

# Design Tools

MICHAEL BERNSTEIN

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]

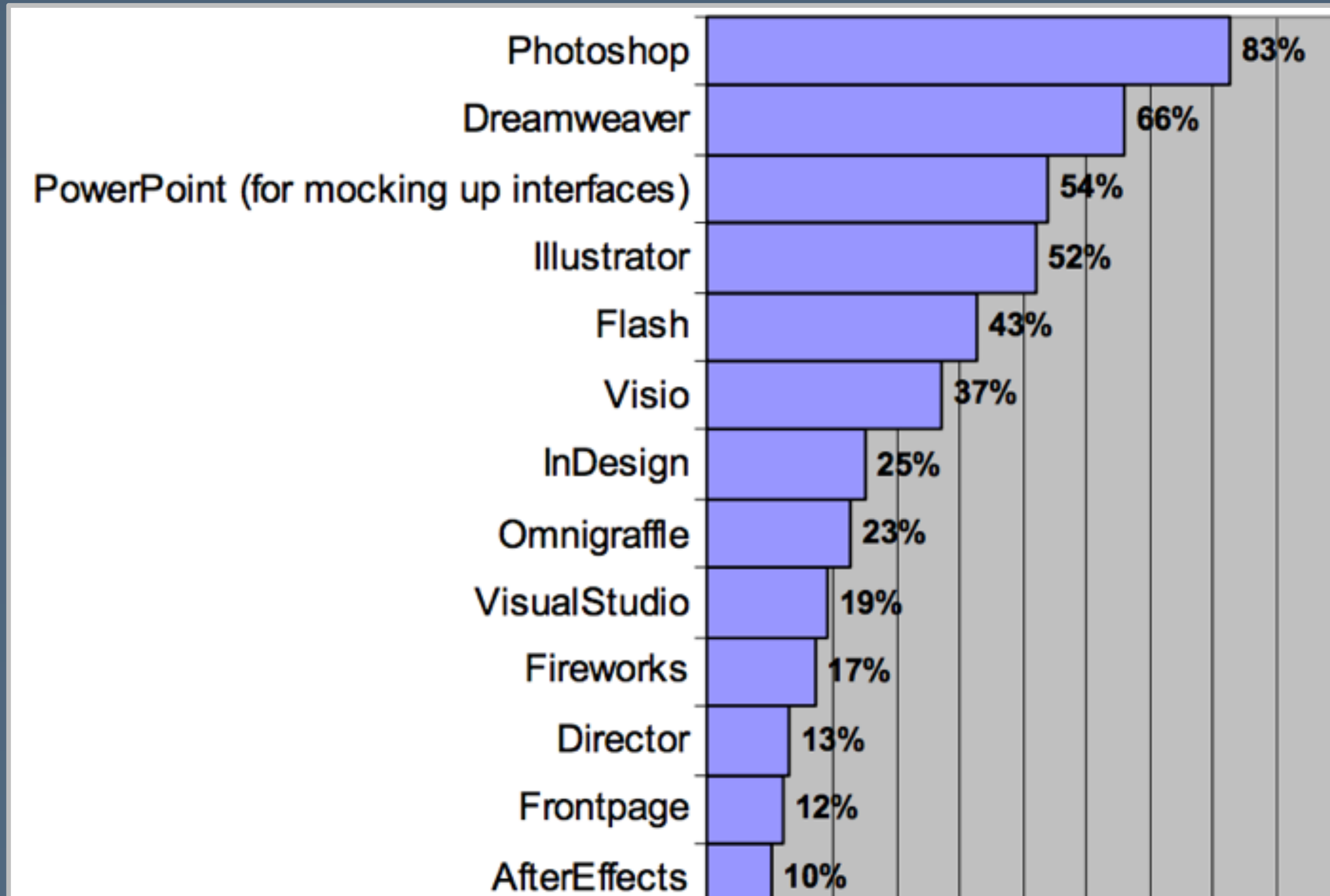
- Prototypes enable exploration and iteration around concrete artifacts
- The more fluid the prototyping process is, the more you can learn before you sink time into engineering

# Early stage design

# What tools do designers use?

[Myers et al., VLHCC '08]

