

Design Tools

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CS 376

Design tools should...

[Hartmann, PhD thesis '09]

- Decrease UI construction time
- Isolate designers from implementation details
- Enable designers to explore an interface technology previously reserved to engineers or other technology experts

Goal: facilitate rapid iteration

[Hartmann, PhD thesis '09]

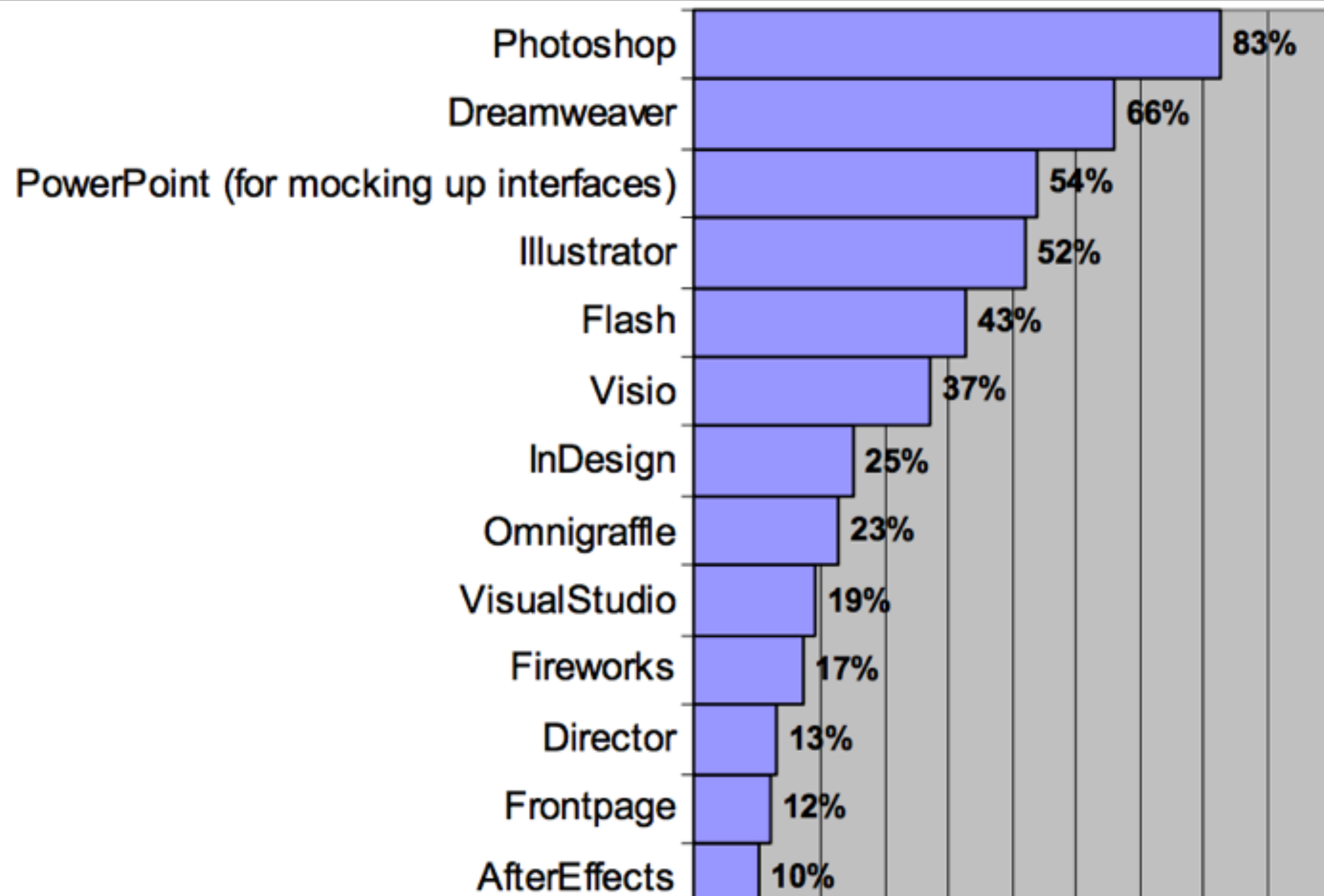
- Prototypes enable exploration and iteration around concrete artifacts
- The more fluid the prototyping process is, the more you can learn before you sink time into engineering

Early stage design

What tools do designers use?

[Myers et al., VLHCC '08]

