jQuery UK

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Wizard Development

Hardware Hacking with JavaScript

Hardware Hacking?

Hardware Hacking?

- Combining electronics and physical components with code

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- Making real things and controlling them with software

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- Building things with your hands

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- Combining electronics and physical components with code
- Making real things and controlling them with software
- Building things with your hands
- Joining the Maker Movement

Why JavaScript?

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- Huge and diverse community

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- Huge and diverse community
- Lowering the barriers to entry

Why yes, JavaScript!

- Hardware demands asynchronous software
- Huge and diverse community
- Lowering the barriers to entry
- JavaScript is the language of the web

Internet of Things

Internet of Things

- Bridging hardware devices and online services

Internet of Things

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- Treating hardware as an API

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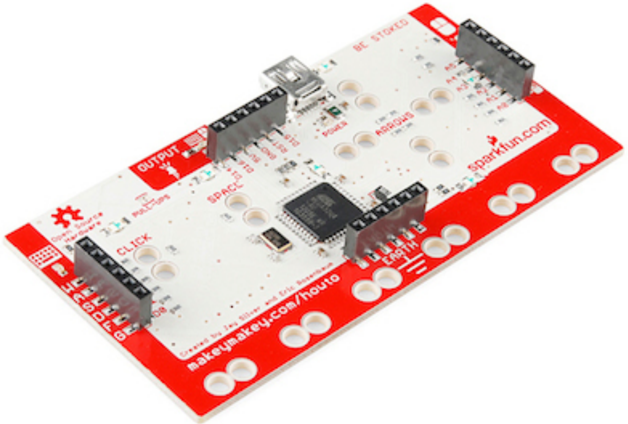
Internet of Things

- Bridging hardware devices and online services
- Treating hardware as an API
- Interconnecting all kinds of hardware
- Mashing up software and hardware

Demo Driven Development

Makey Makey



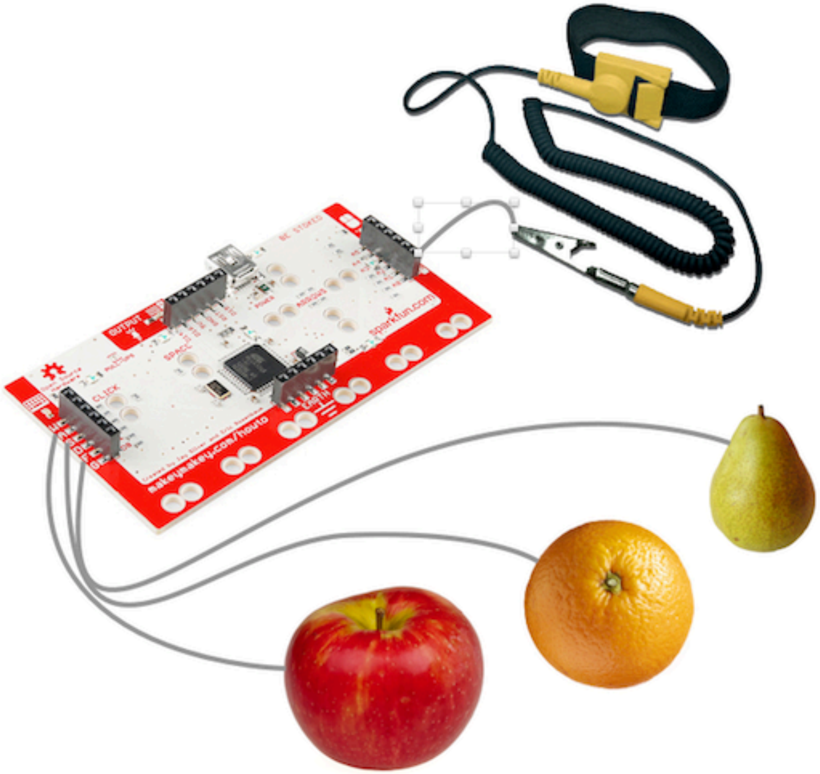
Makey Makey

```
keys = {
  87: 'W',
  65: 'A',
  83: 'S',
  68: 'D'
}

$(document).keydown(function (e) {
  console.log(keys[e.which])
});
```