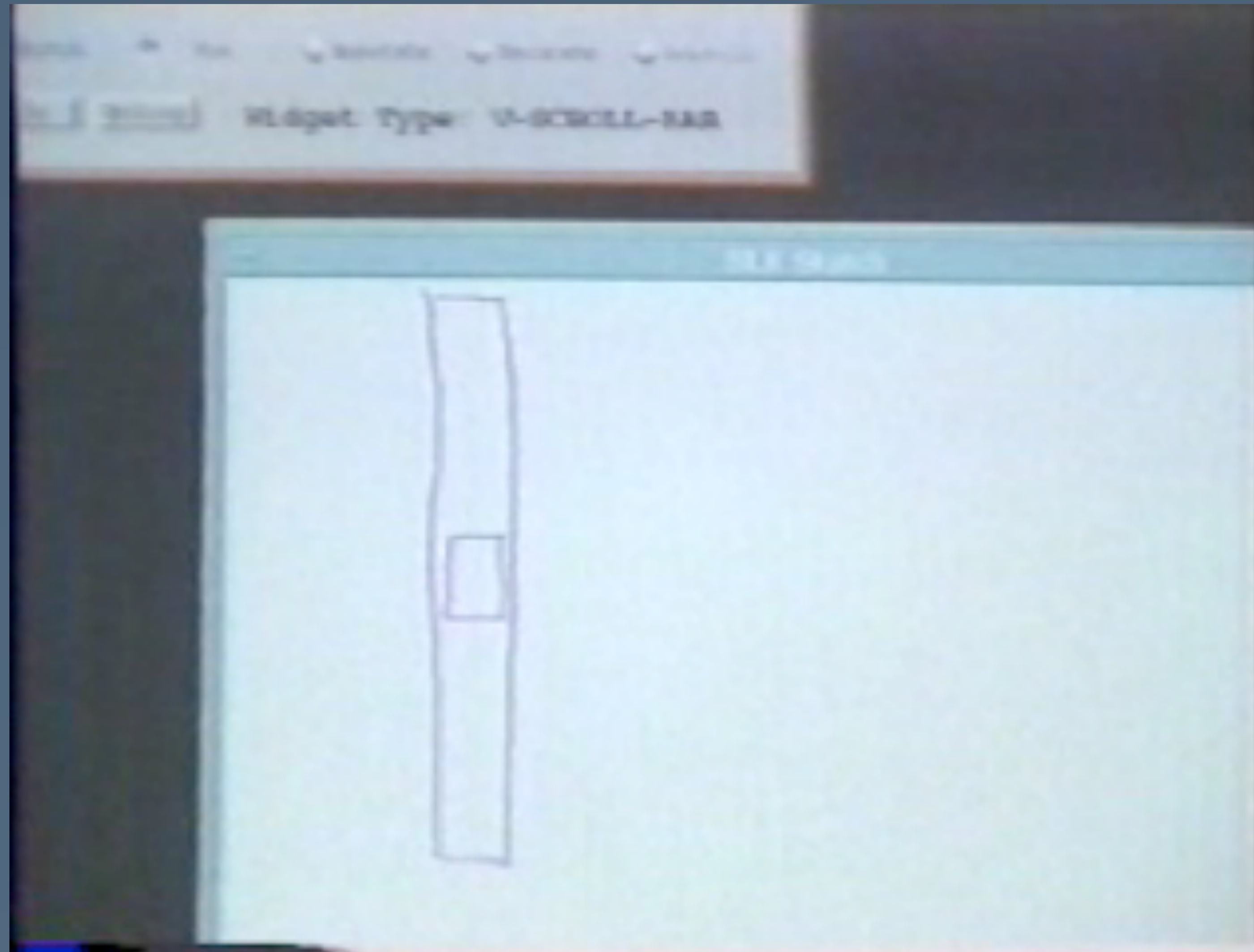
- Survey of 259 interaction designers



# SILK: Sketching Interfaces Like Crazy

[Landay, CHI '96]

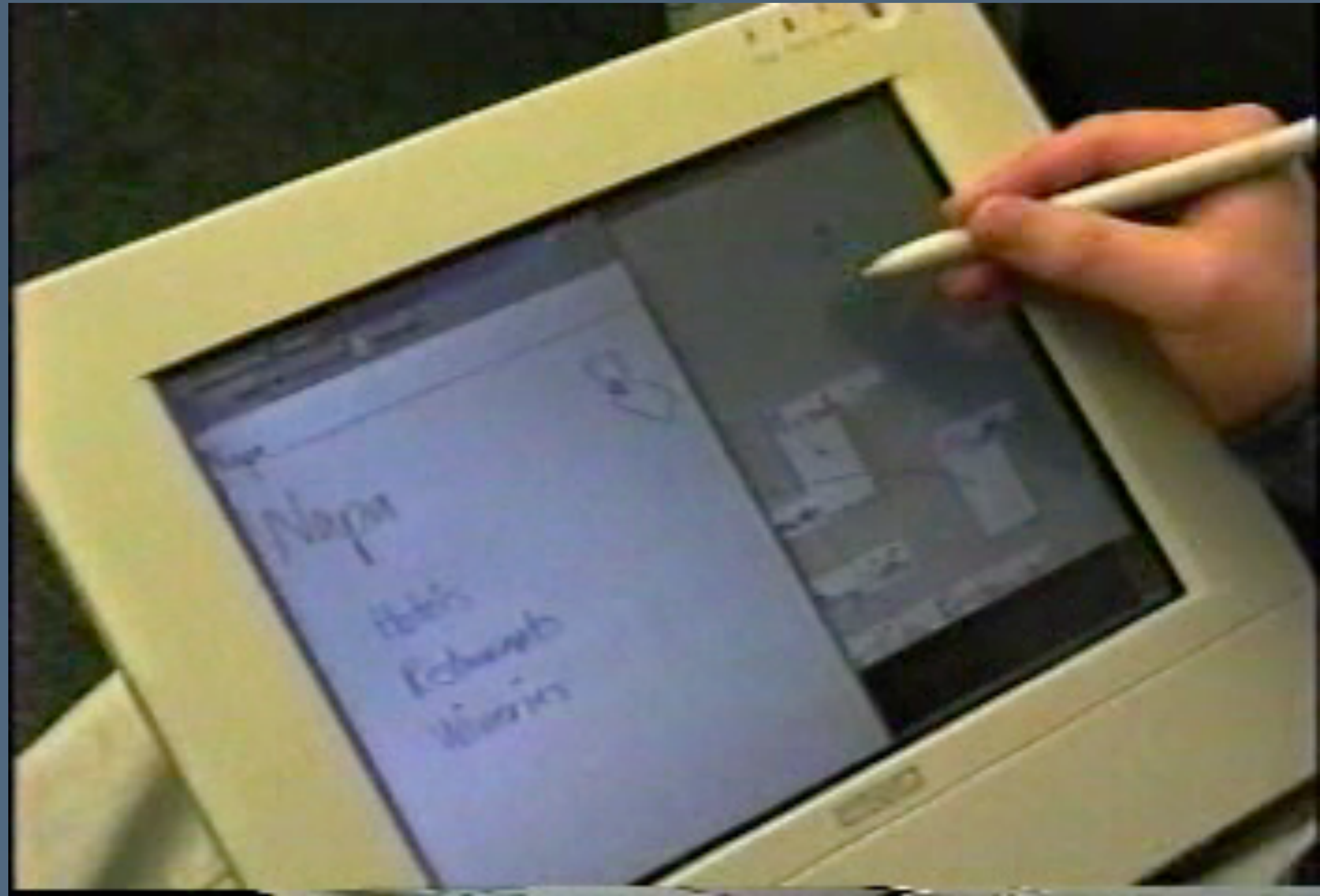
- Combine the fluidity of paper-based sketching with the interactivity of tools
- Technique: sketch recognition of basic UI components



