

Prototyping Ubicomp Systems

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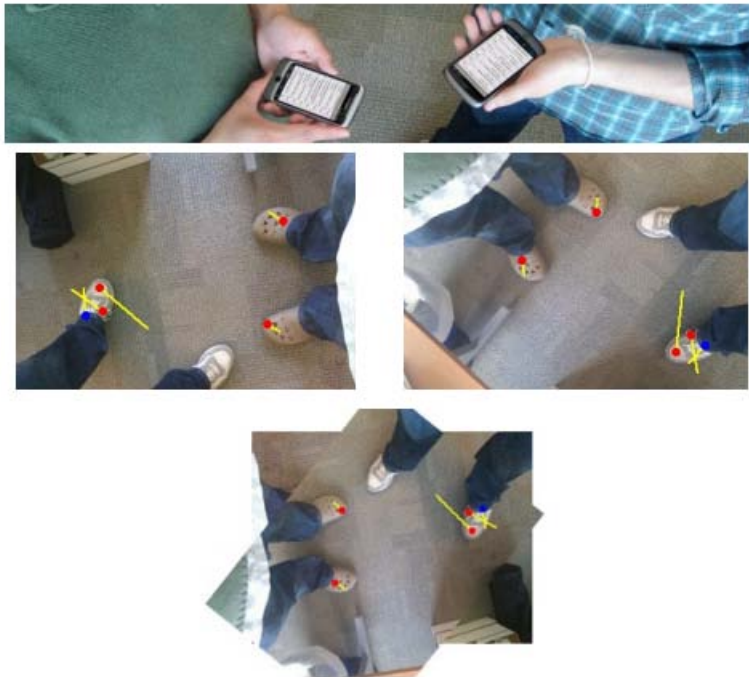
About Me

Khai Truong

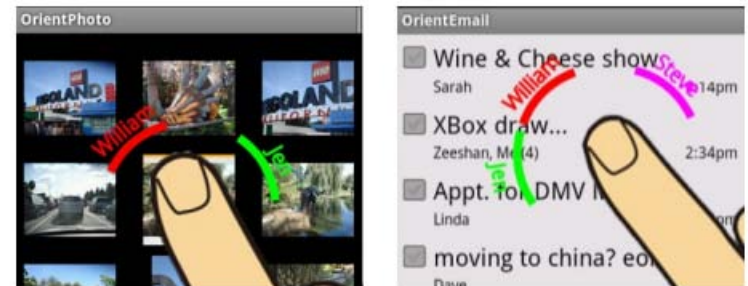
- Associate Professor in Computer Science @ University of Toronto
- B. in CmpE & Ph.D. in CS from Georgia Tech
- Research interest
 - HCI
 - Ubiquitous Computing



