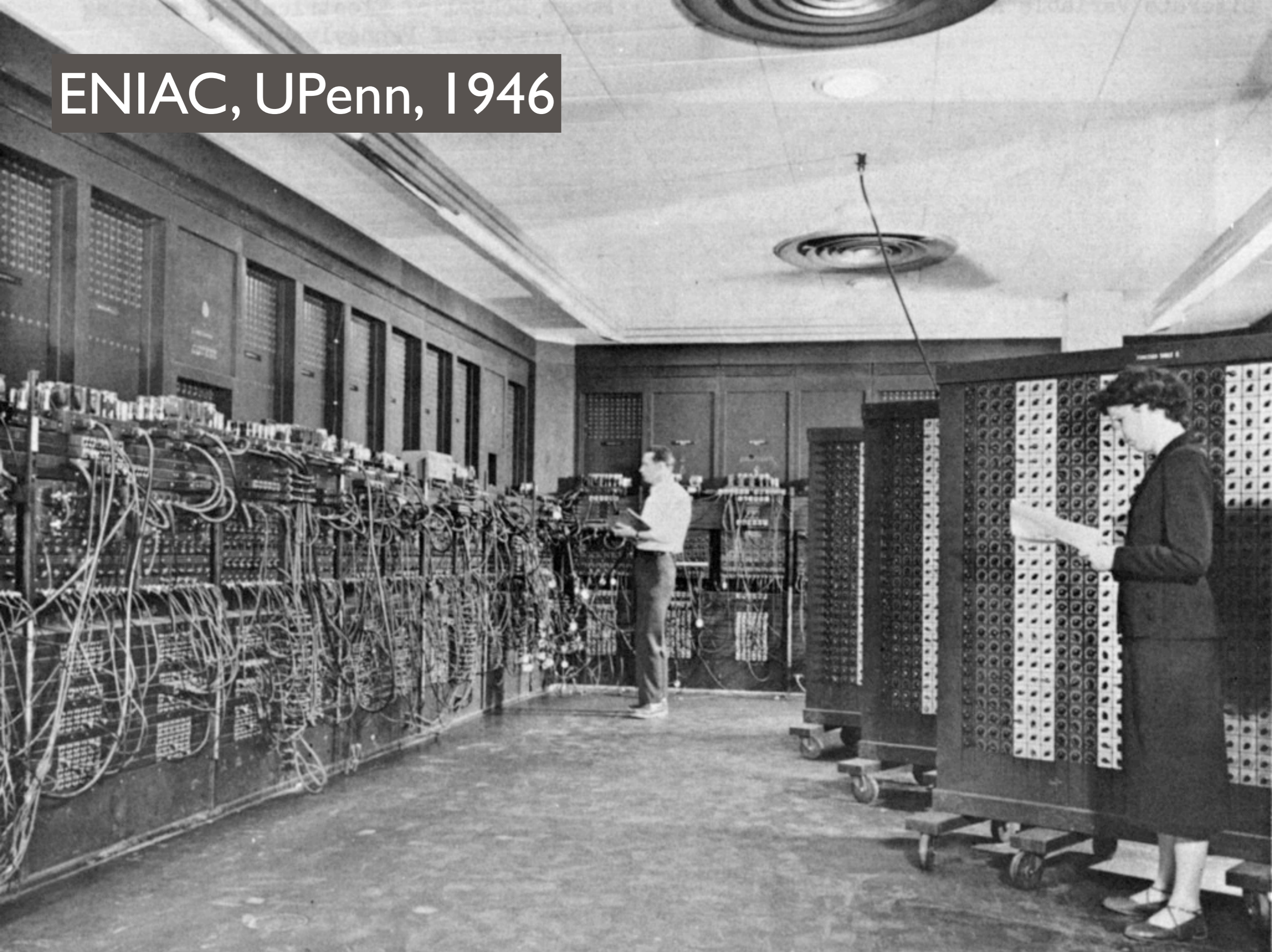
D. 50%

E. 75%

| History

CS10 - UC Berkeley Fall 2013

ENIAC, UPenn, 1946



| When was the mouse invented?

A. 1948

B. 1963

C. 1978

D. 1984

E. 1991



| When was pen input invented?

- A. 1964
- B. 1973
- C. 1986
- D. 1995
- E. 2001





digibarn.com

CSI0 - U

Last month...



GRiD Compass in Space



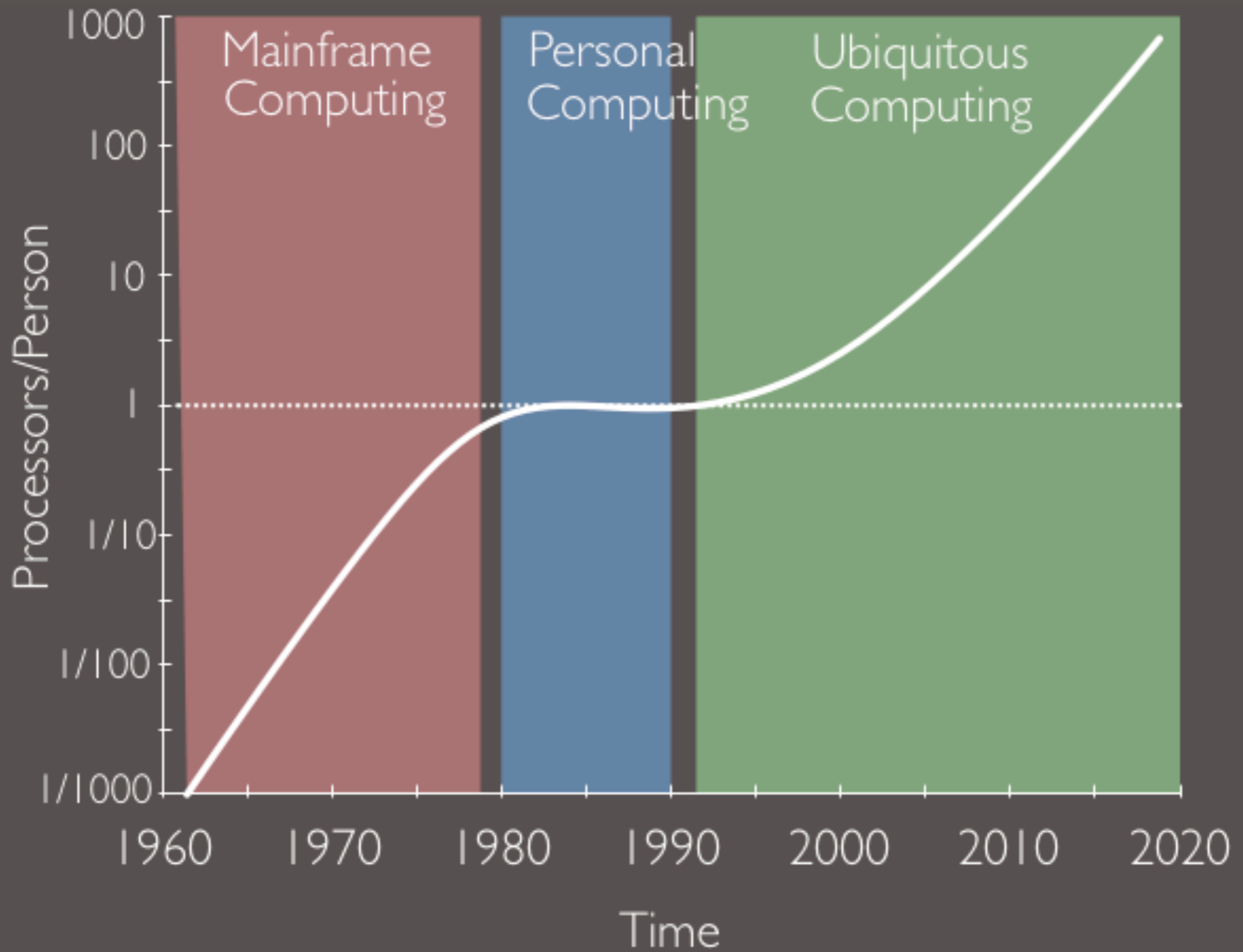


IBM Simon

| What has changed?

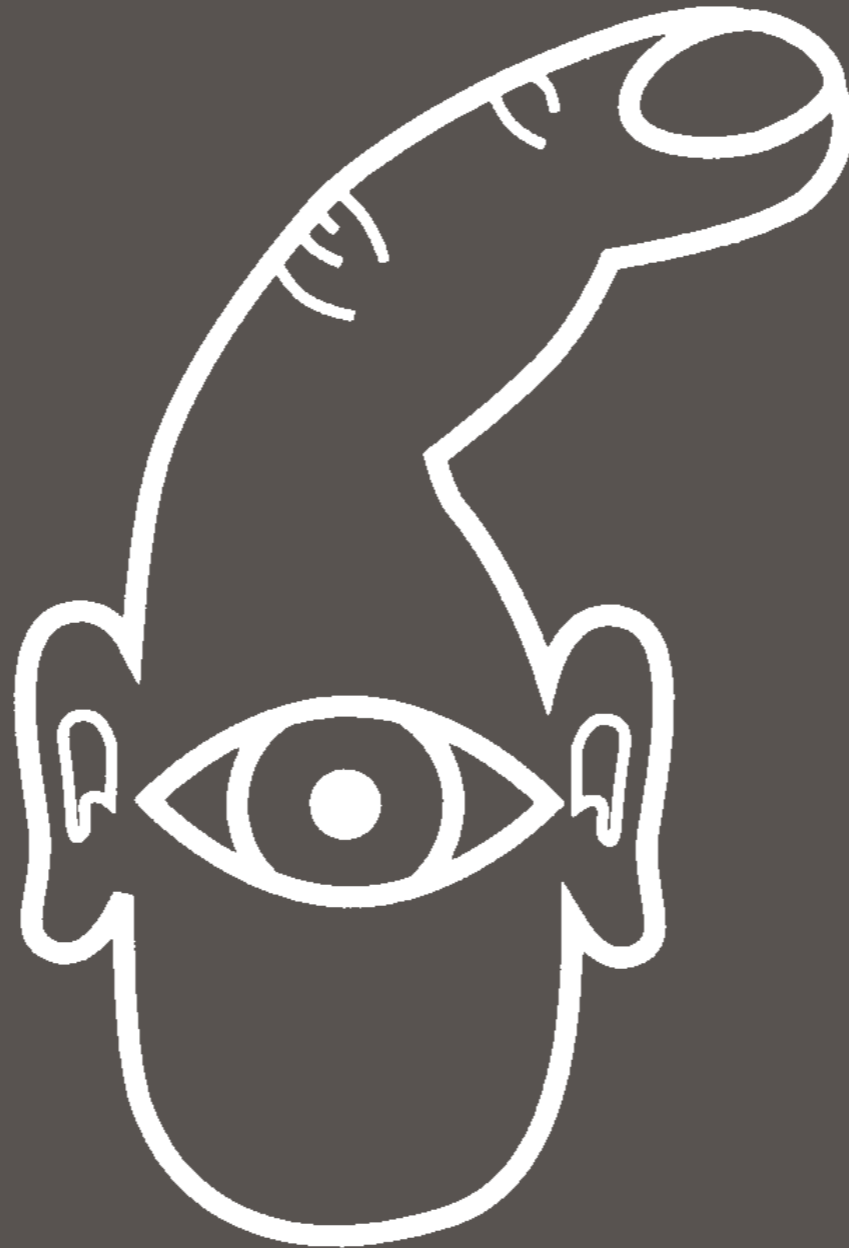
“For every ant in the world today,
there are 100 transistors.”

- Gordon Moore, 2003



Era	Ratio Computers:People	HCI Focus
Mainframe Computing	1:many	Human Factors
Personal Computing	1:1	Psychology, Cog. Science
Ubiquitous Computing	many:1	Collaboration, Rich Interaction

| Research Directions



(c) Dan O'Sullivan



Booker the Penguin



Computer required during gameplay

Air Guitar Hero



I wish I knew you

I like your picture

You are cool

I was paid to link to you

I want your reflected glory

Everybody else links to you

I'd vote for you

Can I date you?