# DENIM: web site storyboarding

[Lin et al., CHI '00]

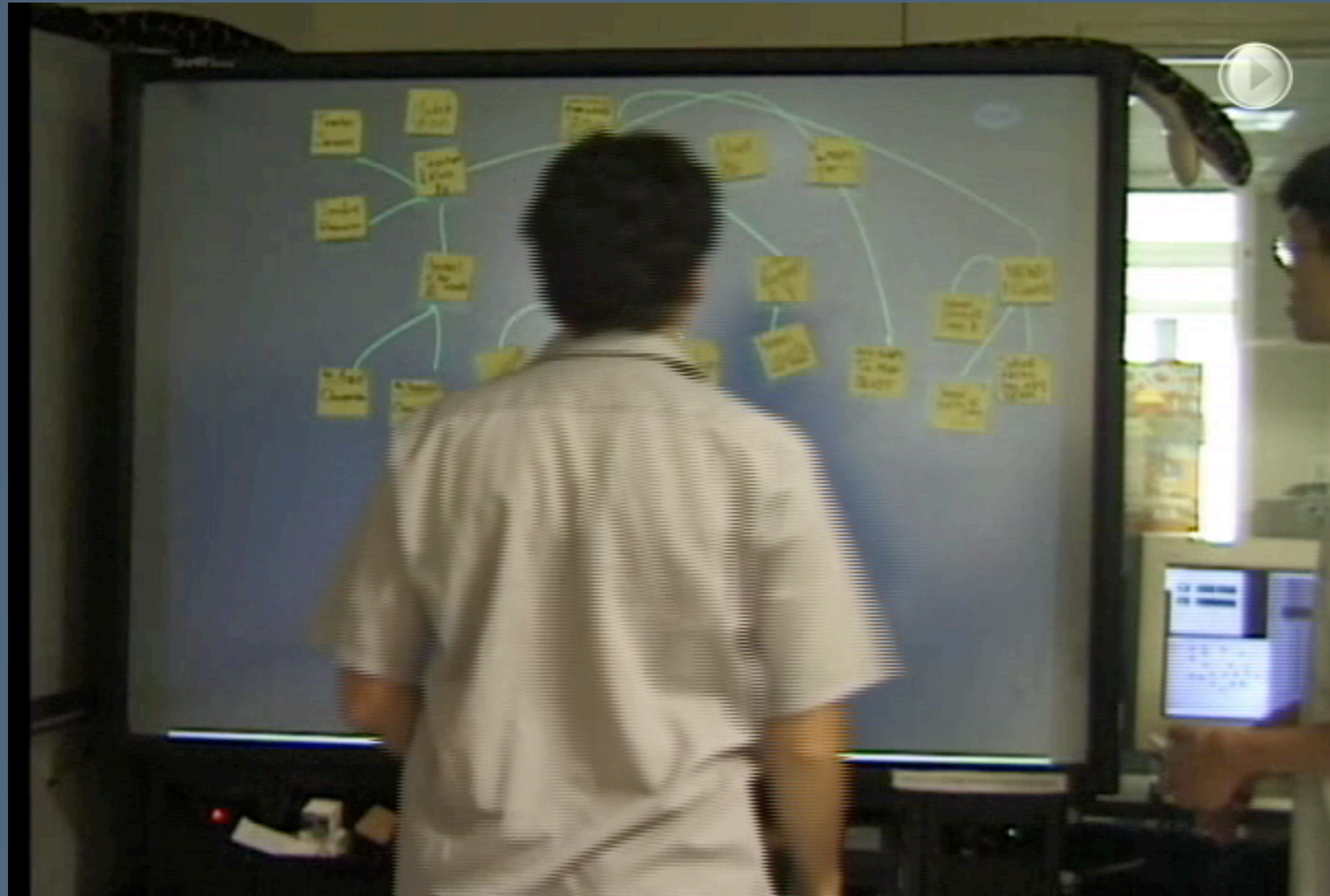
- Enable fluid, informal interactions for web site design
- Work at a higher level of abstraction than HTML