Orienteer

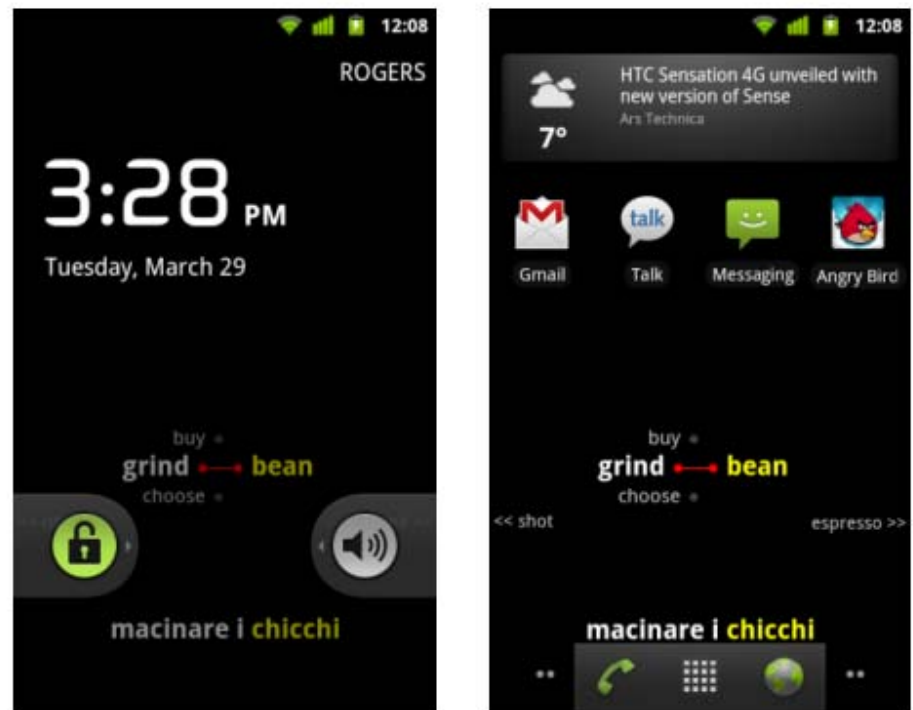


Two people collaborating while using their mobile phones (top). To determine the orientation of each device relative to one another, images can be sampled from each device's camera stream (middle) and stitched together (bottom) using features common in both images.



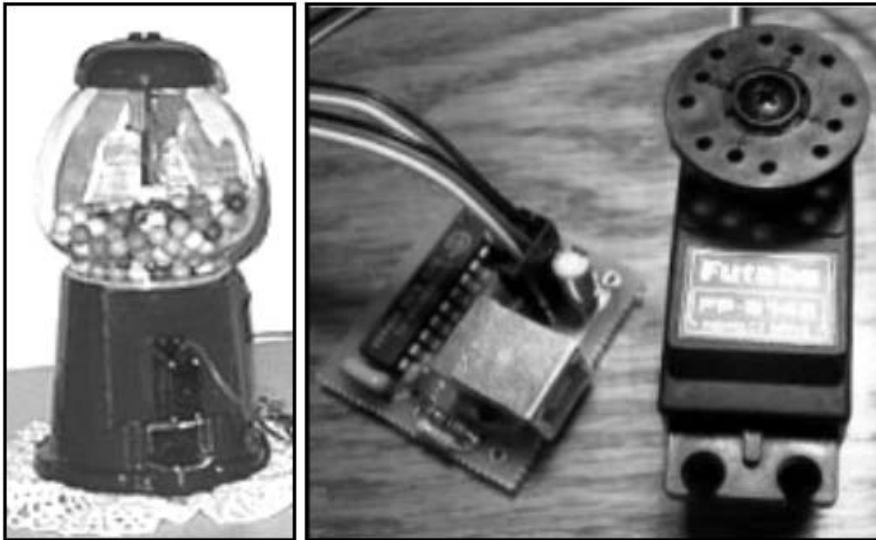
The orientation information provided by *Orienteer* can be applied by application developers to support natural modes of interaction such as pushing content to adjacent devices.

Vocabulary Wallpaper



Vocabulary Wallpaper implemented as a Live Wallpaper for the Android OS. The vocabulary content is dynamic and interactive, and it is always visible unless occluded by a running application.

Devices for Sharing Thoughts & Affection at a Distance



Gumball machine (left) augmented with a Servo Phidget (right) to control the dispensing of candy.



Personal Web page that displays personal updates and controls the gumball machine.

Some Background Needed for Building Ubicomp Systems

mobile development
hardware development
machine learning
computer vision
natural language processing
...much, much more