Emoji Fruit Piano

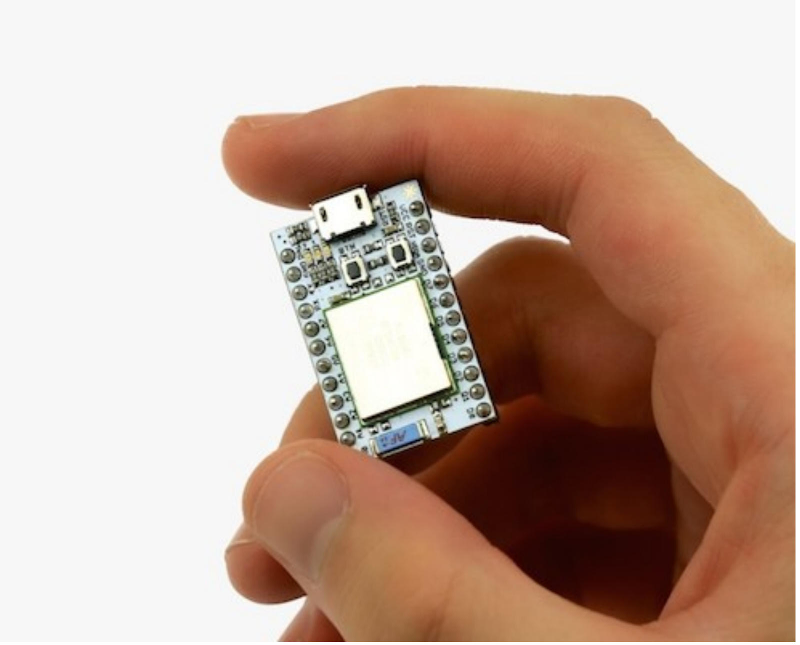
Emoji Fruit Piano

Patent Pending


BE STOKED
OUTPUT
SPACE
CLICK
POWER
EARTH
makeymakey.com/howto
sparkfun.com

Emoji Fruit Piano Demo

Spark Core



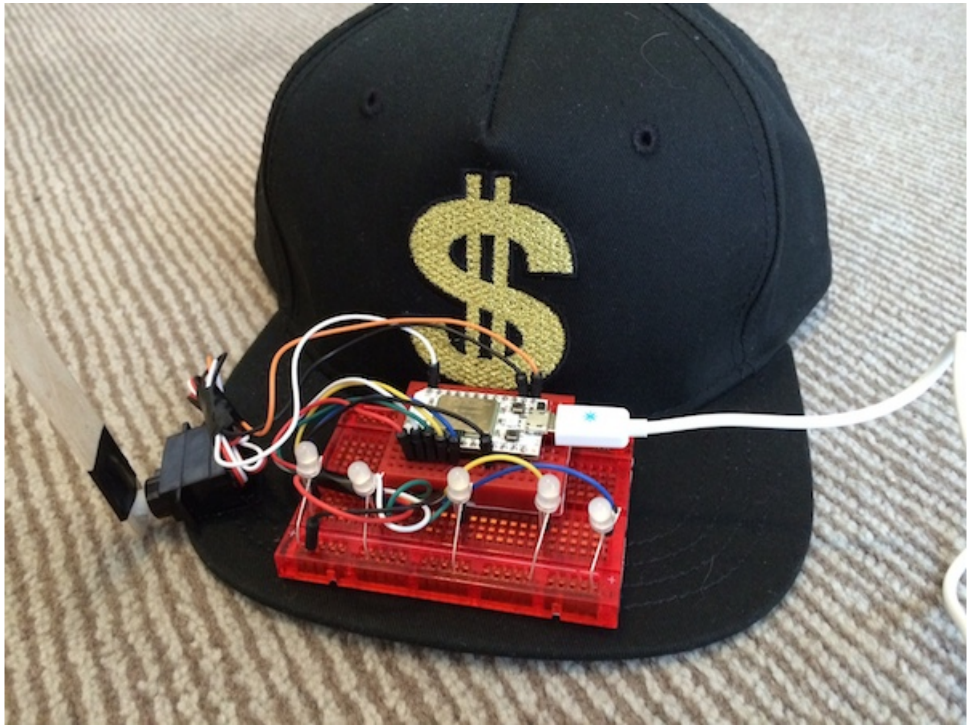
Spark.io

- Open source microcontroller
- Arduino compatible
- Wifi enabled
- Cloud certified®