# Designer's Outpost

[Klemmer et al., UIST '01]

- Fluid interactive brainstorming that bridges physical and digital artifacts

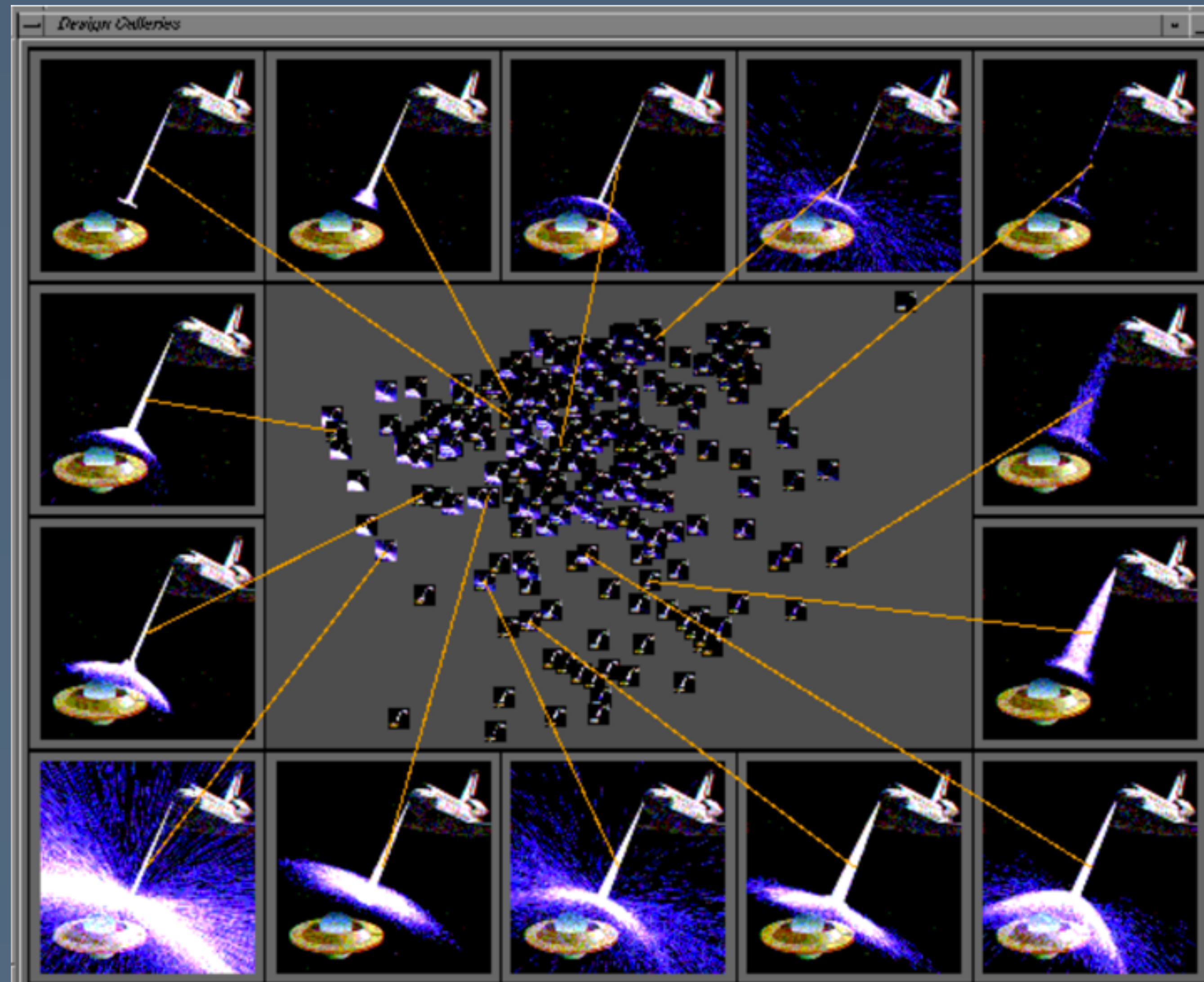




# Design galleries

[Marks et al., SIGGRAPH '97]