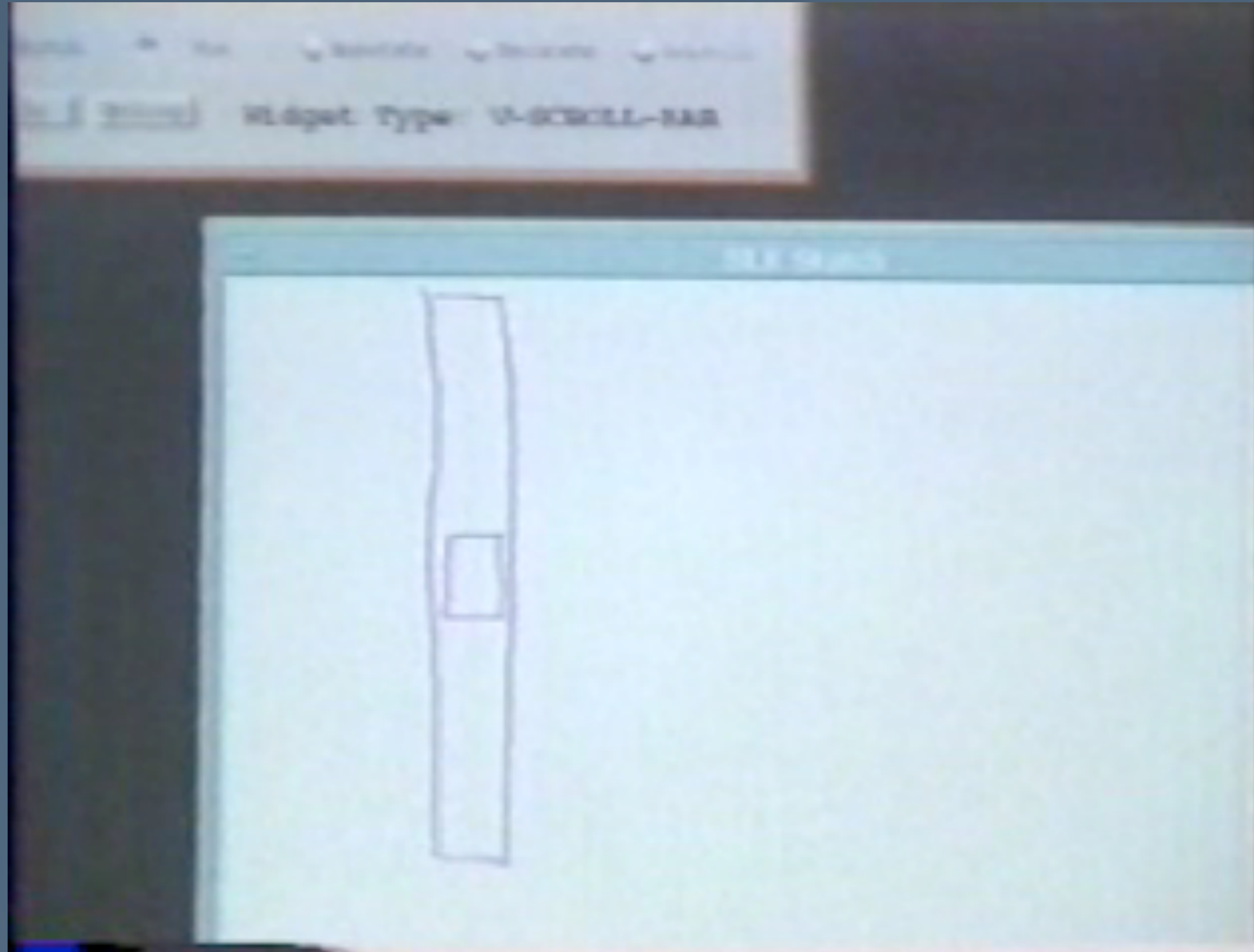
- Survey of 259 interaction designers



SILK: Sketching Interfaces Like Crazy

[Landay, CHI '96]

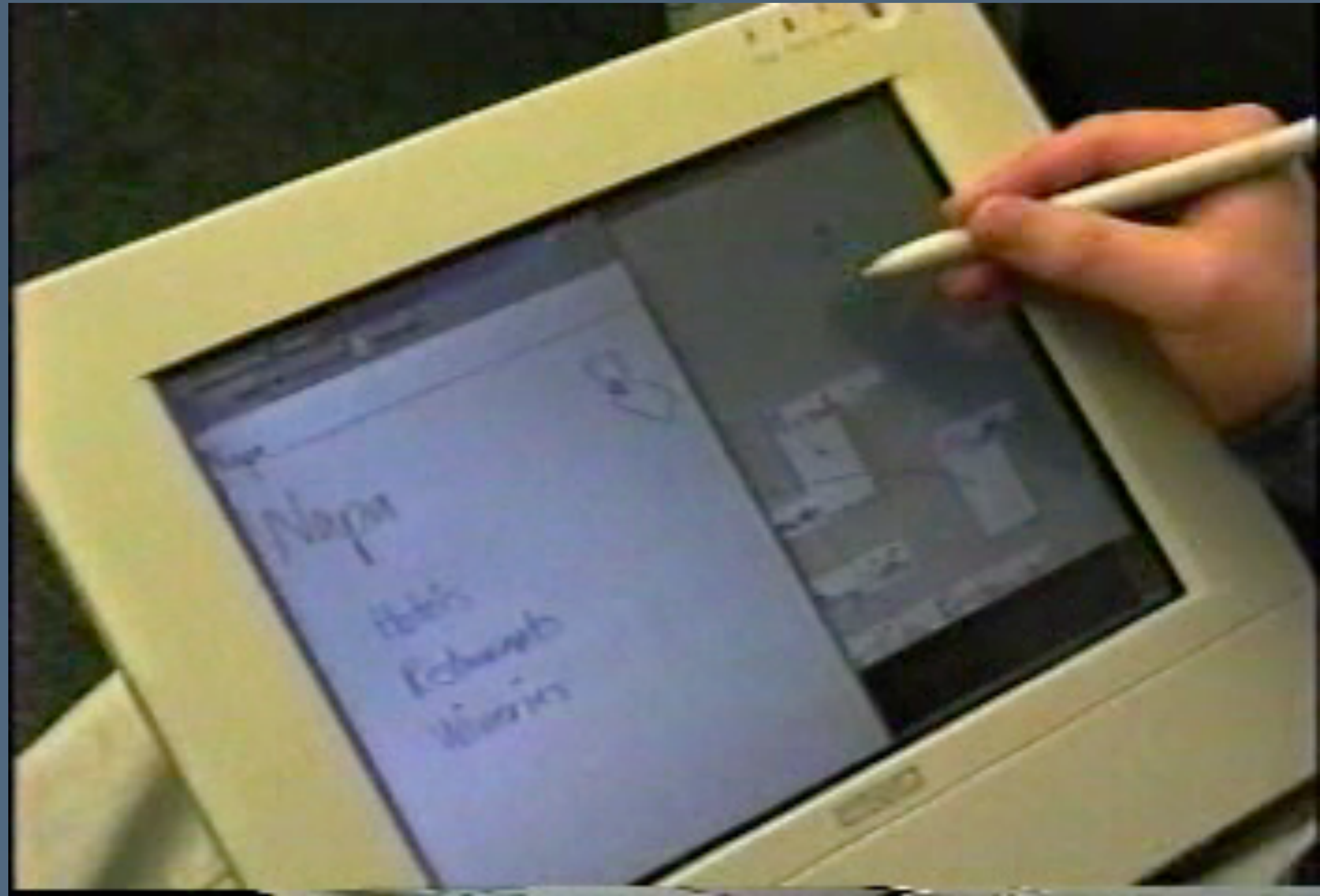
- Combine the fluidity of paper-based sketching with the interactivity of tools
- Technique: sketch recognition of basic UI components



DENIM: web site storyboarding

[Lin et al., CHI '00]

