Interaction Design & Firmware Programming

September 4, 2018

Lab Review!

I like, I wish

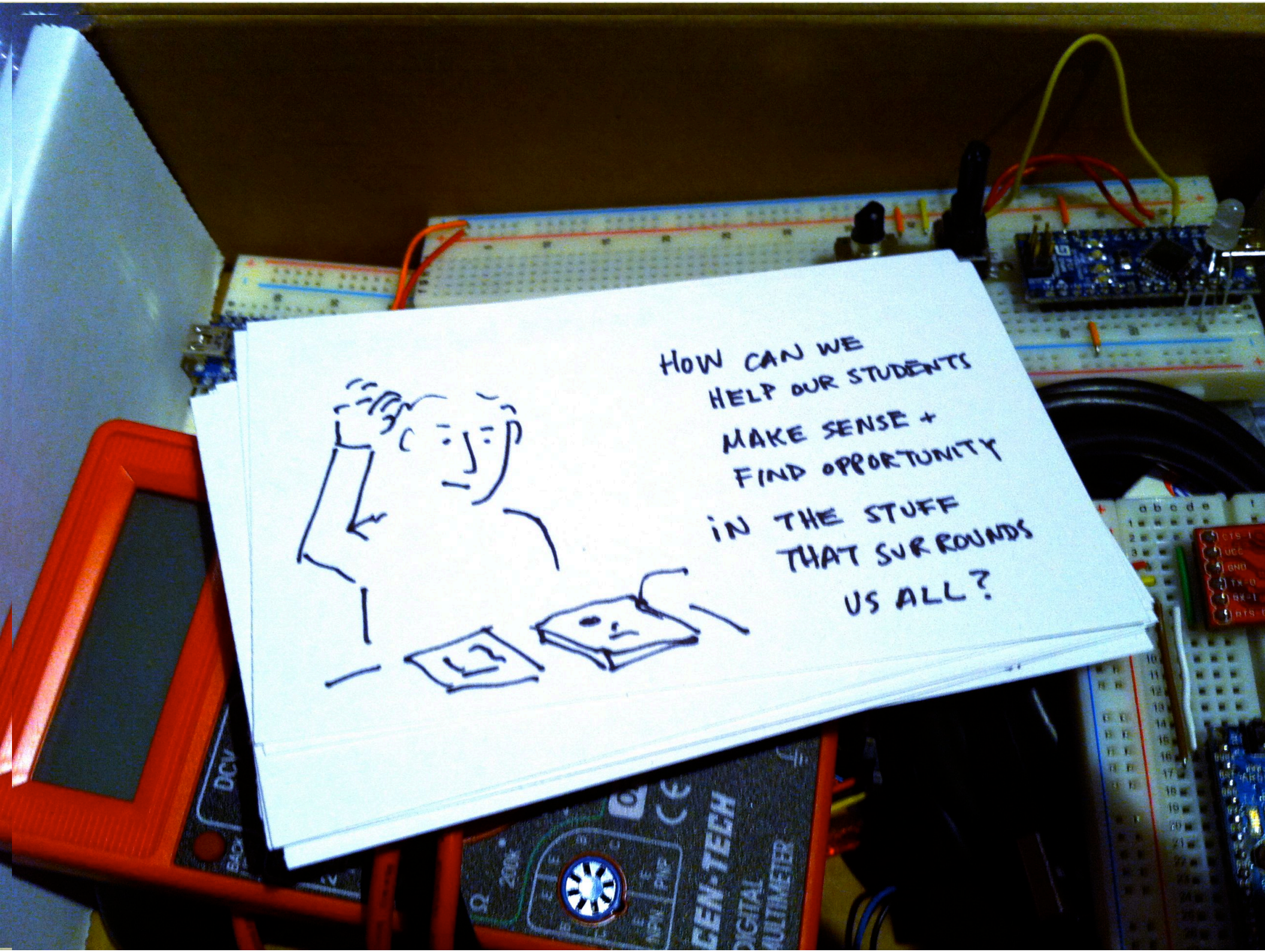
Cool Frankenlights

1 hour rule

Hacking

Culture | Understanding how things work

Being rough and ready

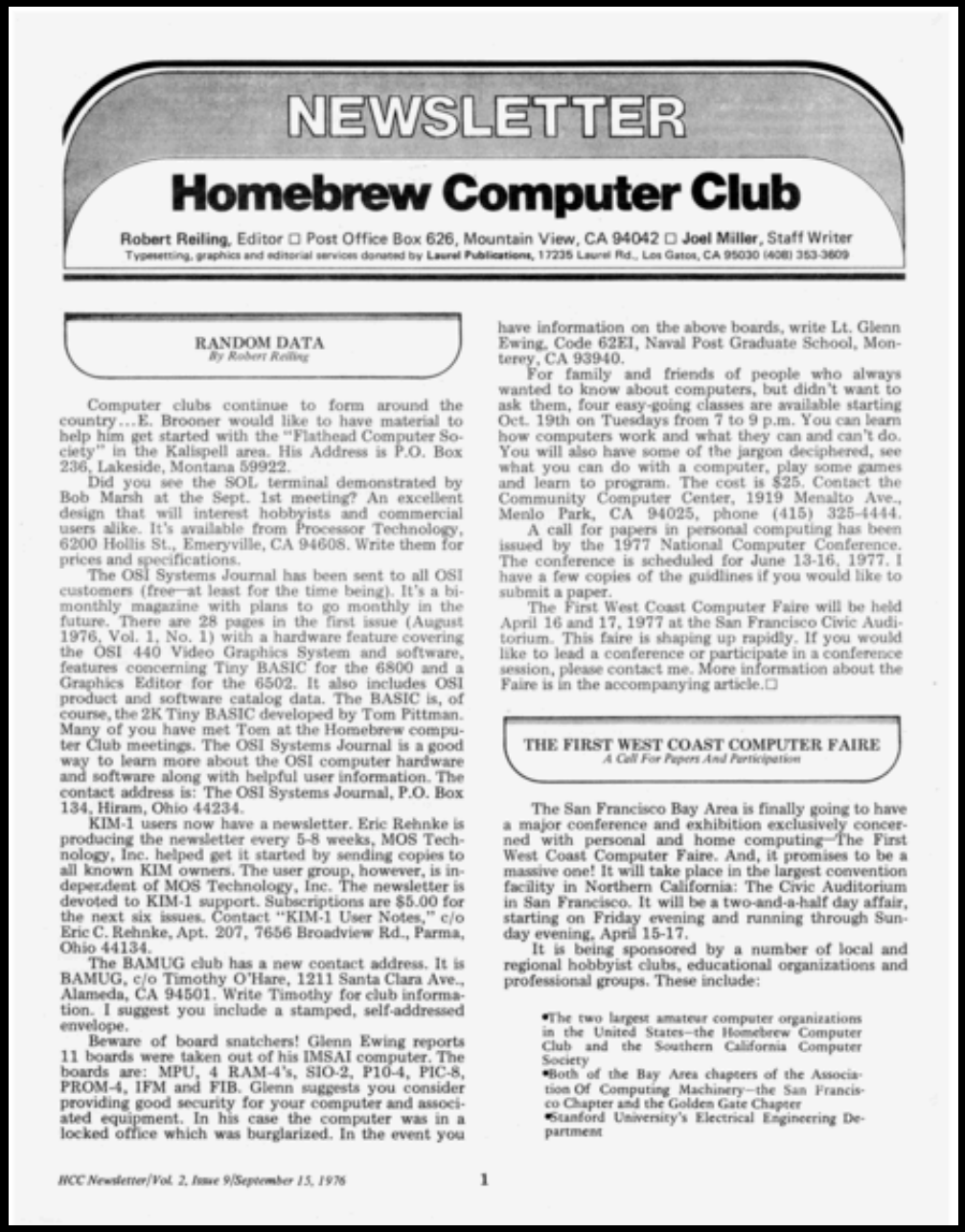

HOW CAN WE
HELP OUR STUDENTS
MAKE SENSE +
FIND OPPORTUNITY
IN THE STUFF
THAT SURROUNDS
US ALL?

Hacker:

[a] person who delights in having an intimate understanding of the internal workings of a system, computers and computer networks in particular

Homebrew:

Several very high-profile Silicon Valley hackers and IT entrepreneurs emerged from the DIY computer movement of the mid 1970's.



NEWSLETTER

Homebrew Computer Club

Robert Reiling, Editor □ Post Office Box 626, Mountain View, CA 94042 □ **Joel Miller**, Staff Writer
Typesetting, graphics and editorial services donated by **Laurel Publications**, 17235 Laurel Rd., Los Gatos, CA 95030 (408) 353-3609

RANDOM DATA

By Robert Reiling

Computer clubs continue to form around the country...E. Brooner would like to have material to help him get started with the "Flathead Computer Society" in the Kalispell area. His Address is P.O. Box 236, Lakeside, Montana 59922.

Did you see the SOL terminal demonstrated by Bob Marsh at the Sept. 1st meeting? An excellent design that will interest hobbyists and commercial users alike. It's available from Processor Technology, 6200 Hollis St., Emeryville, CA 94608. Write them for prices and specifications.

The OSI Systems Journal has been sent to all OSI customers (free—at least for the time being). It's a bi-monthly magazine with plans to go monthly in the future. There are 28 pages in the first issue (August 1976, Vol. 1, No. 1) with a hardware feature covering the OSI 440 Video Graphics System and software, features concerning Tiny BASIC for the 6800 and a Graphics Editor for the 6502. It also includes OSI product and software catalog data. The BASIC is, of course, the 2K Tiny BASIC developed by Tom Pittman. Many of you have met Tom at the Homebrew computer Club meetings. The OSI Systems Journal is a good way to learn more about the OSI computer hardware and software along with helpful user information. The contact address is: The OSI Systems Journal, P.O. Box 134, Hiram, Ohio 44234.

KIM-1 users now have a newsletter. Eric Rehnke is producing the newsletter every 5-8 weeks, MOS Technology, Inc. helped get it started by sending copies to all known KIM owners. The user group, however, is independent of MOS Technology, Inc. The newsletter is devoted to KIM-1 support. Subscriptions are $5.00 for the next six issues. Contact "KIM-1 User Notes," c/o Eric C. Rehnke, Apt. 207, 7656 Broadview Rd., Parma, Ohio 44134.

The BAMUG club has a new contact address. It is BAMUG, c/o Timothy O'Hare, 1211 Santa Clara Ave., Alameda, CA 94501. Write Timothy for club information. I suggest you include a stamped, self-addressed envelope.

Beware of board snatchers! Glenn Ewing reports 11 boards were taken out of his IMSAI computer. The boards are: MPU, 4 RAM-4's, SIO-2, P10-4, PIC-8, PROM-4, IFM and FIB. Glenn suggests you consider providing good security for your computer and associated equipment. In his case the computer was in a locked office which was burglarized. In the event you have information on the above boards, write Lt. Glenn Ewing, Code 62EI, Naval Post Graduate School, Monterey, CA 93940.

For family and friends of people who always wanted to know about computers, but didn't want to ask them, four easy-going classes are available starting Oct. 19th on Tuesdays from 7 to 9 p.m. You can learn how computers work and what they can and can't do. You will also have some of the jargon deciphered, see what you can do with a computer, play some games and learn to program. The cost is $25. Contact the Community Computer Center, 1919 Menalto Ave., Menlo Park, CA 94025, phone (415) 325-4444.

