



Automated mini-greenhouse

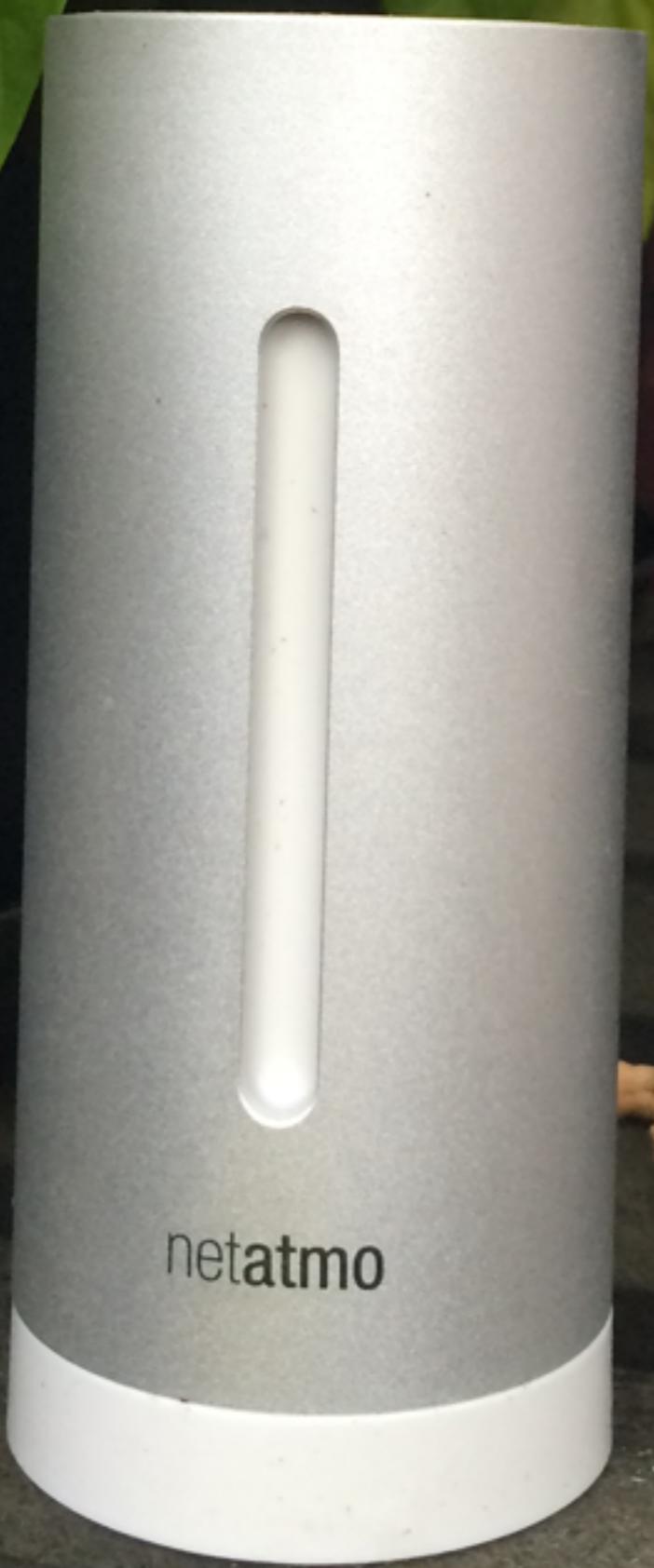
@anettebgo

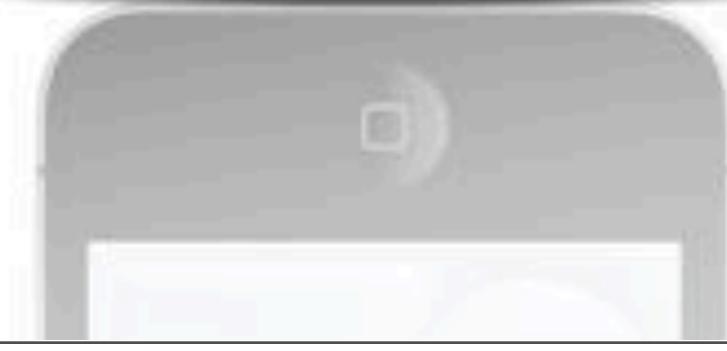




Version One







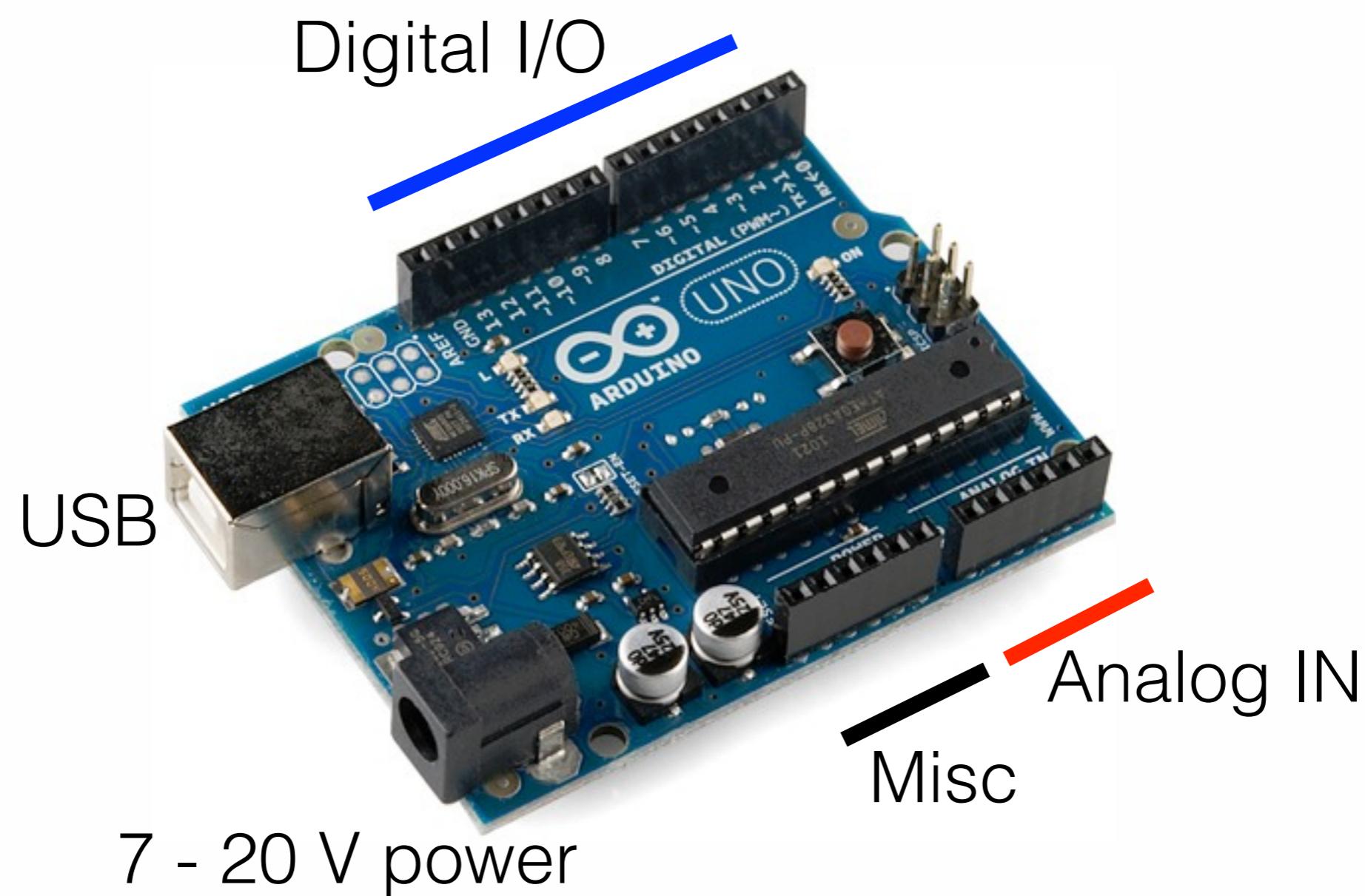
ALARM



Version Two