We met at a conference and it seemed like the thing to do.

yes

no

I like you

I kind of like you

I really like you

I know you

I feel socially obligated to link to you

I beat you on Xbox Live

Hi, Mom

I have fake alter egos



WIKIPEDIA
The Free Encyclopedia

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Welcome to Wikipedia,
the free encyclopedia that anyone can edit.
3,262,285 articles in English

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Today's featured article



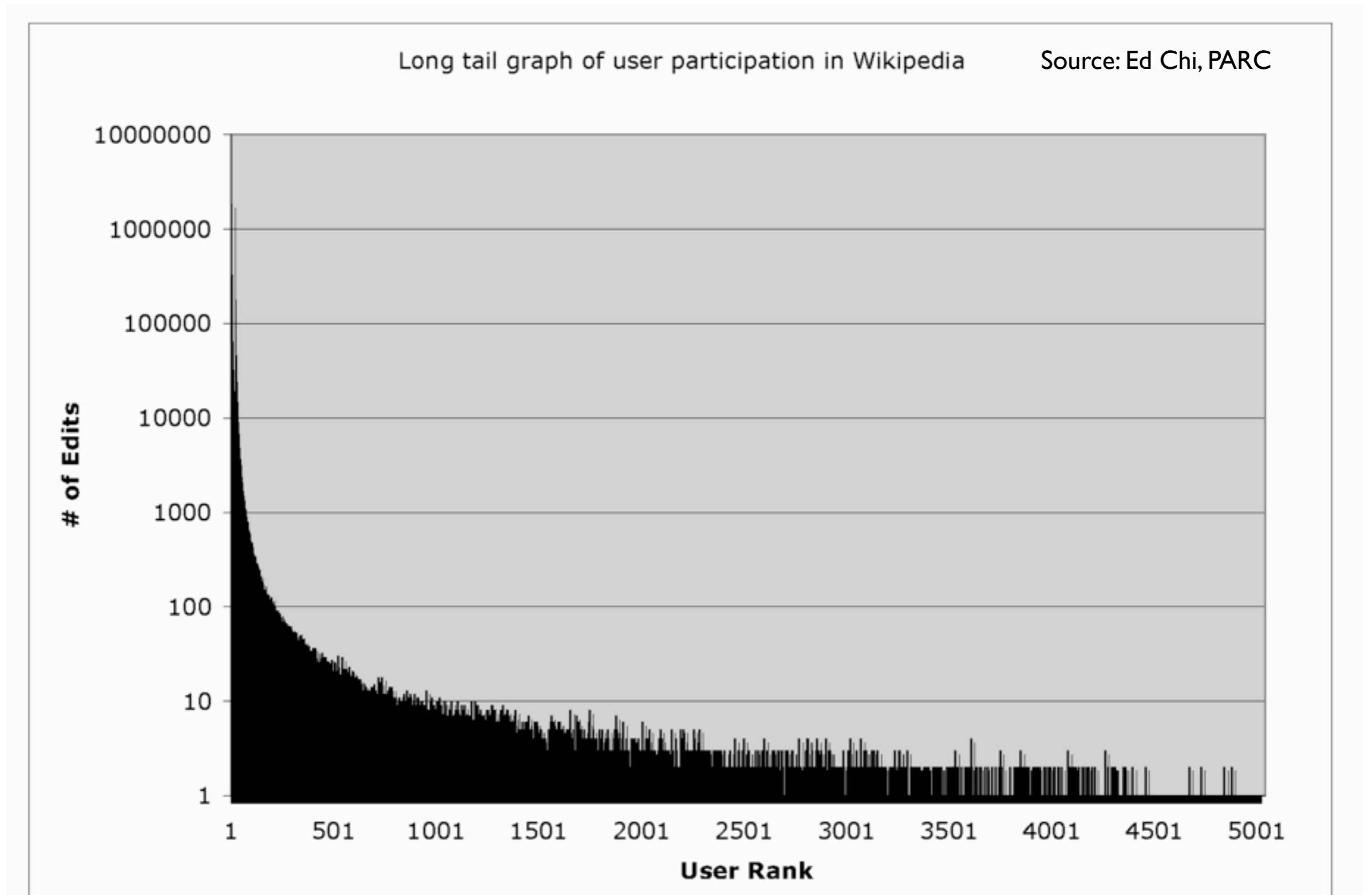
The "**Morotai Mutiny**" was an incident in April 1945 involving members of the [Australian First Tactical Air Force](#) based on the island of [Morotai](#), in the [Dutch East Indies](#). Eight senior pilots, including Australia's leading [flying ace](#), Group Captain [Clive Caldwell](#), tendered their resignations to protest what they perceived as the relegation of [Royal Australian Air Force \(RAAF\) fighter](#) squadrons to strategically unimportant [ground attack](#) missions. A government investigation vindicated the "mutineers", and three high-ranking officers at

In the news

- [Venezuelan boxer Edwin Valero](#) is found dead from an apparent suicide at the age of 28.
- A [state funeral](#) is held for [Polish President Lech Kaczyński](#) and [First Lady Maria Kaczyńska](#) in [Kraków](#), a week after their [fatal plane crash](#).
- A [series of bomb attacks](#) kills more than 48 people in [Kohat District](#), [Pakistan](#).
- [Volcanic ash](#) from the [eruption](#) of