A call for papers in personal computing has been issued by the 1977 National Computer Conference. The conference is scheduled for June 13-16, 1977. I have a few copies of the guidlines if you would like to submit a paper.

The First West Coast Computer Faire will be held April 16 and 17, 1977 at the San Francisco Civic Auditorium. This faire is shaping up rapidly. If you would like to lead a conference or participate in a conference session, please contact me. More information about the Faire is in the accompanying article.□

THE FIRST WEST COAST COMPUTER FAIRE

A Call For Papers And Participation

The San Francisco Bay Area is finally going to have a major conference and exhibition exclusively concerned with personal and home computing—The First West Coast Computer Faire. And, it promises to be a massive one! It will take place in the largest convention facility in Northern California: The Civic Auditorium in San Francisco. It will be a two-and-a-half day affair, starting on Friday evening and running through Sunday evening, April 15-17.

It is being sponsored by a number of local and regional hobbyist clubs, educational organizations and professional groups. These include:

- The two largest amateur computer organizations in the United States—the Homebrew Computer Club and the Southern California Computer Society
- Both of the Bay Area chapters of the Association Of Computing Machinery—the San Francisco Chapter and the Golden Gate Chapter
- Stanford University's Electrical Engineering Department


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Photo from articulate.com

Photo from photobucket: pacapo

Photo from Ambidextrous Mag

Photo from Bunnie Studios

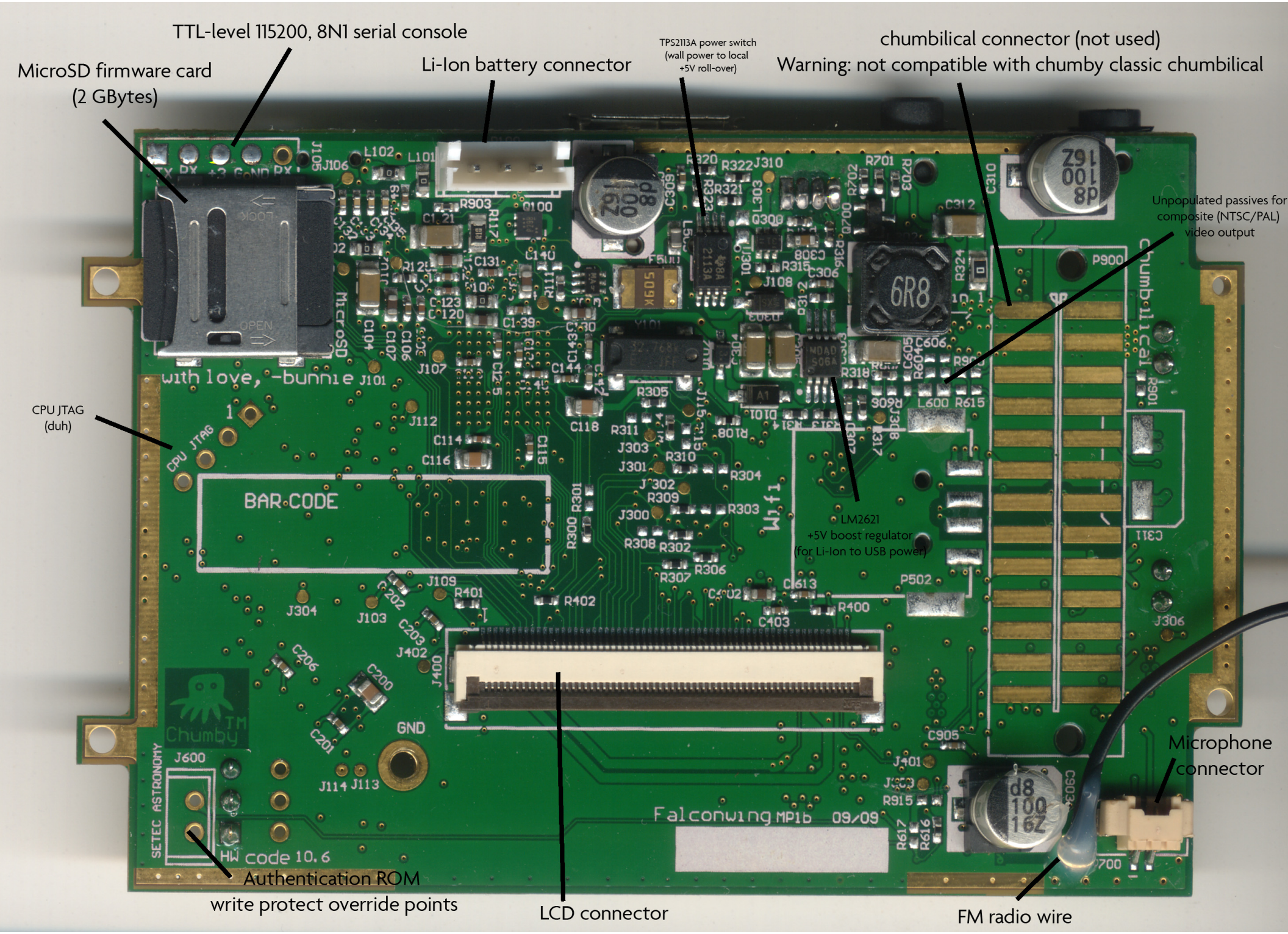
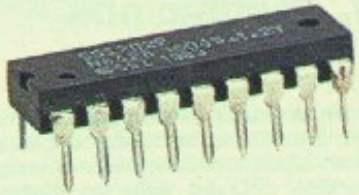


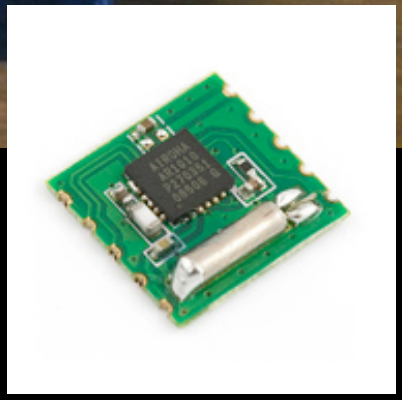
Photo from Bunnie Studios

FM Receiver On-A-Chip



11.95

TDA7000. Combines RF, mixer, IF and demodulator stages in one monolithic IC! Mute circuit reduces spurious reception. Frequency-locked-loop system with non critical 70 KHz IF. With data. **276-1304 . 11.95**