Arduino

The Hardware



Digital I/O

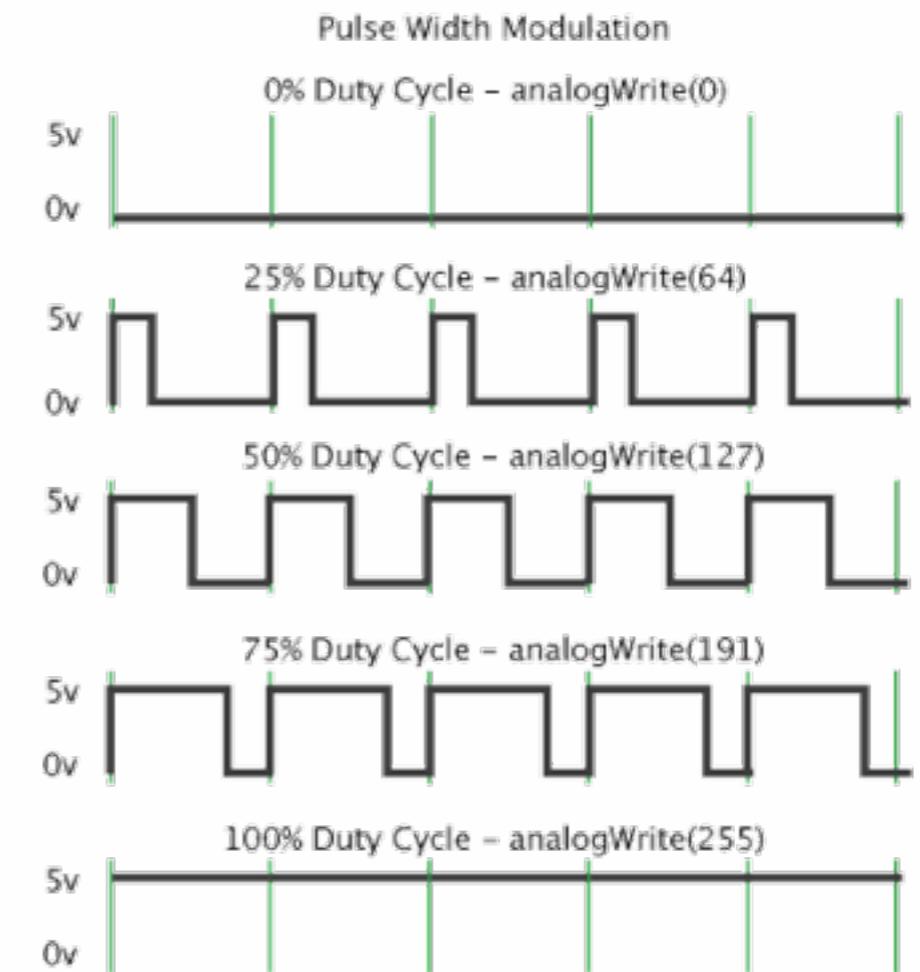


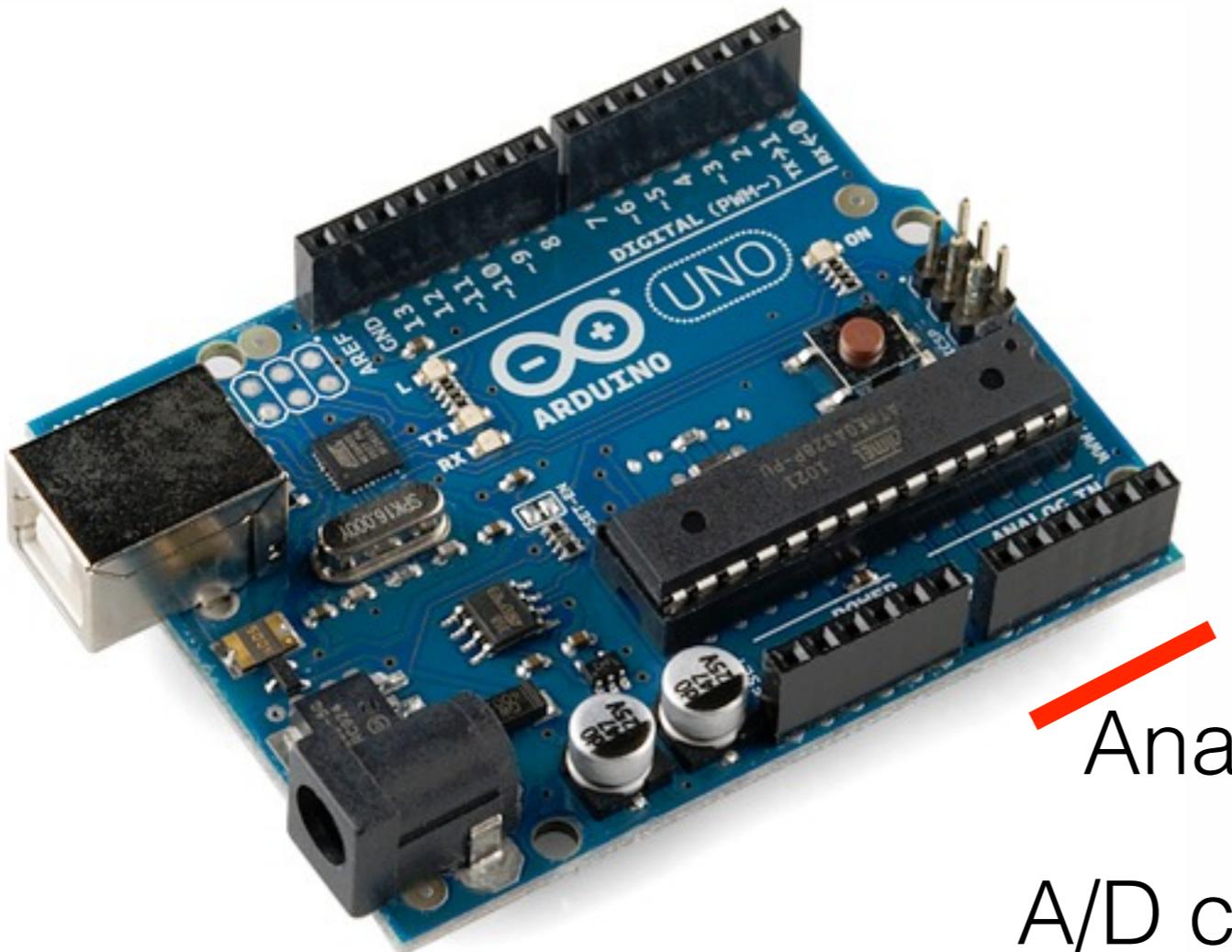
Input or Output mode
Digital input (High/Low)
Digital or ‘Analog’ output (Not really)