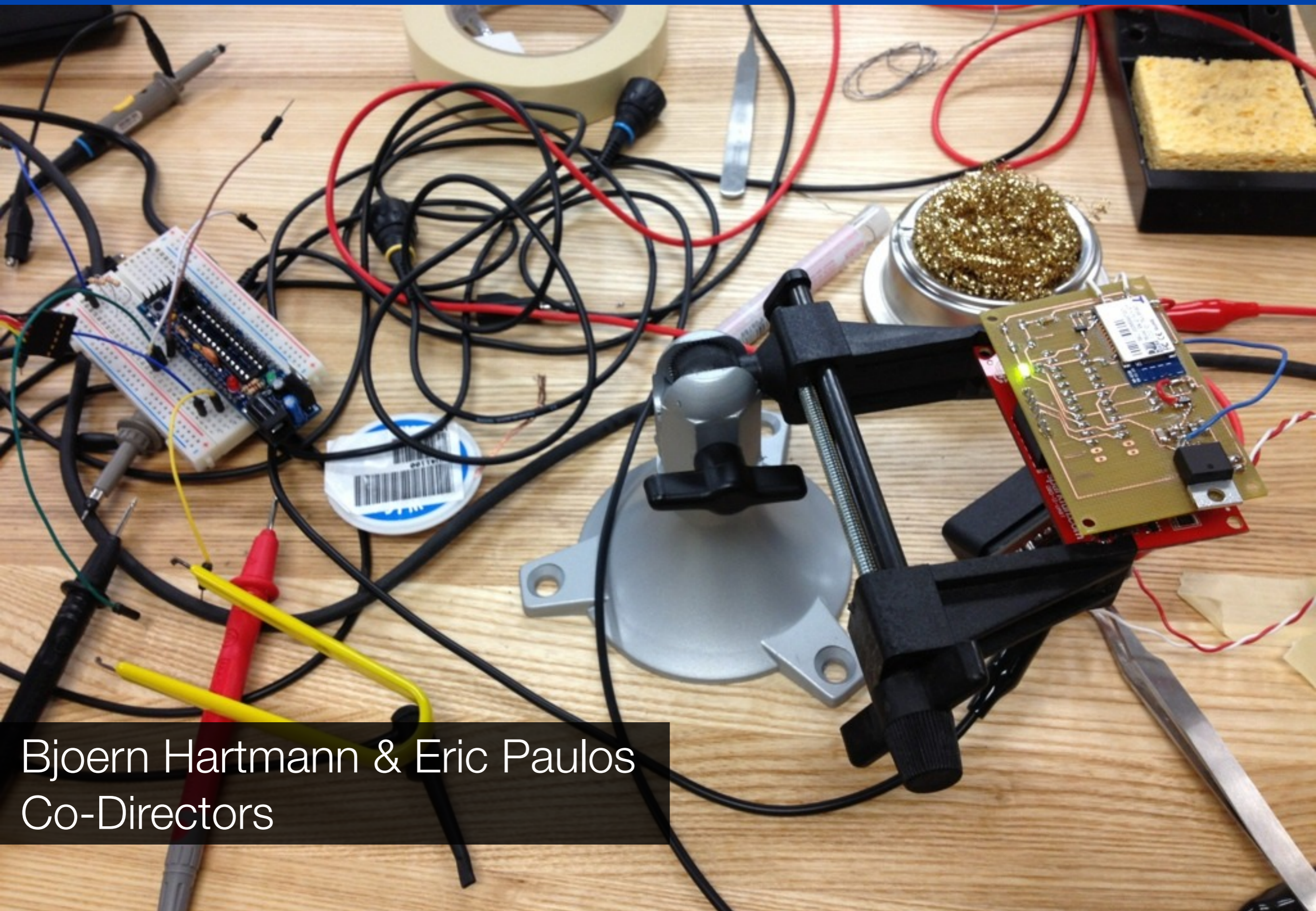


Zipf / Power Law Distribution



| HCI at Berkeley

CS10 - UC Berkeley Fall 2013

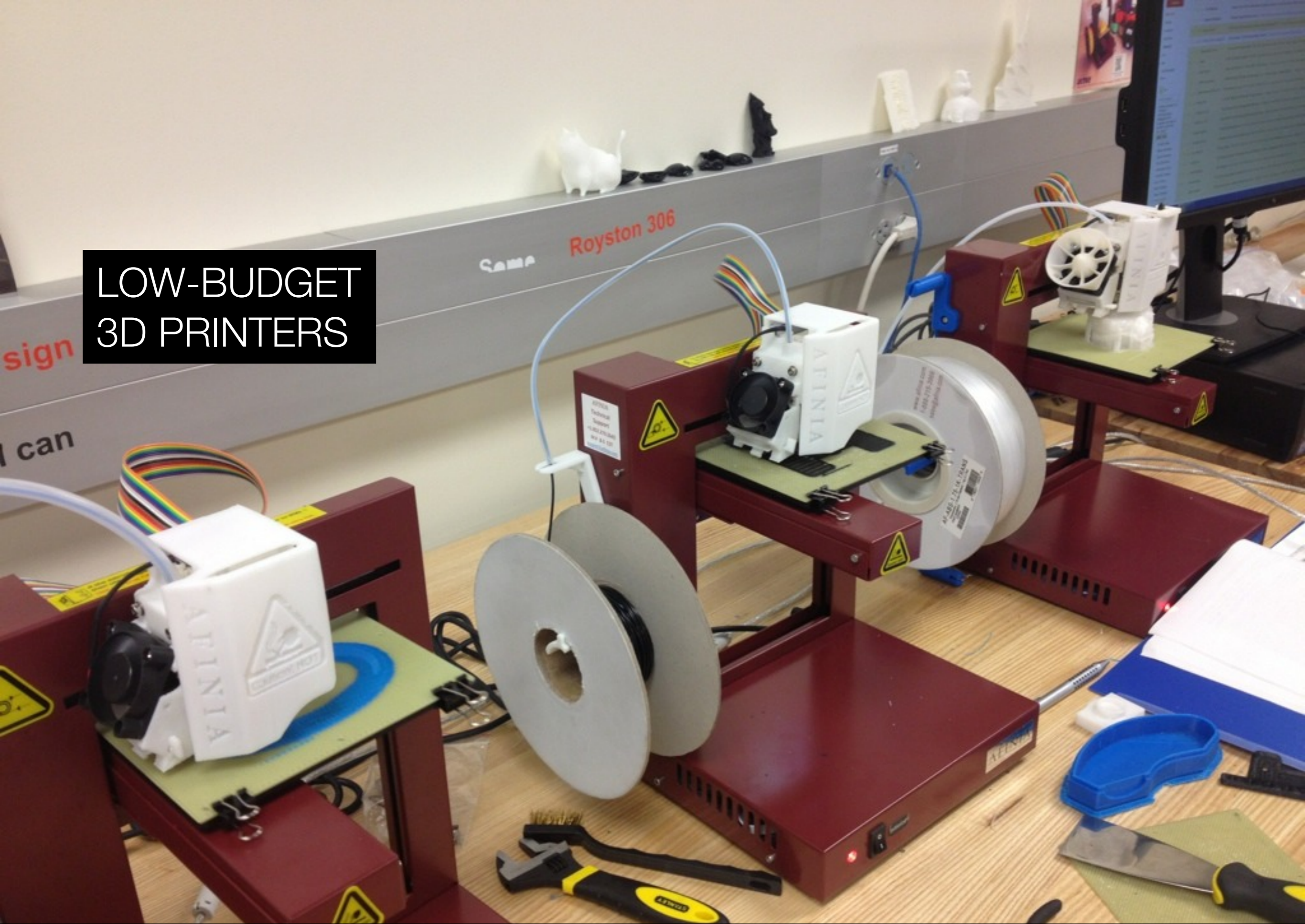


Bjoern Hartmann & Eric Paulos
Co-Directors



141 Sutardja Dai Hall

LOW-BUDGET 3D PRINTERS

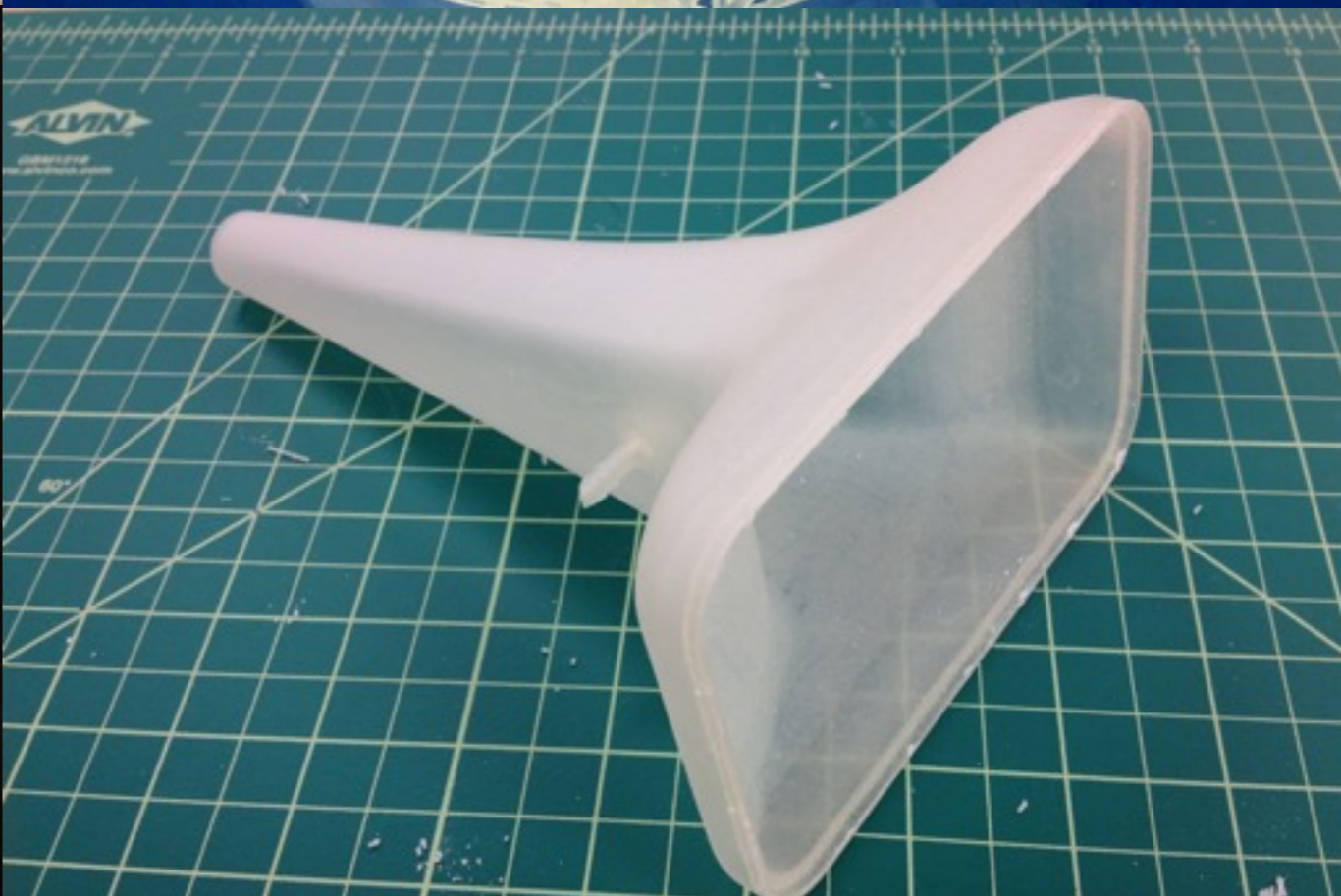




HIGH-END 3D PRINTERS

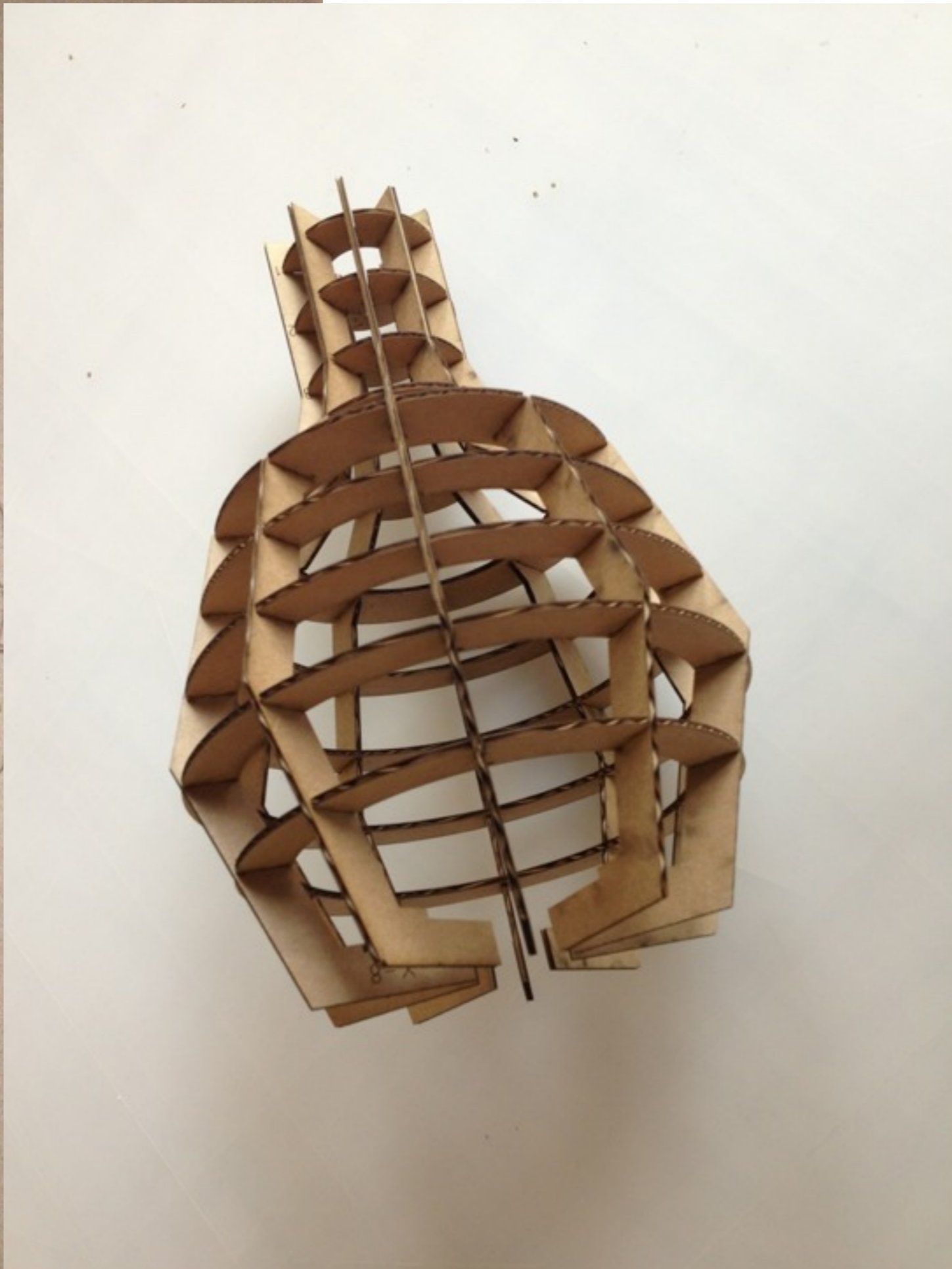
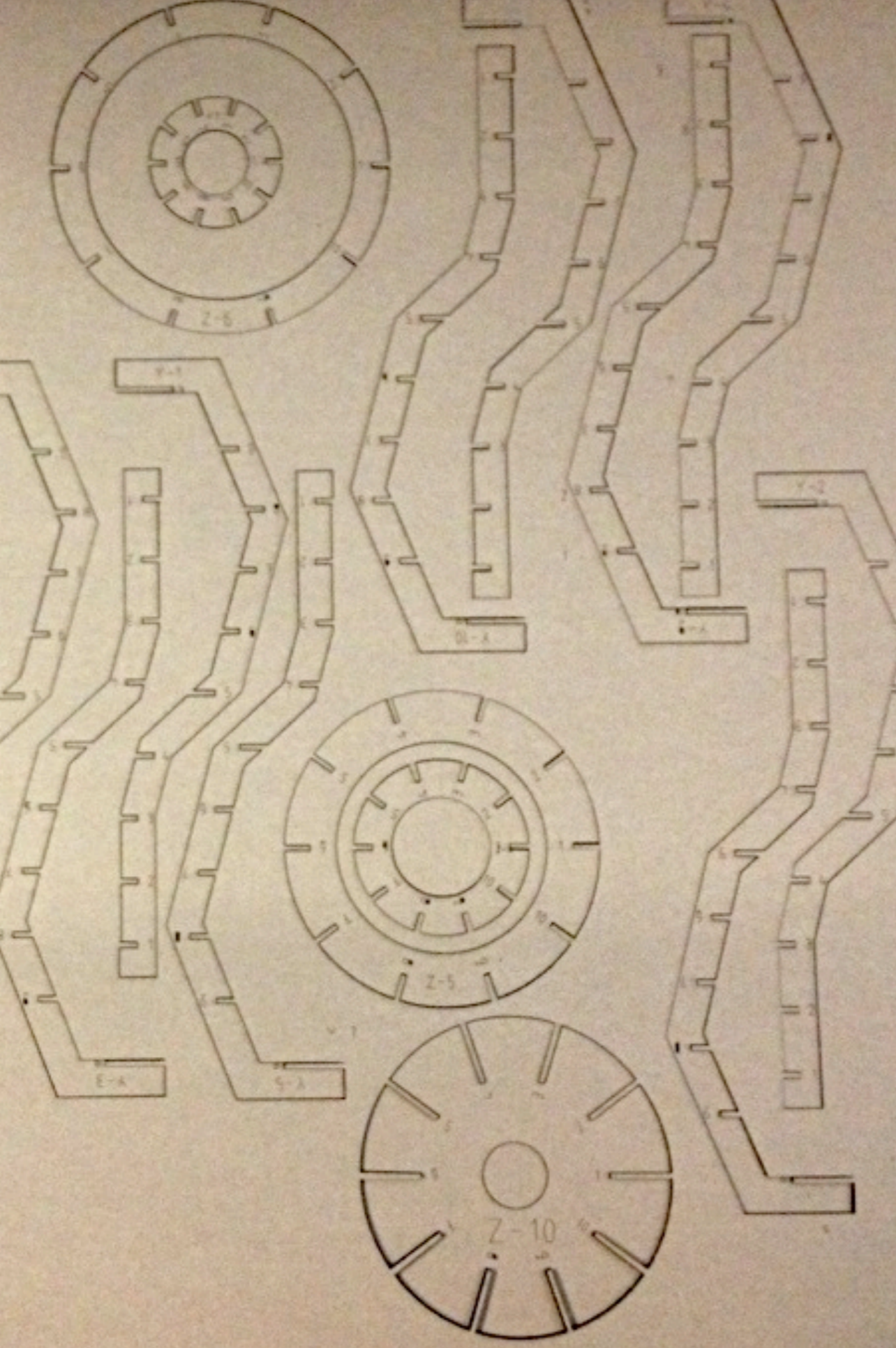


