

Human-Computer Interaction



An Opinionated Survey

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EECS, Computer Science Division
CS10, Fall 2010

| My Background

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1997-2002



(cc) SnapsterMax

<http://www.flickr.com/photos/myworldinpixels/558060045>

1999-2004



Jay Haze
Club Milk, Tokyo, 2003

2004-2009



2010



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| What is HCI?

Human-Computer Interaction (HCI)

Human

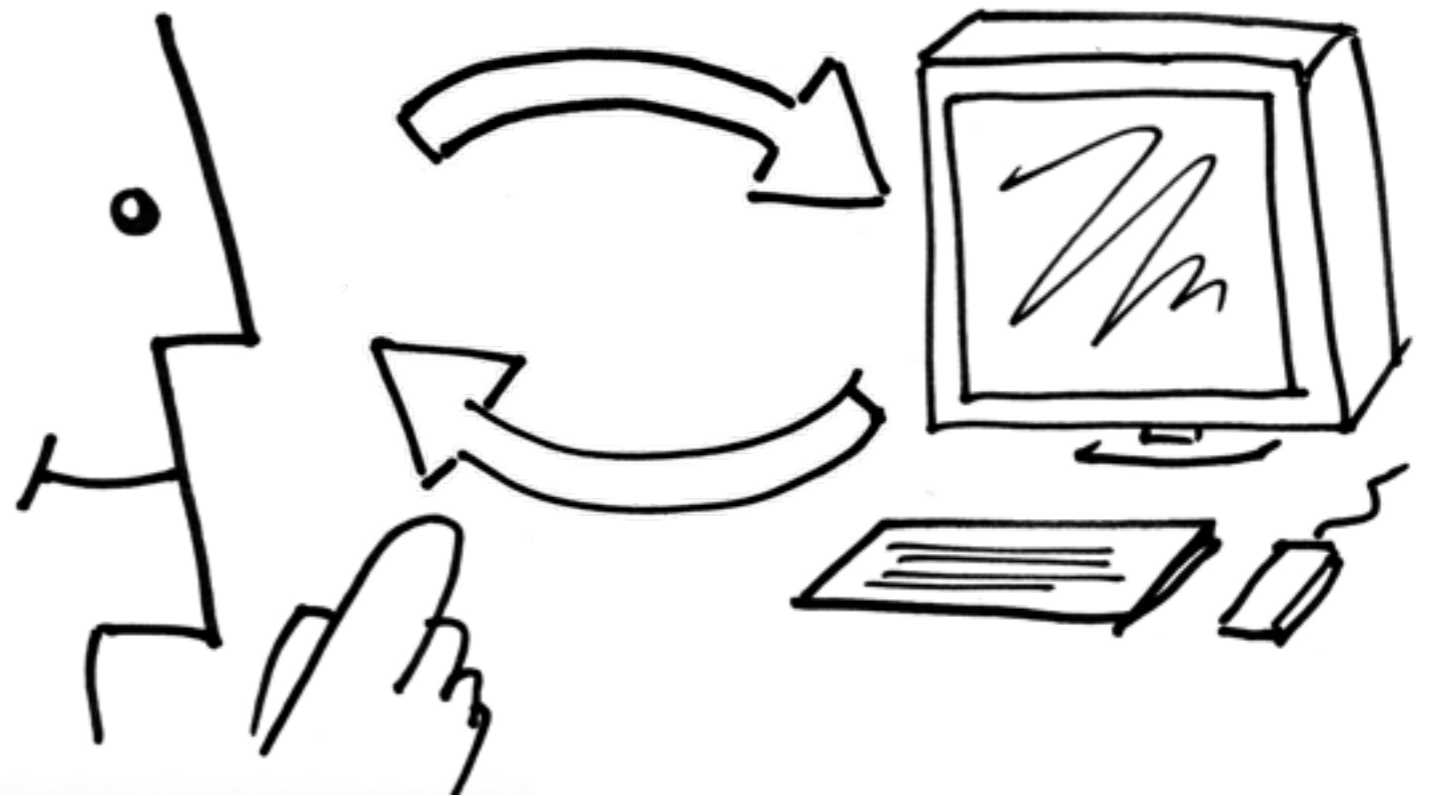
- End-user of program
- Others (friends, collaborators, coworkers)

Computer

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

Interaction

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



User Interfaces (UIs)

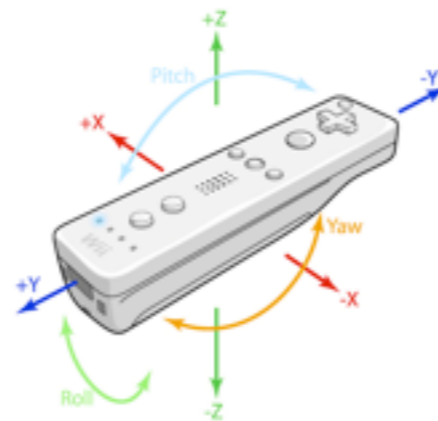
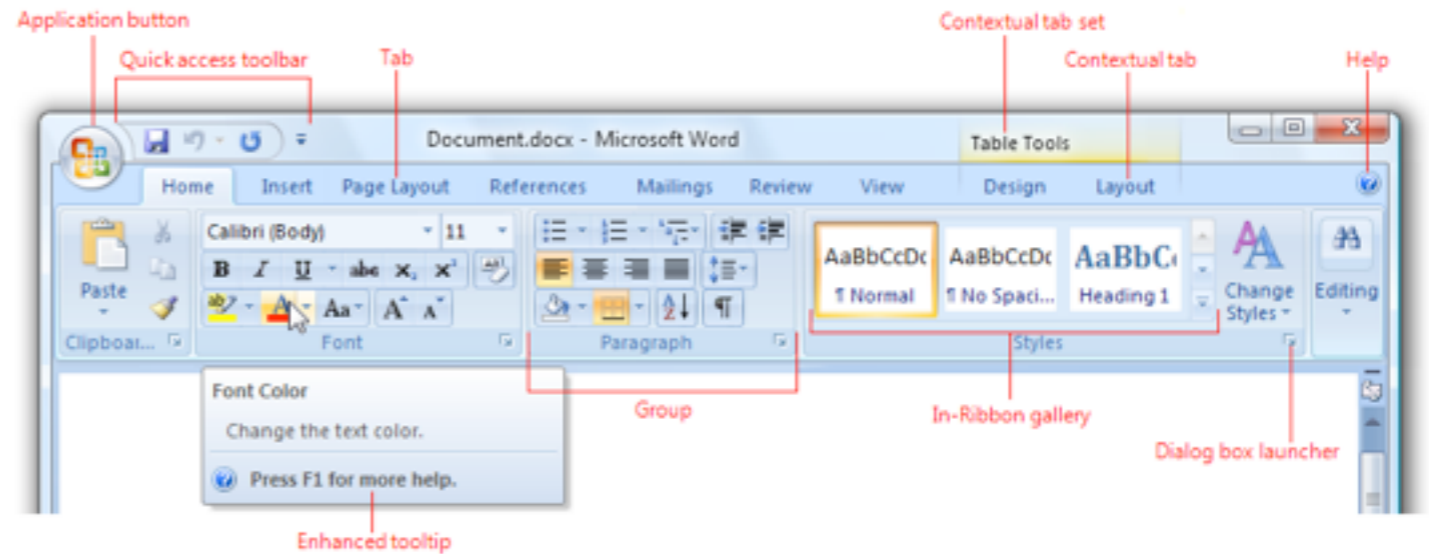
Part of application that allows