Digital I/O



“Analog” out - Pulse Width Modulation





Analog IN

A/D conversion

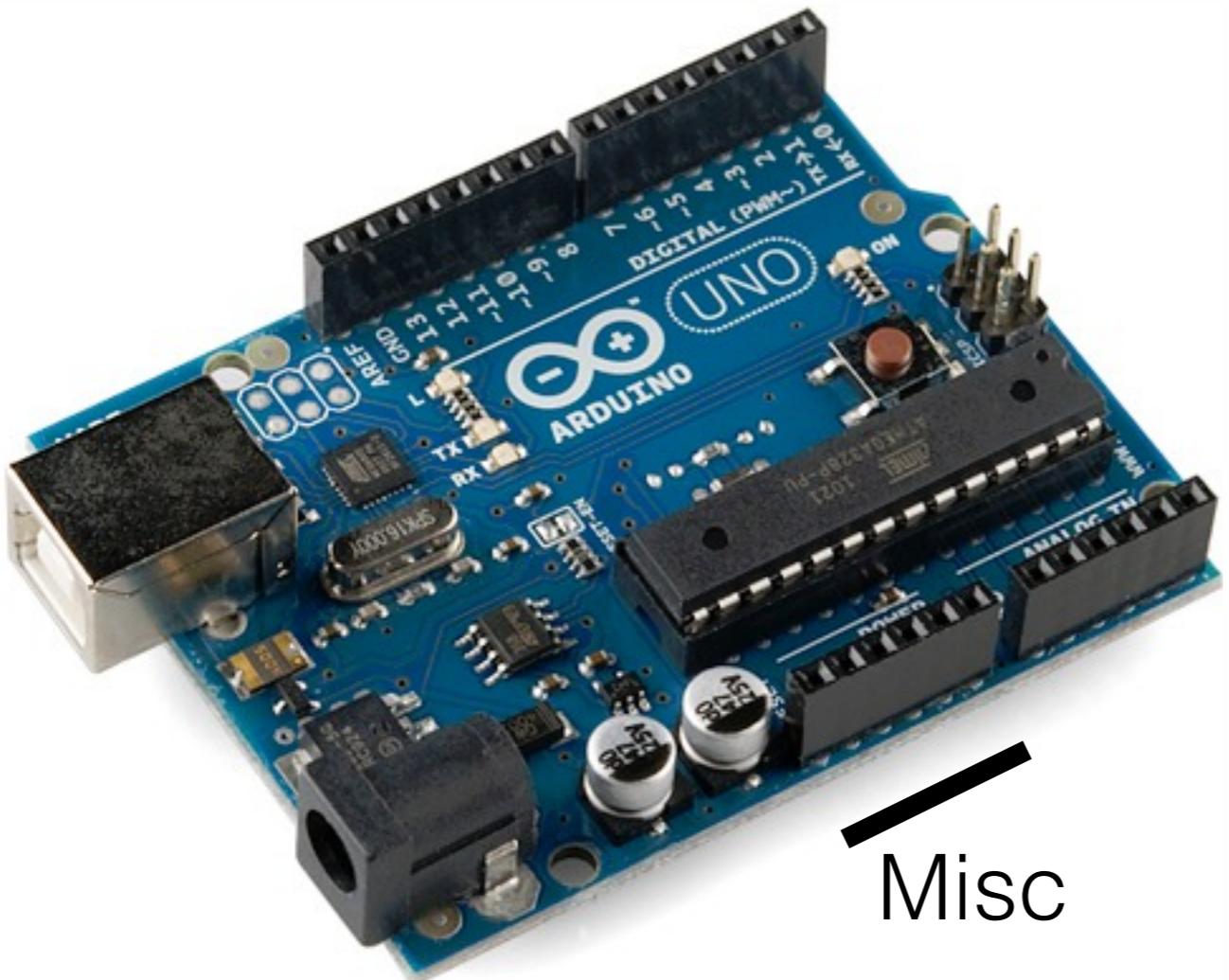
Low current == low number

High current == high number

10bit resolution

Doubles as Digital I/O pins

No D/A conversion!