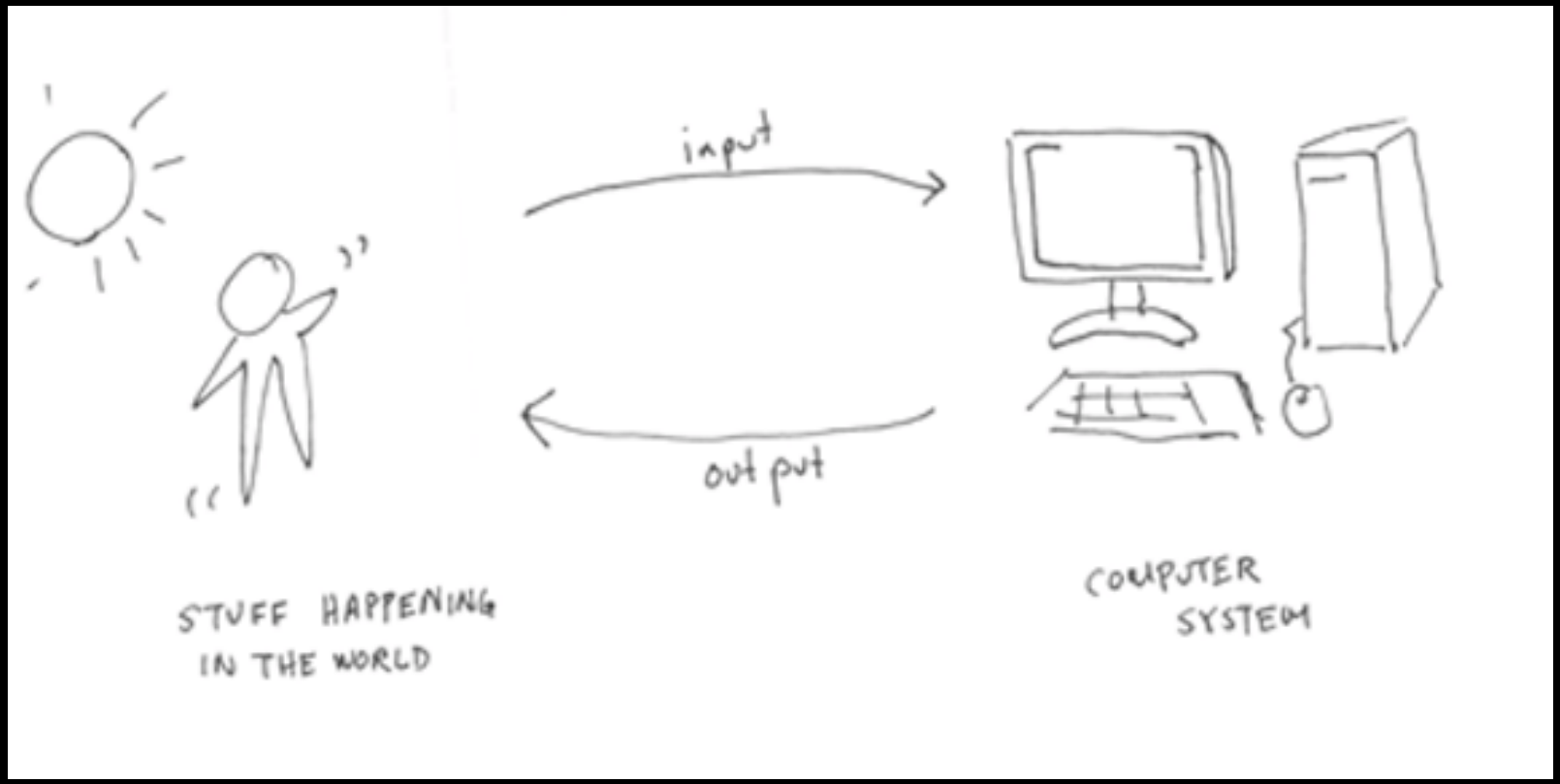

QUEEN
"WE WILL ROCK YOU"
soft
2 MINUTES OF MUSIC!
"WE WILL ROCK YOU"
PERFORMED BY
QUEEN
tooth tunes
MUSIC IN YOUR MOUTH


An
inflatable
corset

Multimeter demonstration

Voltage
Resistance
Connections

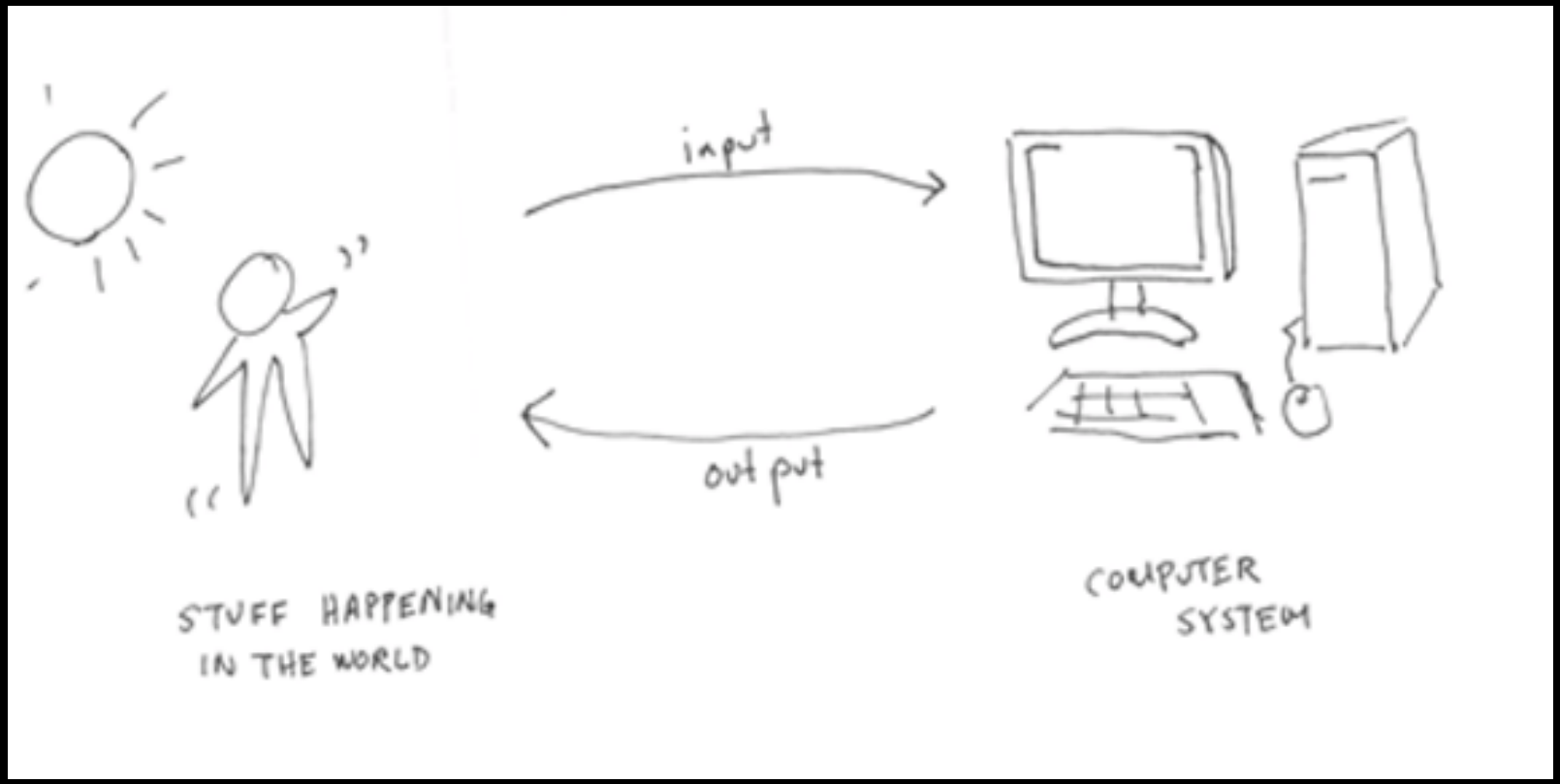
This week's preLab



How do we sketch ideas for interactions?