- People to interact with computer
- Computer to communicate results

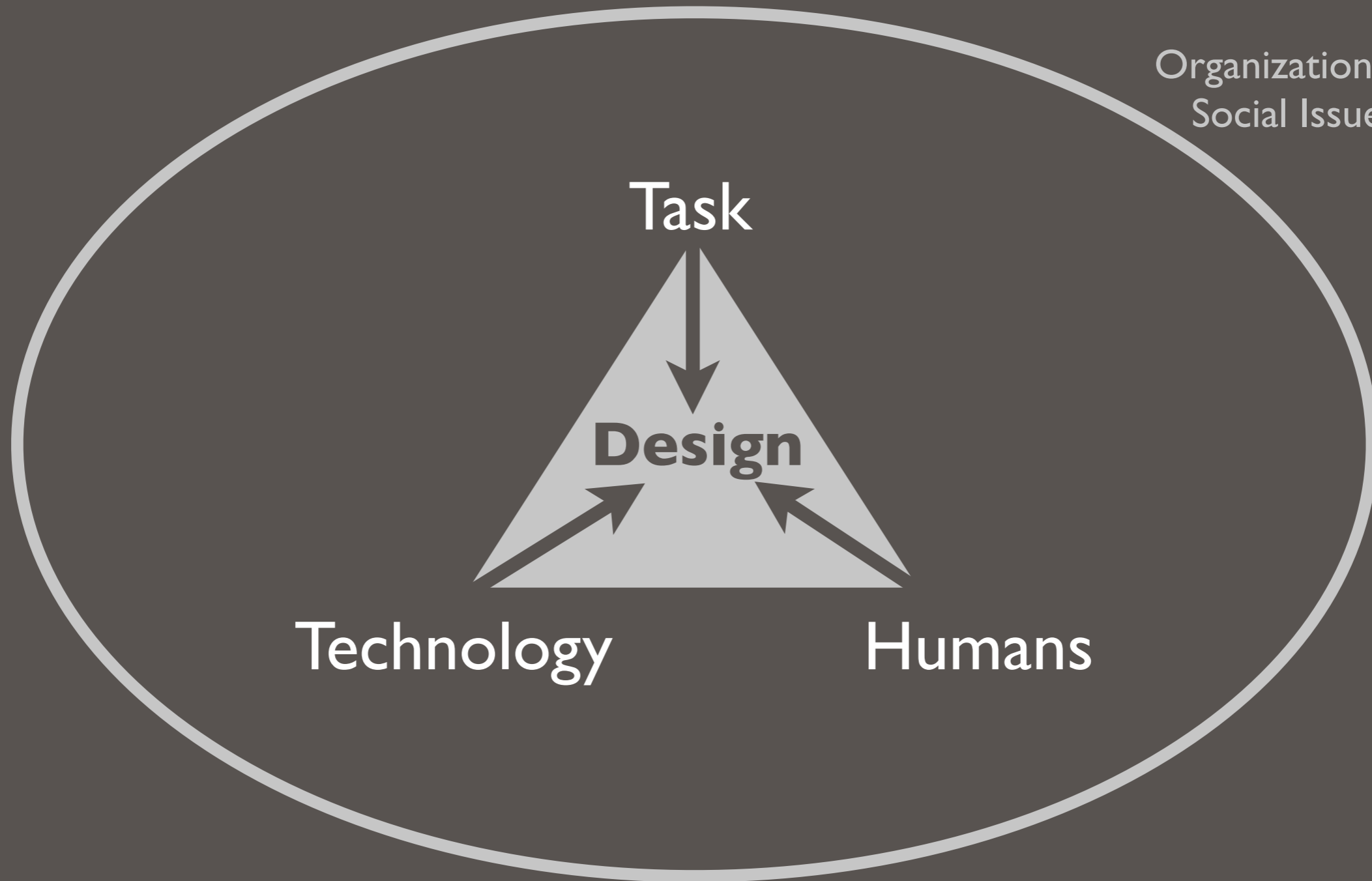
Can include hardware design

- Buttons, sliders, other sensors

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



<http://www.reactable.com>



Organizational +
Social Issues

Task

Design

Technology

Humans



Design

Computer Science

Applied Psychology

artist



scientist



designer

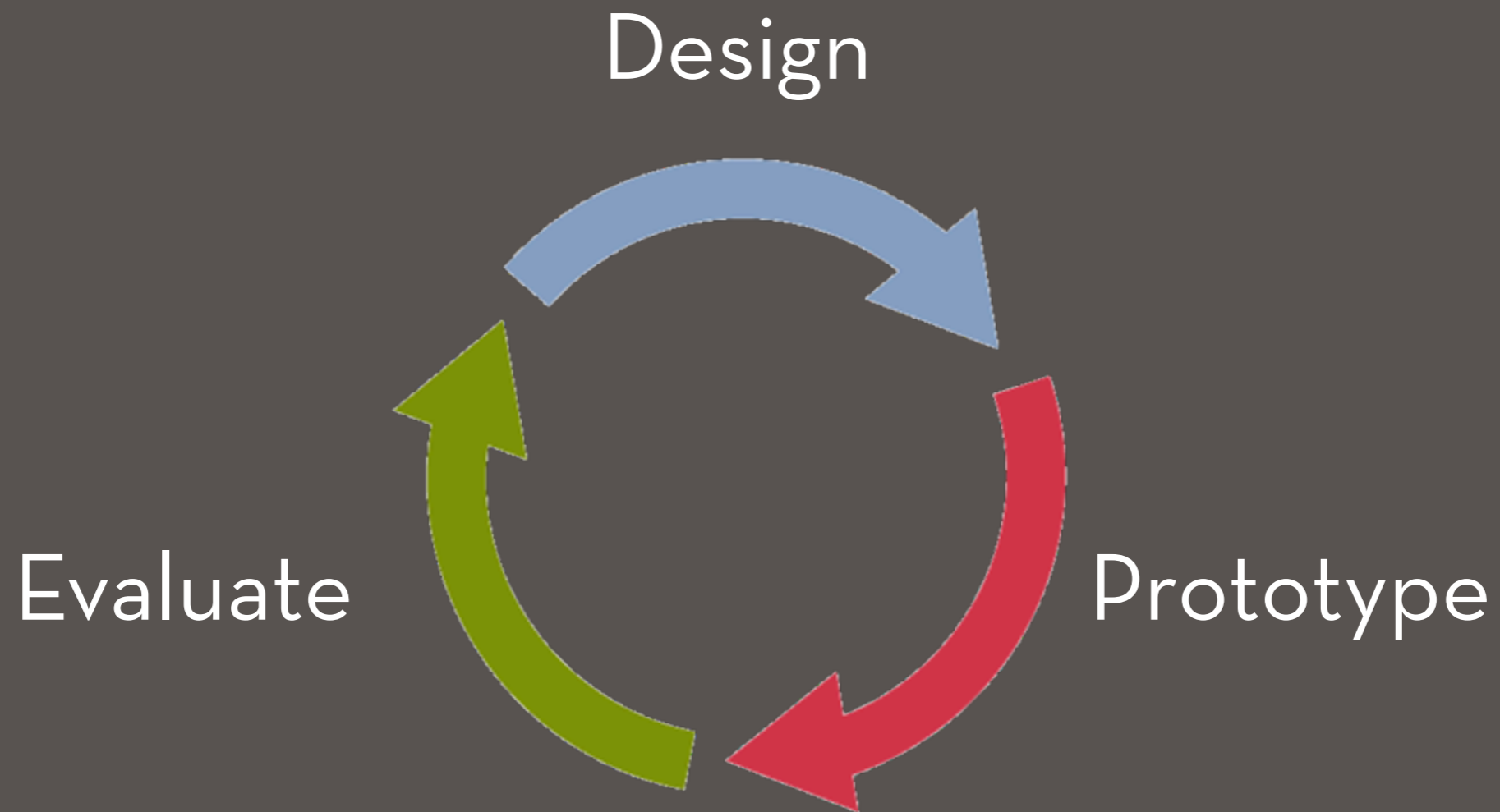


engineer



Rich Gold, *The Plenitude*, MIT Press

| Iterative Design Cycle



Getting it right the first time is hard!

“Enlightened trial and error
outperforms the planning of
flawless intellect.”

- David Kelley

| 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

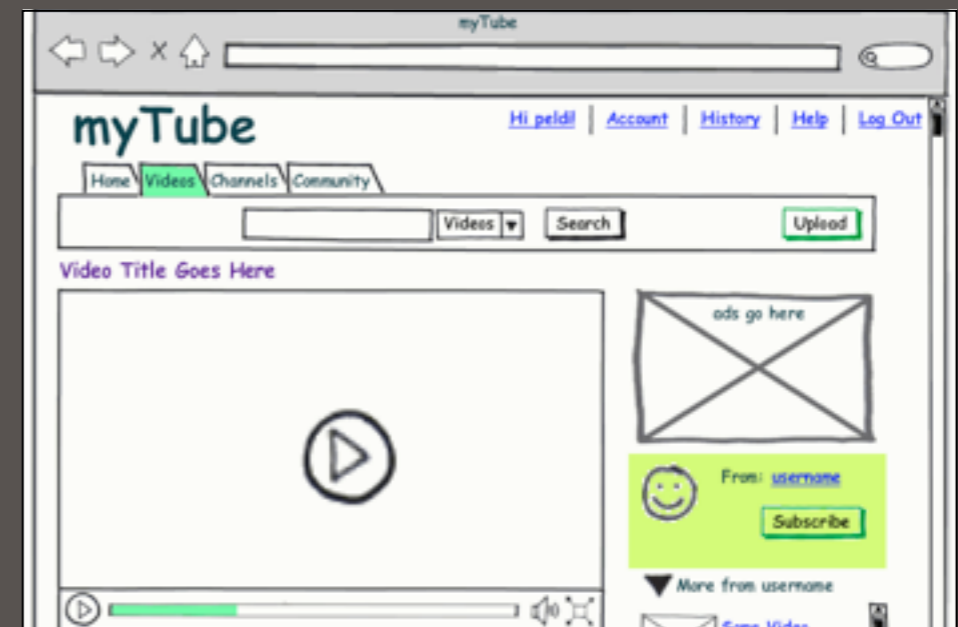
Video prototypes

Interactive prototypes:

HTML, Javascript, Flash, ...

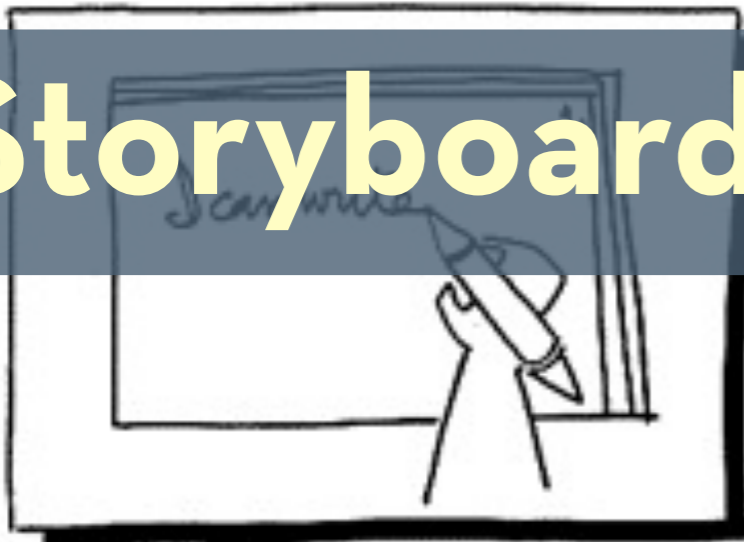


Moggridge, Designing Interactions, p.704

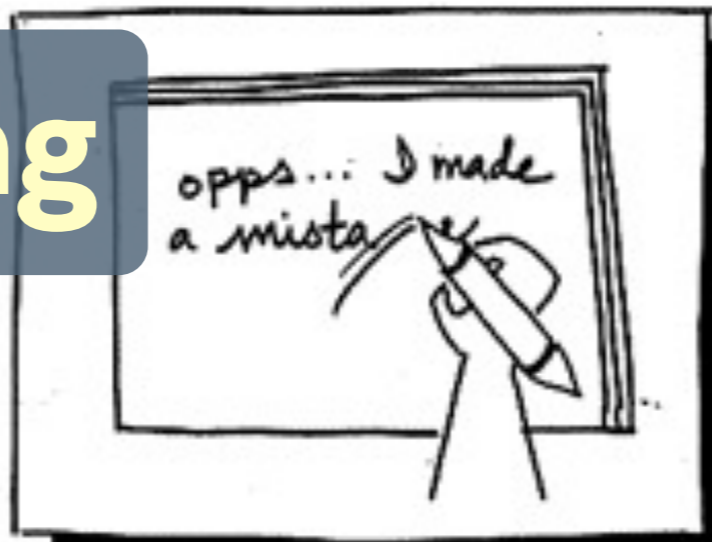


<http://www.balsamiq.com/products/mockups/examples#wiki>

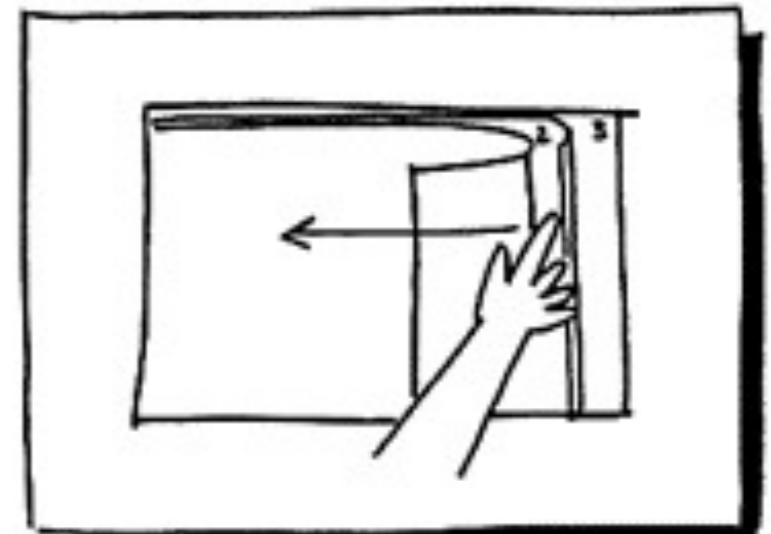
Storyboarding



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.