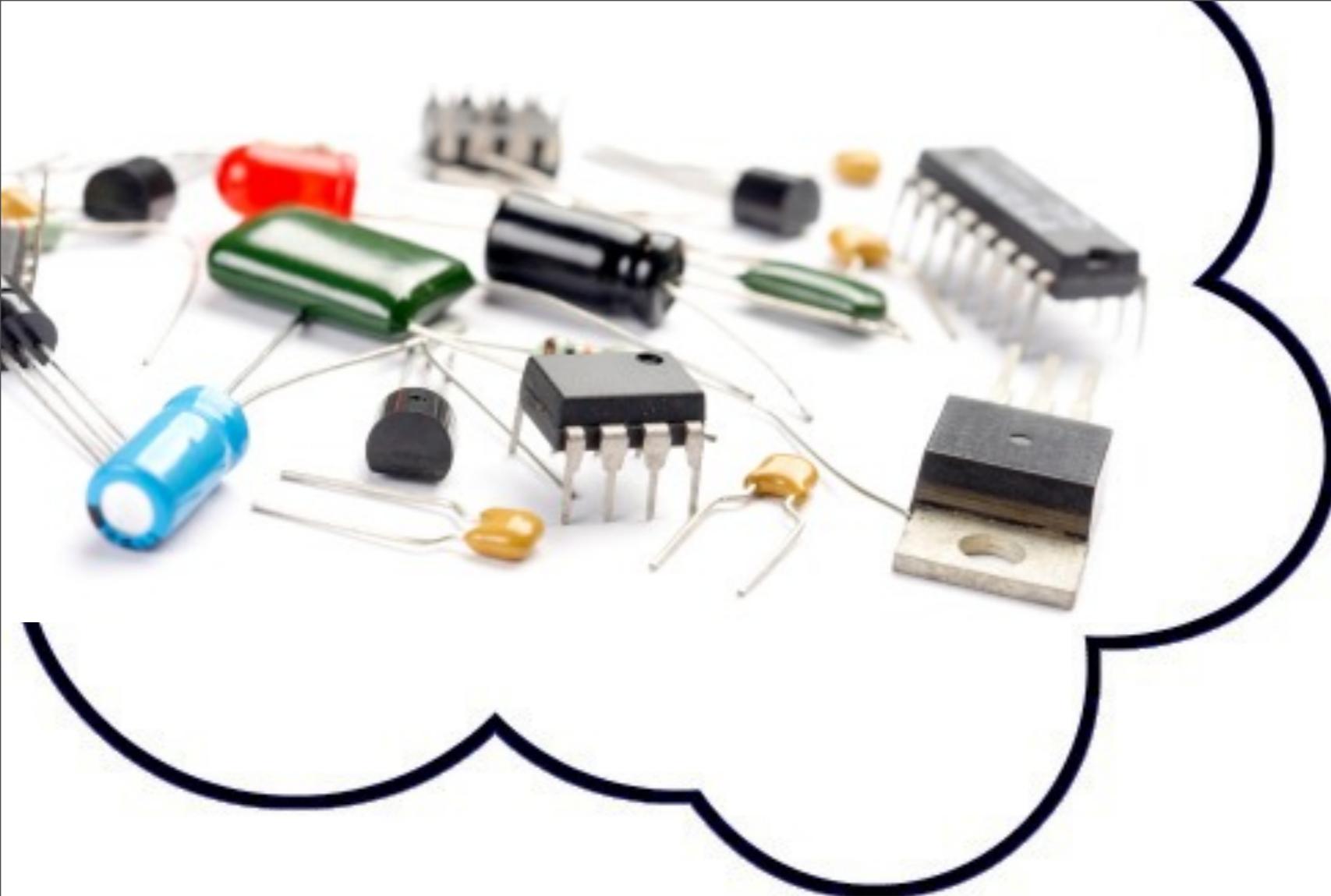
Misc

+5v

+3.3v

Ground

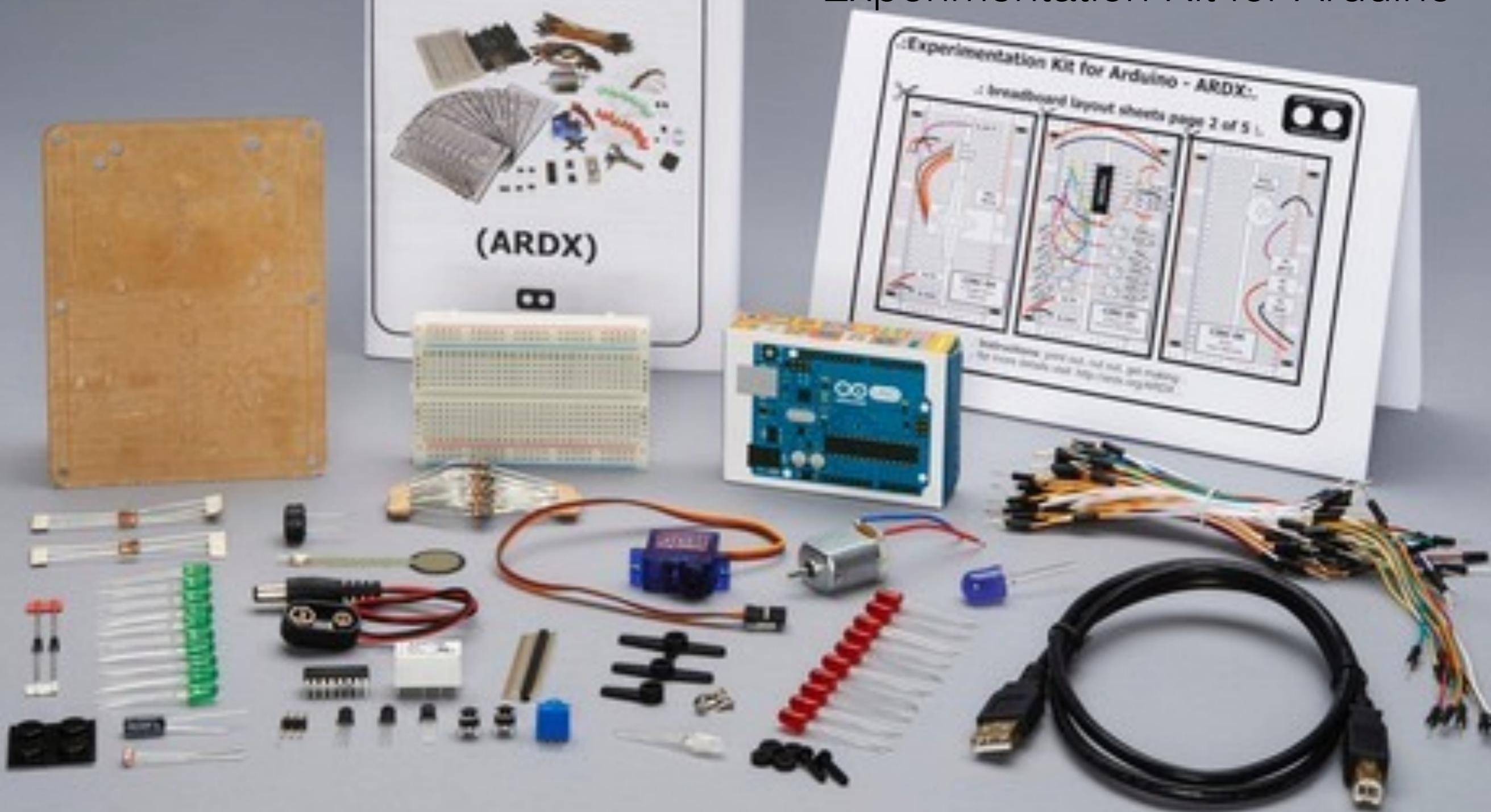
Reset

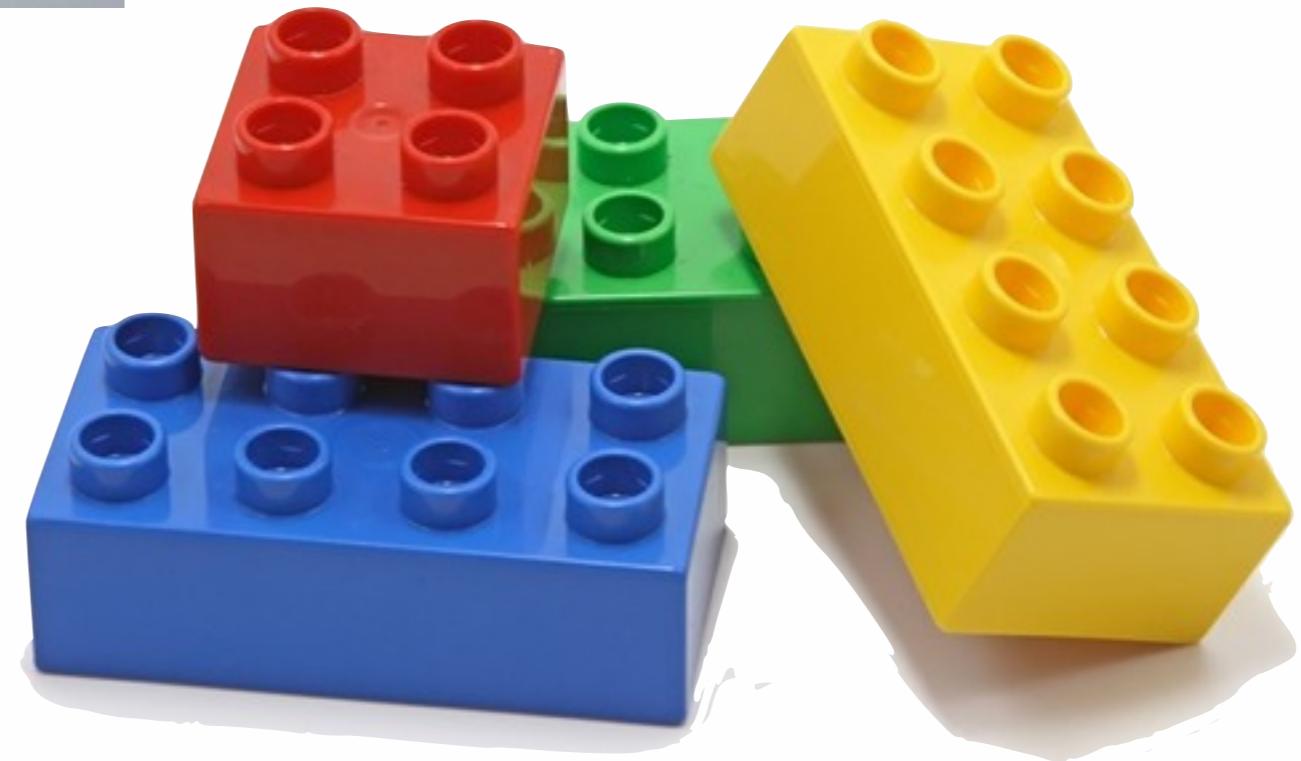