this lecture is not about how to do the following things

- *you should already know how to code*

this lecture is about strategies for how to do the following things

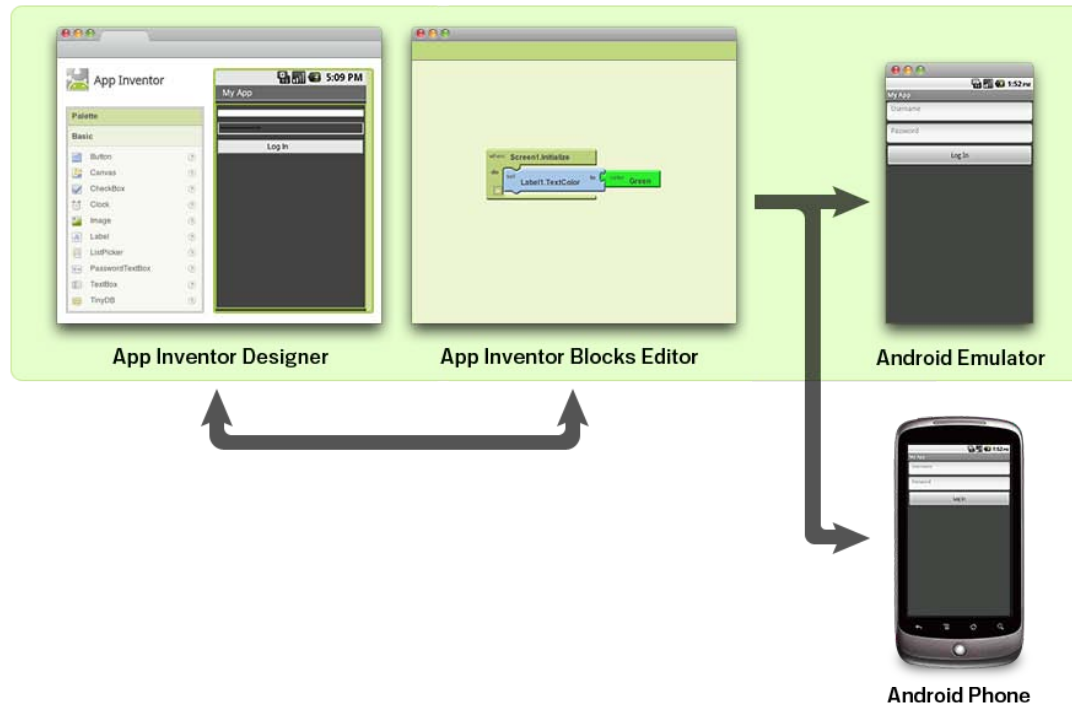
Mobile Development

Android SDK

App Inventor



Google App Inventor Servers



App Inventor

App Inventor - Designer

The screenshot displays the App Inventor Designer interface for a project named "test2". The top navigation bar includes "My Projects", "Design", "Learn", and "Admin". A "Welcome to App Inventor!" message is visible in the top right. The main workspace is divided into four panels: "Palette", "Viewer", "Components", and "Properties".

- Palette:** Contains various UI components categorized into "Basic", "Media", "Animation", "Social", "Sensors", "Screen Arrangement", "LEGO® MINDSTORMS®", "Other stuff", "Not ready for prime time", and "Old stuff". The "Basic" category is expanded, showing items like Button, Canvas, CheckBox, Clock, Image, Label, ListPicker, PasswordTextBox, TextBox, and TinyDB.
- Viewer:** Shows a mobile device simulation with a status bar at the top displaying "5:09 PM" and icons for signal strength, Wi-Fi, and battery. The main area is labeled "Screen1" and is currently empty.
- Components:** Lists the components currently on the screen, showing "Screen1". Below the list are "Rename..." and "Delete..." buttons. A "Media" section at the bottom has an "Add..." button.
- Properties:** Shows the properties for the selected "Screen1" component. The properties include: "Screen", "BackgroundColor" (with a "White" checkbox), "BackgroundImage" (set to "None..."), "Icon" (set to "None..."), "Scrollable" (checked), and "Title" (set to "Screen1").

At the top of the workspace, there are buttons for "Save", "Save As", and "Checkpoint", and a dropdown menu for "Package for Phone".

App Inventor - Components

Basic Components

- [Button](#)
- [Canvas](#)
- [CheckBox](#)
- [Clock](#)
- [Image](#)
- [Label](#)
- [ListPicker](#)
- [PasswordTextBox](#)
- [Screen](#)
- [TextBox](#)
- [TinyDB](#)

Media Components

- [Camera](#)
- [ImagePicker](#)
- [Player](#)
- [Sound](#)
- [VideoPlayer](#)

Social Components

- [ContactPicker](#)
- [EmailPicker](#)
- [PhoneCall](#)
- [PhoneNumberPicker](#)
- [Texting](#)
- [Twitter](#)

Sensor Components

- [AccelerometerSensor](#)
- [LocationSensor](#)
- [OrientationSensor](#)

Screen Arrangement Components

- [HorizontalArrangement](#)
- [TableArrangement](#)
- [VerticalArrangement](#)

App Inventor – Blocks Editor

The screenshot displays the App Inventor for Android Blocks Editor interface. The window title is "App Inventor for Android Blocks Editor: HelloPurr". The main workspace is titled "HelloPurr" and contains a single block: "when Button1.Click" with a "do" block containing "call Sound1.Play". The left sidebar shows a "Built-In" tab with categories: Definition, Text, Lists, Math, Logic, Control, and Colors. The top toolbar includes "Saved", "Undo", "Redo", "Connect to emulator", and a "Zoom" slider set to 100%. A trash icon is located in the bottom right corner.