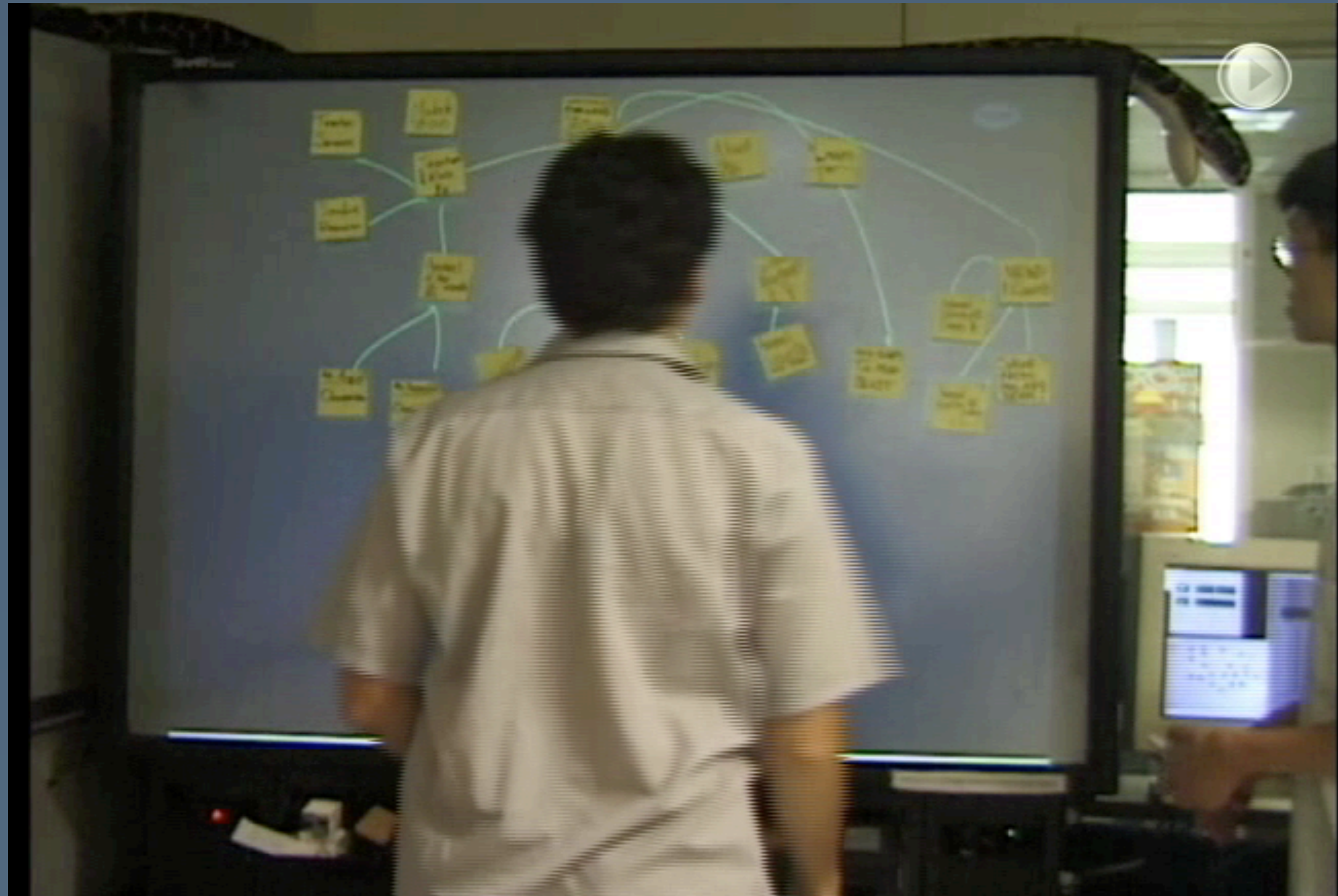
- Enable fluid, informal interactions for web site design
- Work at a higher level of abstraction than HTML



Designer's Outpost

[Klemmer et al., UIST '01]

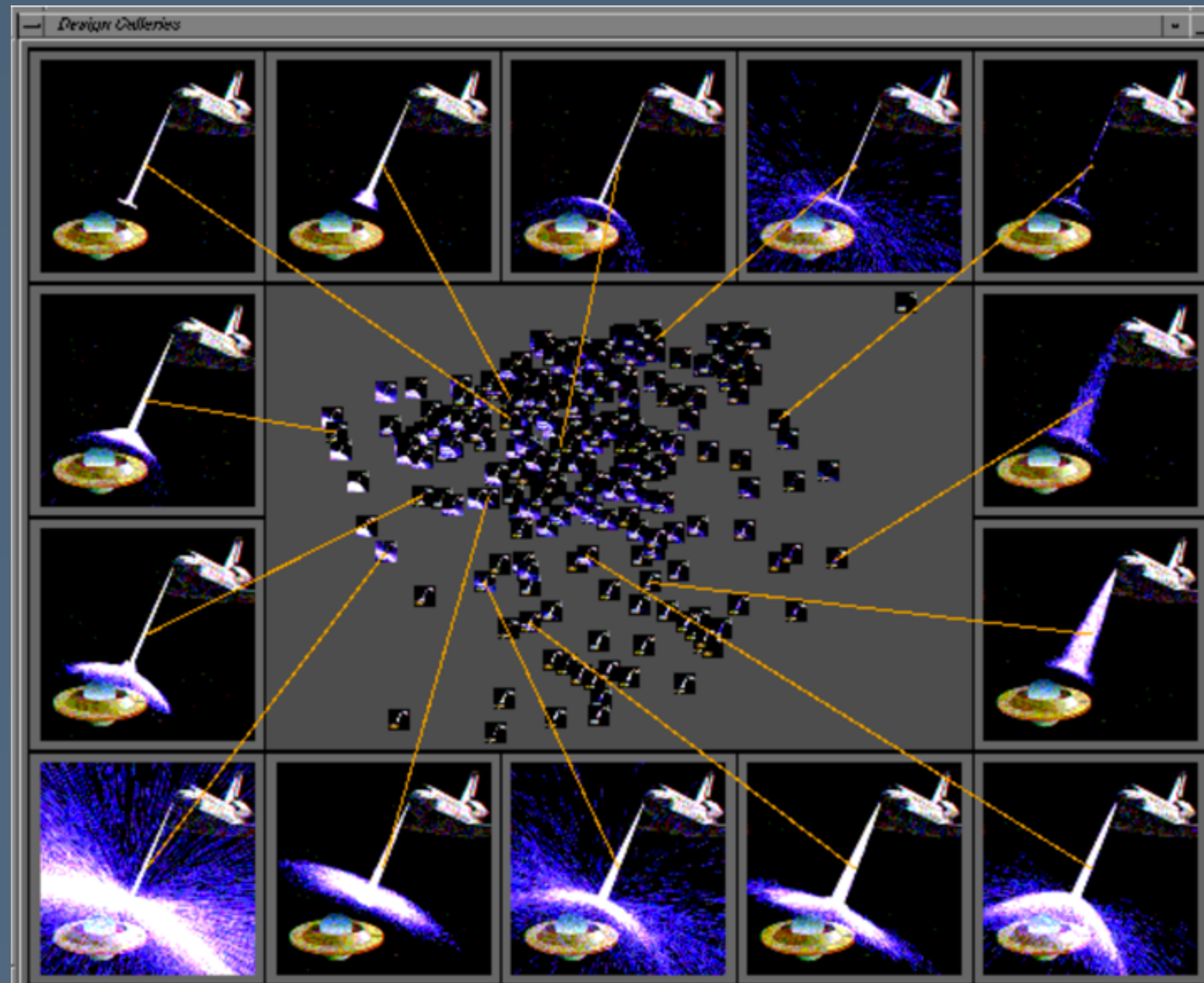
- Fluid interactive brainstorming that bridges physical and digital artifacts