EQUIPMENT AND TOOLING

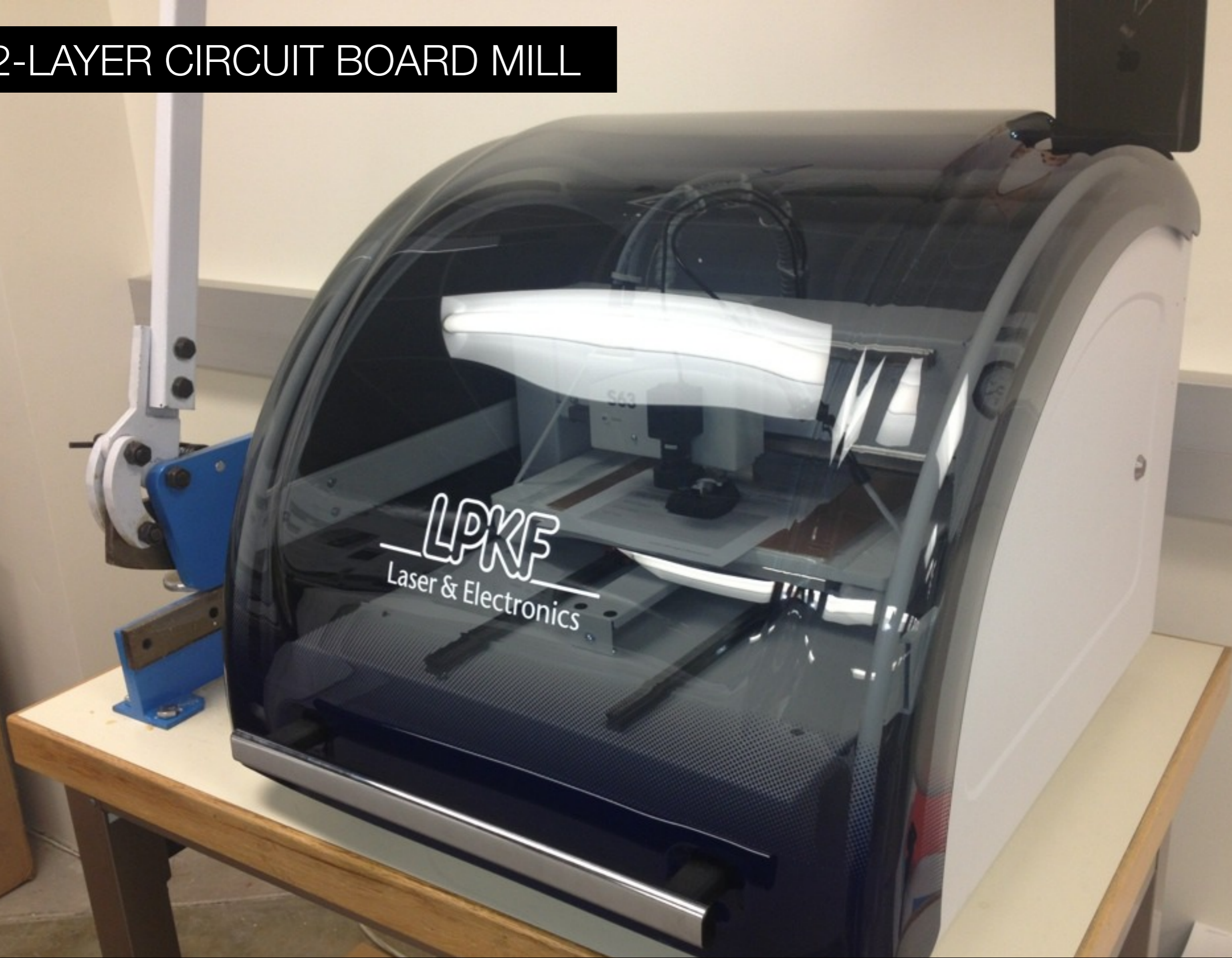


LASER CUTTER

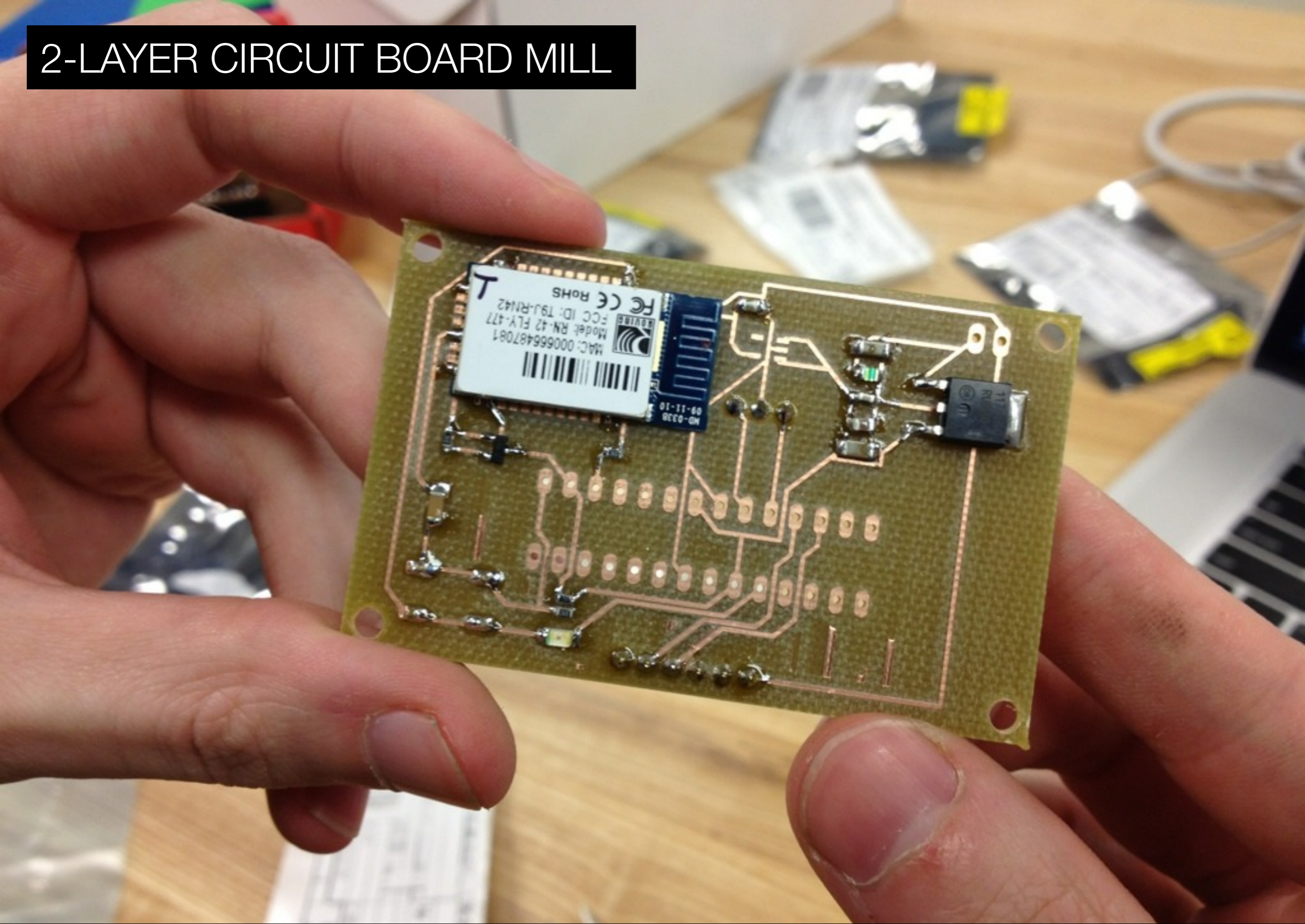




2-LAYER CIRCUIT BOARD MILL

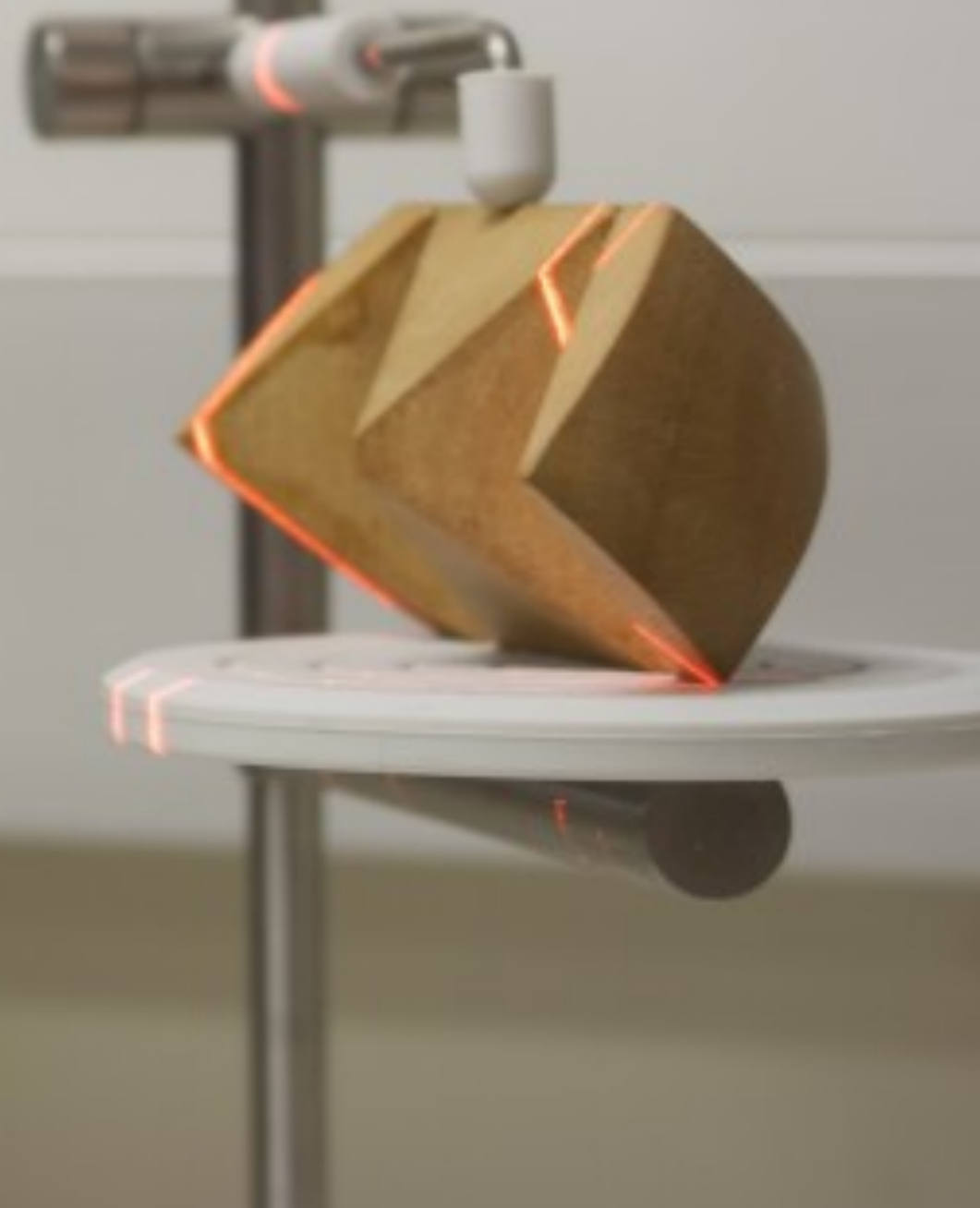


2-LAYER CIRCUIT BOARD MILL



MD-0328
09-11-10
SHHS
FC CE RoHS
Model: RN-42 FLY-477
FCC ID: T9J-RM42
MAC: 000666487081
T

3D SCANNER



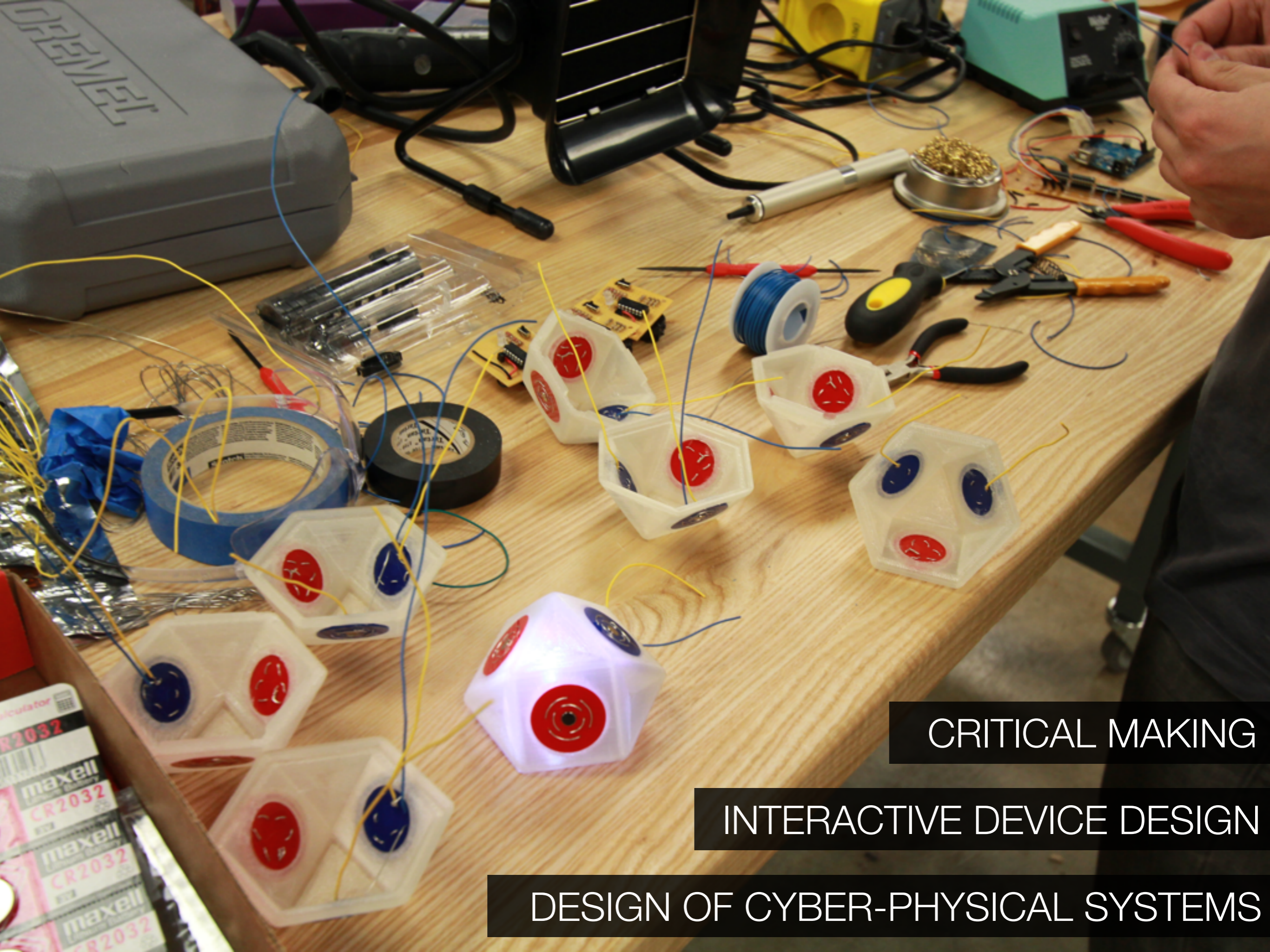
VINYL CUTTER





PART STORE

Instruction in the Invention Lab

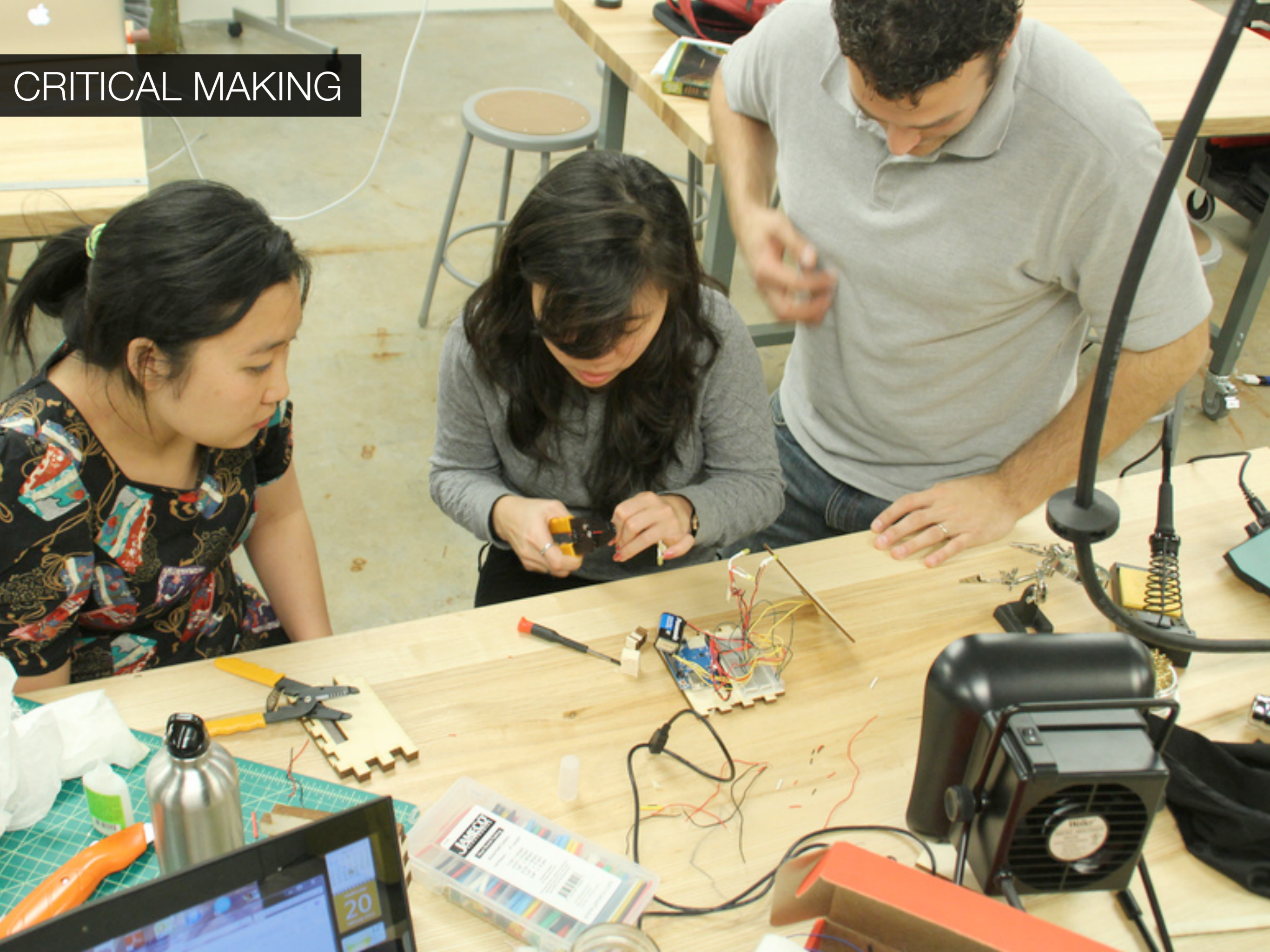


CRITICAL MAKING

INTERACTIVE DEVICE DESIGN

DESIGN OF CYBER-PHYSICAL SYSTEMS

CRITICAL MAKING





SPICE PRINTER

kylan nieh