- Automatically generate perceptually-varying alternatives within a design space



The image shows a screenshot of an IDE window with a menu bar (File, Edit, Run) and buttons for 'Run', 'Add Alternative', and 'Linked Edit'. A tab labeled 'Alternative 1' is open. The code in the editor is as follows:

```
// 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 interface. At the top, a navigation bar includes the logo 'Voyant' and links for 'My Designs', 'Edit account', and 'Logout'. Below this, a central panel shows a design titled 'FRESH SMOOTHIE' featuring three smoothie glasses. To the right of the design is a feedback panel with tabs for 'Elements', 'First Notice', 'Impressions', 'Goals', and 'Guidelines'. The 'Elements' tab is active, showing four categories of feedback: 'object', 'color', 'activity', and 'shape'. Each category has a list of associated terms.

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

# Physical prototyping

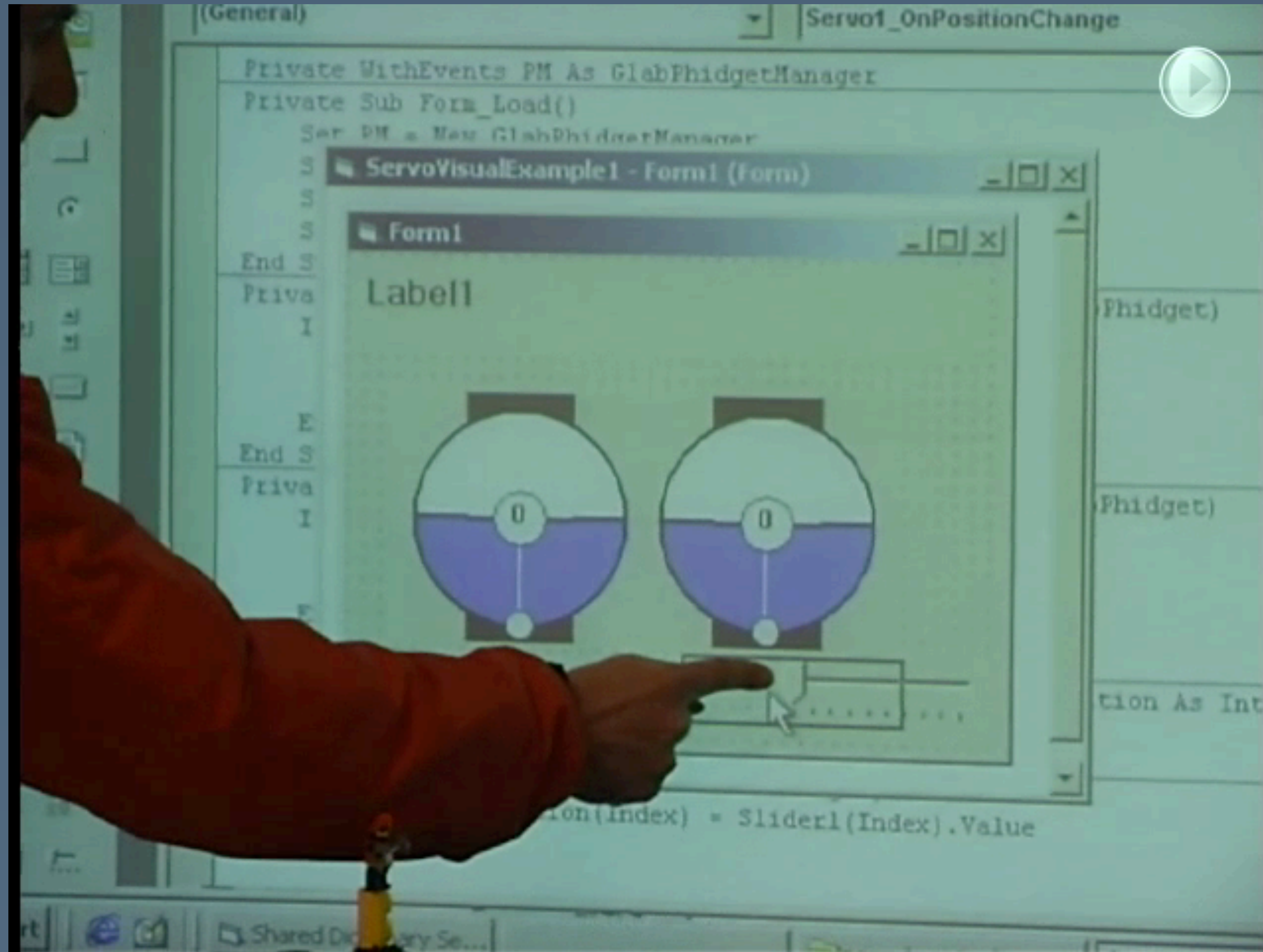
# The challenge of physical prototyping

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

# Phidgets

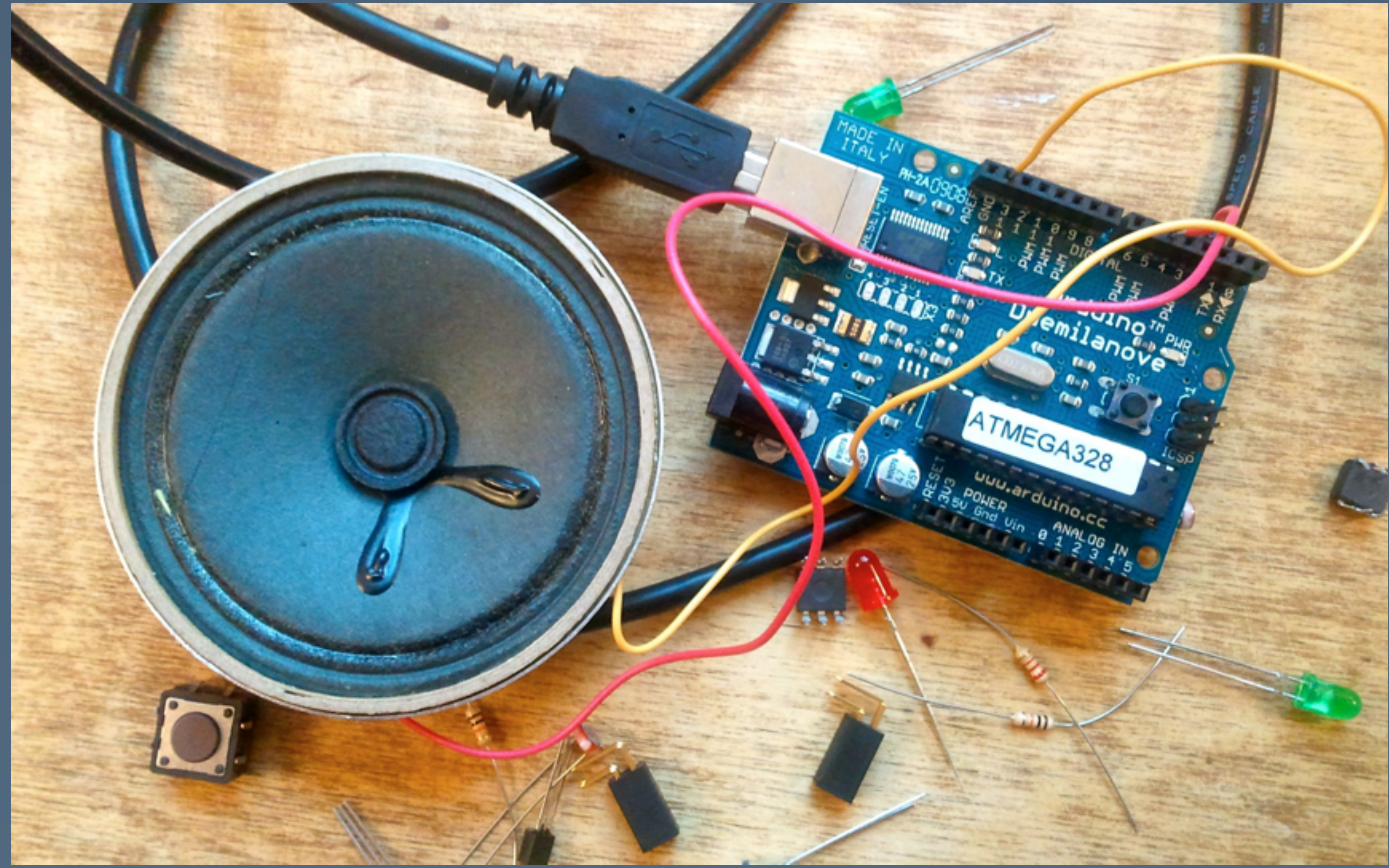
[Greenberg and Fitchett, UIST '01]

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



# Led to: Arduino

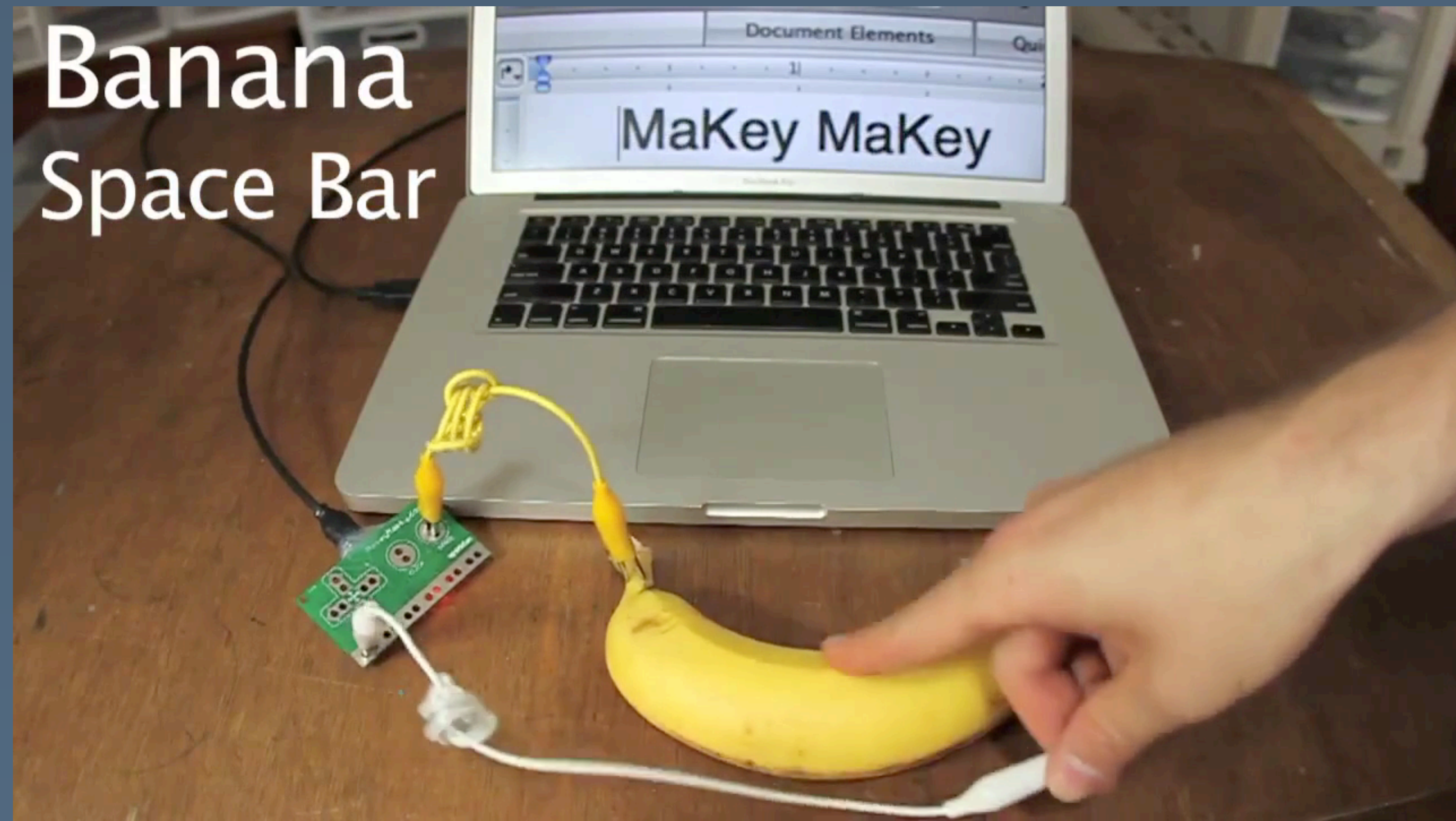
- Maker board for artists, programmers and hobbyists



# Led to: Makey Makey

[Silver et al., TEI '12]