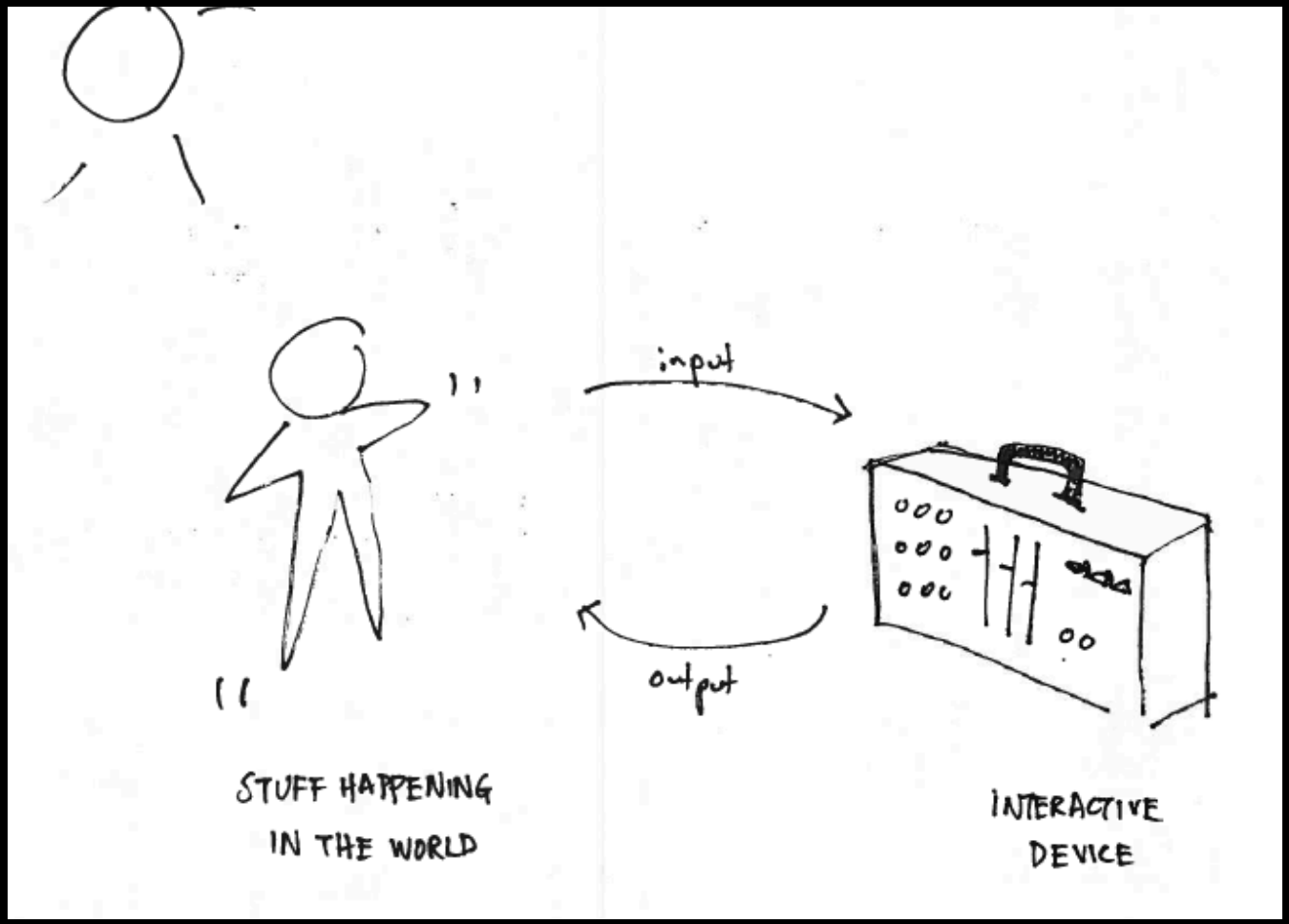
Interacting with Interactive Devices

some sketches



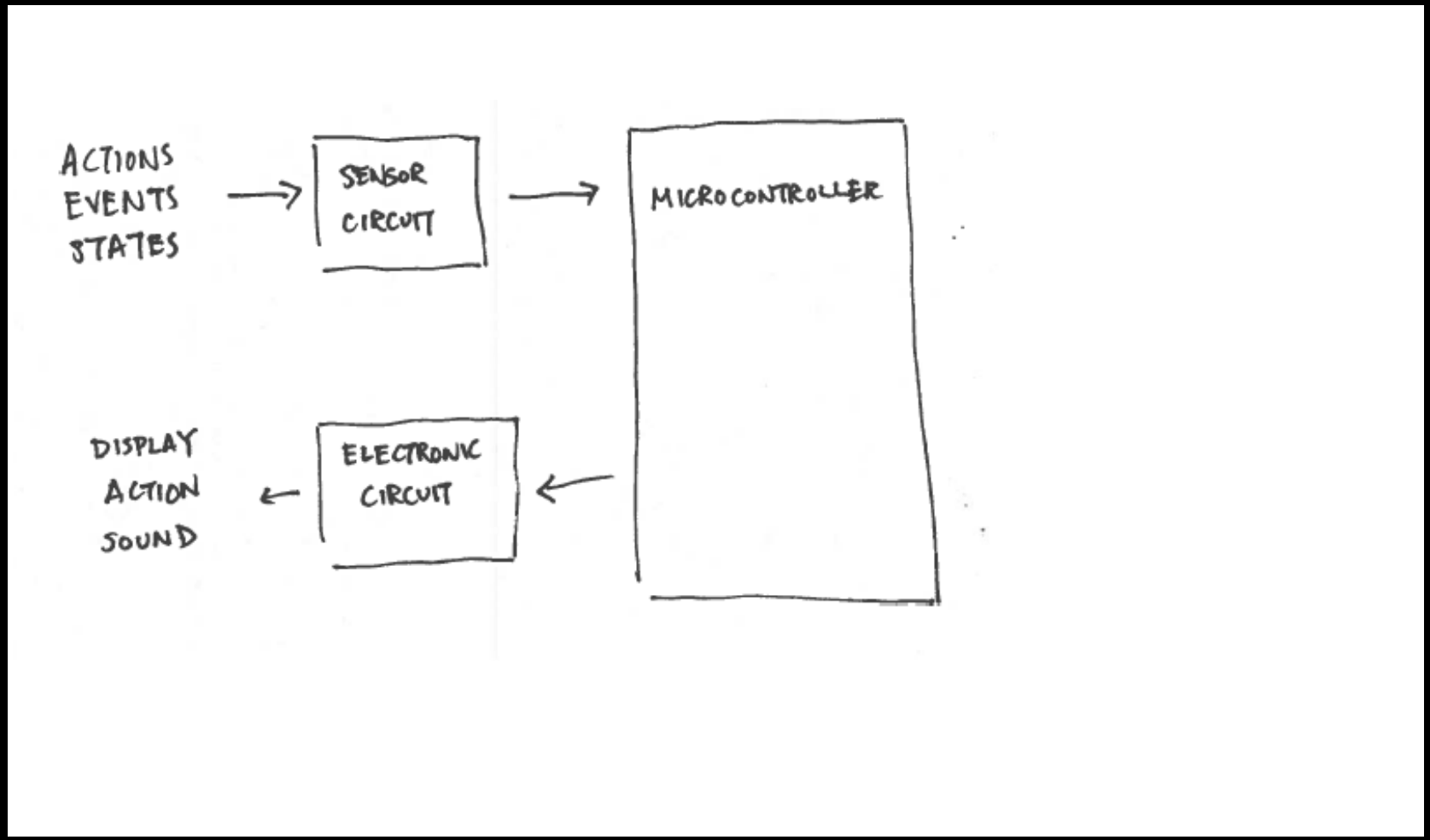
Interacting with Interactive Devices

some sketches



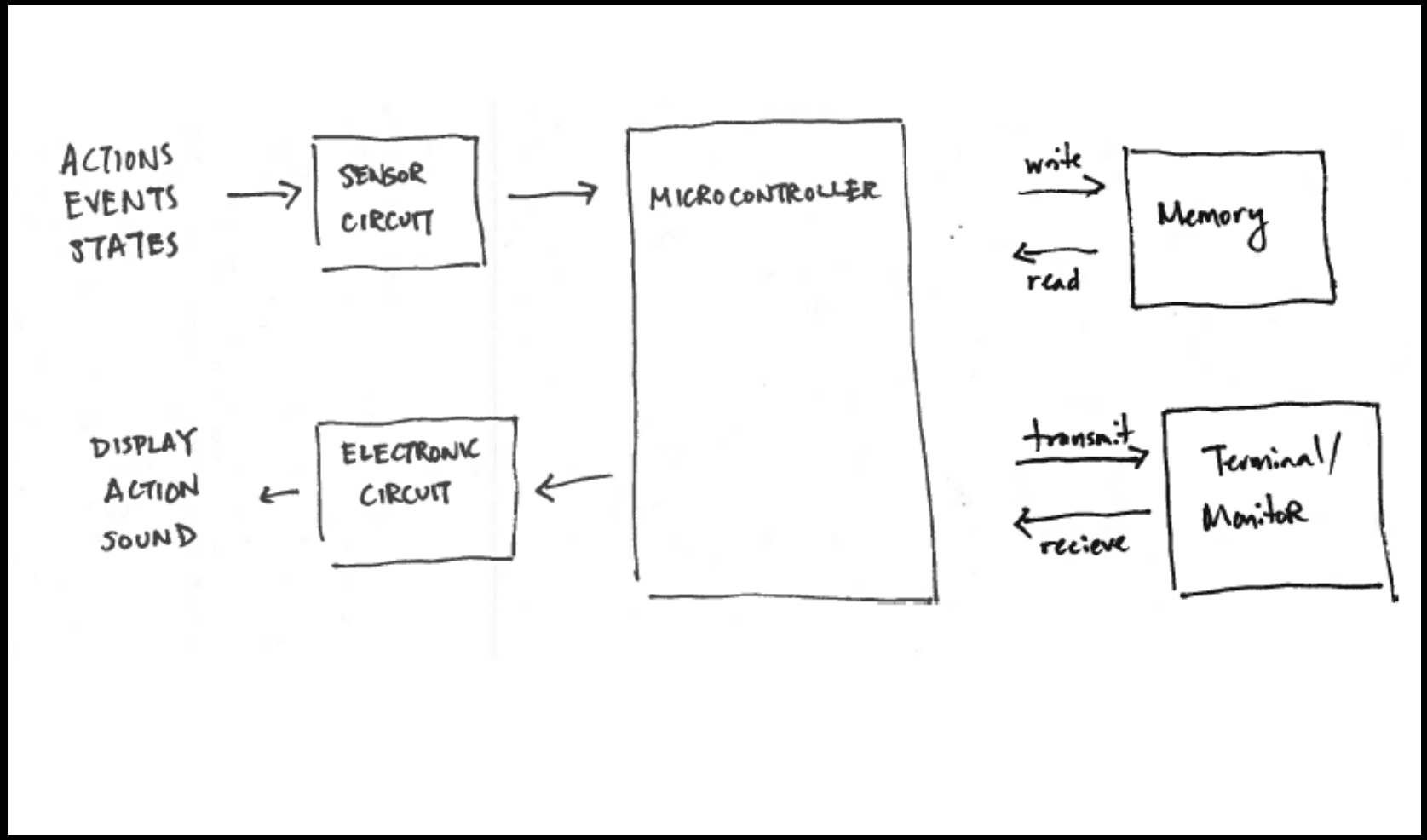
Interacting with Interactive Devices

some sketches



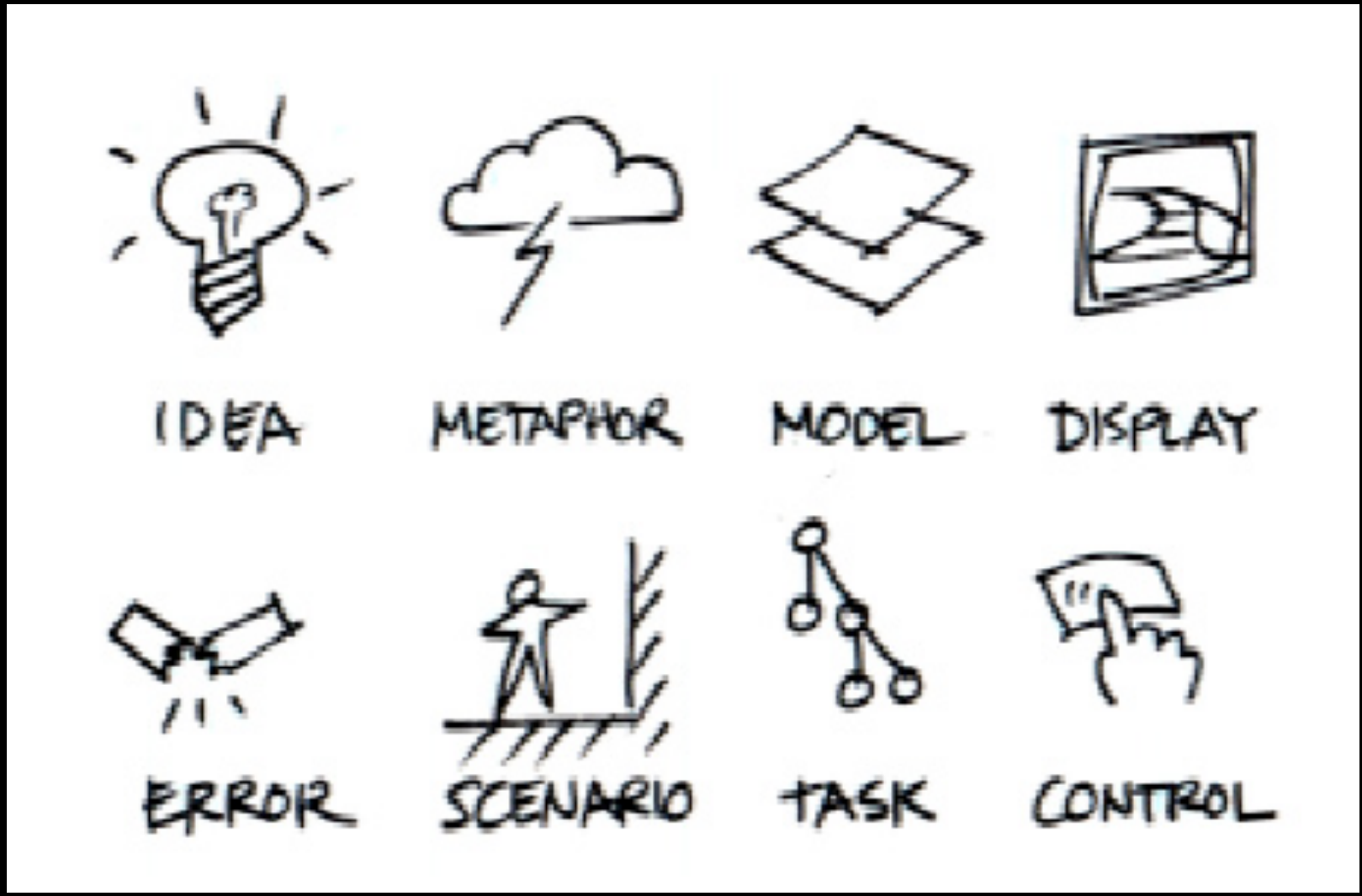
Interacting with Interactive Devices

some sketches



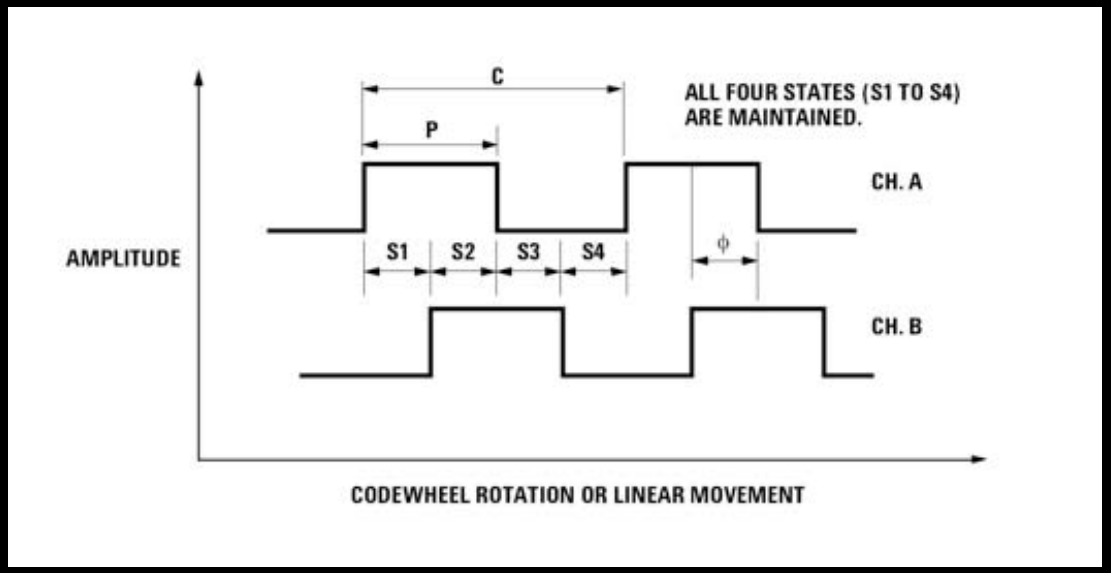
Interacting with Interactive Devices