victor sandberg
hurshal patel

DARK MAZE

brittany cheng
jonathan cotte
hurshal patel
curtis hwang



MOSSED UP

jonathan cotte
noah pitts



MY CITY

karl landin
victor sandberg
kylan nieh
alice lee





“This class was one of the most unique & rewarding classes I took at Berkeley. We actually learned how to make things! I personally think this class should be **REQUIRED** for all engineering students. I learned a lot, and had a lot of fun and made some awesome interdisciplinary friends.”

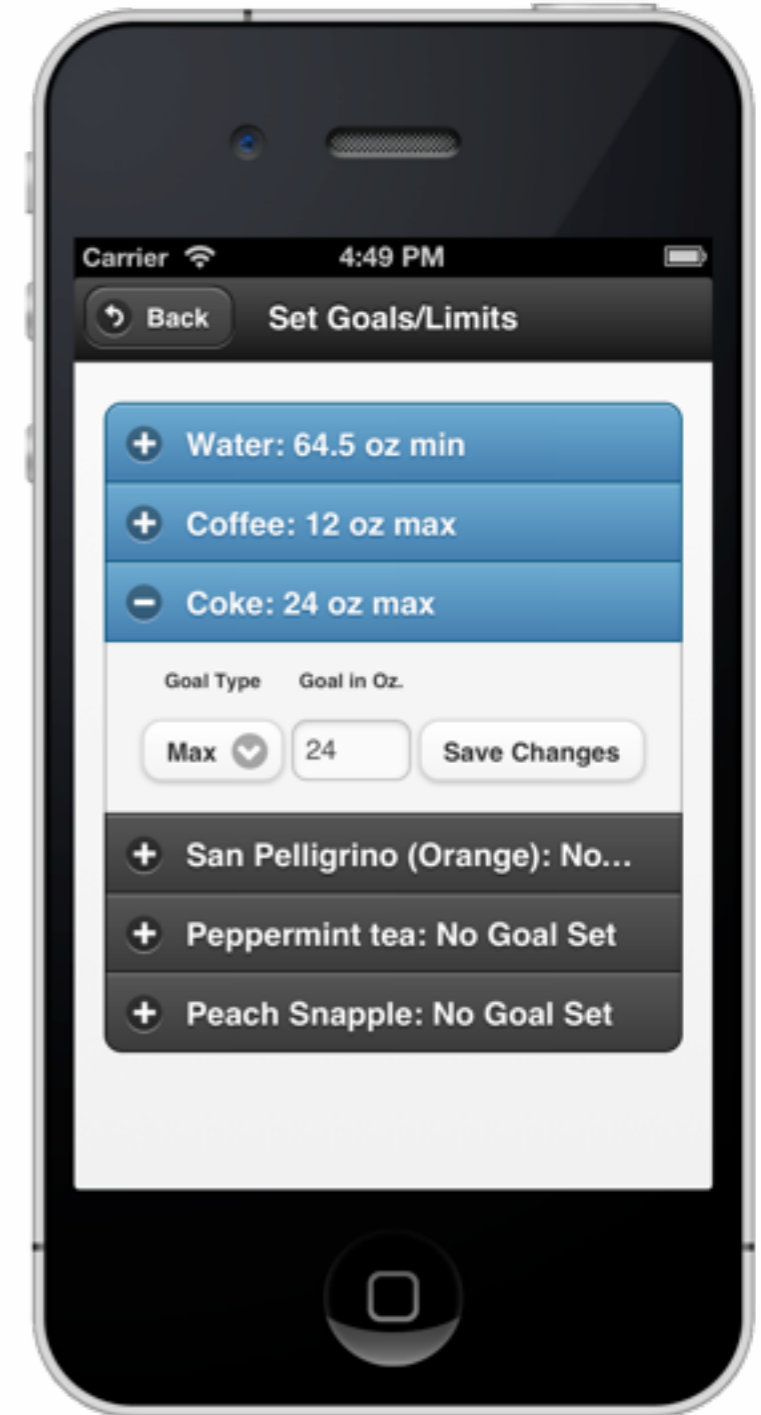
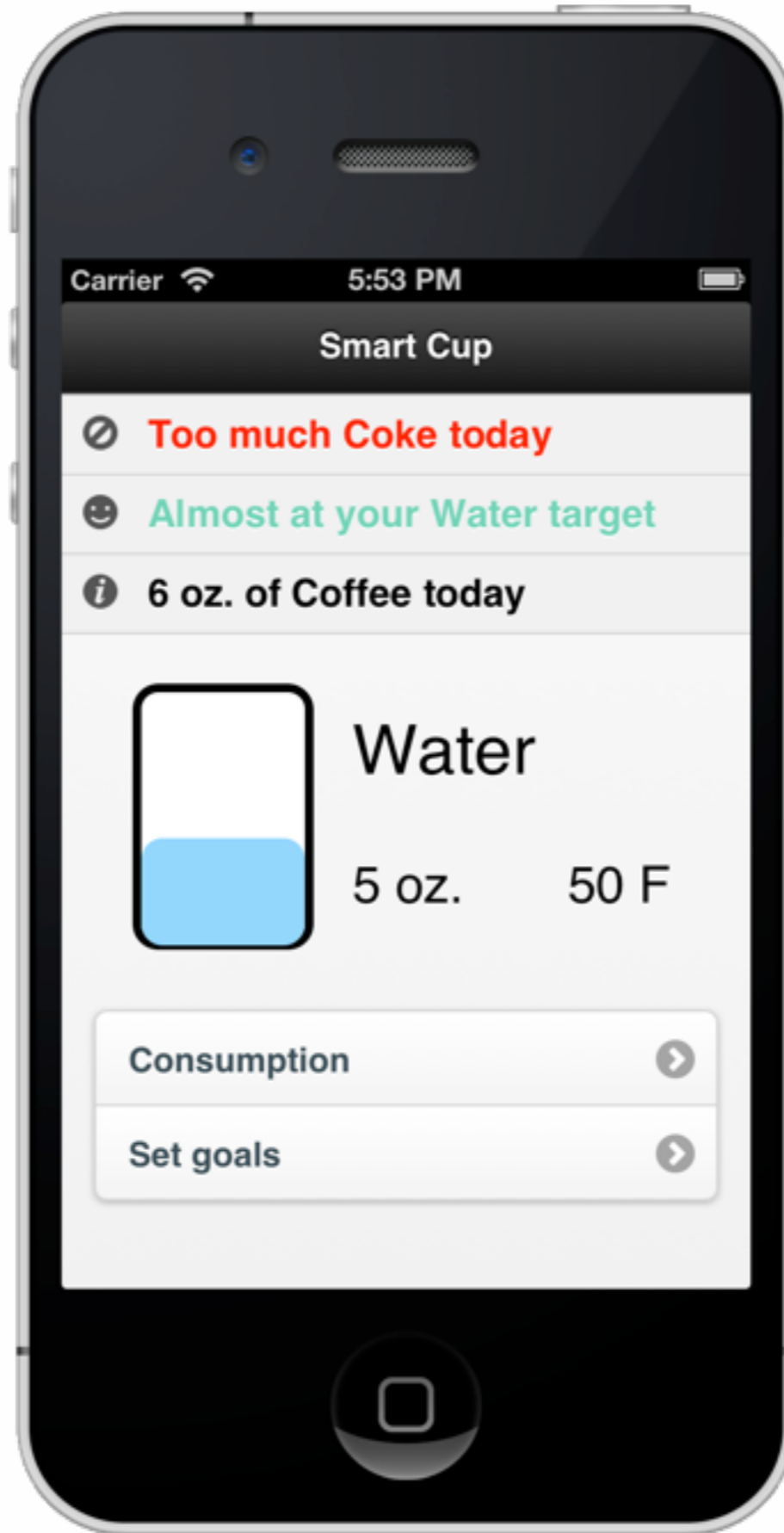
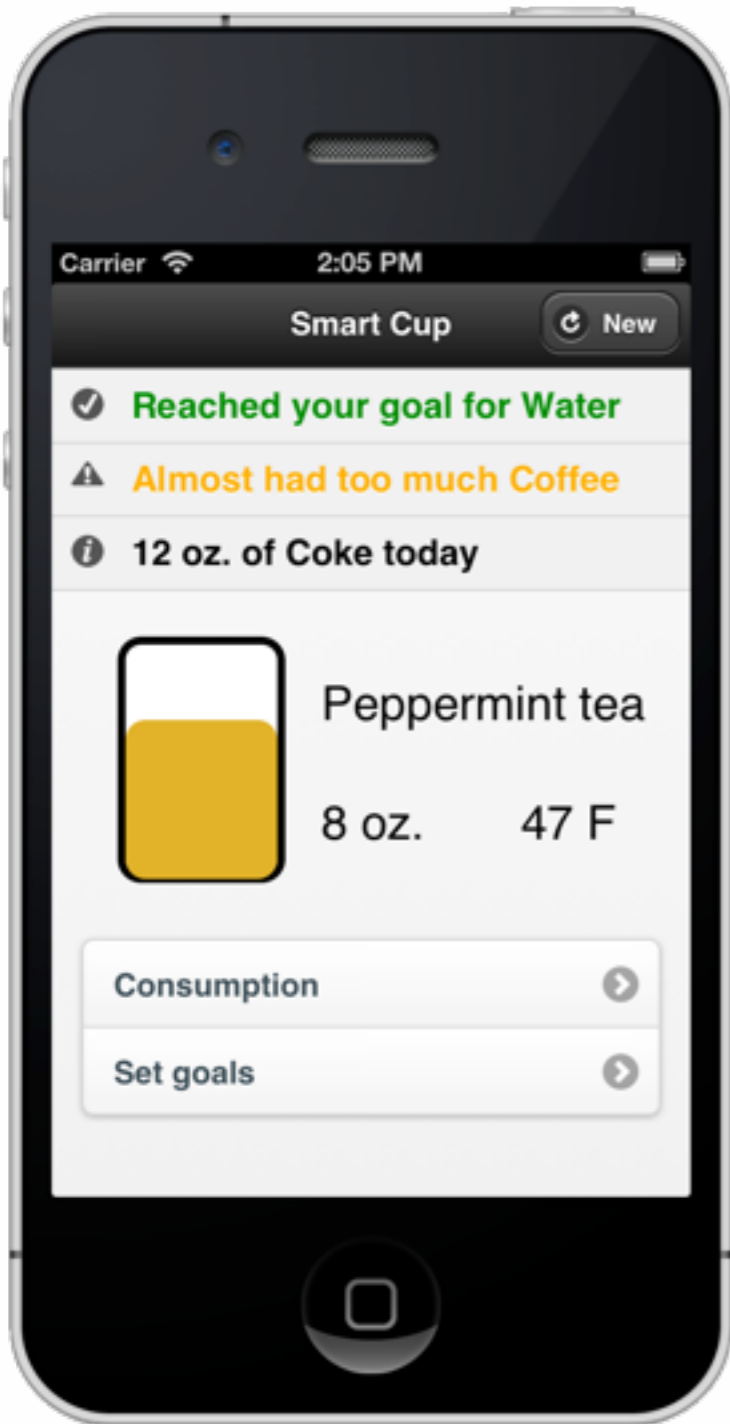