- Alligator clips map onto keystrokes





# d.tools: prototyping behavior

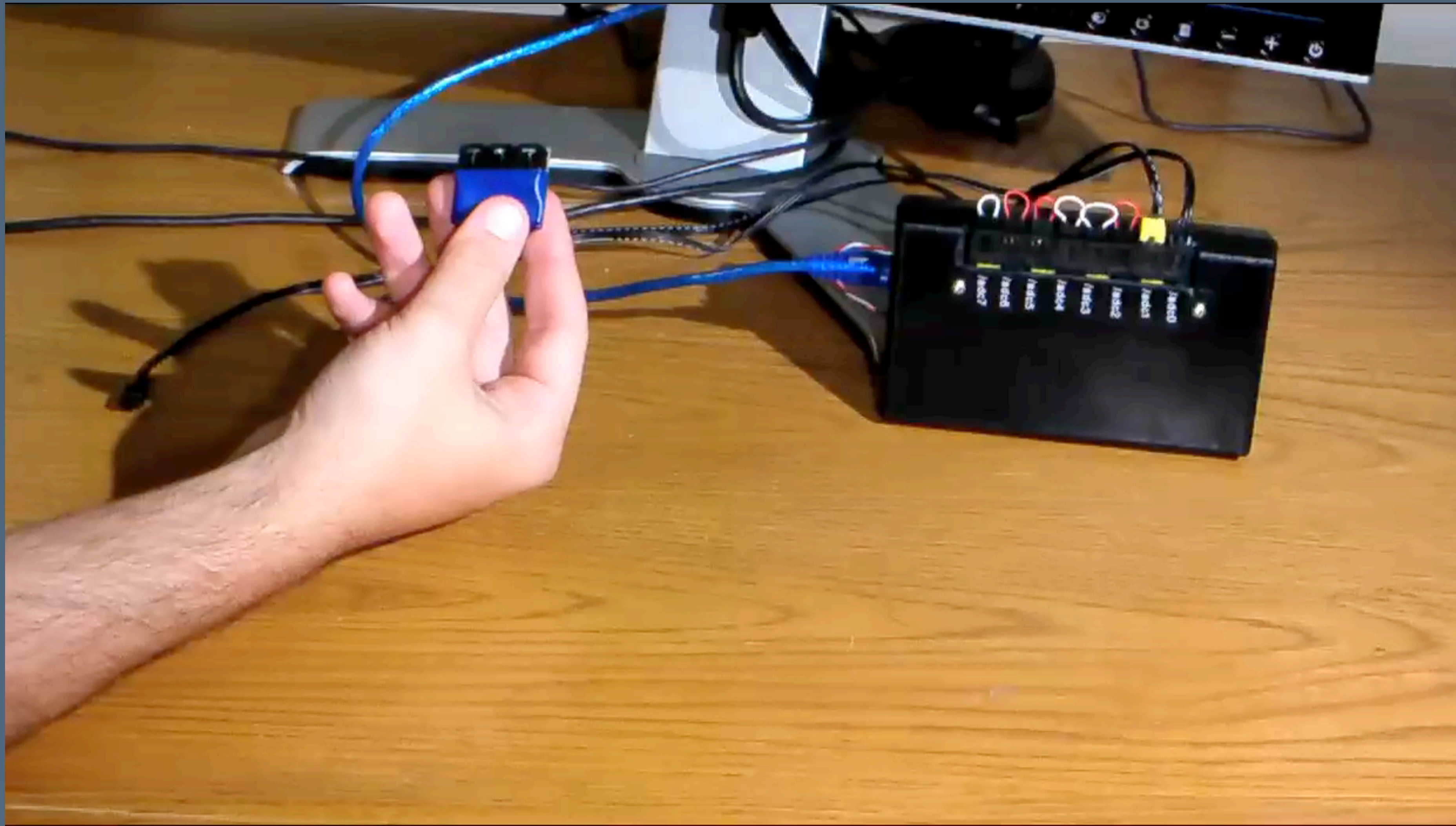
[Hartmann et al., UIST '06]

- Plug-and-play  
HW, visual  
statechart  
behaviors

**prototyping with d.tools**

# Sensor interaction by demonstration

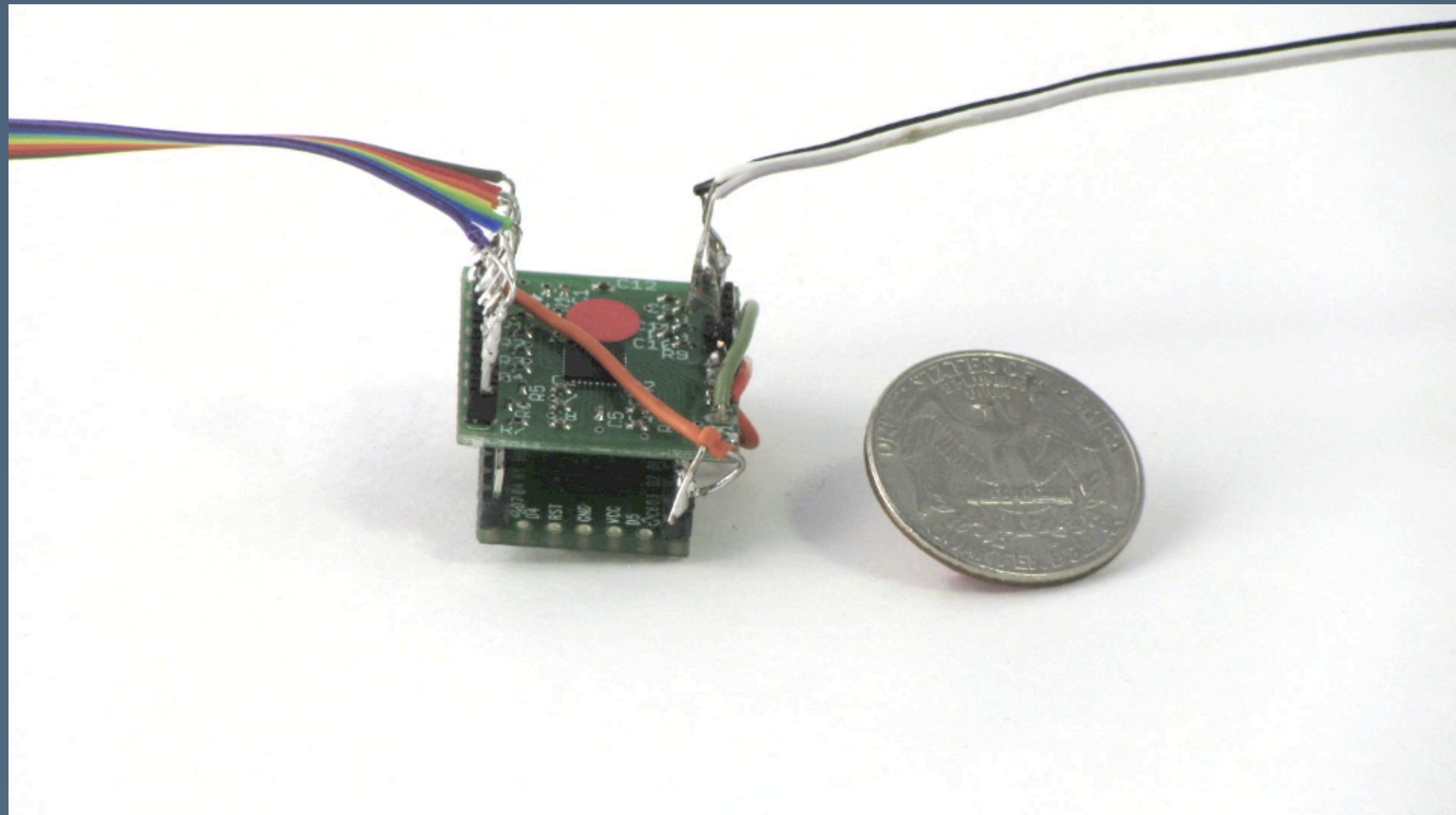
[Hartmann et al., CHI '07]



# Fabricating capacitive hardware

[Savage et al., UIST '12]

- Author behaviors; software does circuit layout



# 3D printing+camera prototypes