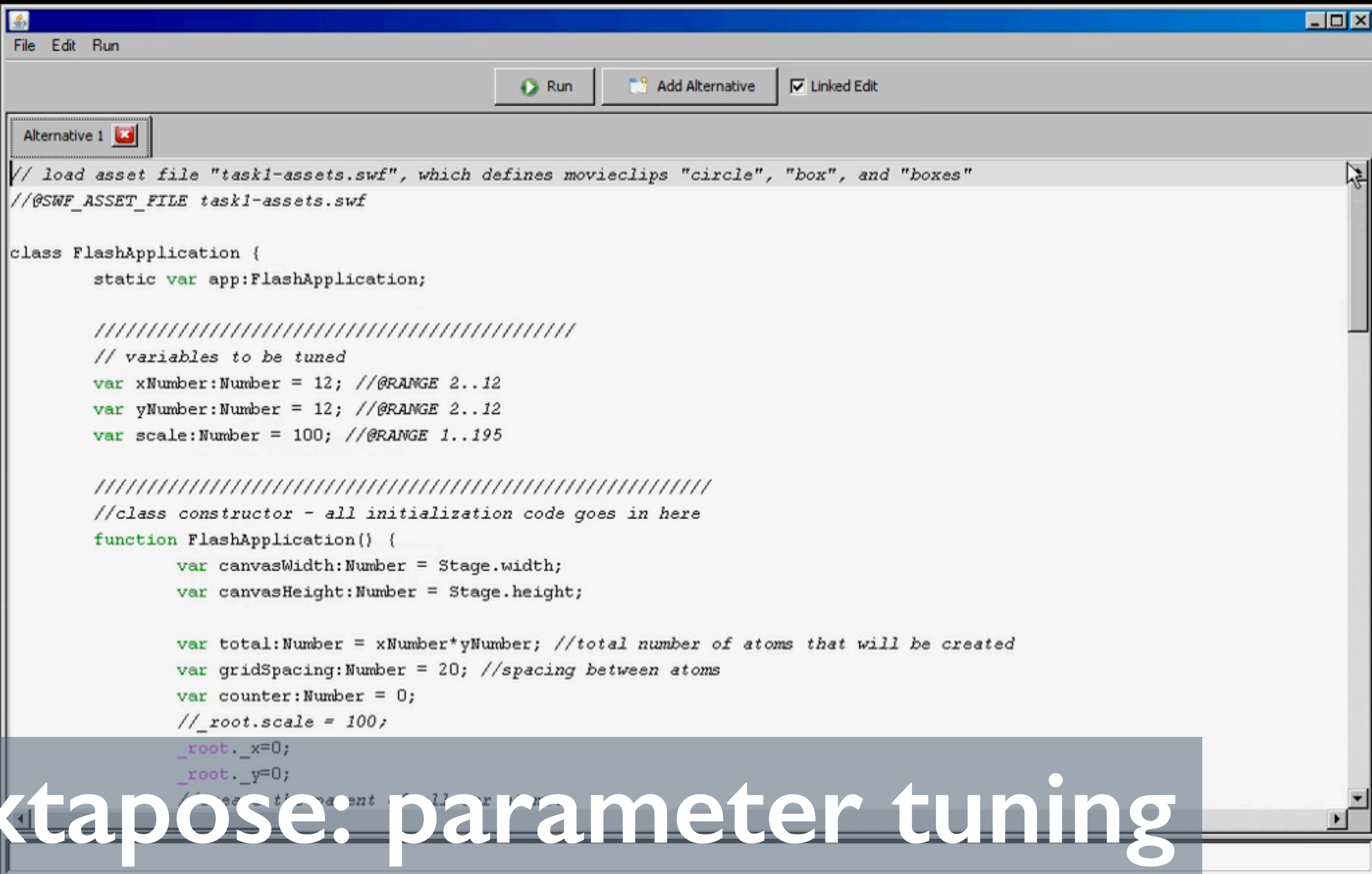


Design galleries

[Marks et al., SIGGRAPH '97]

- Automatically generate perceptually-varying alternatives within a design space





The image shows a screenshot of an IDE window titled "Alternative 1". The window contains the following code:

```
File Edit Run
Run Add Alternative Linked Edit

Alternative 1
// load asset file "task1-assets.swf", which defines movieclips "circle", "box", and "boxes"
//@SWF_ASSET_FILE task1-assets.swf

class FlashApplication {
    static var app:FlashApplication;

    //////////////////////////////////////
    // variables to be tuned
    var xNumber:Number = 12; //@RANGE 2..12
    var yNumber:Number = 12; //@RANGE 2..12
    var scale:Number = 100; //@RANGE 1..195

    //////////////////////////////////////
    //class constructor - all initialization code goes in here
    function FlashApplication() {
        var canvasWidth:Number = Stage.width;
        var canvasHeight:Number = Stage.height;

        var total:Number = xNumber*yNumber; //total number of atoms that will be created
        var gridSpacing:Number = 20; //spacing between atoms
        var counter:Number = 0;
        //_root.scale = 100;
        _root._x=0;
        _root._y=0;
        //see the parent class for more
    }
}
```

Juxtapose: parameter tuning

[Hartmann et al., UIST '09]

Voyant: crowd feedback

[Xu, Huang, and Bailey CSCW '13]