INTERACTIVE DEVICE DESIGN

DRINKE SMART CUP

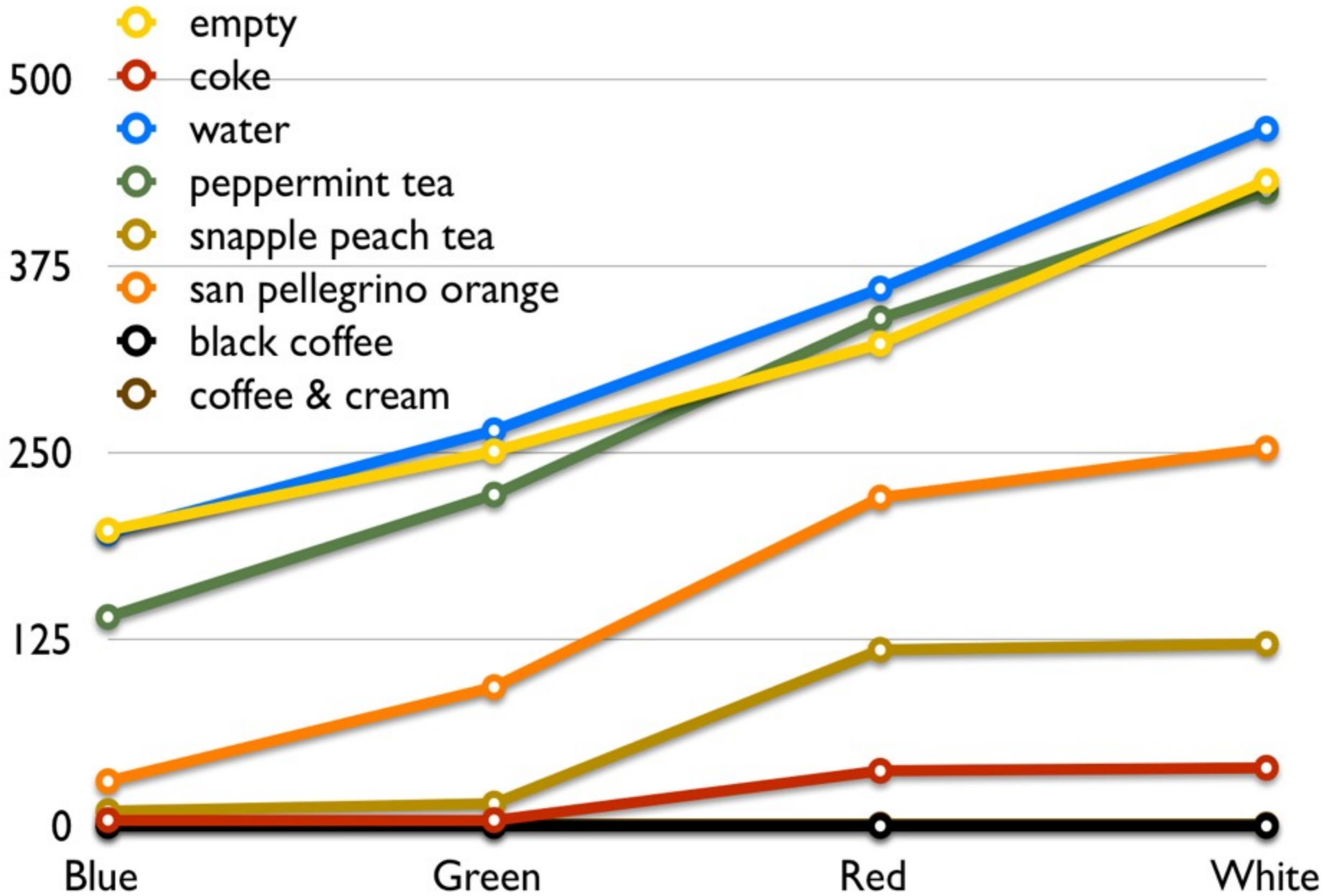
Amy Pavel
Steve Rubin
Elliot Nahman
Sean Chen