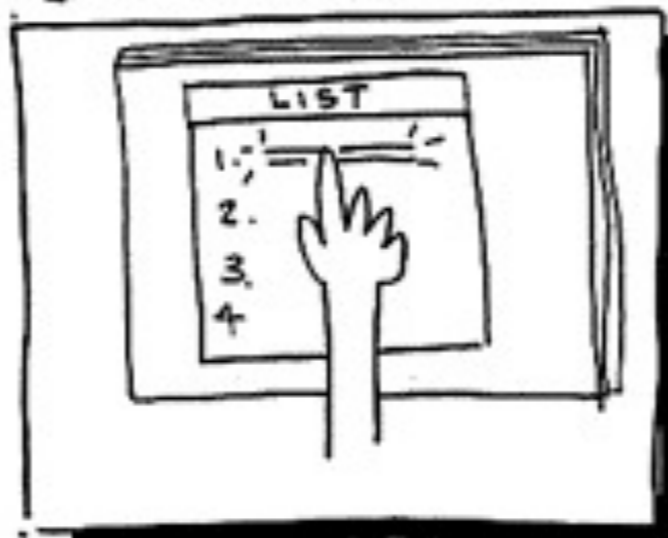
L. marks a phone number.



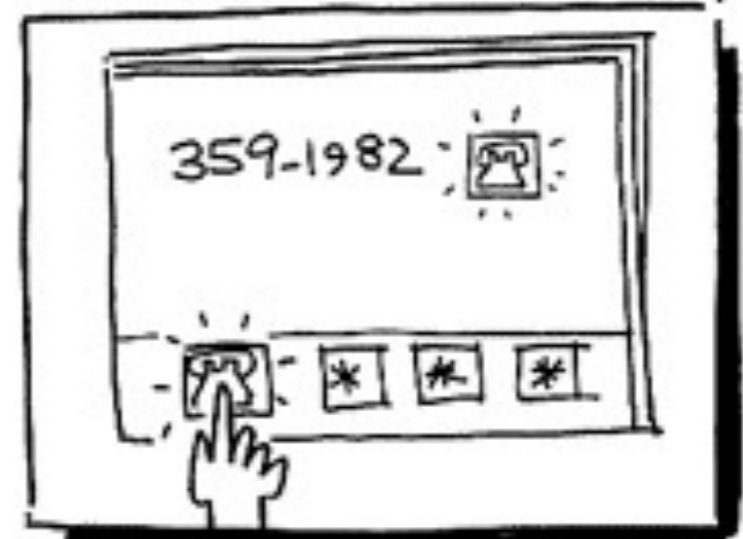
L. shifts to the InBox Section.



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. 30%

C. 50%

D. 70%

E. 90%

| Why study user interfaces?

“The results show that in today's applications, an average of 48% of the code is devoted to the user interface portion.

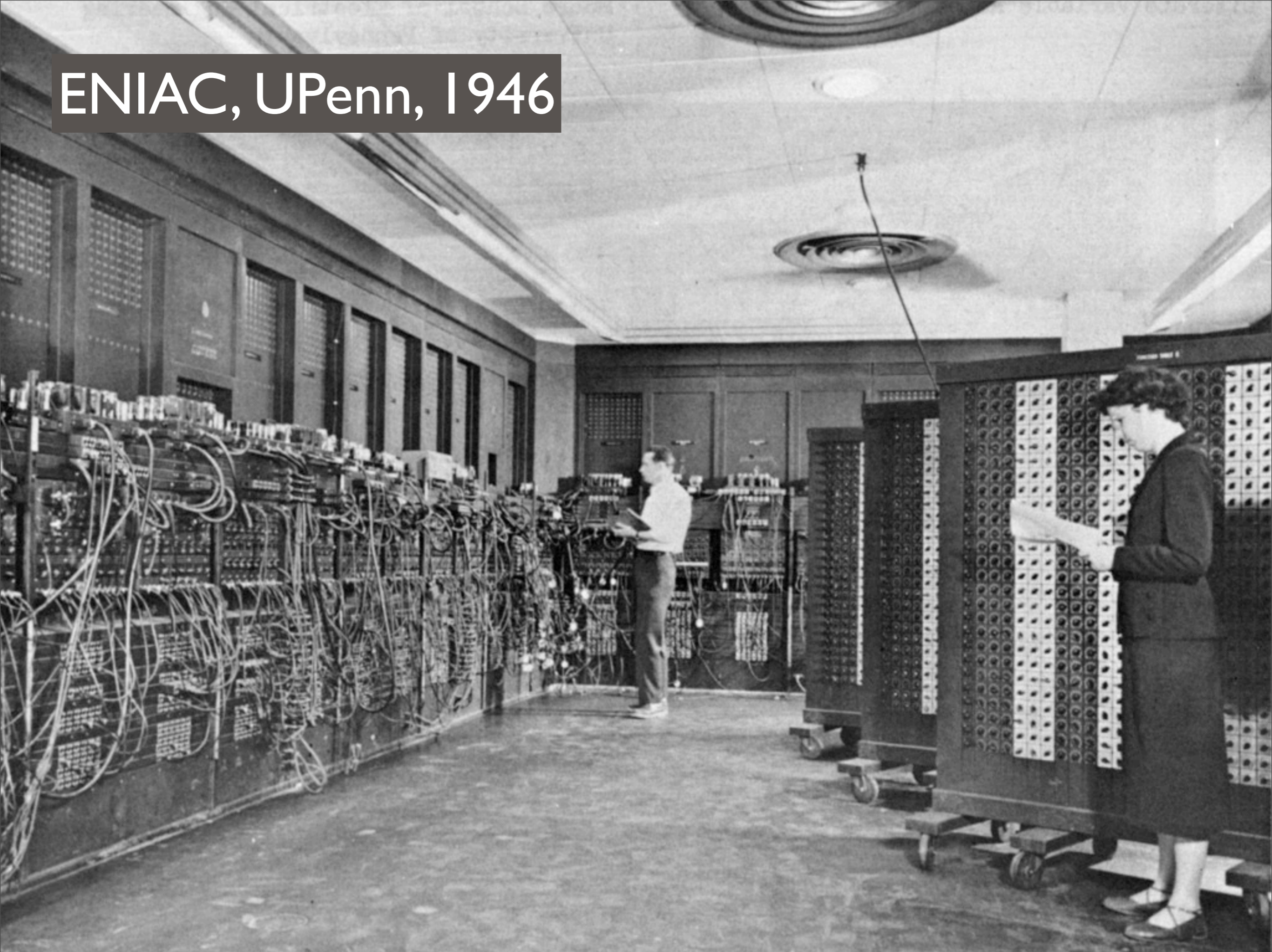
The average time spent on the user interface portion is 45% during the design phase, 50% during the implementation phase, and 37% during the maintenance phase.”

– Myers & Rosson, CHI'92

| History

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ENIAC, UPenn, 1946



| When was the mouse invented?

- A. 1948
- B. 1963
- C. 1978
- D. 1984
- E. 1991





Doug Engelbart &
Bill English, SRI, 1963



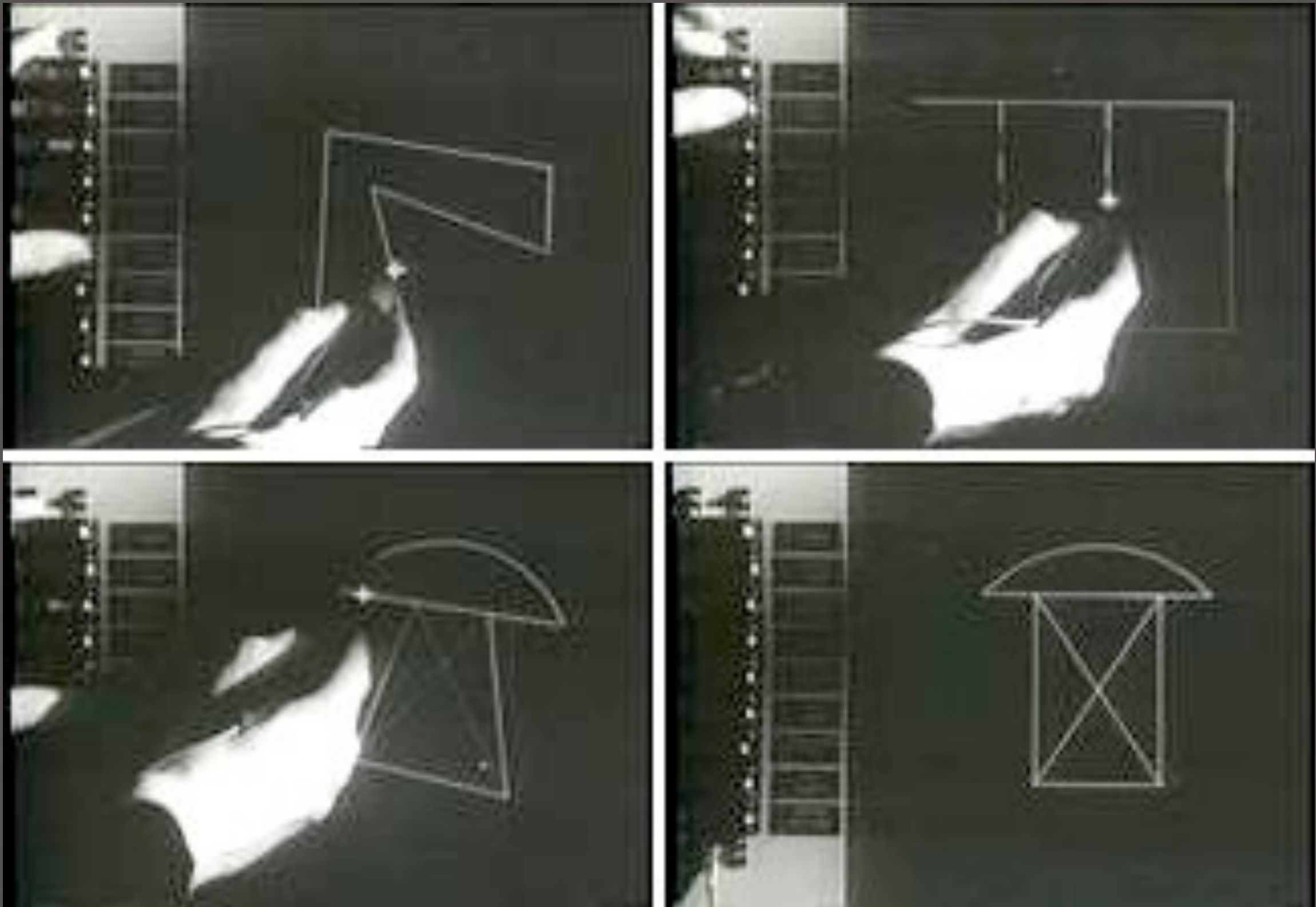
(cc) Flickr user John Chuang
<http://www.flickr.com/photos/13184584@N08/1362760884/>

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| When was pen input invented?