The screenshot displays the Voyant web application interface. At the top, there is a navigation bar with the following items: **Voyant**, [My Designs](#), [Edit account](#), and [Logout](#). Below the navigation bar, the main content area is divided into several sections. On the left, there is a design preview titled "FRESH SMOOTHIE" featuring three colorful smoothie glasses (orange, pink, and green) with straws, set against a green background with a yellow sunburst. To the right of the design preview, there are four tabs: **Elements**, [First Notice](#), [Impressions](#), [Goals](#), and [Guidelines](#). The **Elements** tab is currently selected, showing a list of feedback categories and their associated terms. The categories and their terms are:

- object**: beverages, drink, glass, smoothie, straw, sun, words
- activity**: drinking a smoothie, fresh, sipping, sunbathing
- color**: blue, brown, green, orange, pink, red, white, yellow
- shape**: circle, cone, hourglass, rectangle

DesignScape: interactive layout

[O'Donovan, Agarwala, and Hertzmann CHI '15]

Tweak Your Design

File ▾ Add ▾ Undo Redo   ▾ 35.7 ▾ Randomize Save

Click To Accept

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Available after 6pm weekday evenings, 10am-5pm on weekends

Learn how to:

- identify types of chemical reactions
- balance chemical equations
- balance redox reactions
- convert grams to moles
- write in scientific notation

Brainstorm New Designs

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Physical prototyping

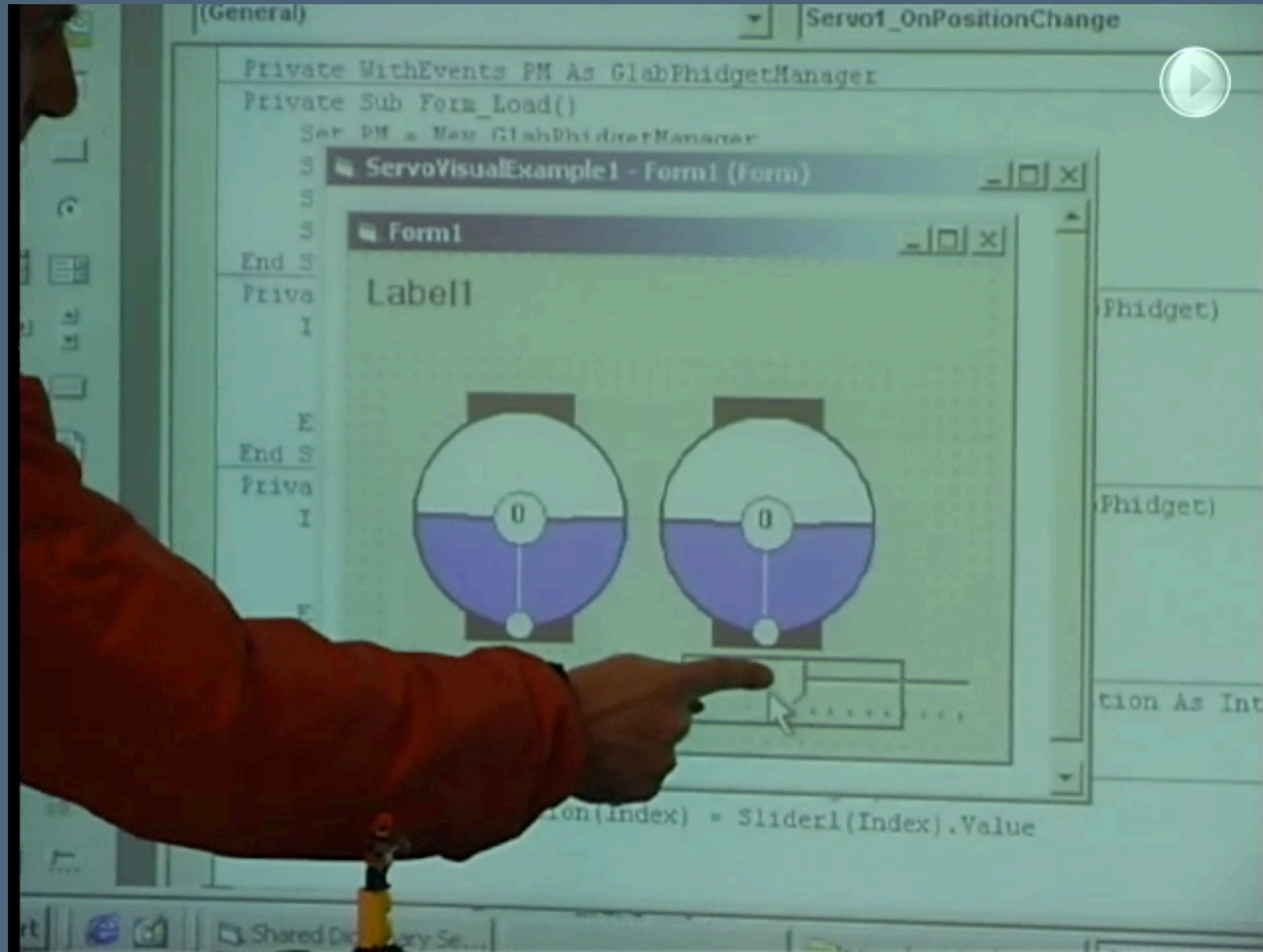
The challenge of physical prototyping

- Prototype the bits, or prototype the atoms?
- Goal: lower the threshold to prototype interactive systems that depend on electronics and physical materials

