DANGER
HIGH VOLTAGE ABOVE
KEEP OFF
PACIFIC GAS AND ELECTRIC COMPANY
Arduino

- Digital/analog I/O
- $30 for base model
- Open-source hardware
Getting started
Blink an LED
The Arduino IDE

Lots of examples.

Start with:

* File
  * Examples
    * Basic
      * Blink
Powerswitch tail
Sensors

What kinds of devices can you talk to?
Light sensor
Sonar rangefinder
Serial from Arduino

```cpp
int sensorPin = 1;

void setup()
{
    Serial.begin(9600);
}

void loop()
{
    int val = analogRead(sensorPin);
    Serial.println(val);
    delay(500);
}
```
Serial pins

Arduino uses digital pins 0 and 1 for serial.

Don't use them for something else!

(when doing serial I/O)
Command-line development

Packages:
\[ gcc-avr, avr-libc, binutils-avr \]
\[ avrdude \]

Need a Makefile and the Arduino libraries.
import serial

ard = serial.Serial("/dev/ttyACM0", 9600)
# Also try ttyACM1, ttyUSB0, etc.

while True :
    print ard.readline()
Graphical output
void setup() {
    Serial.begin(115200);
}

void loop() {
    // read all analog ports, split by " "
    for (int i=0; i<6; i++) {
        Serial.print(analogRead(i));
        Serial.print(" ");
    }
    Serial.println();
}
Graphical output

**Processing.org:** most common way.

Anything works! C, python, ruby, gnuplot etc.

You're just reading/plotting serial data.
Cool hardware
Special-purpose shields

- displays
- gaming
- motor
- sound/voice
- networking
- GPS
- data logging
- prototyping
Plotting data

```python
import pylab
pylab.plotfile('logger00.csv', (0, 1, 2, 3))
pylab.show()
```
Connecting motors

You *could* ... plug one wire into output pin, other into ground.
Electronic Speed Controller
Writing to the Arduino

On the Arduino:

```cpp
int nchars = Serial.available();
char c = Serial.read();
```

In Python:

```python
import serial
ser = serial.Serial(port, 9600)
ser.write(line)
```
Arduino / Air Swimmers Shark transmitter interface

**Blue**

- Arduino digital 2
- 1k
- NPN (e.g. 2222 or 4401)
- Shark right btn

**Yellow**

- Arduino digital 4
- 1k
- NPN (e.g. 2222 or 4401)
- Shark up btn

**Green**

- Arduino digital 3
- 1k
- NPN (e.g. 2222 or 4401)
- Shark left btn

**Orange**

- Arduino digital 5
- 1k
- NPN (e.g. 2222 or 4401)
- Shark down btn

**Brown**: ground  
**Red**: not used
STOP USING THE AISLE BEHIND MY CUBICLE. IT'S DISTRACTING.

EVERYTHING WITHIN TWELVE FEET OF MY CUBICLE ARE MY TERRITORIAL WATERS. YOU CAN'T ENFORCE THAT.

TELL THAT TO MY ROBOSHARK.
Thank you ...
and have fun hacking!

Summary and notes at:
shallowsky.com/arduino