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





Ivan Sutherland, Sketchpad, MIT, 1963/64

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digibarn.com

CSI0-L

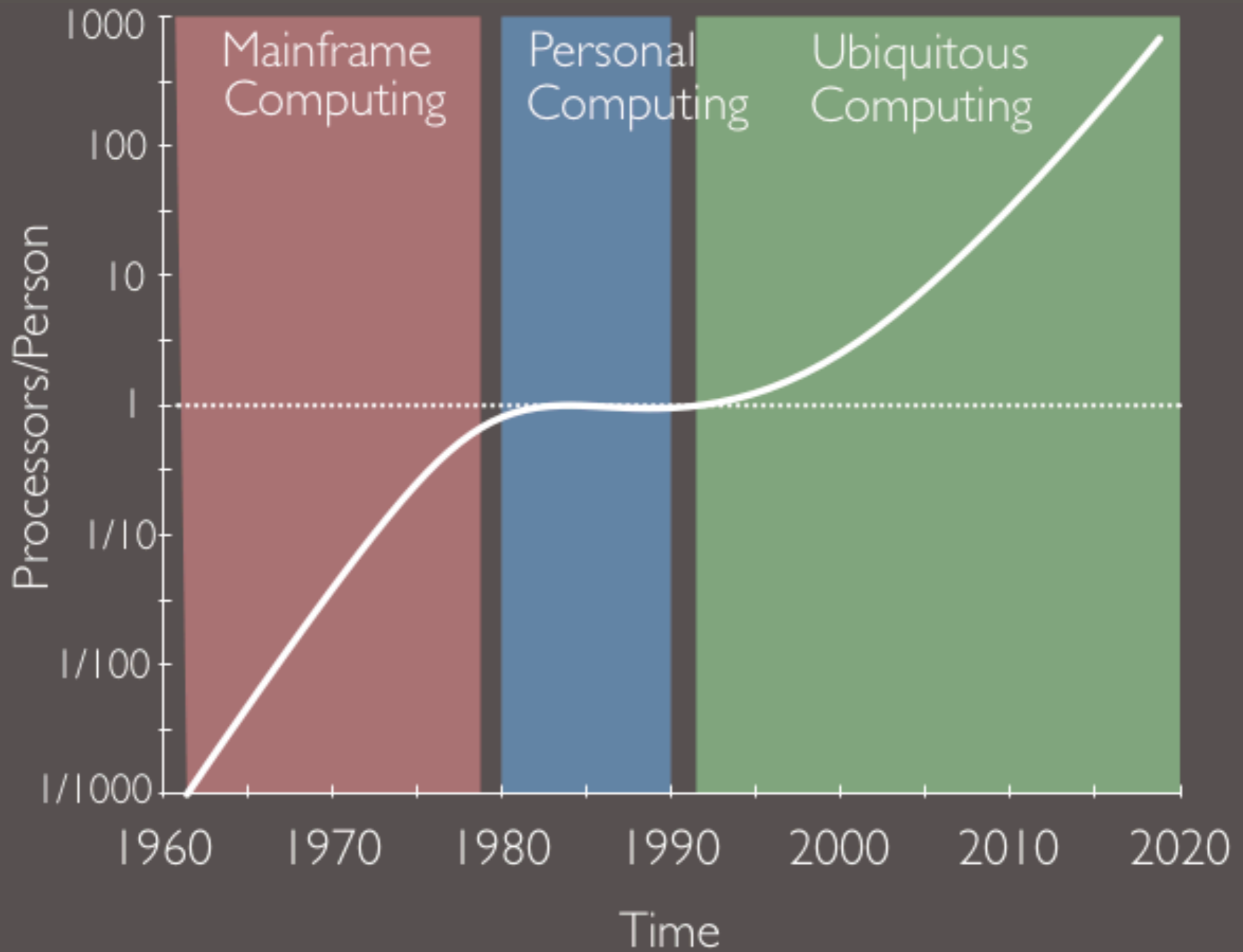
31

<http://www.dipity.com/bjoern/personal>

| What has changed?

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

- Gordon Moore, 2003



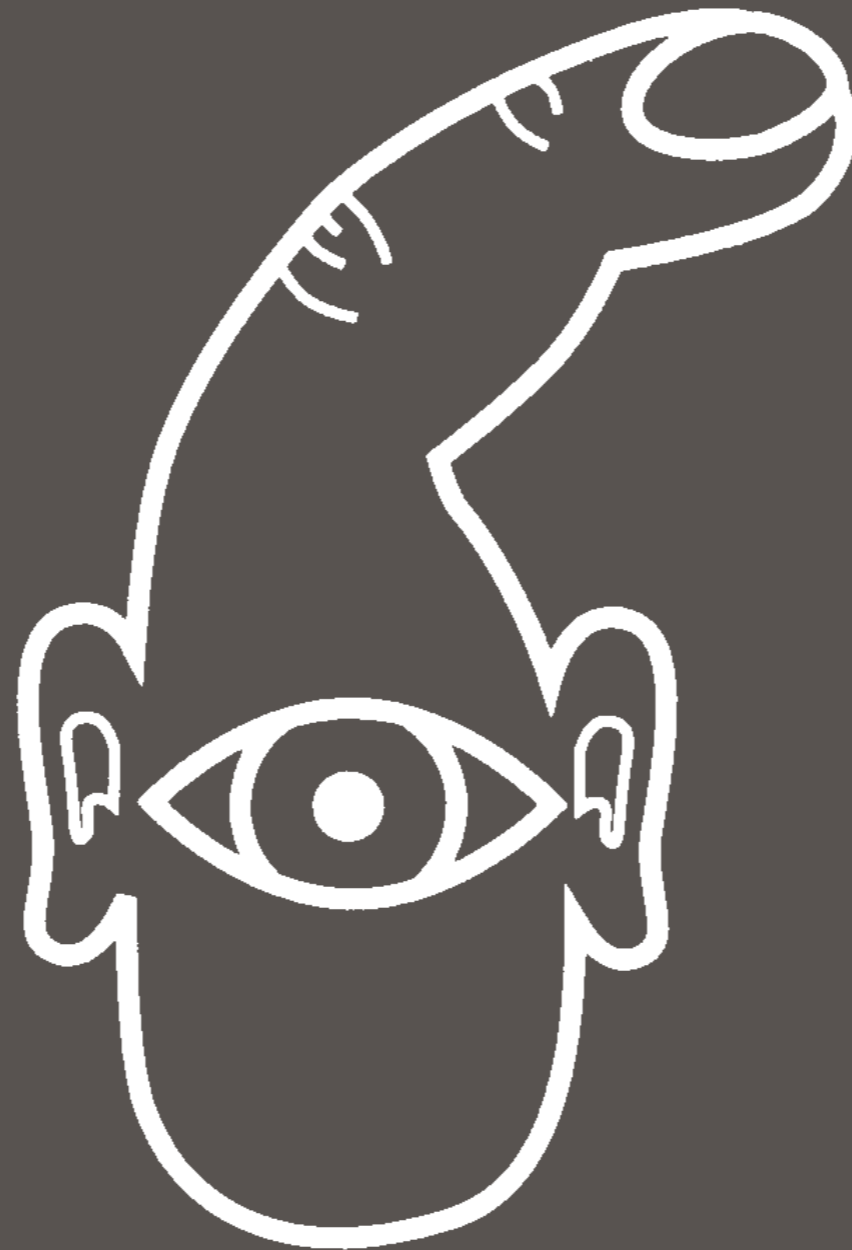
Era	Ratio Computers:People	HCI Focus
Mainframe Computing	1:many	Human Factors
Personal Computing	1:1	Psychology, Cog. Science
Ubiquitous Computing	many:1	Collaboration, Rich Interaction

| Research Directions



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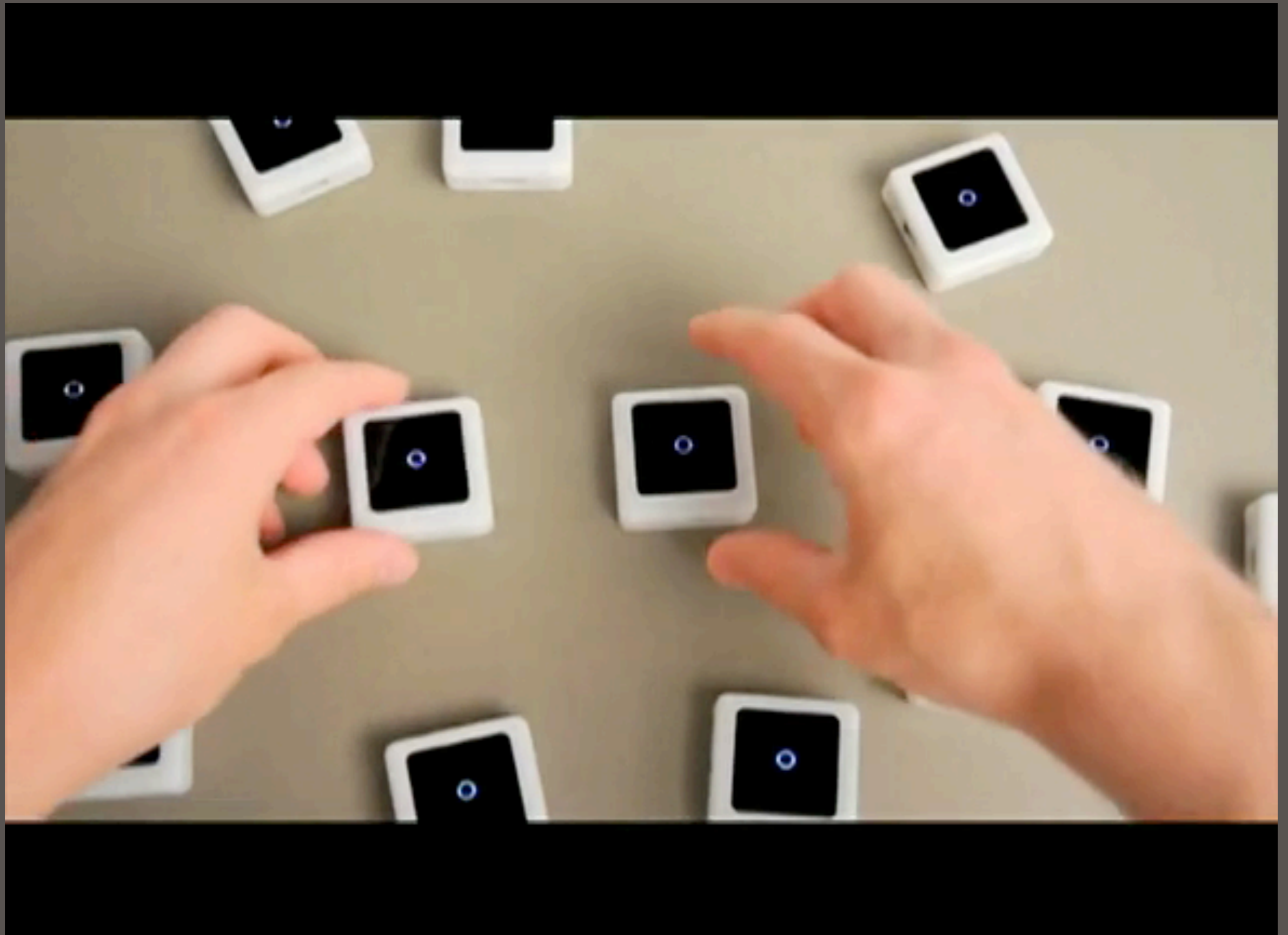
CSI0-L