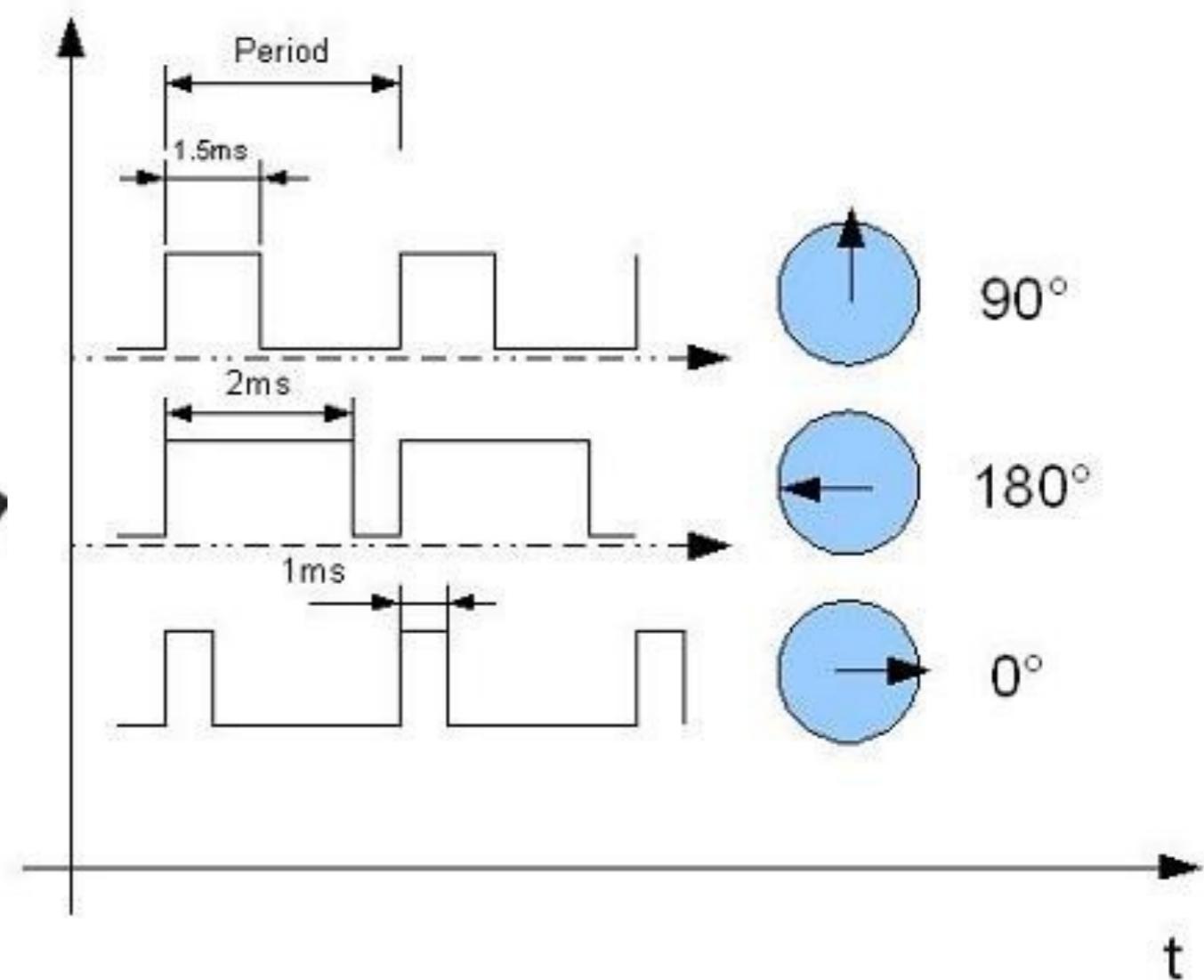
adafruit

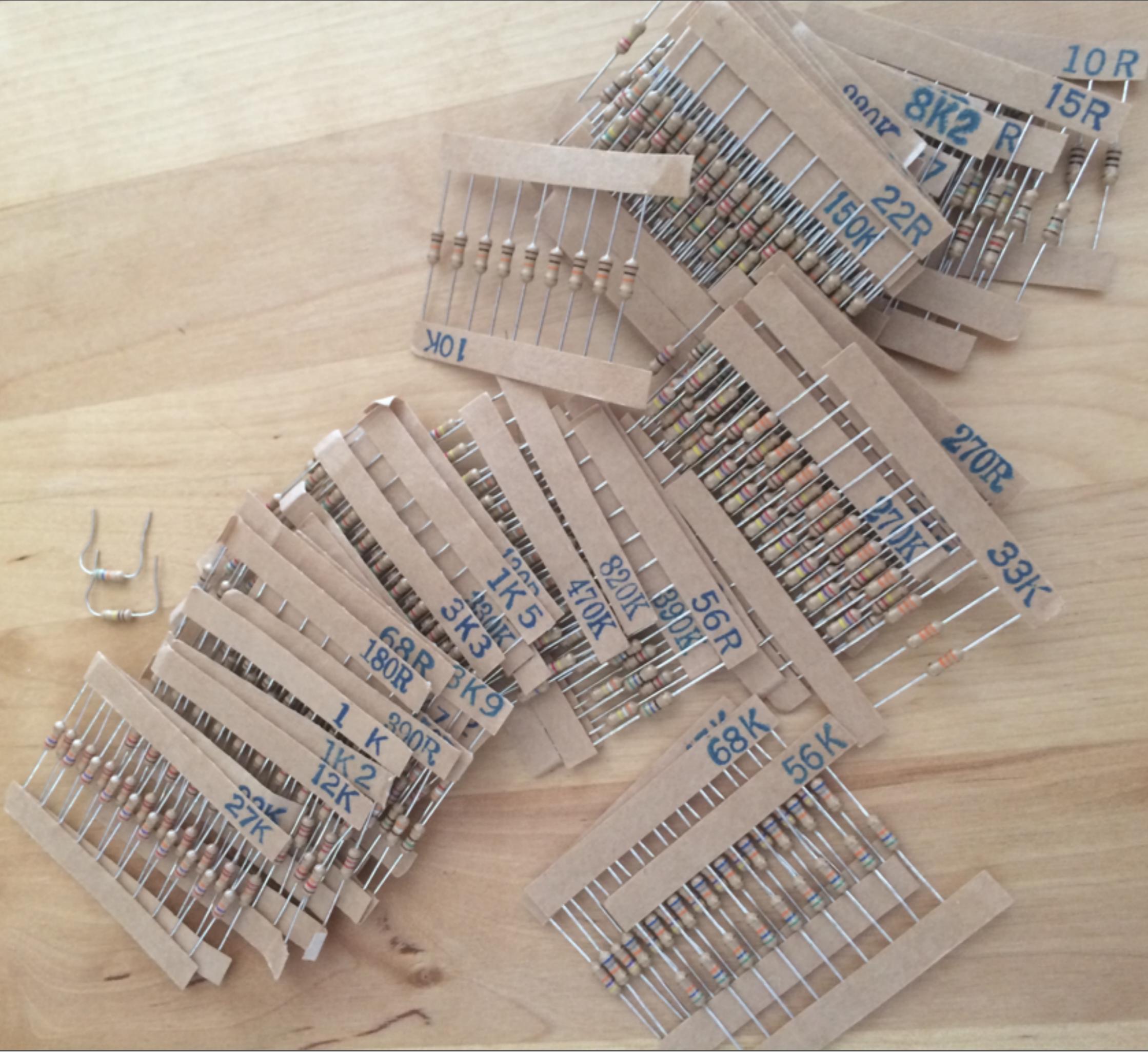
Adafruit ARDX - v1.3 Experimentation Kit for Arduino