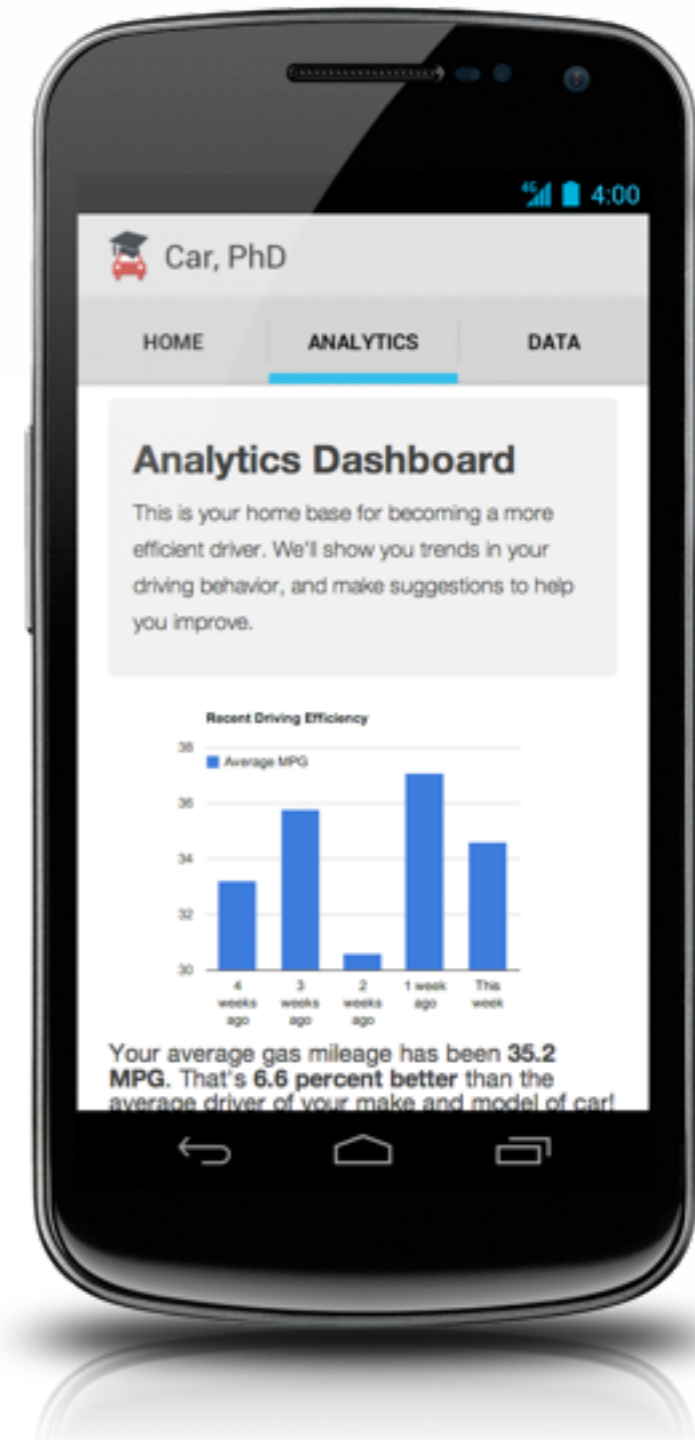






CAR, PhD

Daniel Haas
Daniel Bruckner
Chris Thompson

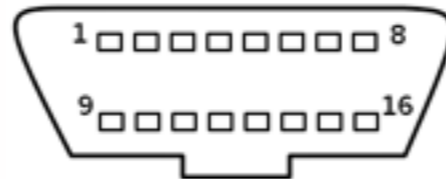






Car

OBD II



CarPhD



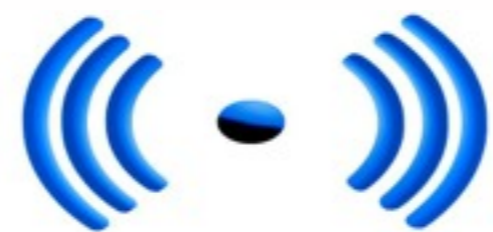
Bluetooth



Phone



Cloud



WiFi

4G



H2O IQ Drip Irrigation Controller

Valkyrie Savage
Shiry Ginosar
Mark Fuge



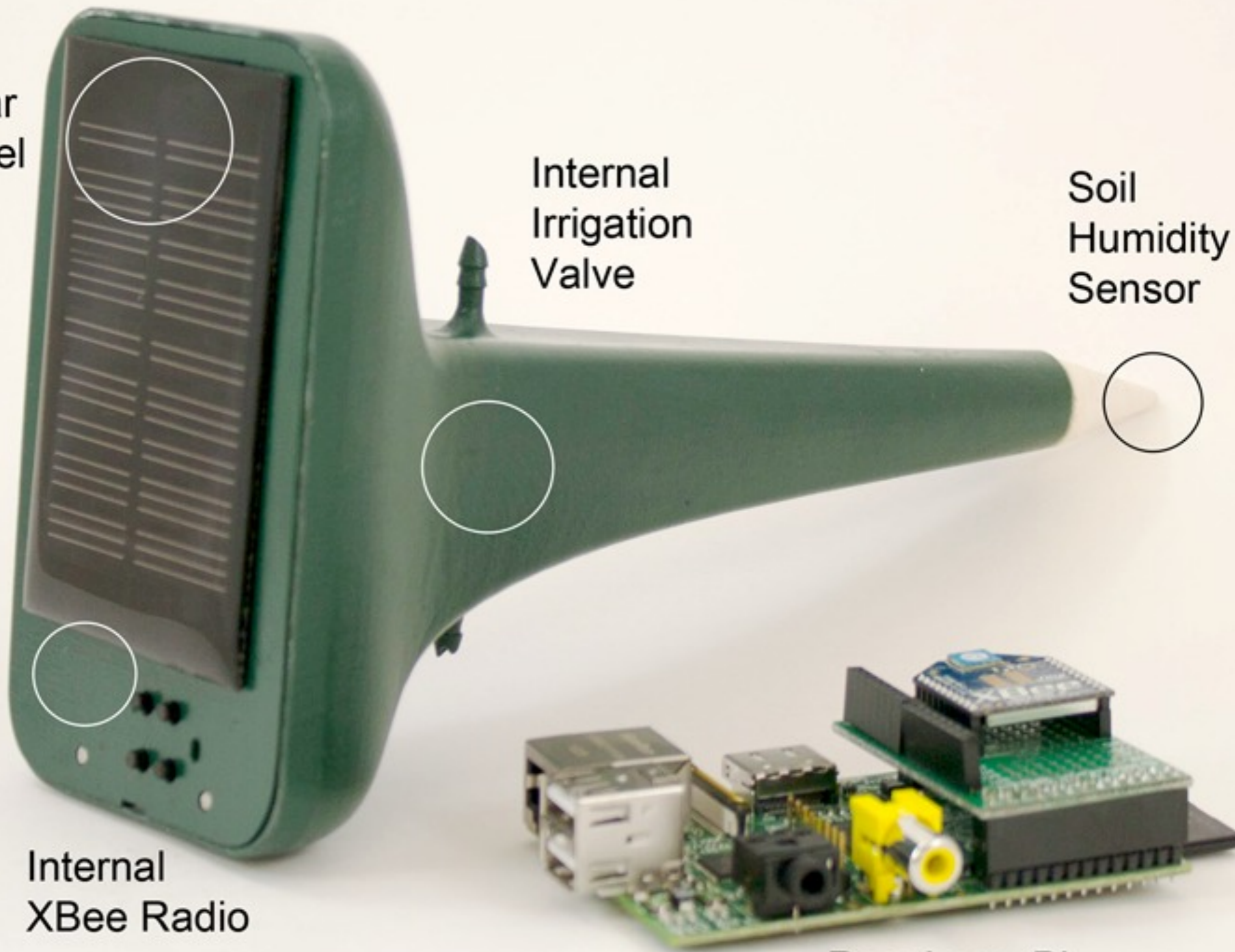
Solar Panel

Internal Irrigation Valve

Soil Humidity Sensor

Internal XBee Radio

Raspberry Pi

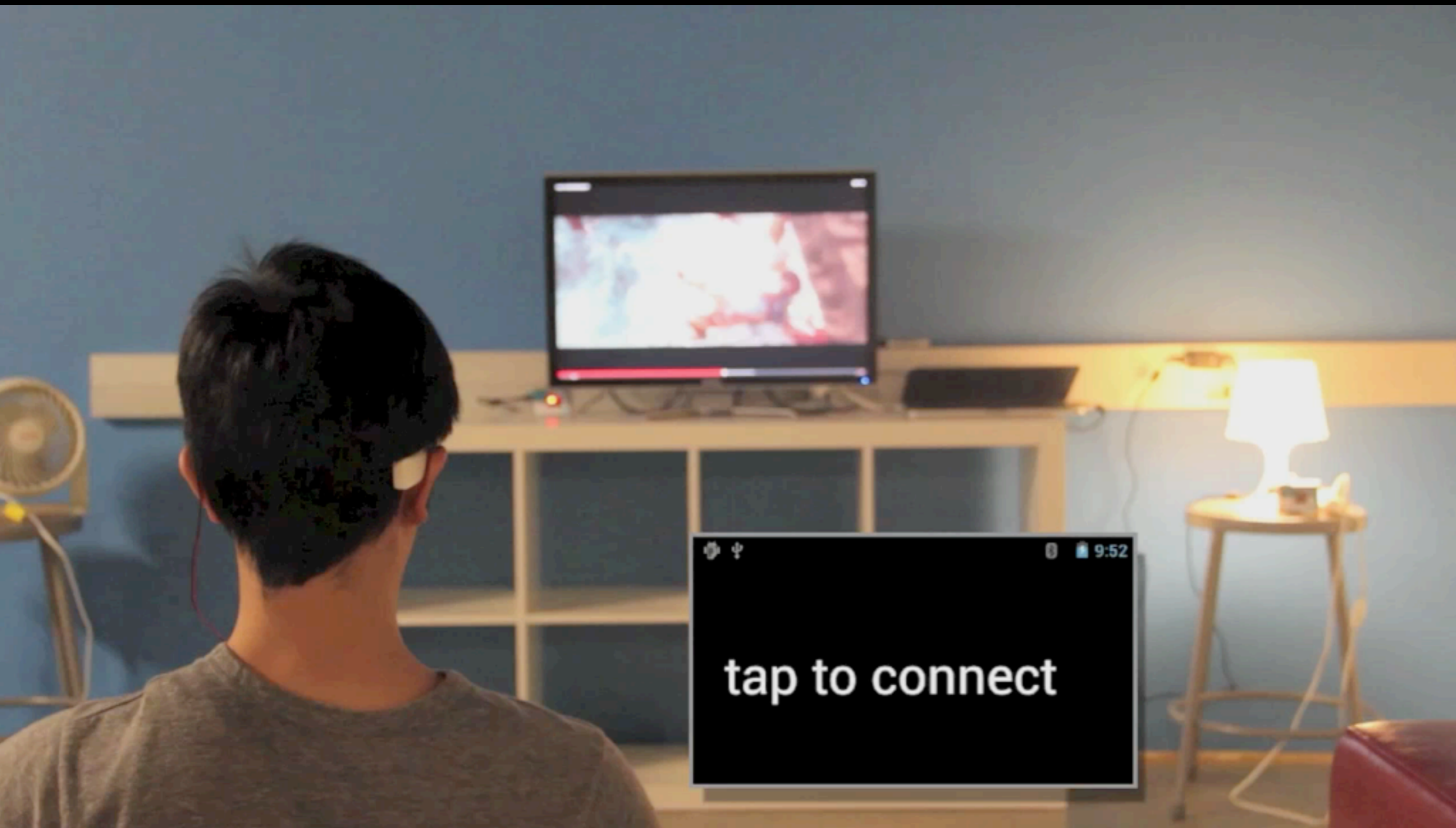




Sean Chen,
Ben Zhang,
Claire Tuna



IR EMITTER



tap to connect

Design Tools for Digital Fabrication

Midas: Fabricating custom touch sensors

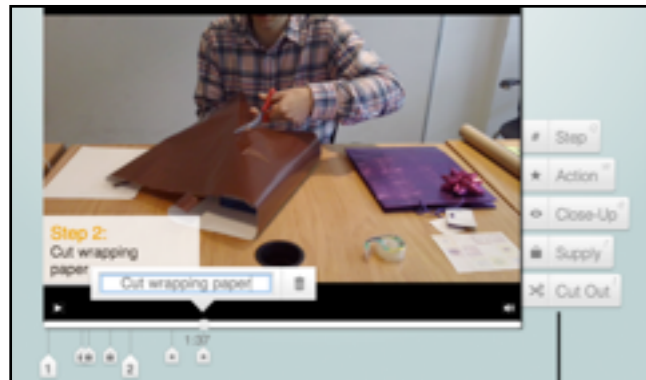
Sauron: Vision-sensing of 3D printed prototypes



Expertise Sharing

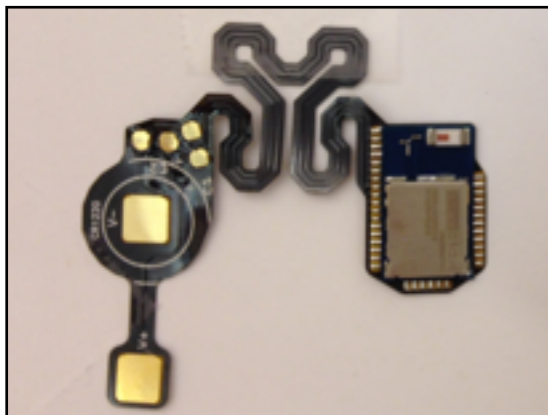
Fabbit: Threaded discussions for 3D models