Air Guitar Hero



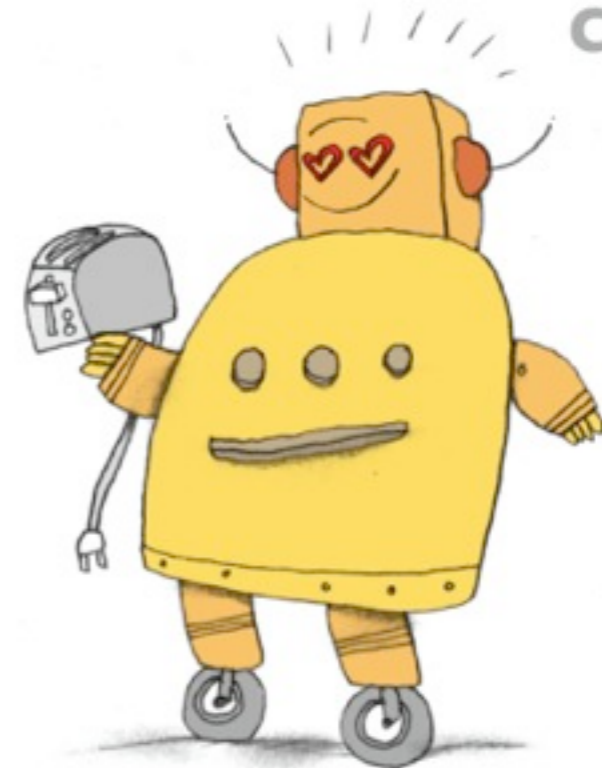
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Maker Faire®



MASH-UP contest



instructables + ReadyMade

instructables + ReadyMade

- Motion
- Looks
- Sound
- Pen
- Control
- Sensing
- Numbers
- Variables

Chica
 x: -148 y: -41 direction: 90
 Scripts Costumes Sounds

Navigation icons: mouse, pin, scissors, arrows, zoom in, zoom out

Green flag icon and red stop icon

- move 10 steps
- turn 15 degrees
- turn 15 degrees
- point in direction 90
- point towards
- go to x: -148 y: -41
- go to
- glide 1 secs to x: -148 y: -41
- change x by 10
- set x to 0
- change y by 10
- set y to 0
- if on edge, bounce
- x position
- y position
- direction

```

when green flag clicked
say Knock knock... for 2 secs
wait 2 secs
say Banana for 2 secs
wait 2 secs
say Knock Knock... for 2 secs
wait 2 secs
say Bananaaaaaaaa for 2 secs
wait 2 secs
say Knock! Knock! for 2 secs
wait 2 secs
say Orange for 2 secs
wait 2 secs
say Orange you glad I didn't say banana!!!! for 5 secs
play drum 49 for 0.25 beats
  
```



Icons for help, save, and trash

mouse x: 24
 mouse y: 289

Asset library showing 'Instruction...', 'Ella', 'Chica', and 'Stage'.



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the free encyclopedia that anyone can edit.

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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

navigation

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Find: Match case

Reached end of page, continued from top

1. El Farolito

Category: Mexican
Neighborhood: Mission
Meals Served: Dinner
Price: \$

★★★★★ 1173 reviews
2779 Mission St
San Francisco, CA 94110
(415) 824-7877

Their claim to fame is the "super burrito" (and especially the chile relleno super burrito) which is huge, moist, and flavorful. A **cheap** and filling **dinner** in the Mission district, and a **cheap**

2. La Oaxaqueña Bakery and Restaurant

Categories: Mexican, Bakeries
Neighborhood: Mission
Meals Served: Dinner
Price: \$

★★★★★ 158 reviews
2128 Mission St
San Francisco, CA 94110
(415) 621-5446

Jeff had another work assignment at 16th and Mission and texted me to see if I was free to meet him during his lunch break, which is **dinner** for most folks. I don't see my guy as much as I'd like, so

3. Valencia Pizza & Pasta

Categories: Pizza, Italian, Breakfast & Brunch
Neighborhood: Mission
Meals Served: Dinner
Price: \$

★★★★★ 202 reviews
801 Valencia St
San Francisco, CA 94110
(415) 642-1882

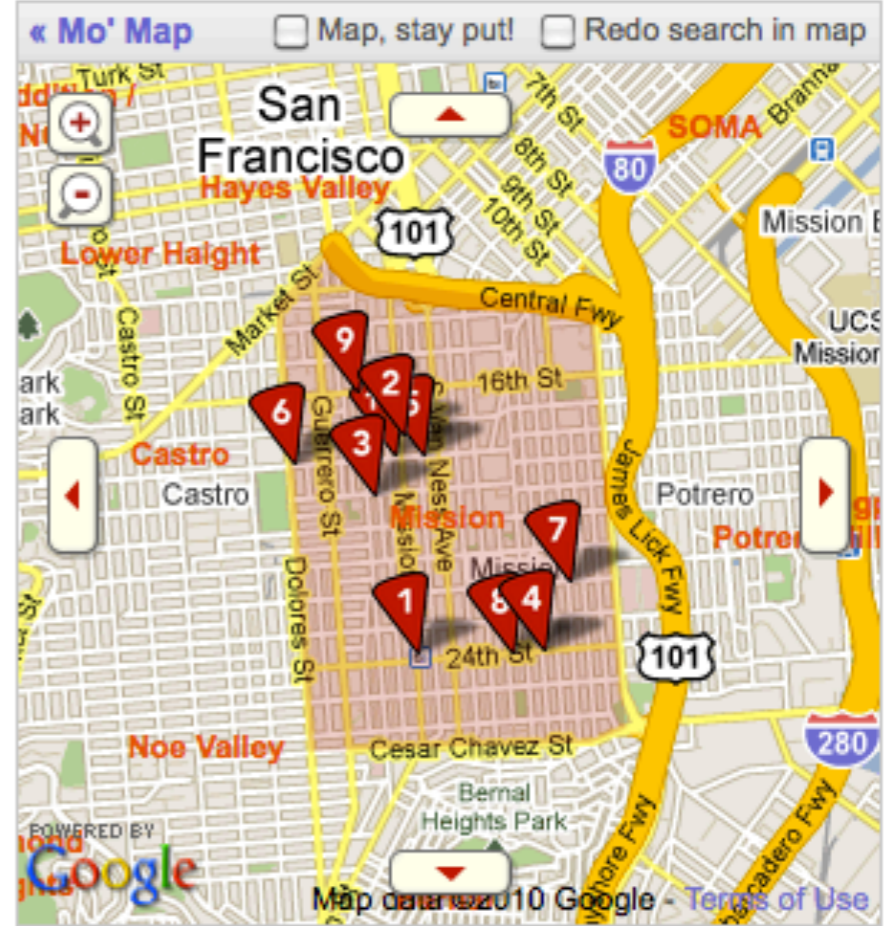
A redeeming feature was the wine that we could pick by the bottle and it was about \$15 per bottle. Sure it was a **cheap dinner**, my boyfriend and I walked away paying about \$45 but I'd rather pay a bit more

4. El Farolito

Category: Mexican
Neighborhood: Mission
Meals Served: Dinner
Price: \$

★★★★★ 350 reviews
2950 24th St
San Francisco, CA 94110
(415) 641-0758

I was craving some good ol' **cheap** Mexican food, and I stumbled upon this gem on Yelp. Thanks to Yelp again! If you are looking for a **cheap** hearty FREAKIN DELICIOUS Mexican food, then El Farolito's



| How does social participation work in practice?
| Are there patterns/laws?