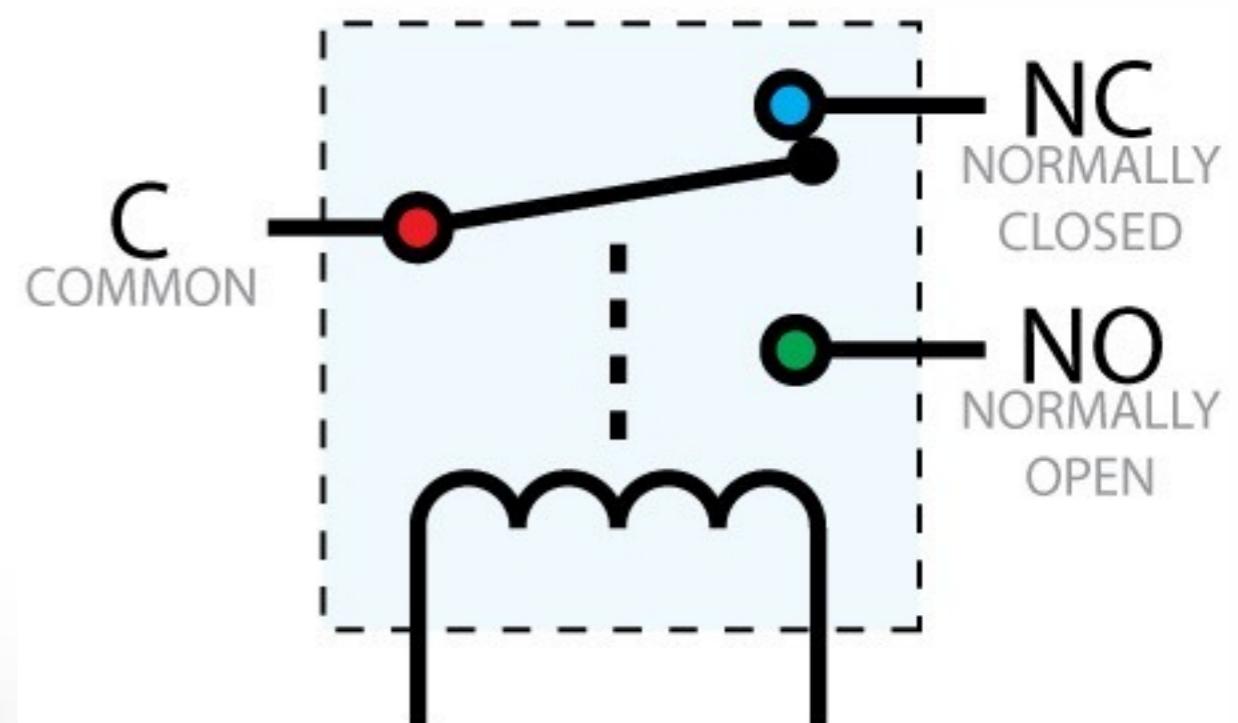


Servo

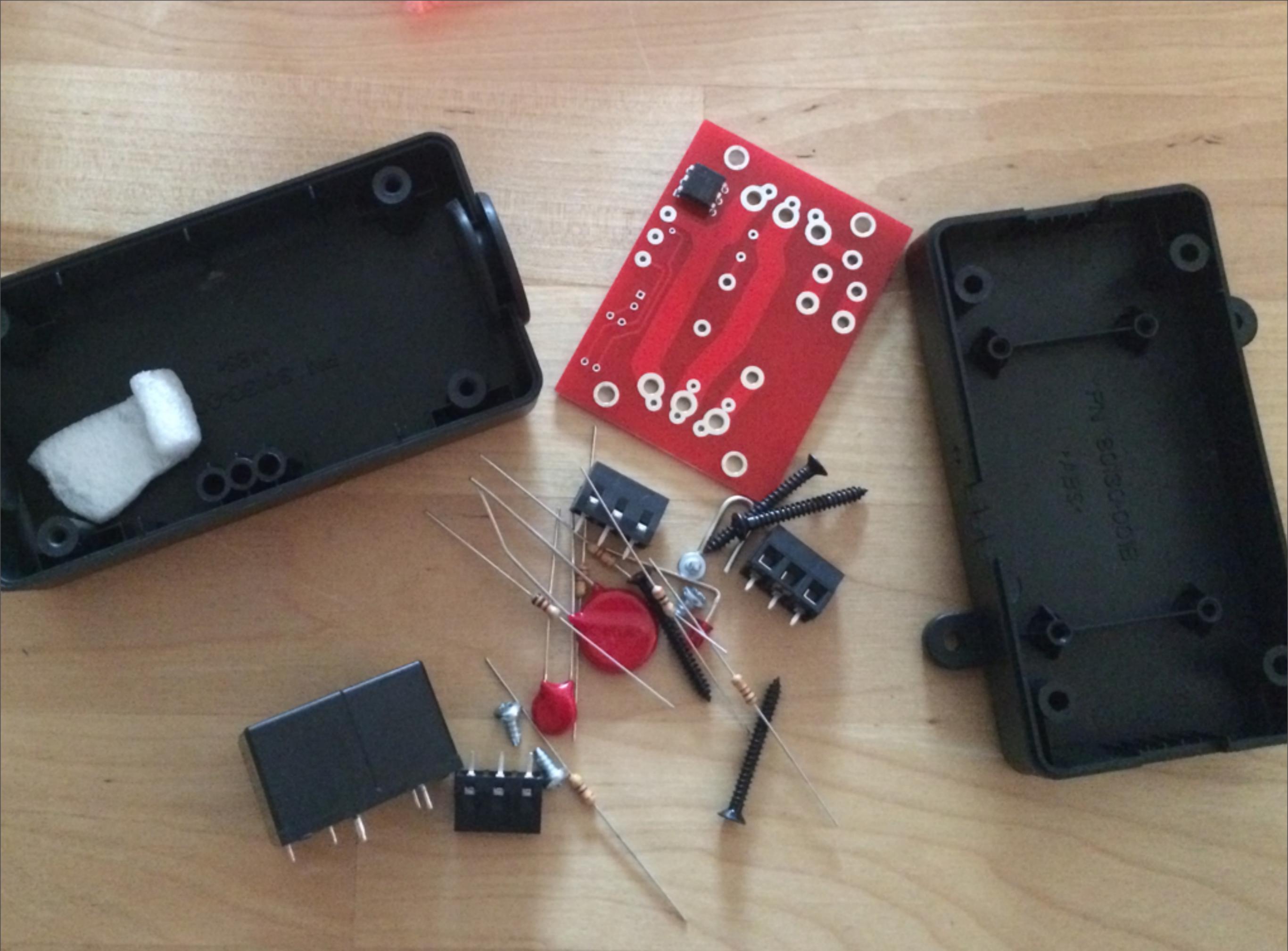




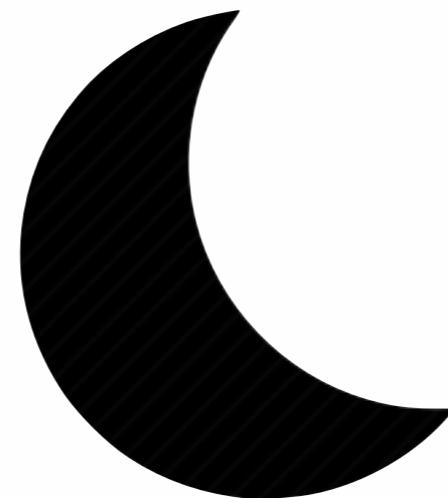
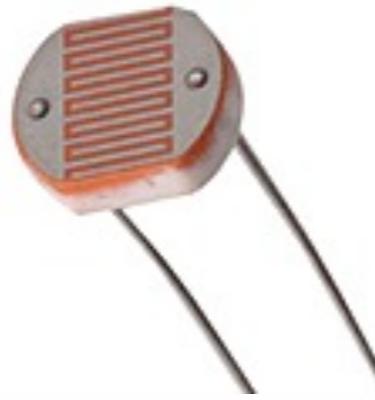
Relay