Phidgets

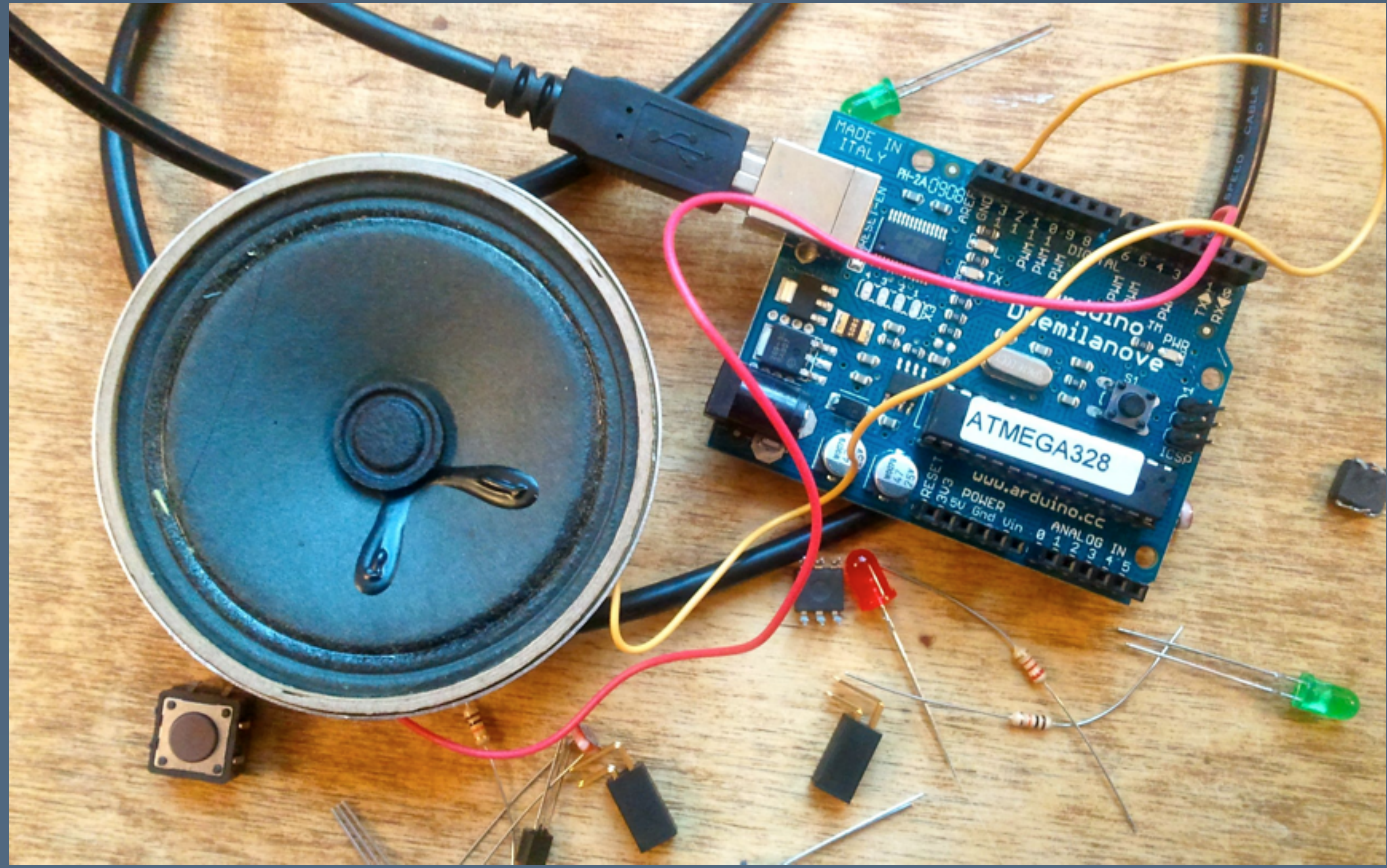
[Greenberg and Fitchett, UIST '01]

- USB plug-and-program I/O devices
 - servos
 - LEDs
 - buttons
 - sliders
- Goal: program physical devices like you would a GUI widget



Led to: Arduino

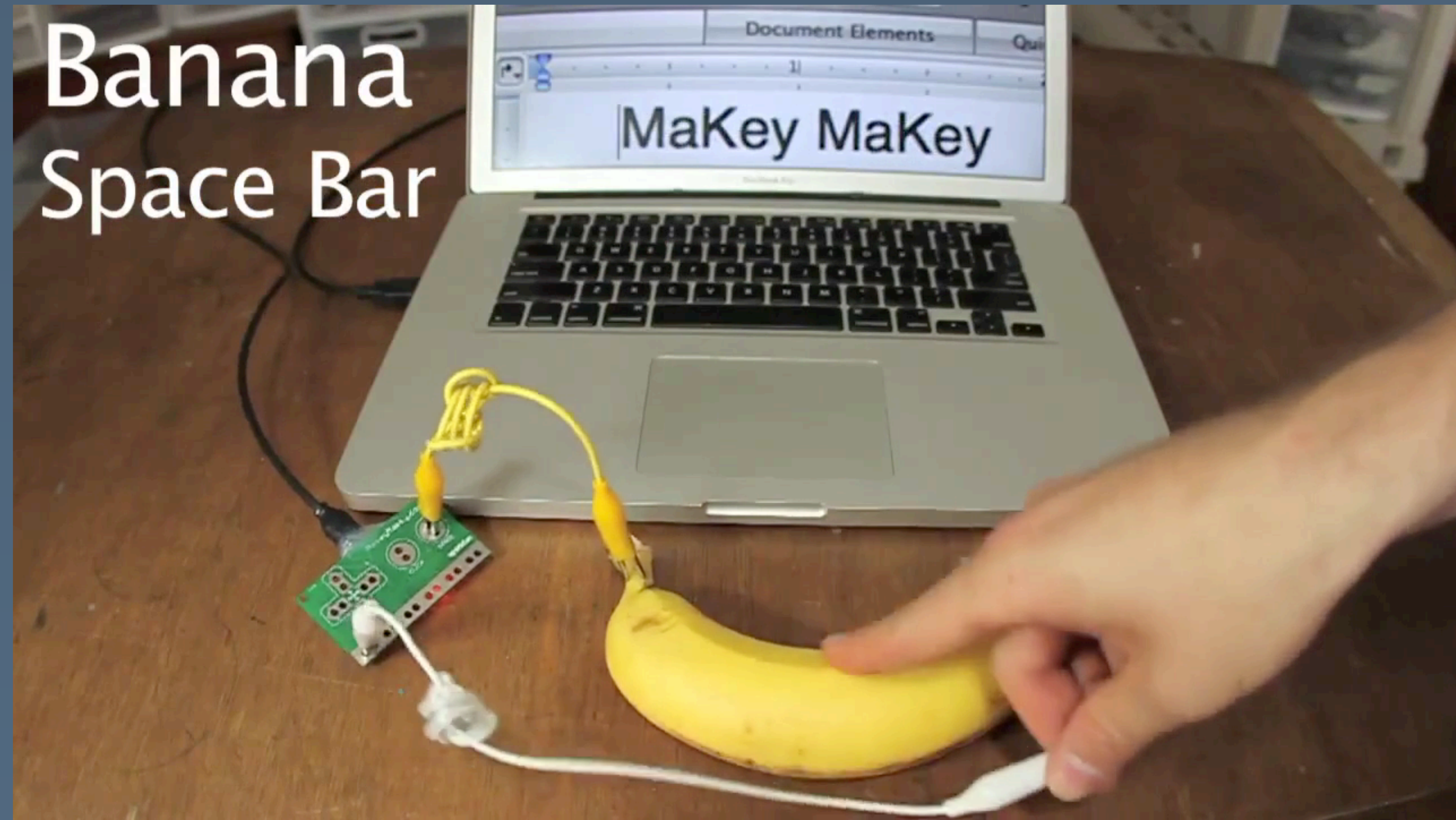
- Maker board for artists, programmers and hobbyists