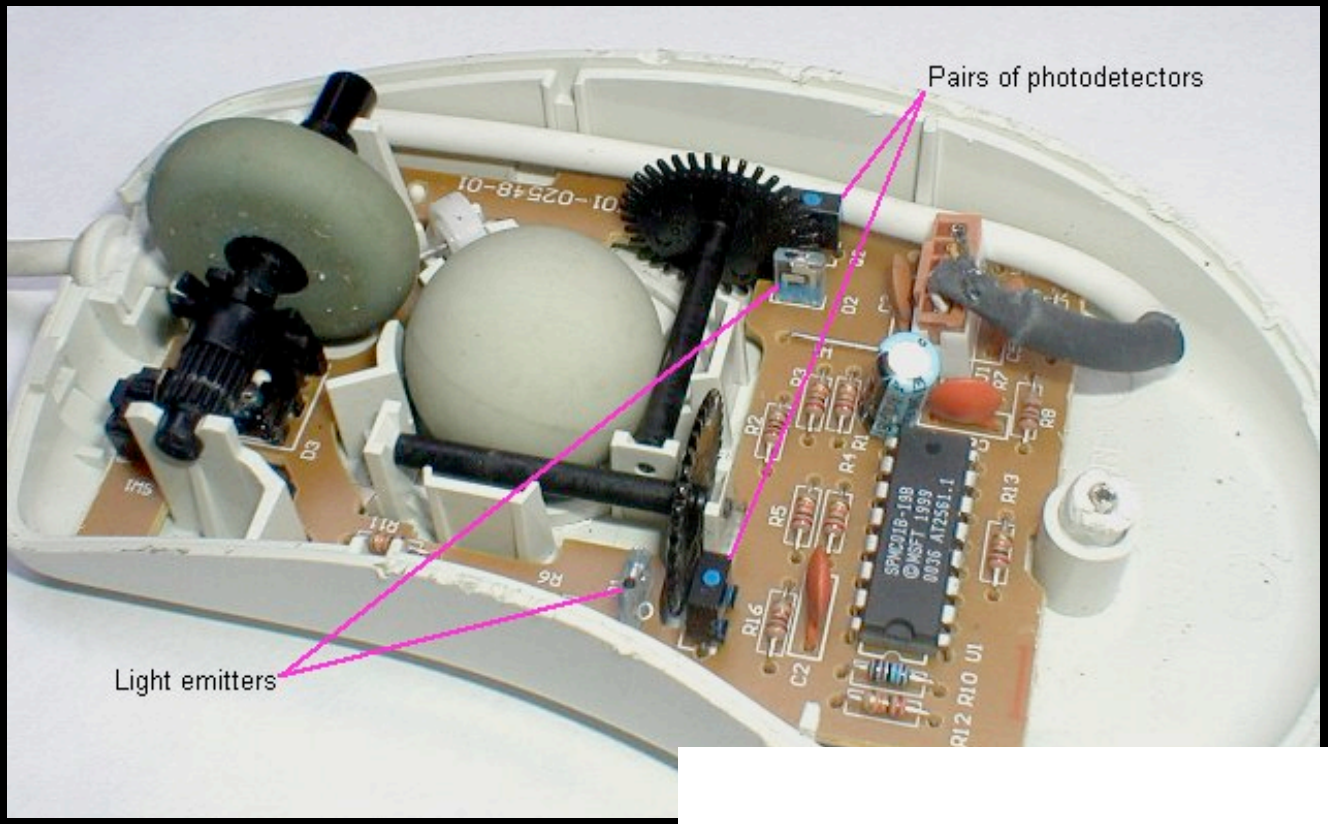
some sketches

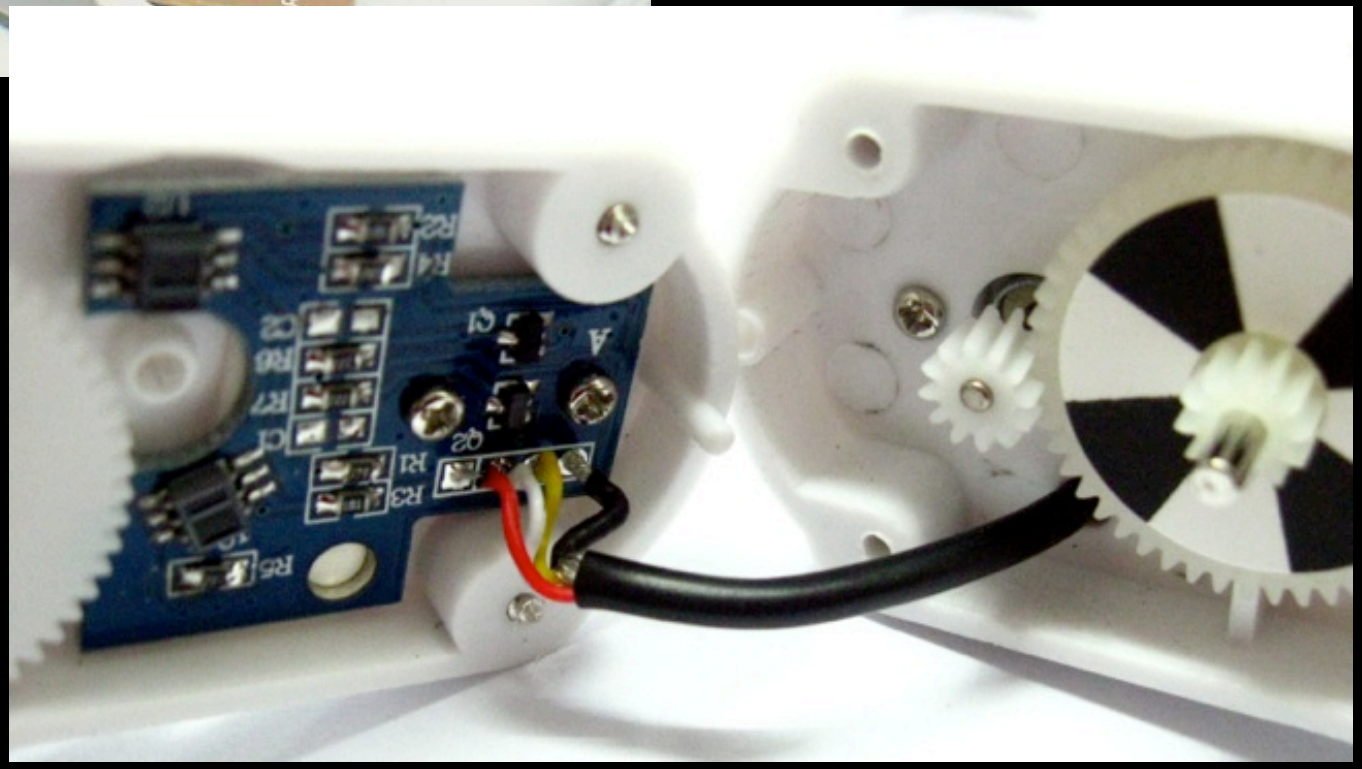


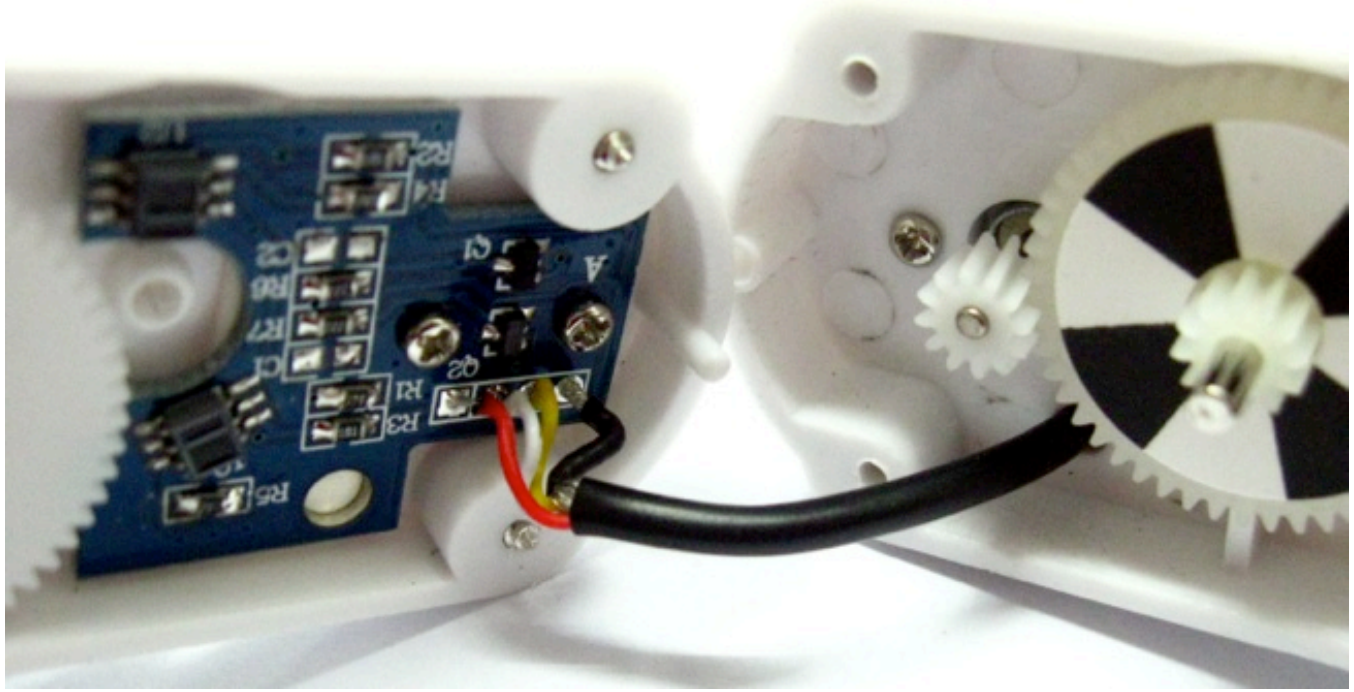
Sensors

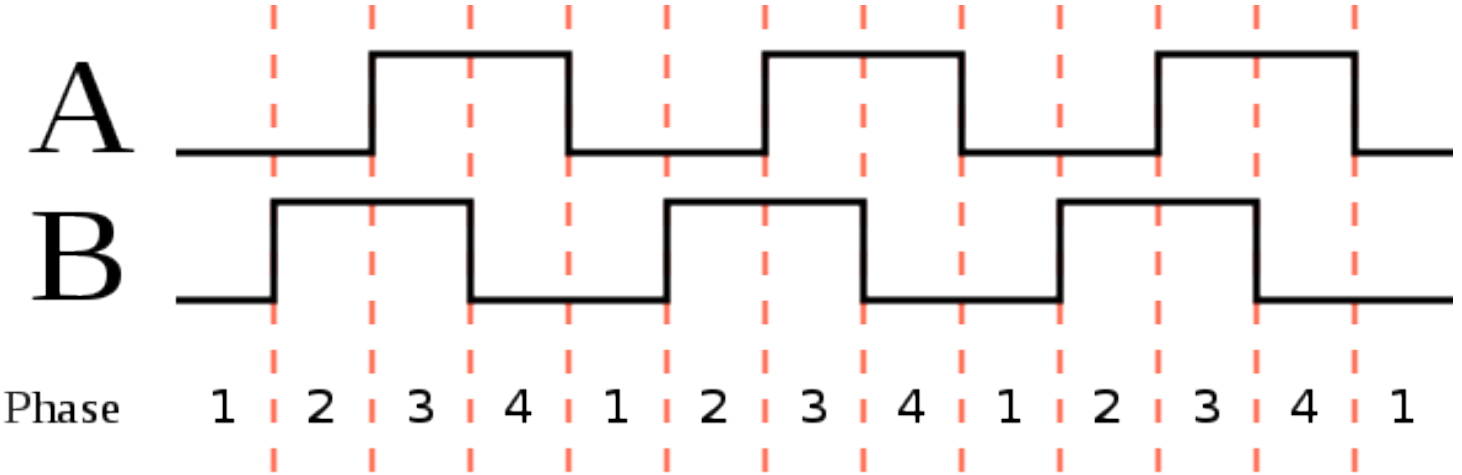
Time/Count varying sensors




Pairs of photodetectors
Light emitters

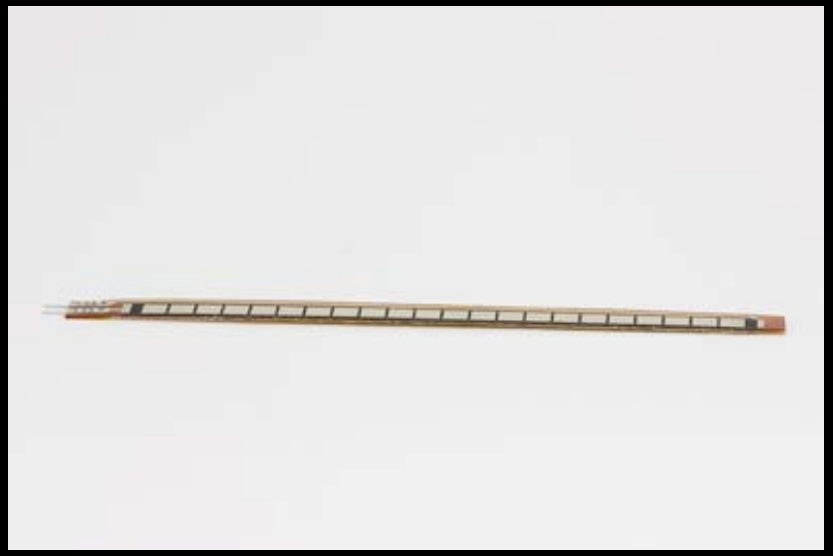





A
B
Phase
1 2 3 4 1 2 3 4 1 2 3 4 1

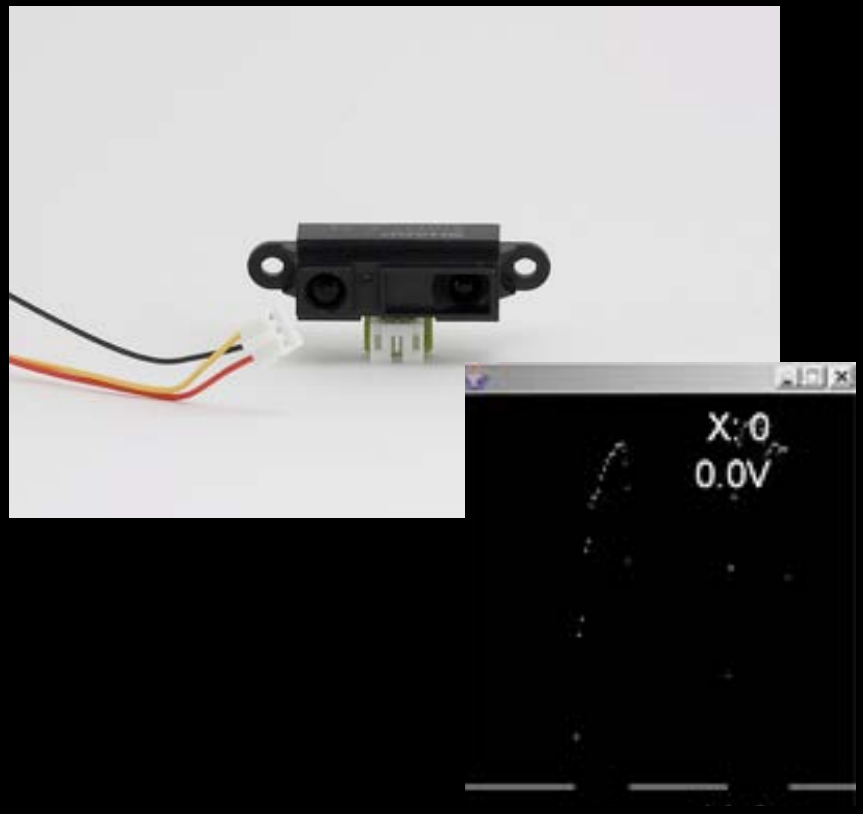
Sensors

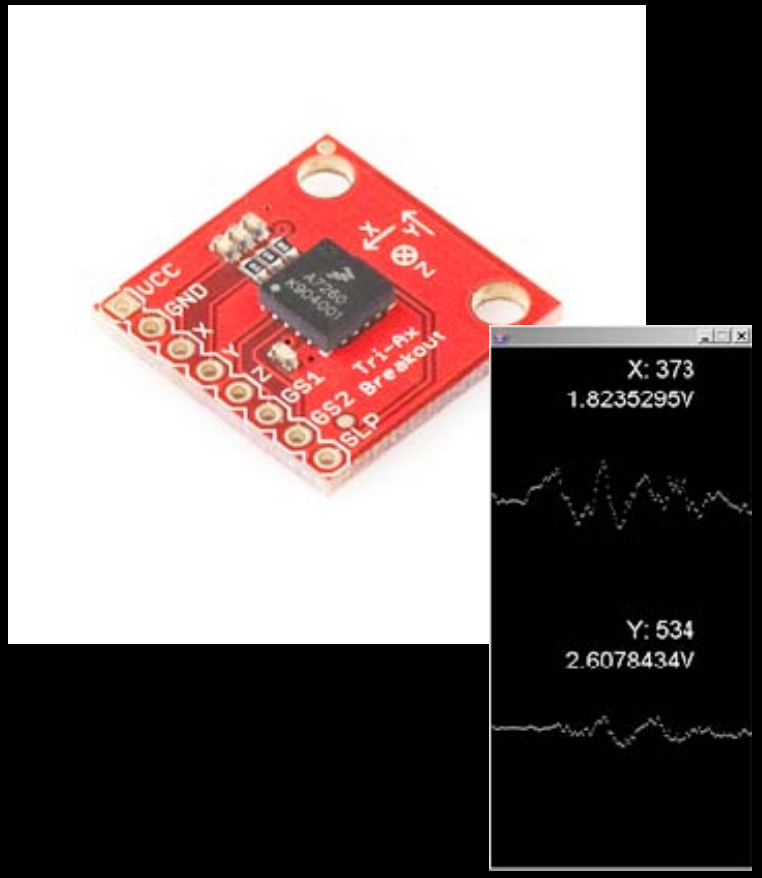