Democut: Mixed-initiative video editor for tutorials

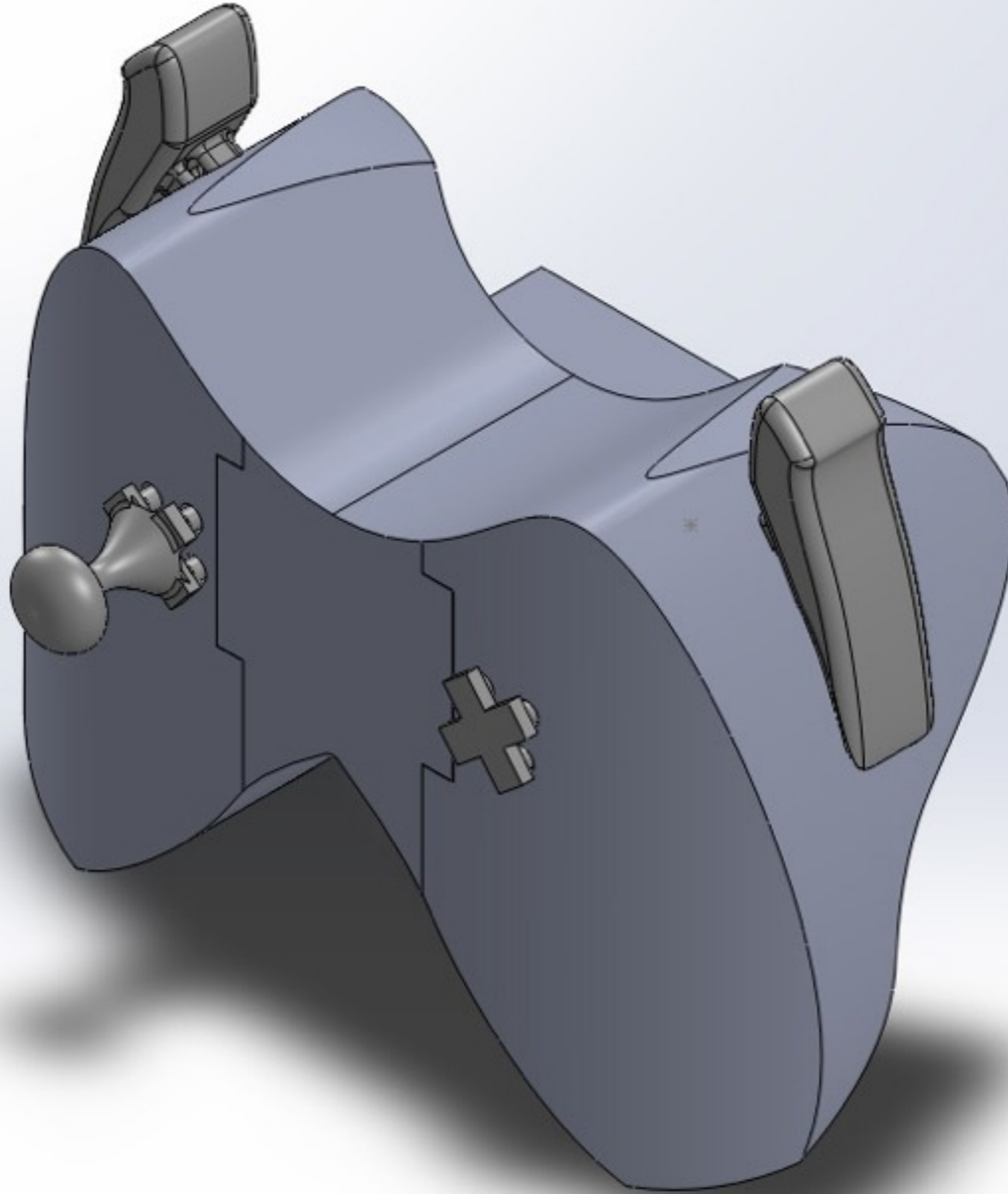


Software Platforms

Fabryq: From sensor to server

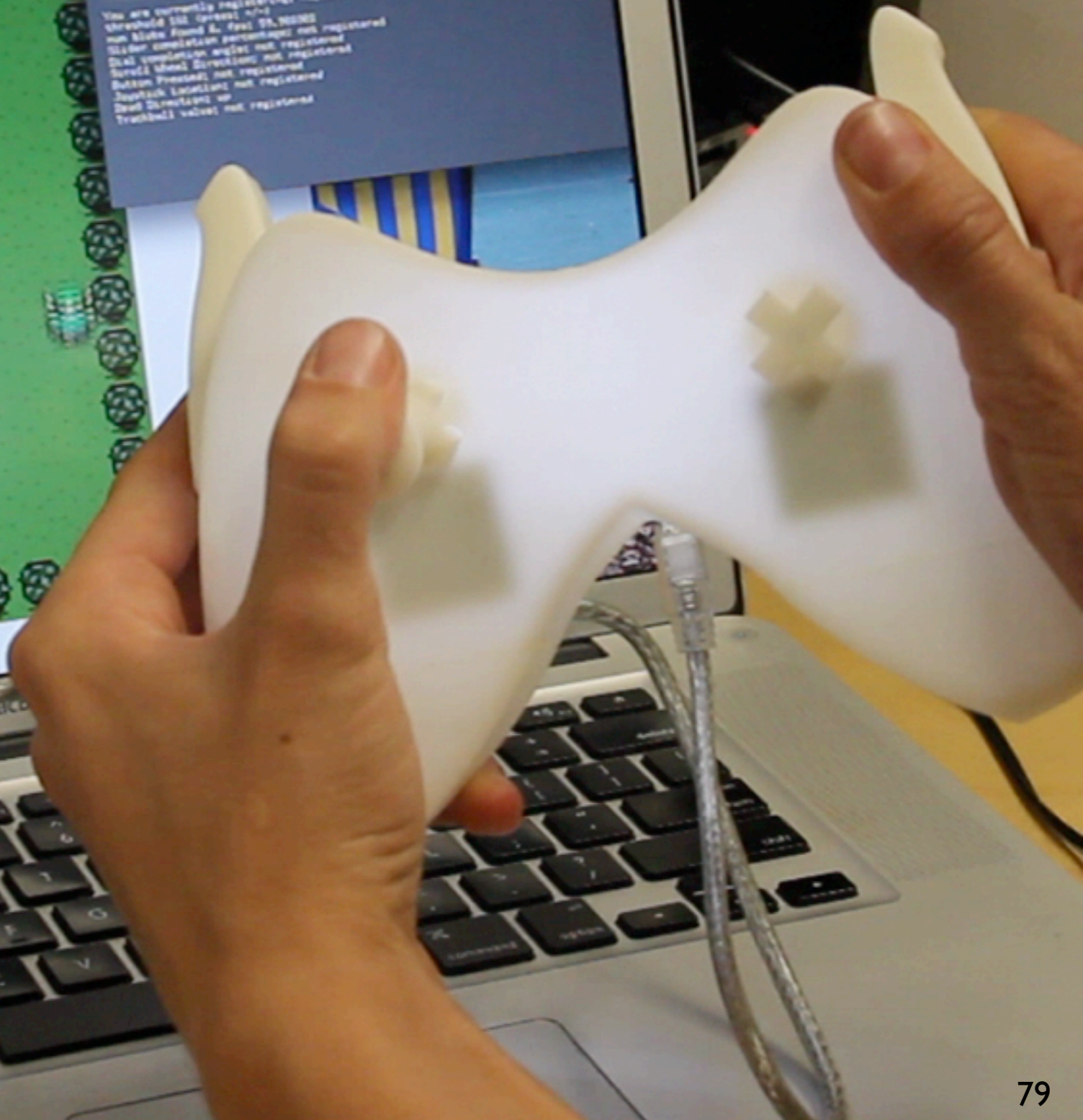
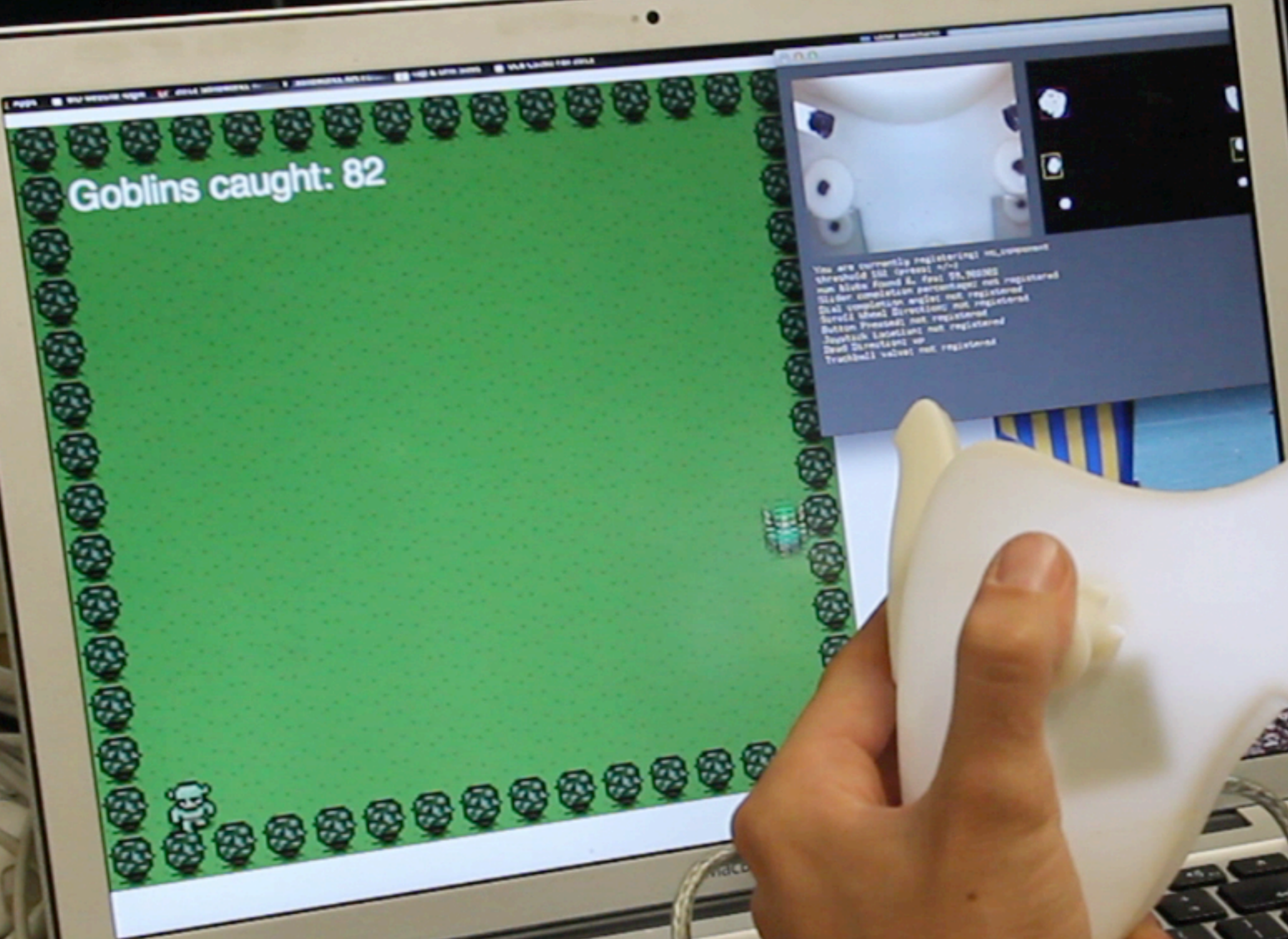


Sauron: vision sensing of 3D printed prototypes









invent.citris-uc.org

Bjoern Hartmann & Eric Paulos



News

December 2011: Three CHI papers

Full papers on communitysourcing, workflow comparison, and multitouch architecture were (conditionally) accepted to CHI2012.

December 2011: Presentations

Final presentations/demos for CS260 are open to the public. They will be held on 12/6 at 4pm in 510 Soda.

December 2011: Research Awards

We received research awards from Adobe and Google.

October 2011: Two CSCW papers + two posters

Two crowdsourcing papers on Turkomatic and Shepherd were accepted to CSCW, as well as two posters on BribeCaster and Dazzle.

August 2011: NSF Award

We received an NSF award for Fabbit: Fabrication and Brokering Through Information Technology

June 2011: Two UIST Papers

Two full papers on ShowMeHow and Stackexplorer accepted to UIST.

May 2011: Two HCOMP Papers + two posters

Two full papers on pricing and two systems demos from our crowdsourcing class will be presented at HCOMP.

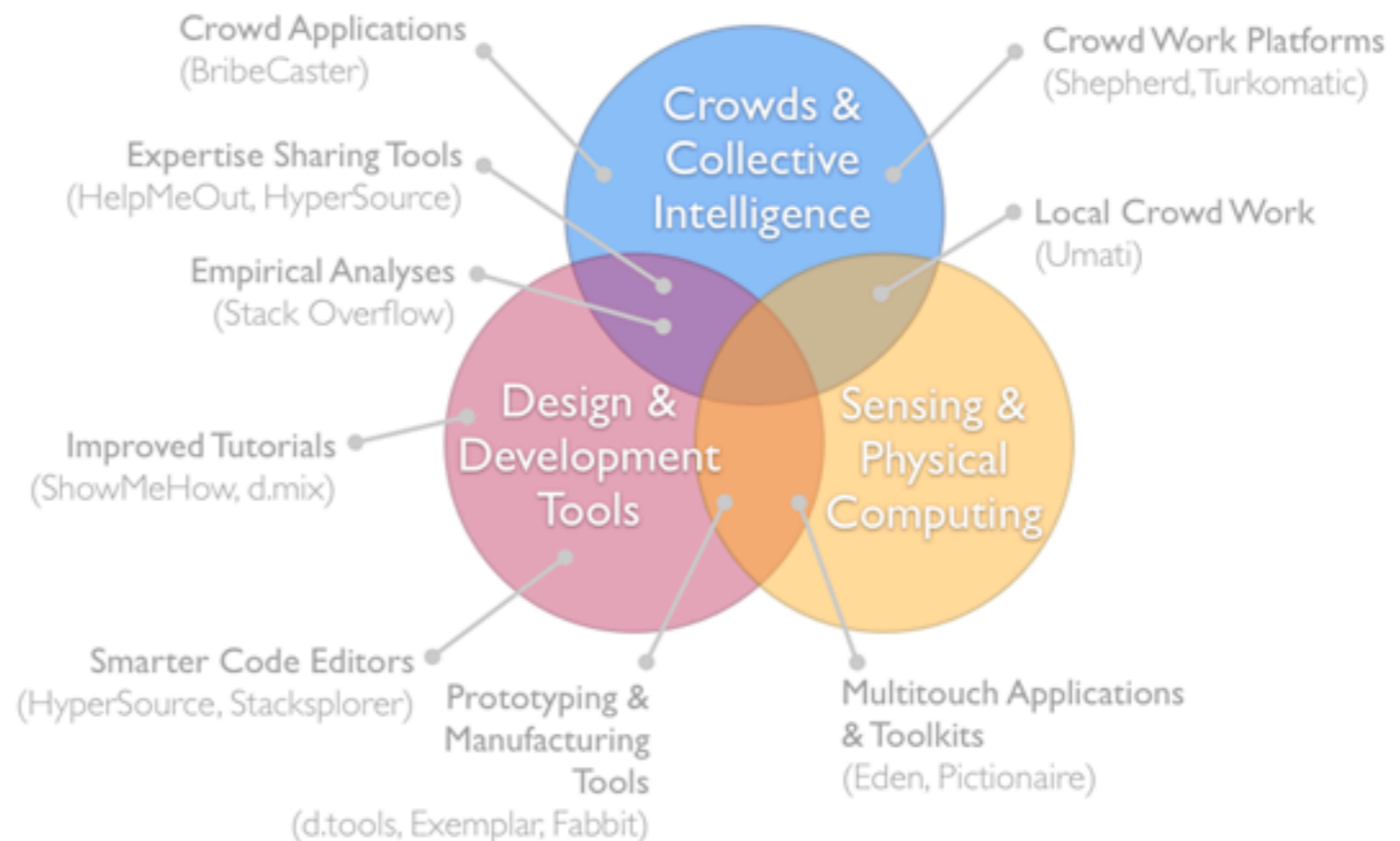
May 2011: CHI Paper Awards

Our two full papers will receive Honorable Mention Awards at CHI.

Contact info

Office Hours: Wed 4-5pm

My research in Human-Computer Interaction lies at the intersections of three domains: crowdsourcing; design tools; and physical computing. Research systems center on tools for designers and programmers, with emphasis on amateurs and DIY groups.



I am a co-director of the Berkeley Institute of Design. I collaborate with many excellent research groups in our department such as the Visual Computing Lab; the Parallel Computing Lab; and the Swarm Lab. I am also affiliated with the Berkeley Center for New Media, and the new Cal Design Lab. I co-initiated the Course Thread in Human-Centered Design. I received my PhD from the Stanford Computer Science department in

| Human-Computer Interaction Redux

...is concerned with the design, implementation, and evaluation of user interfaces.

Mobile, social & ubiquitous computing: now is an incredibly exciting time to work in HCI!

Want more?

CS160 User Interface Design

CS294-85 Critical Making

Course Thread in Human-Centered Design

<http://coursethreads.berkeley.edu>



bjoern@eecs.berkeley.edu |
www.cs.berkeley.edu/~bjoern