Led to: Makey Makey

[Silver et al., TEI '12]

- Alligator clips map onto keystrokes



d.tools: prototyping behavior

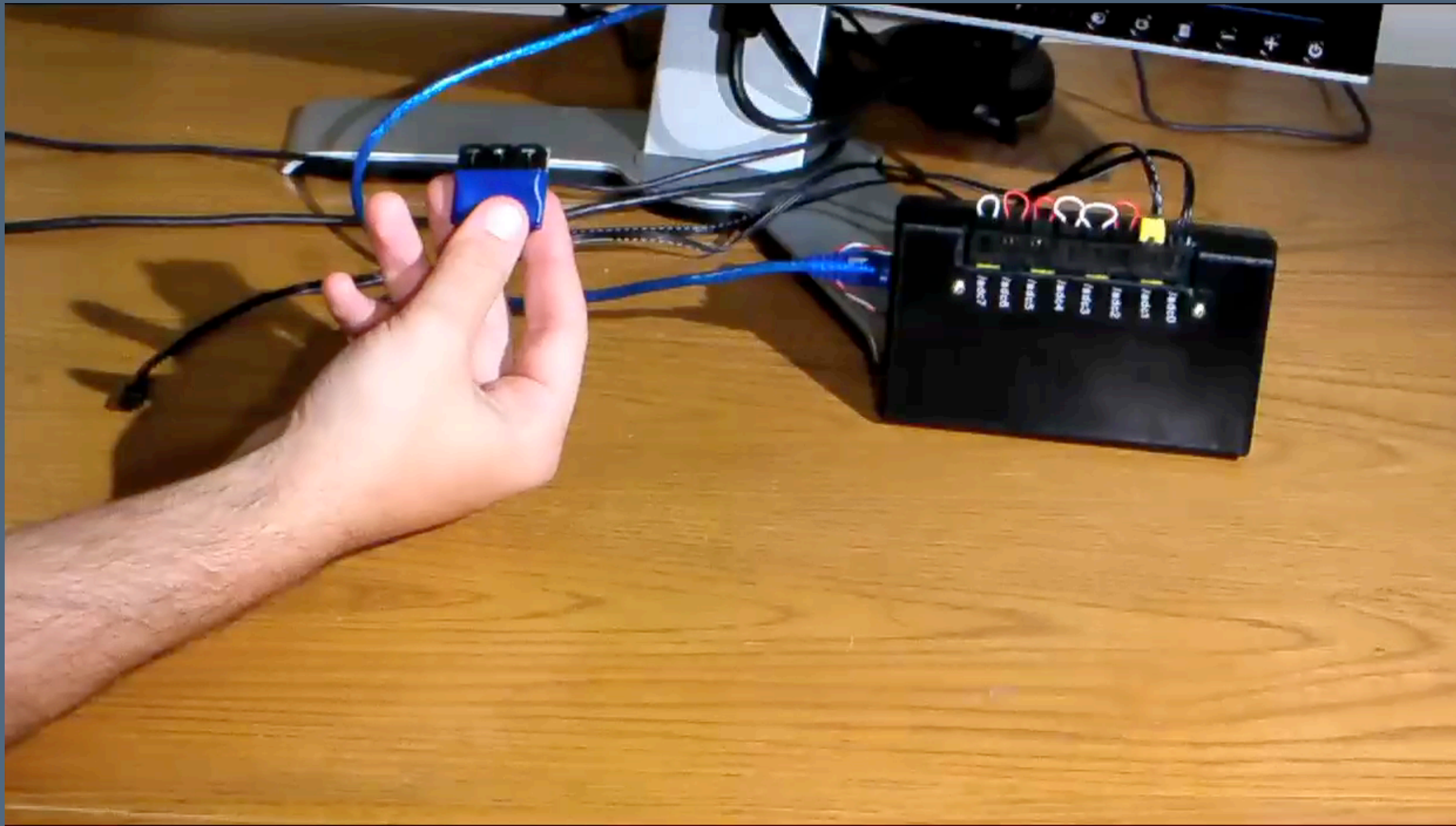
[Hartmann et al., UIST '06]