Zipf / Power Law Distributions

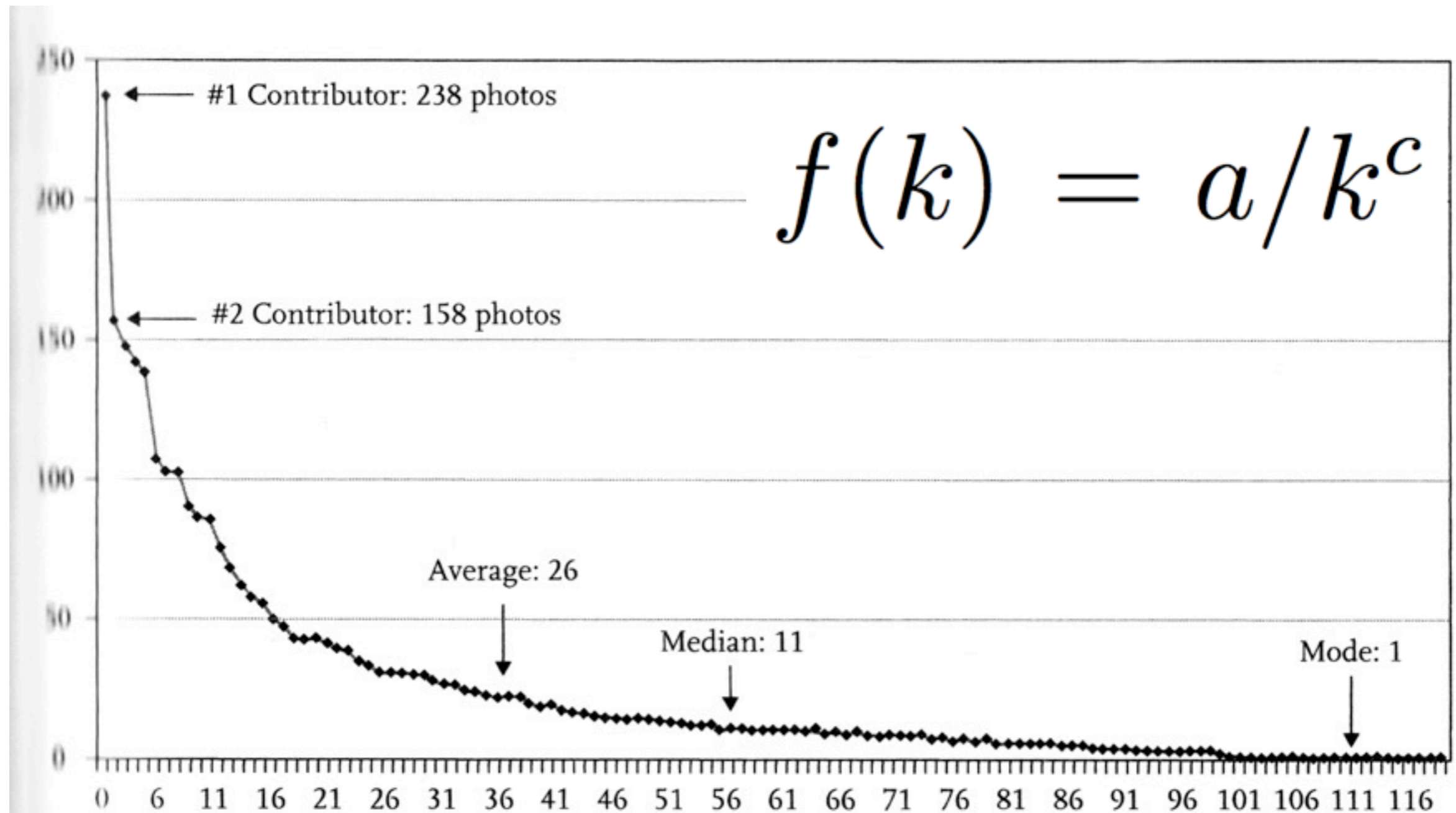
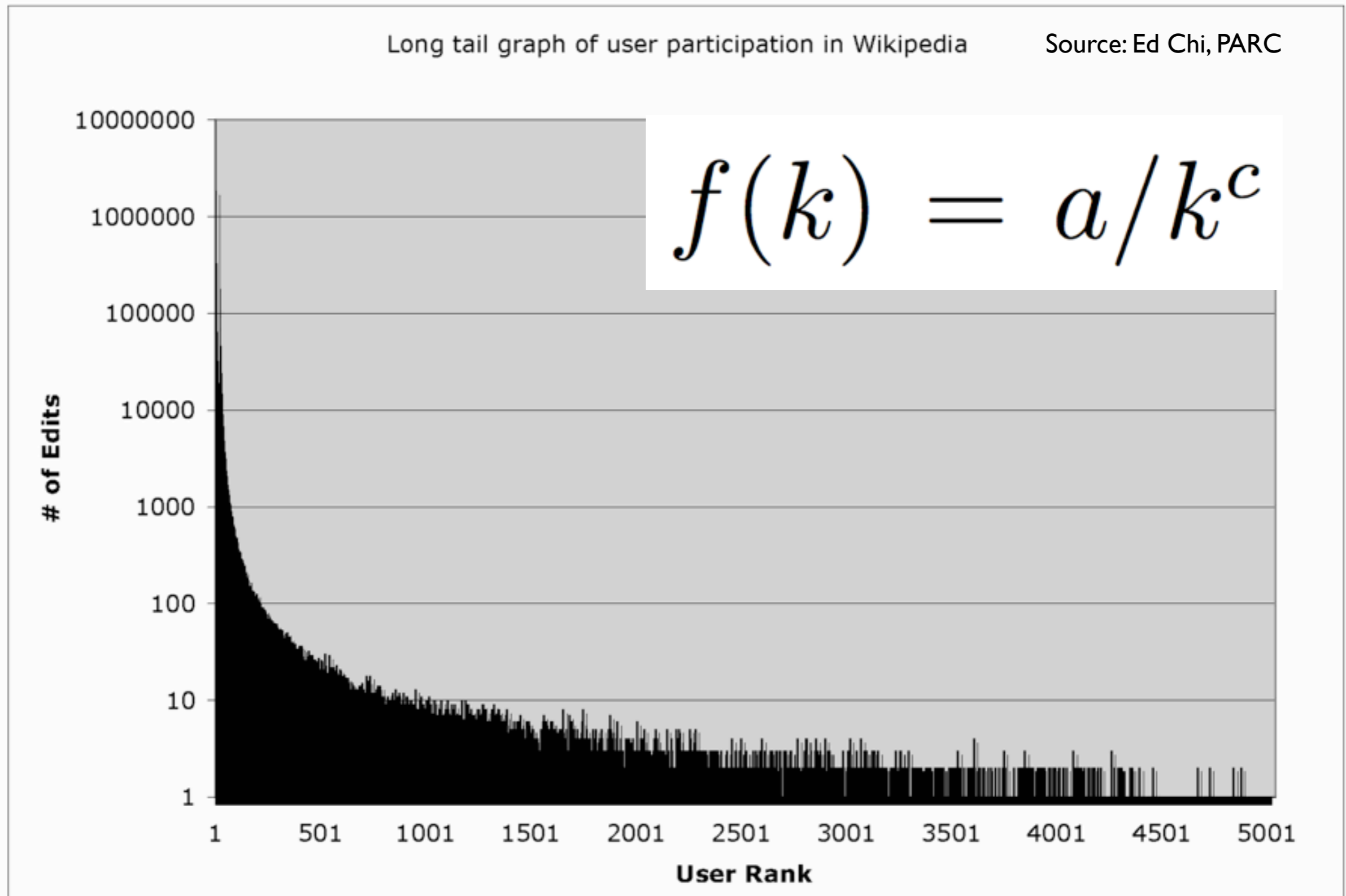


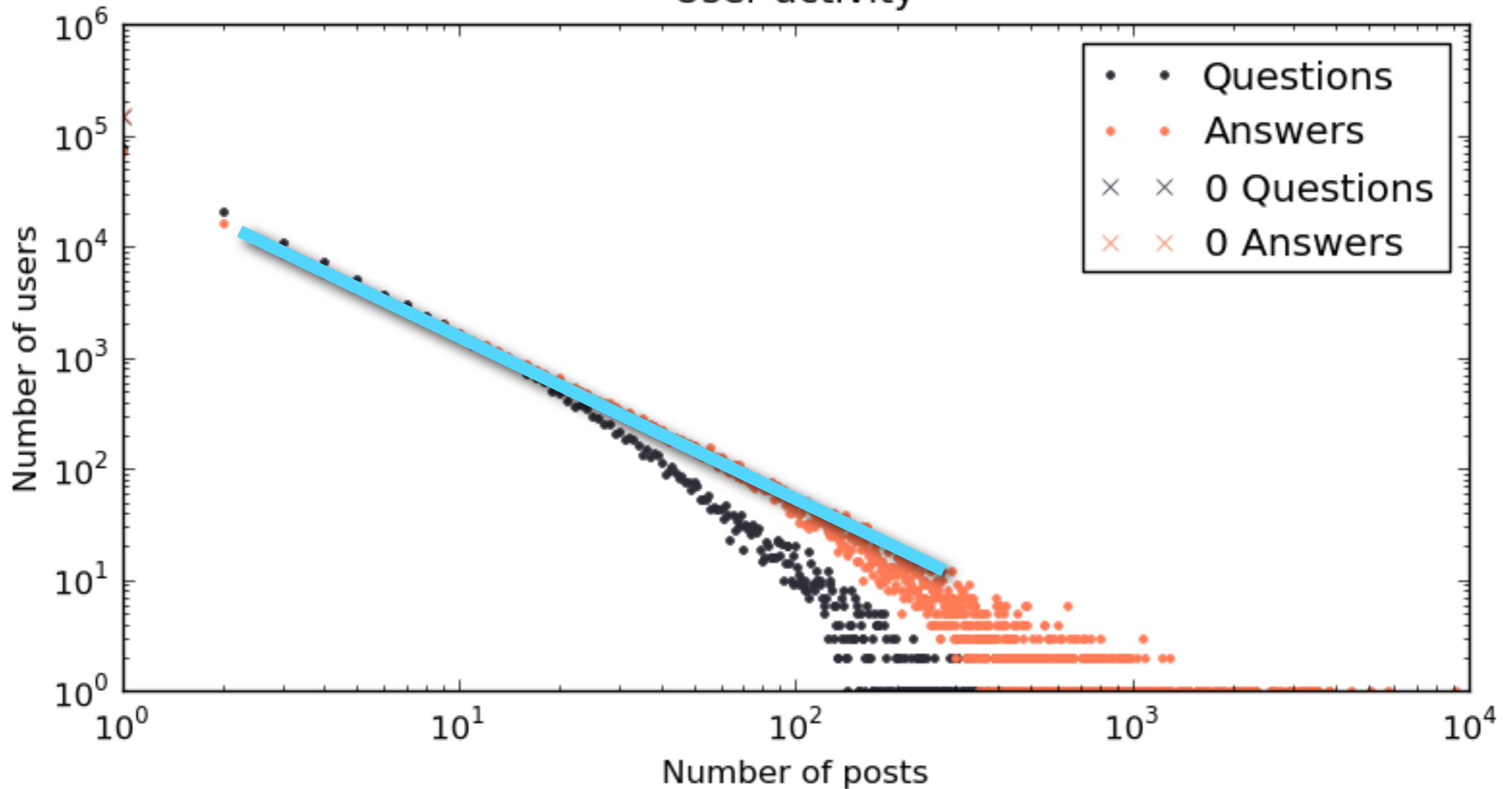
Figure 5-1: The distribution of photographers contributing photos of the 2005 Coney Island Mermaid Parade.