App Inventor - Blocks

Blocks

- [Definition blocks](#)
- [Text blocks](#)
- [List blocks](#)
- [Math blocks](#)
- [Logic blocks](#)
- [Control blocks](#)
- [Color blocks](#)



Definition Blocks

- [procedure](#)
- [procedureWithResult](#)
- [name](#)
- [variable](#)
- |



Control Blocks

- [if](#)
- [ifelse](#)
- [choose](#)
- [foreach](#)
- [for range](#)
- [while](#)
- [get start text](#)
- [close screen](#)
- [close screen with result](#)

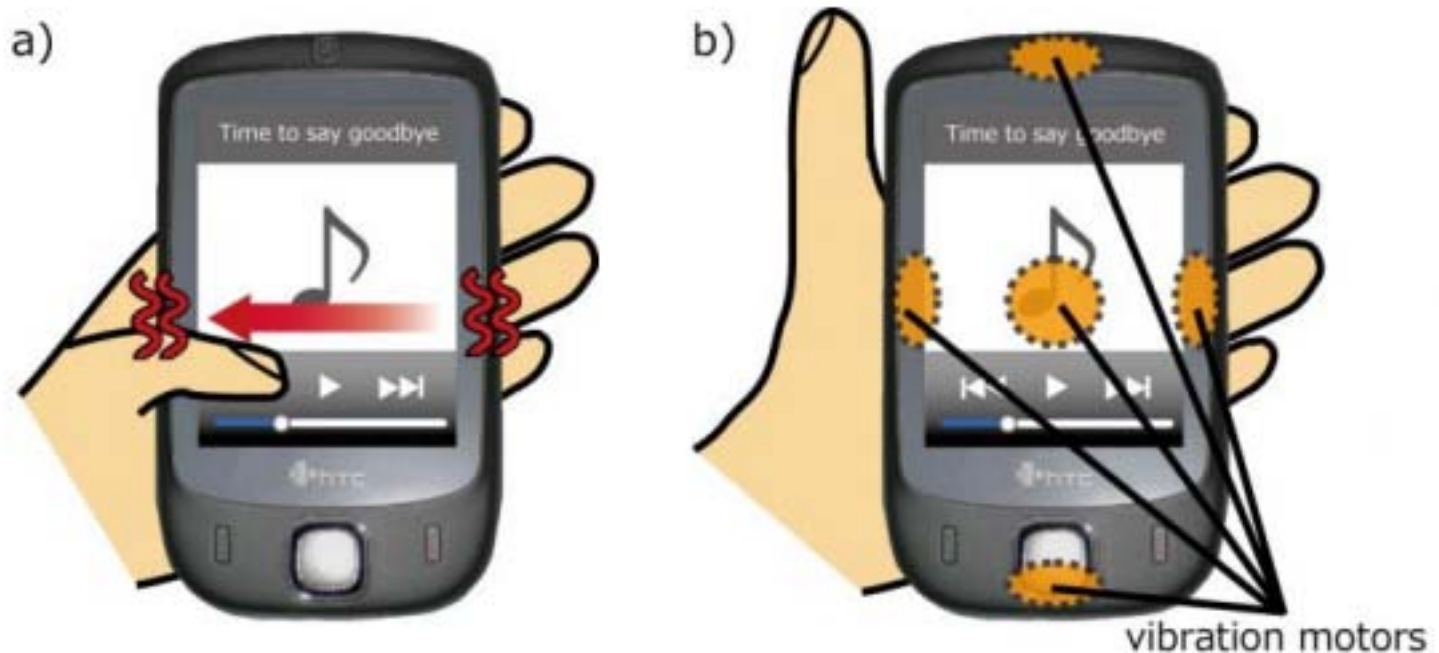


Logic Blocks

- [true](#)
- [false](#)
- [not](#)
- [≡](#)
- [and](#)
- [or](#)