Resistance varying sensors



Sensors

Voltage varying sensors





Where do we get cool sensors, displays and actuators?

Tinkersphere (152 Allen St.)

Adafruit
Sparkfun
Jameco
Mouser
Digikey

Firmware Programming

Arduino IDE review, questions

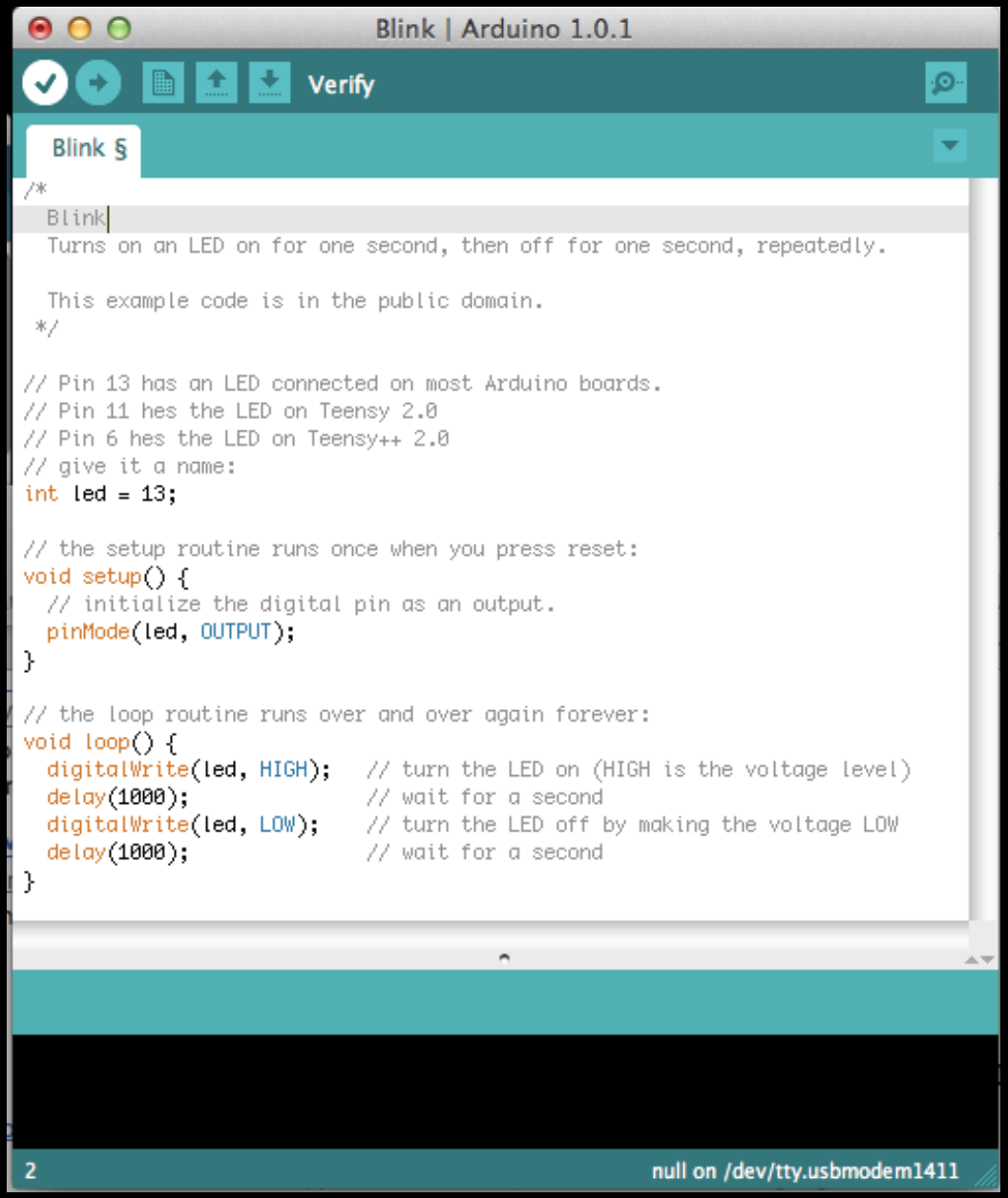
Behind the Scenes

Finite State Machines

Modules

Where were we?

Set preferences to see verbose mode
when compiling, uploading.
Let's look at the files.