From C. Shirky, Here Comes Everybody

Zipf / Power Law Distribution



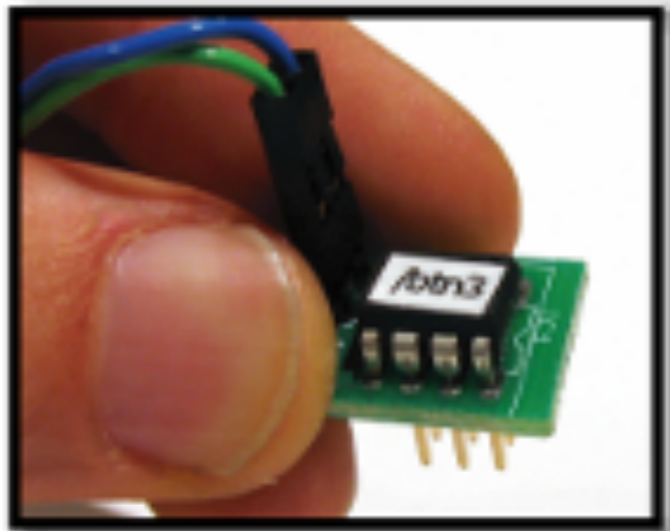
User activity



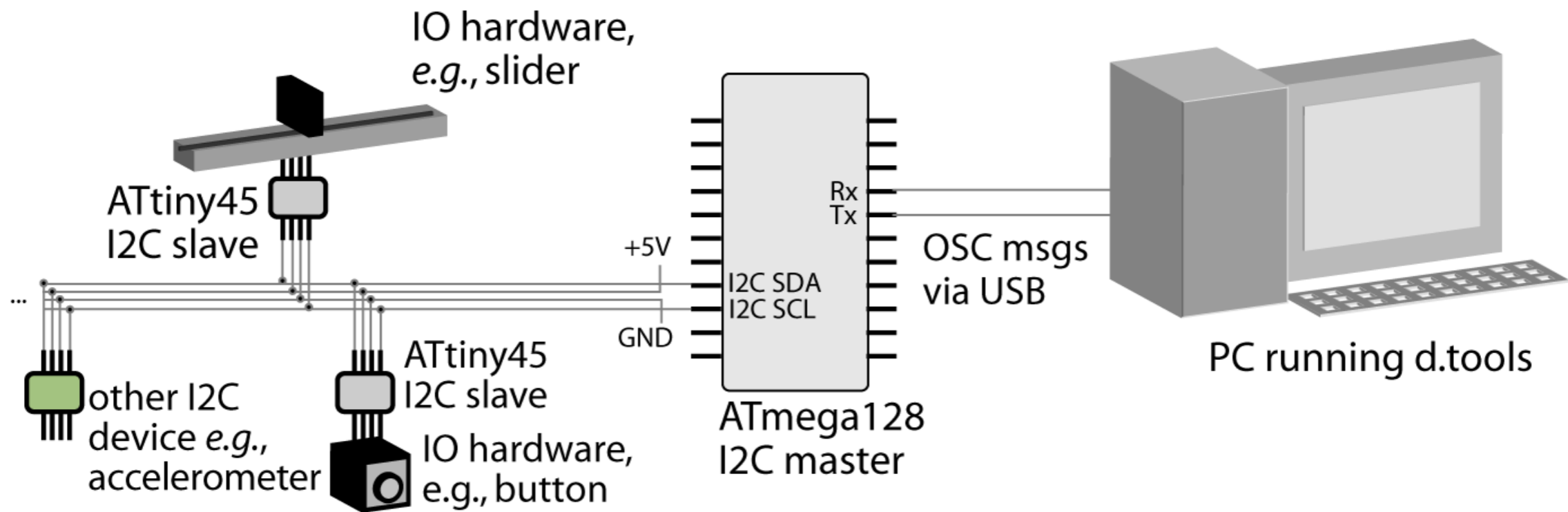
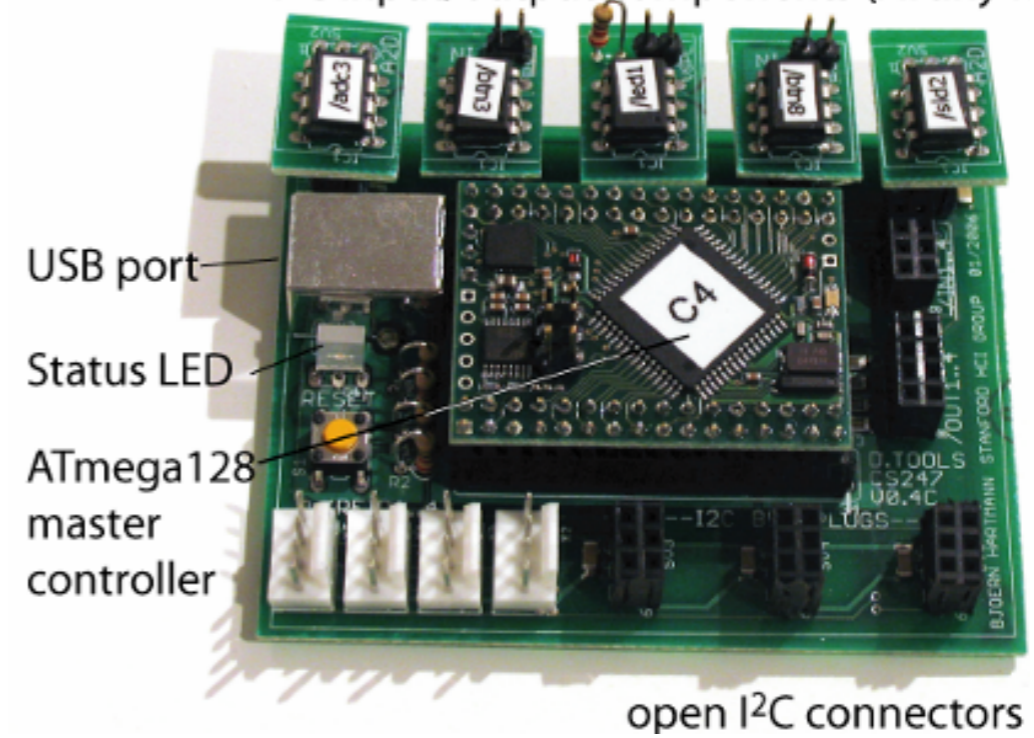
$$f(k) = a/k^c \longrightarrow \log f(k) = \log a - c \log k.$$

| HCI Research at Berkeley

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I²C input/output components (ATtiny45)



camera.dvc

camera.gui

Palette

- Select
- Simulate
- Inputs
- Pen
- Button
- Switch
- Slider
- Knob
- Outputs
- Display Screen
- LED
- PWM
- Speaker

Global Script

Property	Value
Hardware Address	/lcd15
Image	edu.stanford.hci.dtools.utility.Path@398258
Name for Script	lcd15

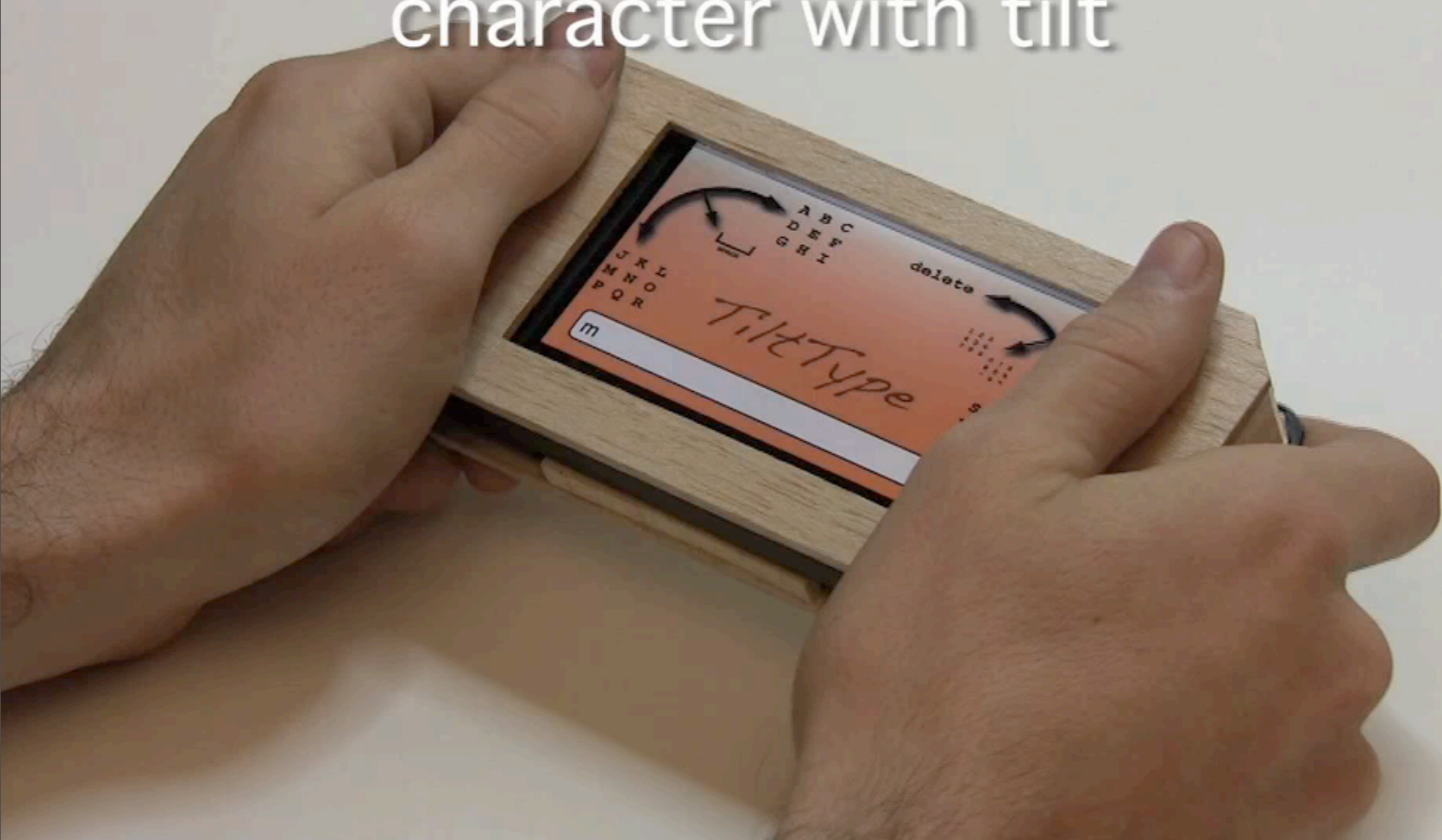
State Script

```

loop() {
  if(btnDown.getValue()) {
    cliplmg.setScale(cliplmg.getScale()+5); //scale up
  }
  if(btnUp.getValue()) {
    cliplmg.setScale(cliplmg.getScale()-5); //scale down
  }
  //center image on stage
  cliplmg.setXY(stage.getWidth()/2-cliplmg.getWidth()/2,
    stage.getHeight()/2-cliplmg.getHeight()/2);
}