Develop some apps with App Inventor

SemFeel - Concept



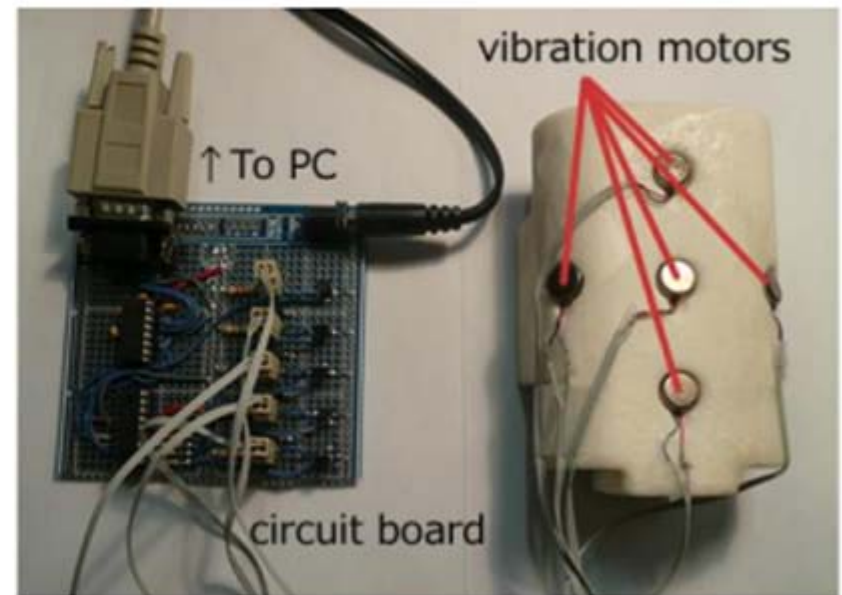
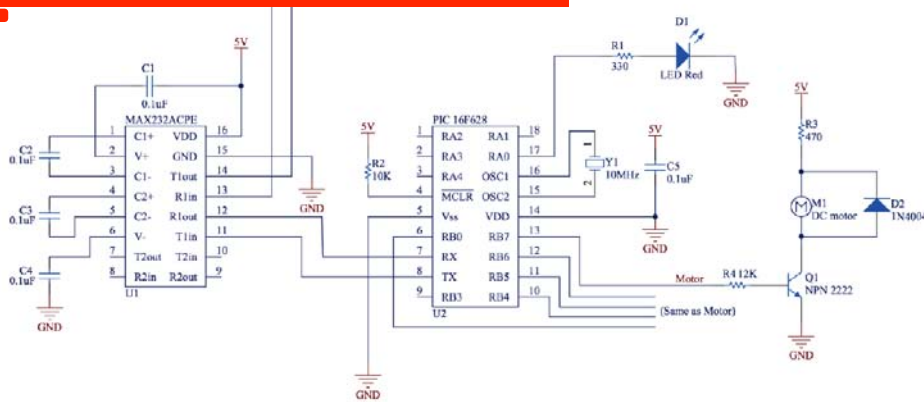
The system generates vibration from right to left as feedback in response to when the user touches the "previous track" button. Multiple vibration motors are embedded in the backside of a mobile touch-screen device.

SemFeel - Hardware



SemFeel – Circuit Design

A difficulty that can be abstracted away

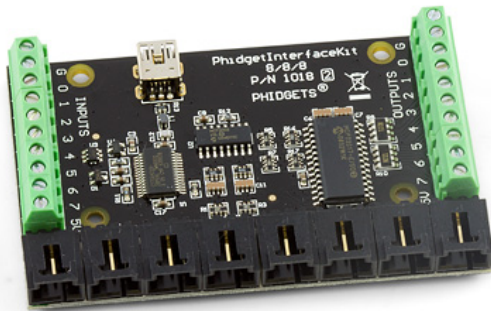


Hardware Development

Arduino

Phidgets

Phidgets



Single board computer

I/O Boards

Sensors

Distance/Range

Force/Pressure

Touch

Motion

Environmental

Input

Voltage/Current

Motors

Servo Controllers

Servo Motors

DC Controllers

DC Motors

Stepper Controllers

Stepper Motors

RFID

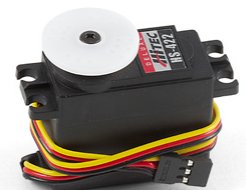
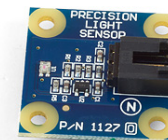
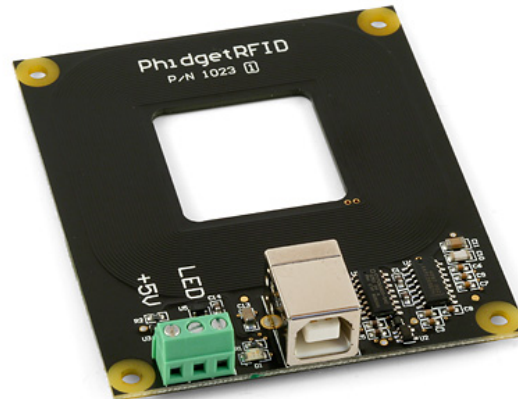
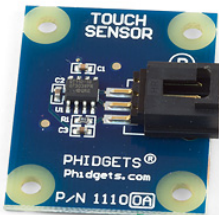
Remote Control