Blink | Arduino 1.0.1
Verify
Blink §
/*
Blink
Turns on an LED on for one second, then off for one second, repeatedly.
This example code is in the public domain.
*/
// Pin 13 has an LED connected on most Arduino boards.
// Pin 11 hes the LED on Teensy 2.0
// Pin 6 hes the LED on Teensy++ 2.0
// give it a name:
int led = 13;
// the setup routine runs once when you press reset:
void setup() {
// initialize the digital pin as an output.
pinMode(led, OUTPUT);
}
// the loop routine runs over and over again forever:
void loop() {
digitalWrite(led, HIGH); // turn the LED on (HIGH is the voltage level)
delay(1000); // wait for a second
digitalWrite(led, LOW); // turn the LED off by making the voltage LOW
delay(1000); // wait for a second
}
2
null on /dev/tty.usbmodem1411

```
drwxr-xr-x  21 wendyju  wendyju     714 Apr 11 15:43 .
drwx------  16 wendyju  wendyju     544 Apr 11 15:47 ..
-rw-r--r--   1 wendyju  wendyju     559 Apr 11 15:42 Blink.cpp
-rw-r--r--   1 wendyju  wendyju      13 Apr 11 15:43 Blink.cpp.eep
-rwxr-xr-x   1 wendyju  wendyju   13913 Apr 11 15:43 Blink.cpp.elf
-rw-r--r--   1 wendyju  wendyju    2881 Apr 11 15:43 Blink.cpp.hex
-rw-r--r--   1 wendyju  wendyju    3716 Apr 11 15:42 Blink.cpp.o
-rw-r--r--   1 wendyju  wendyju   17868 Apr 11 15:43 HardwareSerial.cpp.o
-rw-r--r--   1 wendyju  wendyju   31996 Apr 11 15:43 Print.cpp.o
-rw-r--r--   1 wendyju  wendyju   16264 Apr 11 15:43 Tone.cpp.o
-rw-r--r--   1 wendyju  wendyju    5676 Apr 11 15:43 WInterrupts.c.o
-rw-r--r--   1 wendyju  wendyju    7068 Apr 11 15:43 WMath.cpp.o
-rw-r--r--   1 wendyju  wendyju   57548 Apr 11 15:43 WString.cpp.o
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-rw-r--r--   1 wendyju  wendyju    3288 Apr 11 15:42 pins_arduino.c.o
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-rw-r--r--   1 wendyju  wendyju    6776 Apr 11 15:43 wiring_analog.c.o
-rw-r--r--   1 wendyju  wendyju    9256 Apr 11 15:43 wiring_digital.c.o
-rw-r--r--   1 wendyju  wendyju    6812 Apr 11 15:43 wiring_pulse.c.o
-rw-r--r--   1 wendyju  wendyju    5344 Apr 11 15:43 wiring_shift.c.o
```
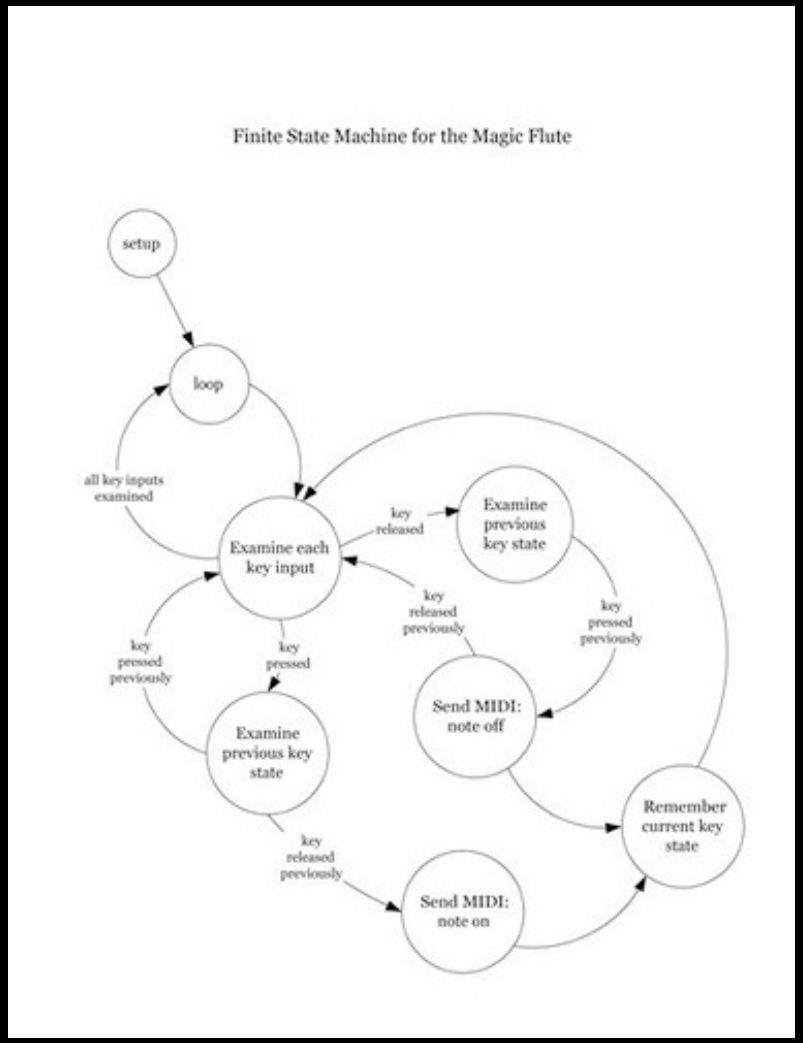
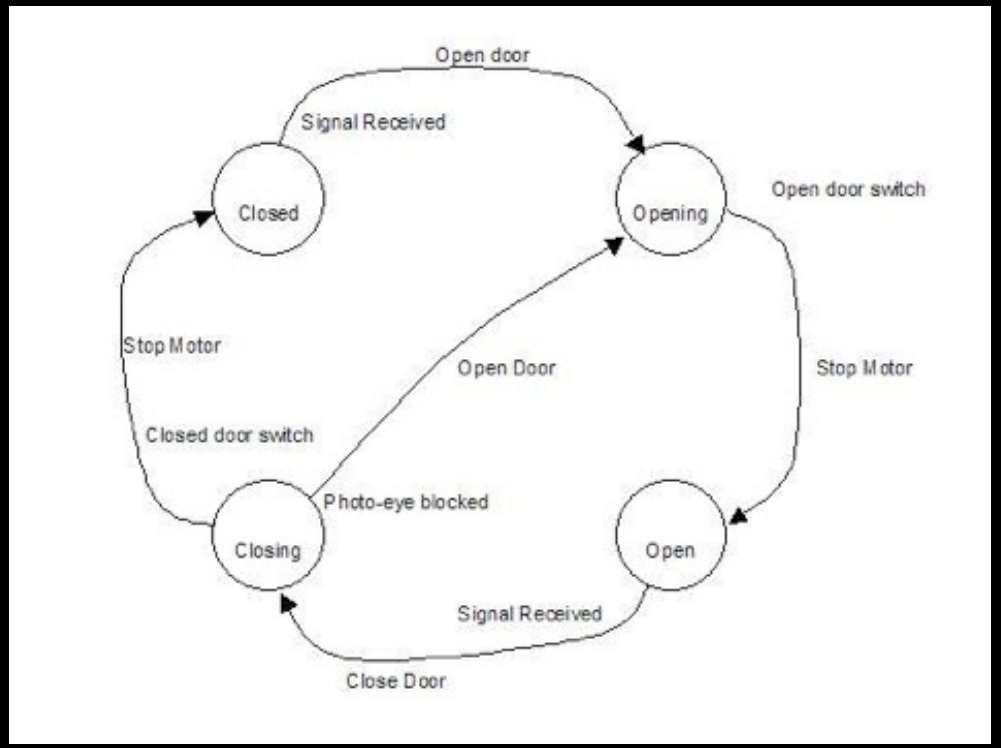
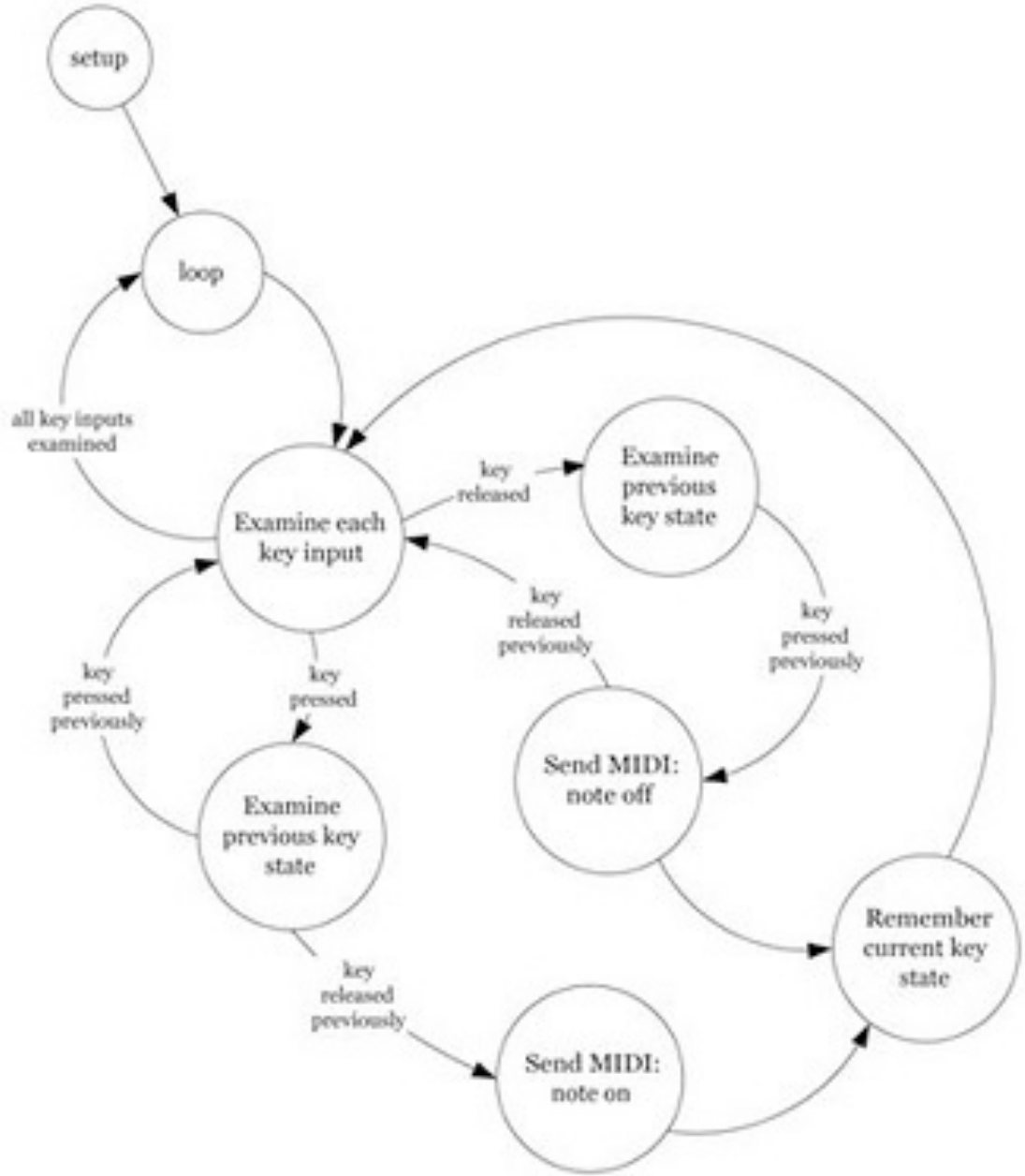