- Plug-and-play
HW, visual
statechart
behaviors

prototyping with d.tools

Sensor interaction by demonstration

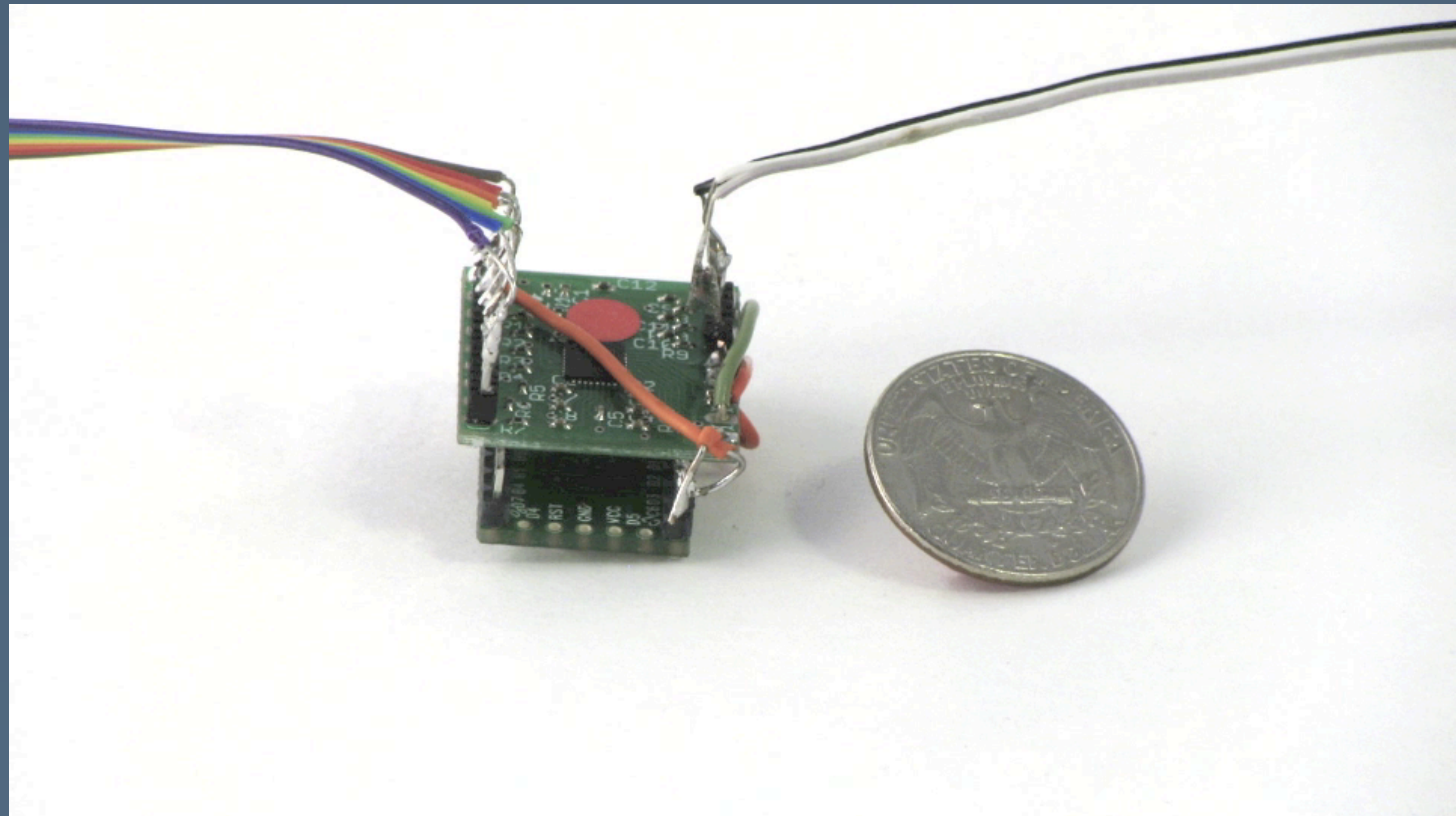
[Hartmann et al., CHI '07]



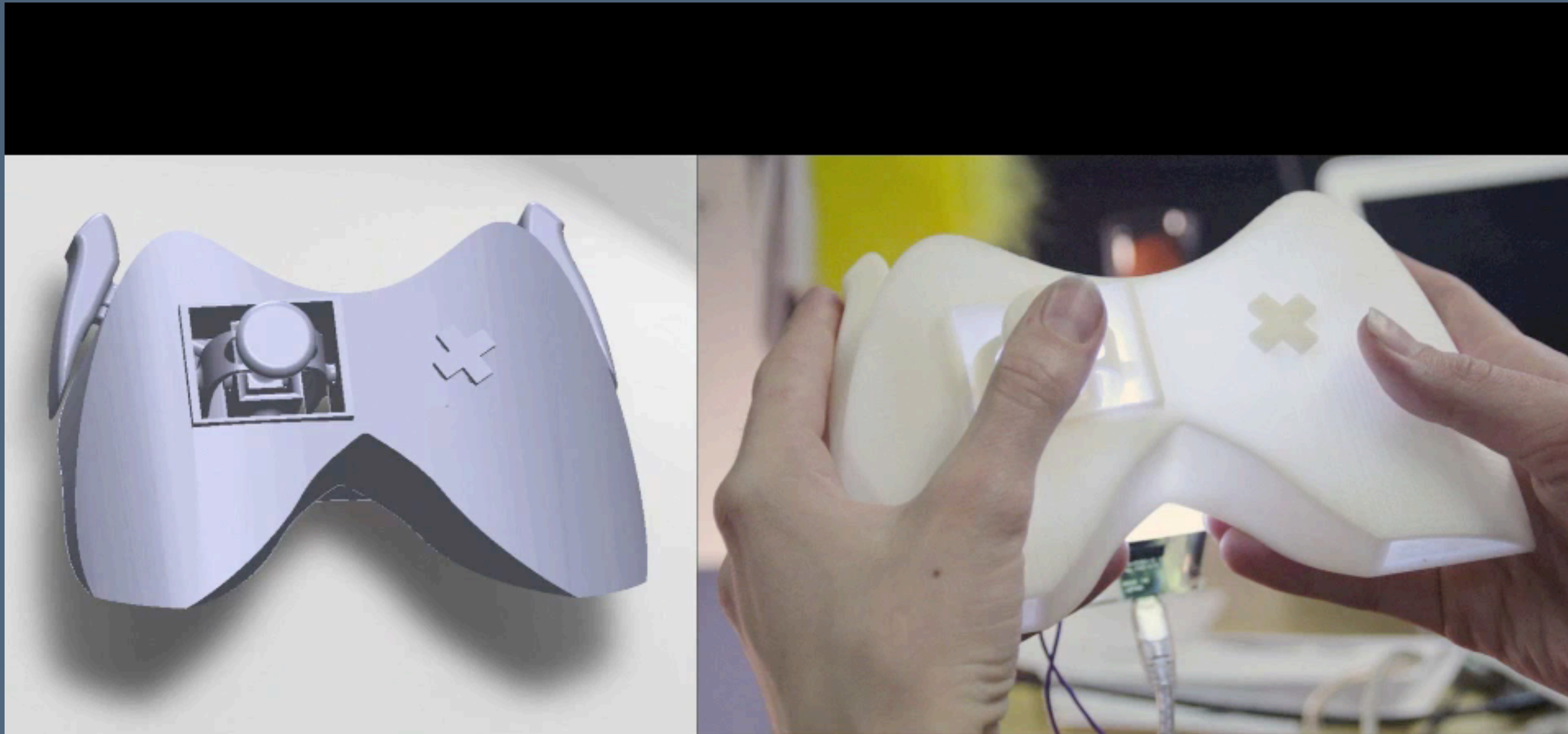
Fabricating capacitive hardware

[Savage et al., UIST '12]

- Author behaviors
- Software does circuit layout



3D printing+camera prototypes



Discussion rooms

Rotation	Littlefield 107	Littlefield 103
a	12	34
b	24	13
c	14	23
d	34	12
e	13	24
f	23	14