```

Option 1:
Select set with buttons,
character with tilt





Wednesday, October 27, 2010







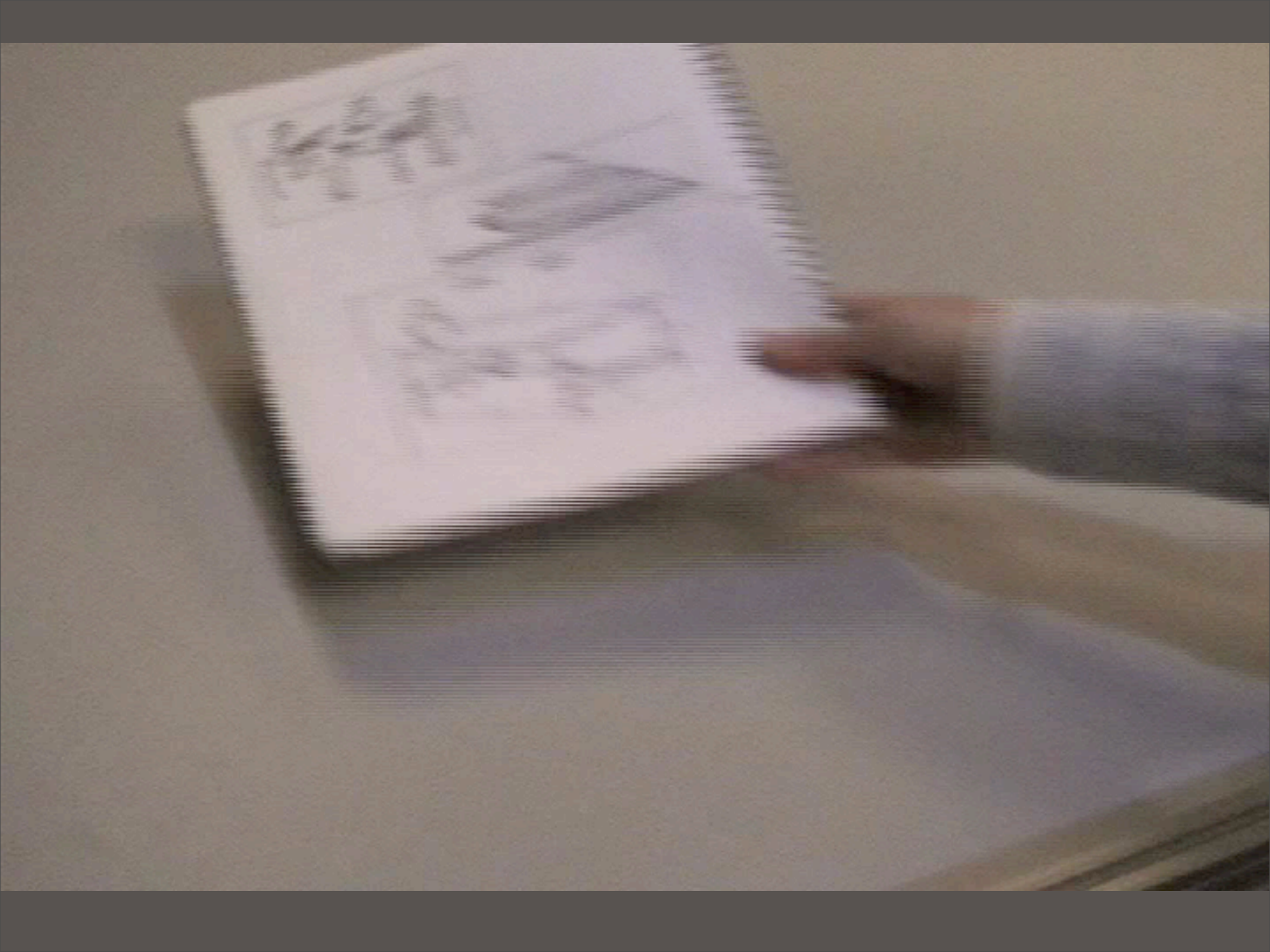
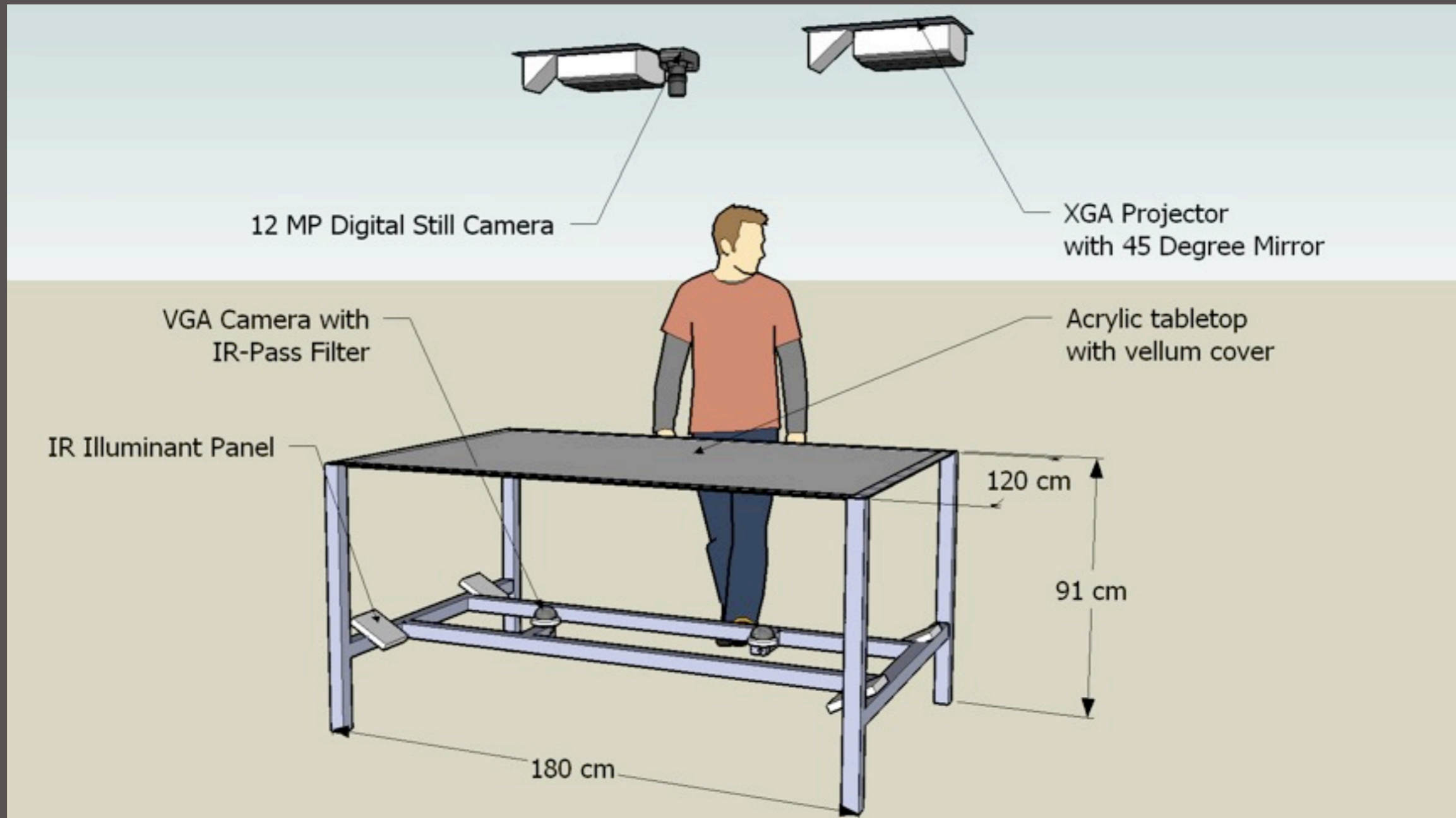


Table Infrastructure



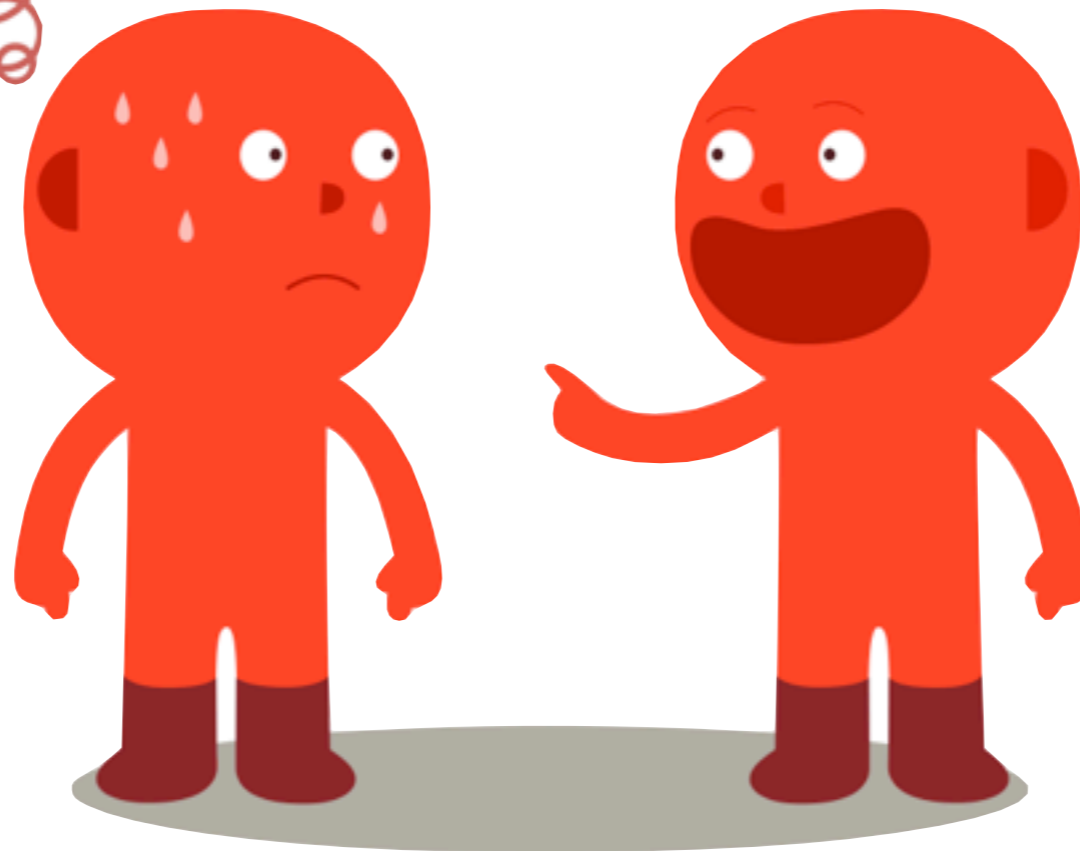
The FourBySix Table



```
ArrayIndexOutOfBoundsException:  
at Array2D.setup(Array2D.java:41)  
at processing.core.PApplet.handleDraw  
at processing.core.PApplet.run  
at java.lang.Thread.run ...
```

???

I've had that problem before!
Here's what I did...



Follow1 | Processing 0167

File Edit Sketch Tools Help

Follow1 §

```
/**
 * Follow 1.
 * Based on code
 *
 * A line segment
 */



float x = 100;
float y = 100;
float arr[] = new
float angle1 = 0.
float segLength =

void setup() {
  size(200, 200);
  smooth();
  strokeWeight(20);
  stroke(0, 100);
}

void draw() {
  background(226);

  float dx = mouseX - x;
  float dy = mouseY - y;
  angle1 = atan2(dy, dx);
```

HelpMeOut

Error Message:
Variable must provide either dimension expressions or an array initializer

Suggestion 1

Before (Broken)	After (Fixed)
<code>2int y[] = new int[];</code>	<code>2int y[] = new int[width];</code>

[more info](#) | [vote up](#) | [vote down](#) | [find line](#) | [copy fix](#)

Suggestion 2

Before (Broken)	After (Fixed)
<code>2float arr[] = new float[];</code>	<code>2float arr[] = {0.0, 0.33, 0.66, 1.0};</code>

[more info](#) | [vote up](#) | [vote down](#) | [find line](#) | [copy fix](#)

Variable must provide either dimension expressions or an array initializer

| 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 - Spring'11

Course Thread in Human-Centered Design
<http://coursethreads.berkeley.edu>



bjoern@eecs.berkeley.edu |
bjoern.org