Finite State Machine Model

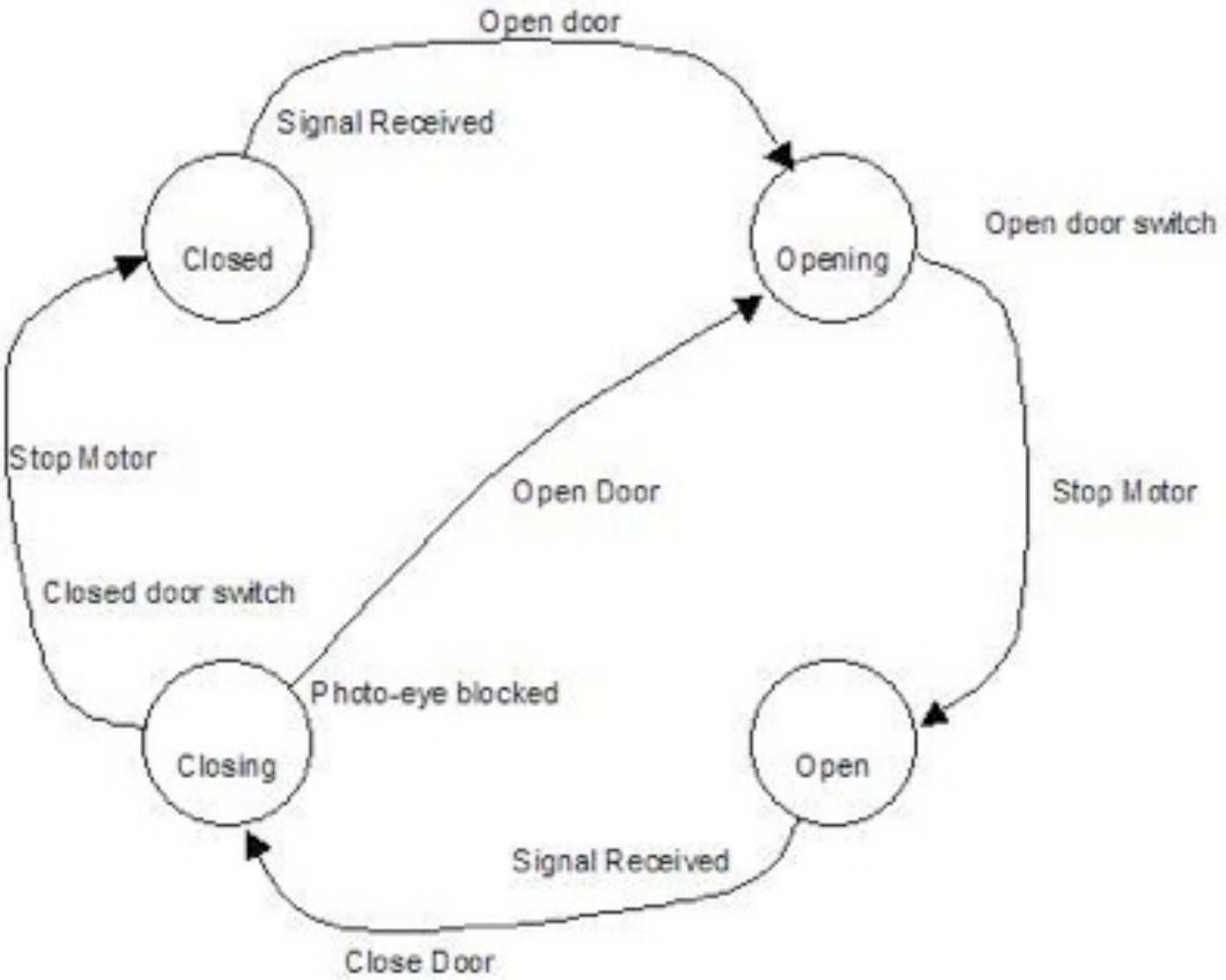
Sketching Interactive Device Behavior





Finite State Machine for the Magic Flute



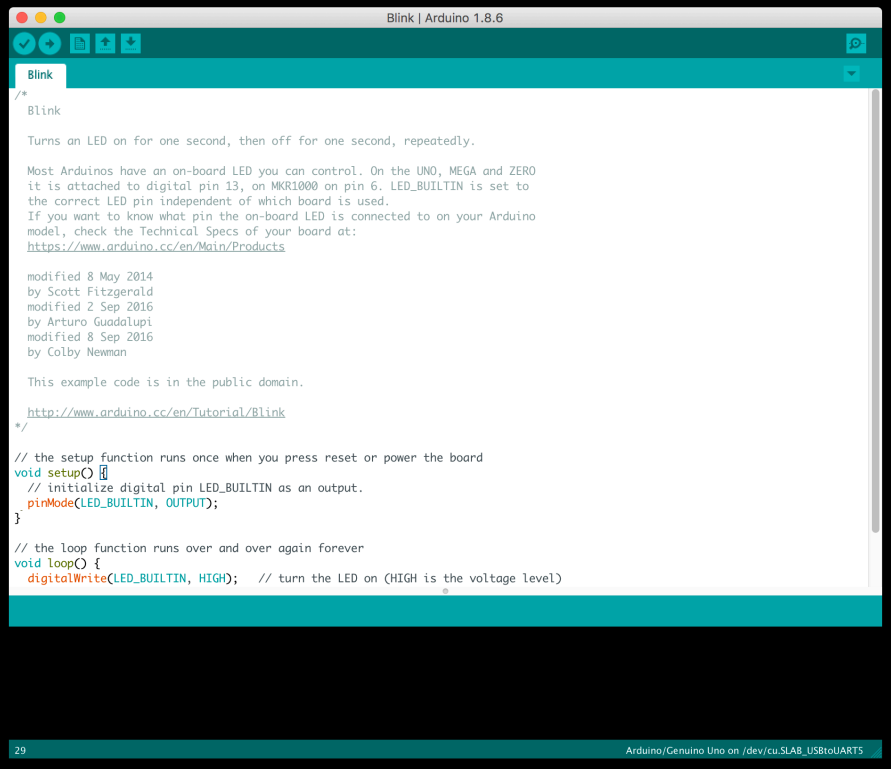

Open door
Signal Received
Closed
Opening
Open door switch
Stop Motor
Open Door
Stop Motor
Closed door switch
Photo-eye blocked
Closing
Open
Signal Received
Close Door

Adapting Found Code

How do we merge two programs?

Adapting Found Code

How do we merge two programs?



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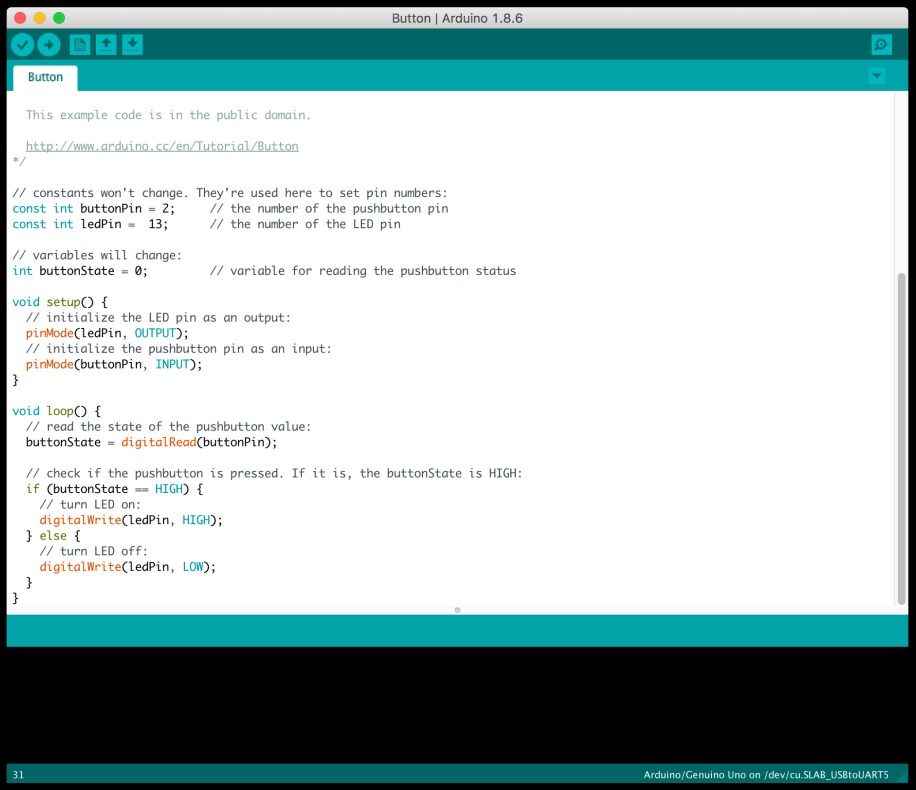
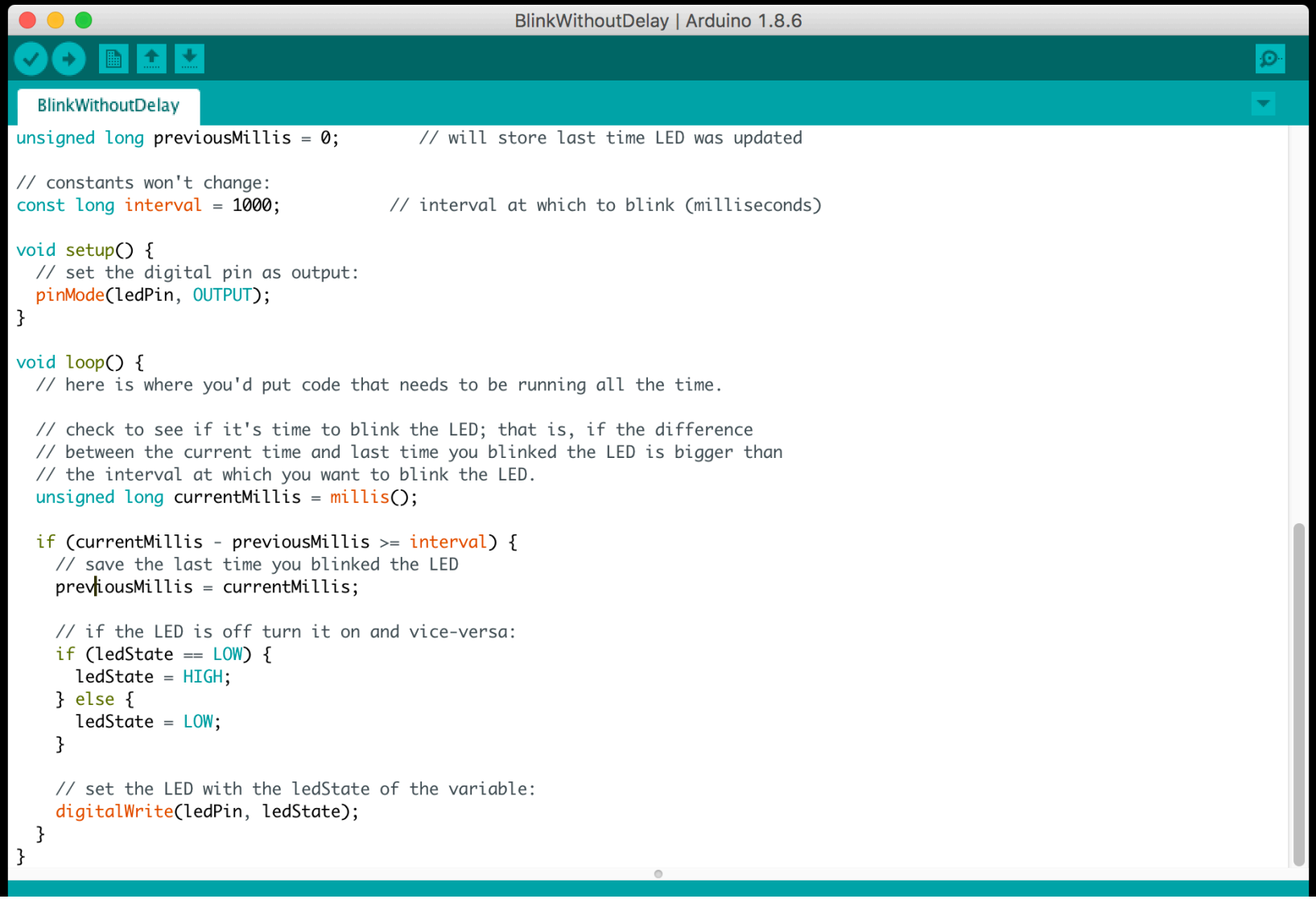


Non-blocking Code

How do we write code that doesn't block execution?



Modules & Modes

Organizing functions and Behaviors