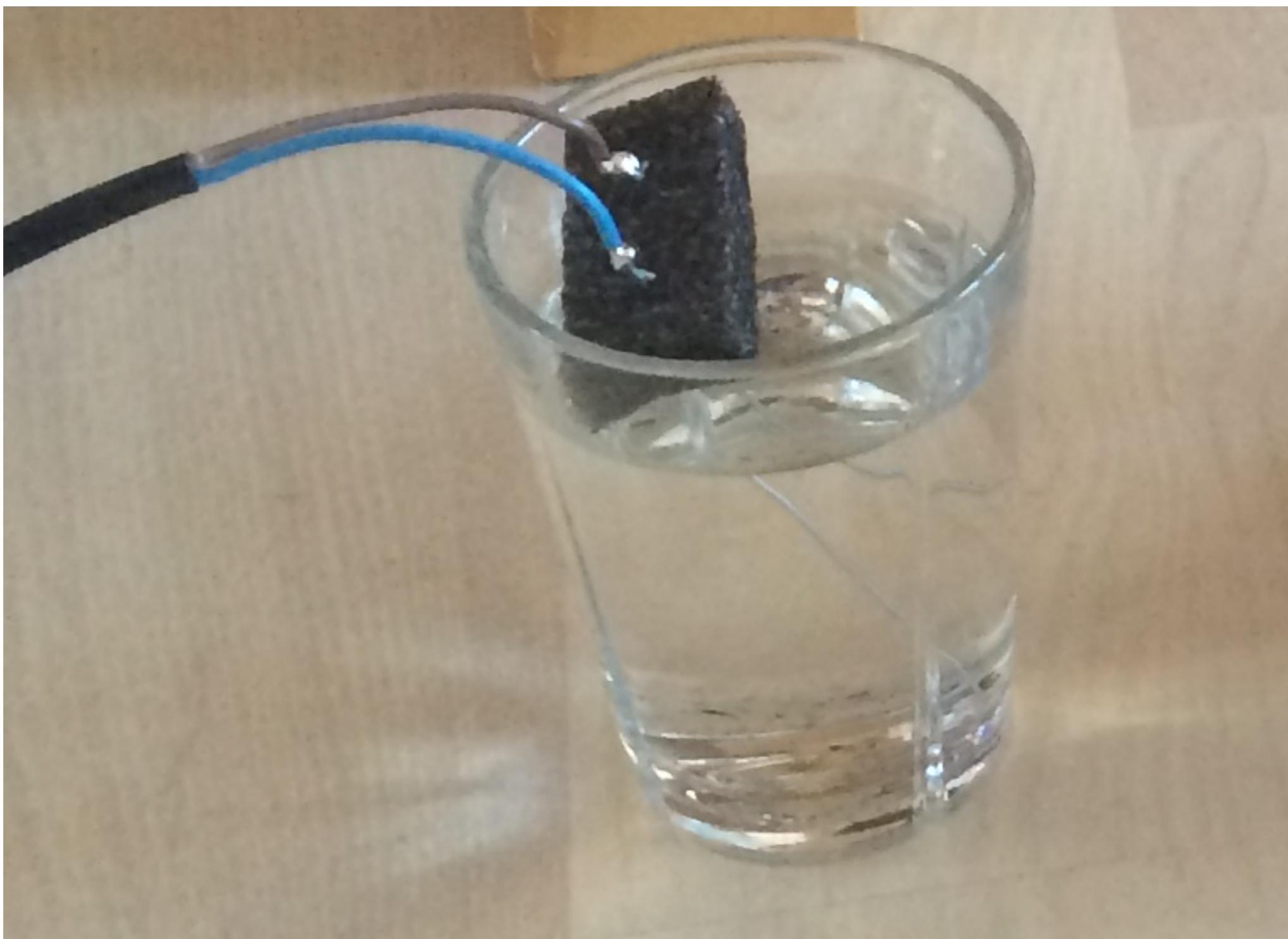


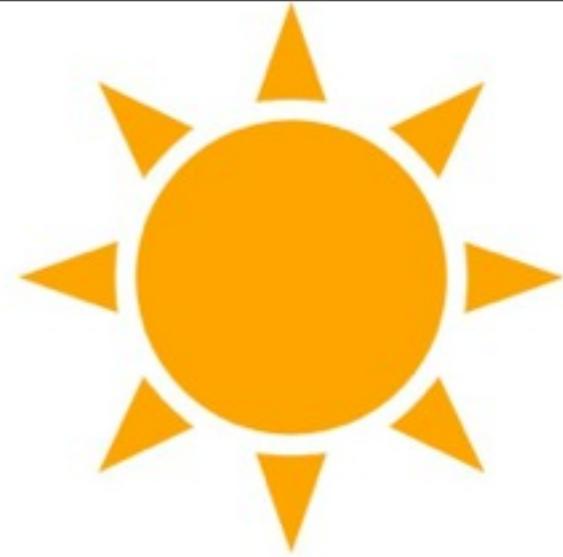
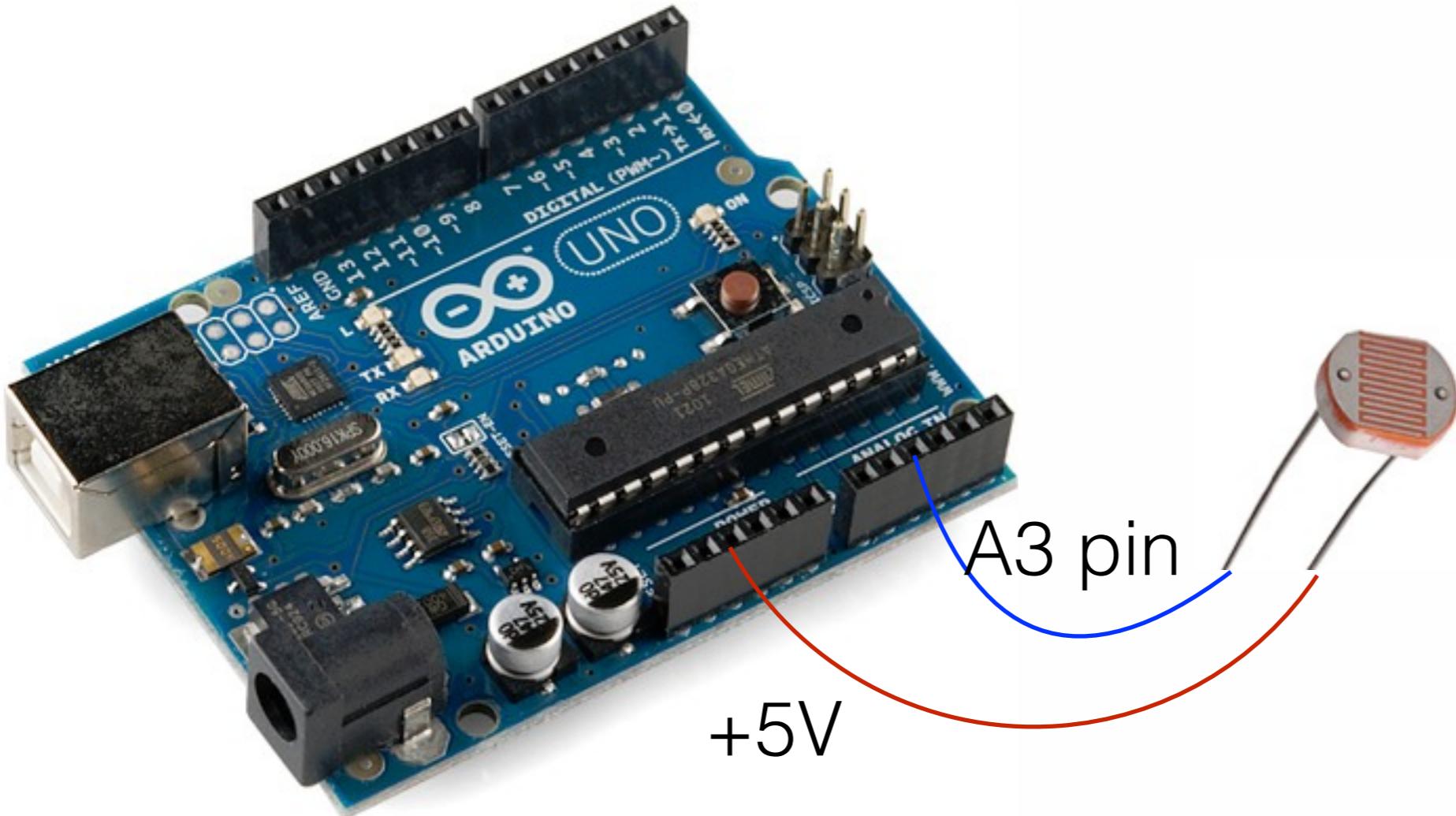
Small amount of current controls
large amount of current



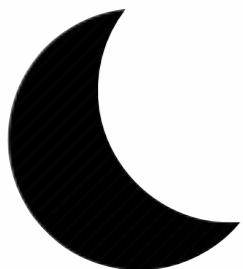
Sensors





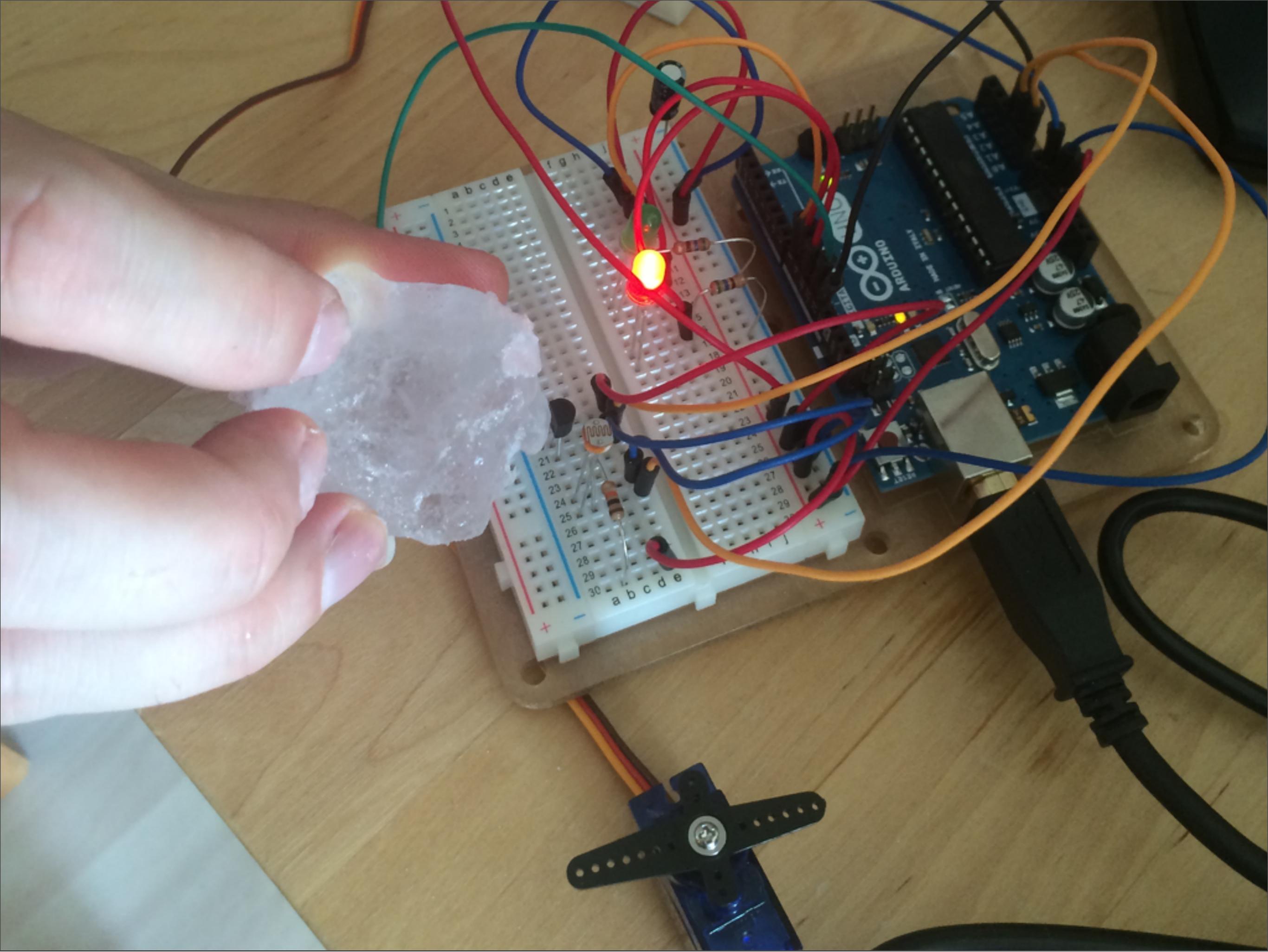


`A3.analogRead() == 0`



`A3.analogRead() == 1023`





johnny-five, express.js, socket.io, d3.js & firmata

The Software

express

a node webserver

```
1 var express = require('express');
2 var app = express();
3 var server = require('http').createServer(app);
4
5 var io = require('socket.io').listen(server);
6
7 server.listen(8080);
8
9 app.use(express.static(__dirname + '/public'));
10
11 app.get('/', function(req, res){
12   res.sendFile(__dirname + "/index.html");
13 });
14
```

```
$ node server.js
```