Displays

Adapters

LEDs

Switches



Phidgets API

The screenshot shows a web browser window with the URL www.phidgets.com/programming_resources.php. The page features the Phidgets logo and a navigation menu with links for Home, Forums, Drivers, Programming, Policies, Contact Us, News, Dealers, Login, and Cart. A sidebar on the left lists various product categories such as SBC, I/O Boards, Sensors, Motors, Relays, and Displays. The main content area is titled "Programming Resources" and includes a "Table of Contents" with links to General Resources and Languages. Below this, there are several sections for different programming languages and platforms, each with links to code samples, API references, and getting started guides.

phidgets Products for USB Sensing and Control

Home Forums Drivers Programming Policies Contact Us News Dealers Login Cart

Display all prices in: USD

Google Site Search
Search

Fast Add

SBC

I/O Boards

Sensors
Distance/Range
Force/Pressure
Touch
Motion
Environmental
Input
Voltage/Current

Motors
Servo Controllers
Servo Motors
DC Controllers
DC Motors
Stepper Controllers
Stepper Motors

Relays
RFID
Remote Control
Displays
Adapters
LEDs
Switches
Fuses/Protection
Cables
USB Hubs
Power Supplies
Kits
Enclosures

Discontinued

Programming Resources

Table of Contents

- General Resources and Miscellaneous
- Languages
- 3rd Party Software

General Resources

- Phidget Programming Manual
- Description of the Phidget Libraries
- Working with WindowsCE
- Working with Phidget Webservice

Miscellaneous

- Addressing EMI Issues
- Effects of Long Wires
- Known Issues and Solutions
- Custom Character Generator for the Phidget TextLCD
- Primer - Stepper Motors

Languages

Adobe Director

- Code Sample
- API Reference (COM)
- Getting Started Guide

AppleScript

- Code Sample
- Getting Started Guide

C#

- Code Sample (Windows)
- Code Sample (.NET Compact Framework)
- API Reference (.NET)
- Getting Started Guide

Cocoa

- Code Sample

Android

- Code Sample
- API Reference (Java)
- Getting Started Guide

AutoIt

- API Reference (COM)
- Getting Started Guide

C/C++

- Code Sample (Standard C/C++)
- Code Sample (MS Visual C/C++)
- Phidget21 Lib (Borland C++)
- API Reference (C/C++)
- Getting Started Guide - Standard C\C++
- Getting Started Guide - MS Visual C\C++

Delphi

- Code Sample

http://www.phidgets.com/programming_resources.php

Develop some apps with Phidgets

Uses of Phidgets



closed

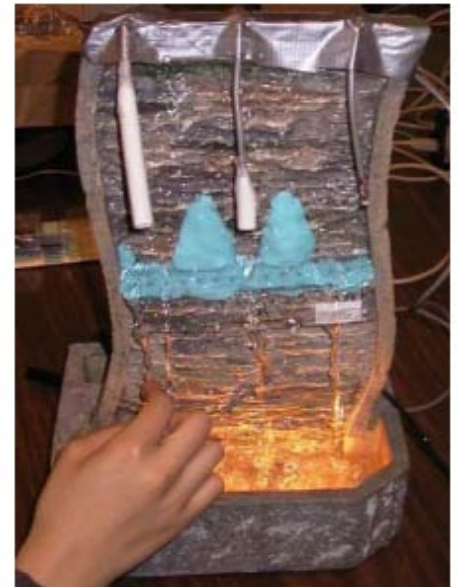


partially bloomed



fully bloomed

Flower in Bloom



The Waterfall harp

Watch video:

<http://grouplab.cpsc.ucalgary.ca/phidgets/gallery/phidgets.UIST01.wmv>

Go forth...

And build cool stuff!