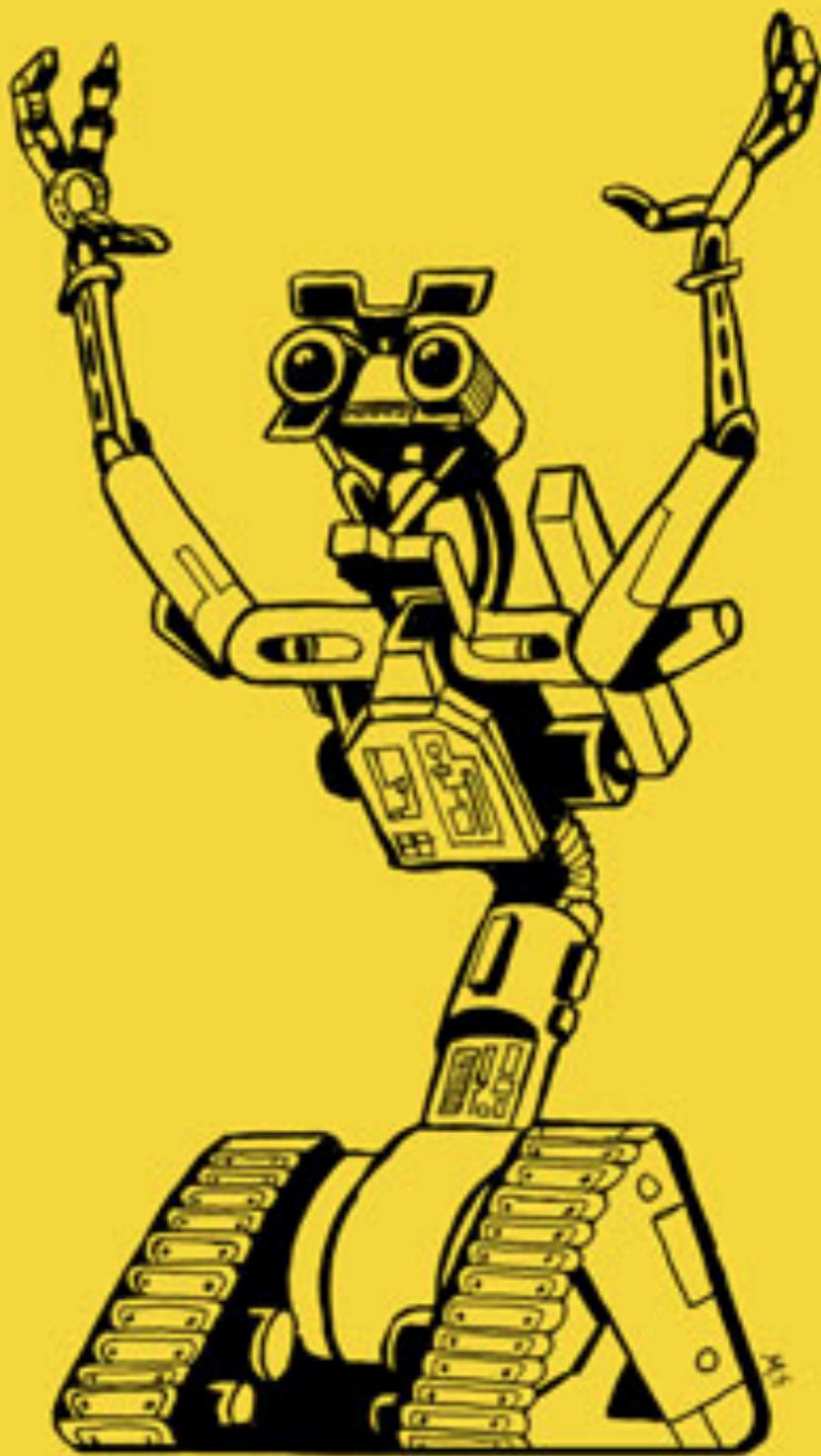
firmata - generic arduino control protocol



```
...
case SERVO:
  if (IS_PIN_SERVO(pin)) {
    pinConfig[pin] = SERVO;
    if (!servos[PIN_TO_SERVO(pin)].attached()) {
      servos[PIN_TO_SERVO(pin)].attach(PIN_TO_DIGITAL(pin));
    }
  }
break;
...
```

johnny-five.js

talks to firmata



```
var five = require('johnny-five');
var fs = require('fs');
var time = require('moment');

var board, light, heatlight,
photoresistor, humidity, temperature, servo, fan, pump;

var pollingFrequency = 3000;
var darkness = 300;
var cold = 165;
```

```
board = new five.Board();

board.on('ready', function(){
  light = new five.Led(9);
  heatlight = new five.Led(10);

  fan = new five.Pin(12);
  pump = new five.Pin(7);

  servo = new five.Servo({
    pin: 8,
    range: [0, 180],
    type: "standard",
    startAt: 0,
    center: false,
  });

  photoresistor = new five.Sensor({
    pin: "A0",
    freq: pollingFrequency
  });
});
```

```
this.repl.inject({
  pot: humidity,
  pot: photoresistor,
  pot: temperature,
  led: heatlight,
  led: light,
  s: servo
});
```

```
humidity.on("data", function() {
  if(this.value < dry){
    pump.high();
    setTimeout(function(){pump.low();}, 3000);
  };
});
```



socket.io

two-way communication

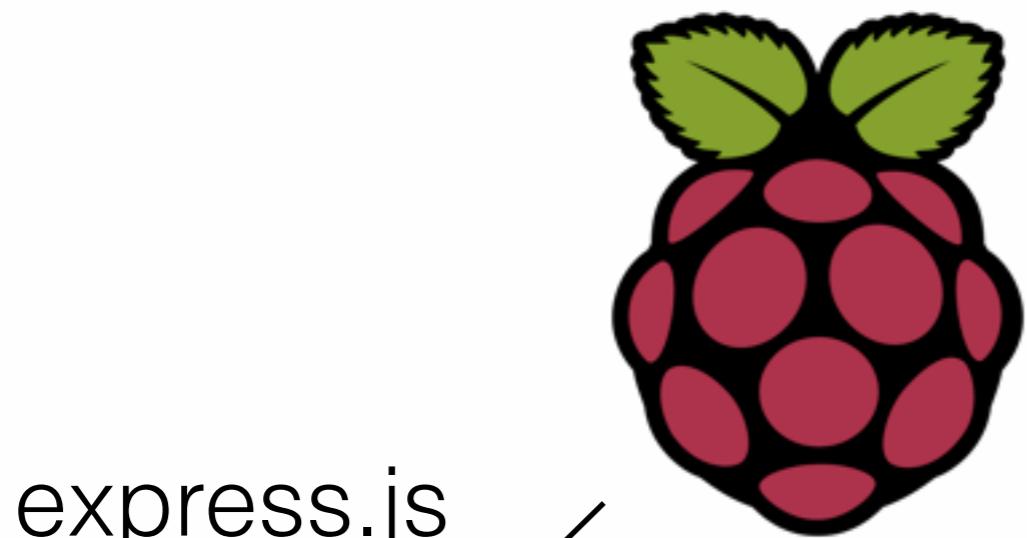
```
io.on('connection', function(socket){  
  socket.emit('board connected', {data: 'Connected'});  
  
  socket.on('robot command', function(data){  
  
    console.log(data);  
    var command = data.command;  
    if(command == "toggle-light"){  
      light.toggle();  
    };  
  
    if(command == "water"){  
      pump.high();  
      setTimeout(function(){pump.low();}, 5000)  
    };  
  });  
});
```

```
$(document).ready(function() {
  var socket = io.connect('http://10.10.12.130:8080')
  socket.on('board connected', function(data) {
    console.log(data);
    socket.emit('robot command', {command: 'nothing'});
  });

  $('#do-toggle-light').click(function(){
    socket.emit('robot command', { command: 'toggle-light' });
  });
}
```



d3.js - graphs



express.js
d3.js

socket.io



johnny-five



firmata

Demo

A close-up photograph of a chili pepper plant. The plant has green, heart-shaped leaves and is bearing several ripe chili peppers. Some are bright red, some are yellow, and one is orange. The peppers are elongated and pointed. The background is dark, making the vibrant colors of the peppers stand out.

<http://github.com/anettebgo/greenhouse>

@anettebgo