The Internet Connected Hat

The Internet Connected Hat

Patent Pending



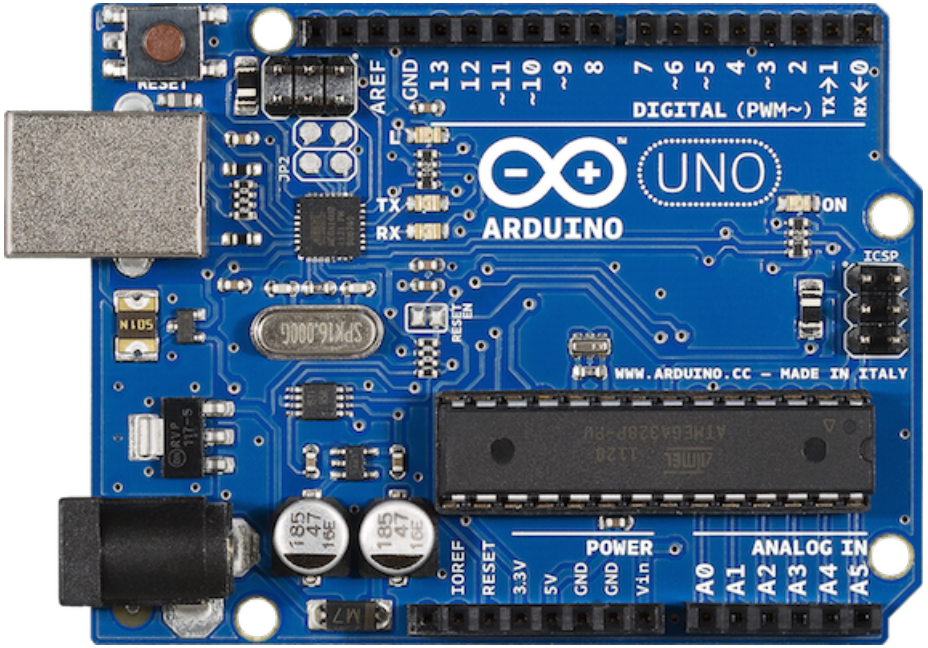
Spark Core

Spark Core

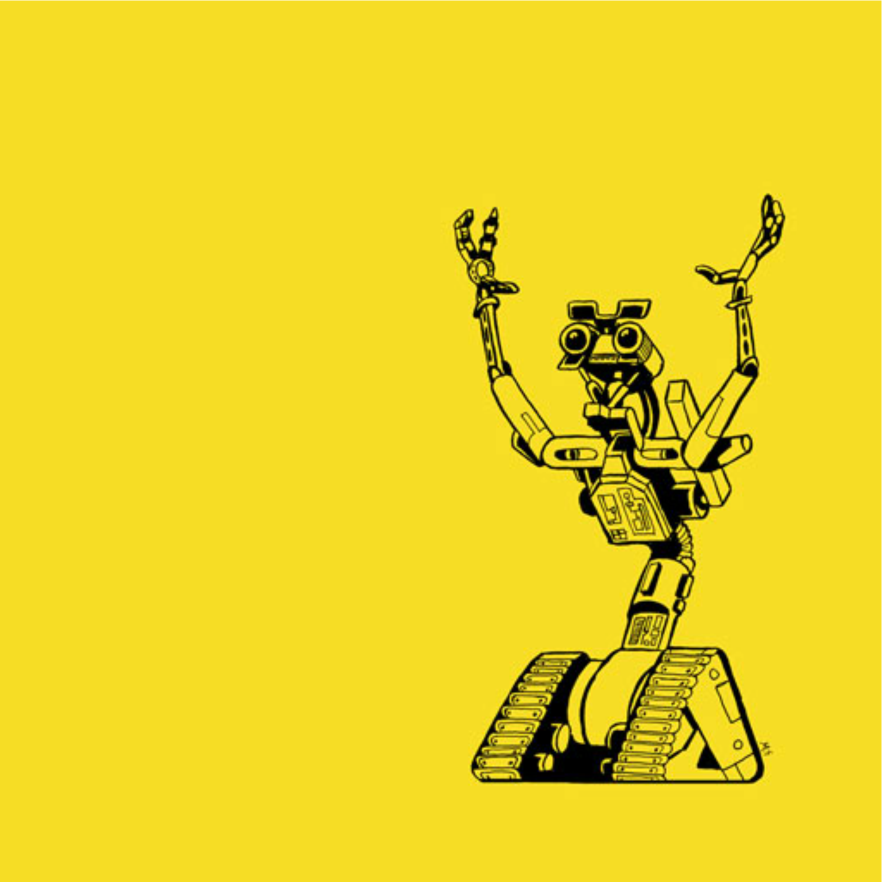
`npm install sparky`

```
var Sparky = require('sparky')

var core = new Sparky({
  deviceId: 'your device id',
  token: 'your access token',
})

core.digitalWrite('D7', 'HIGH');

core.digitalRead('D0', function(val){
  console.log(val)
});
```

Arduino Uno


DIGITAL (PWM~)
UNO
ARDUINO
ON
ICSP
TX
RX
WWW.ARDUINO.CC – MADE IN ITALY
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0

Johnny Five

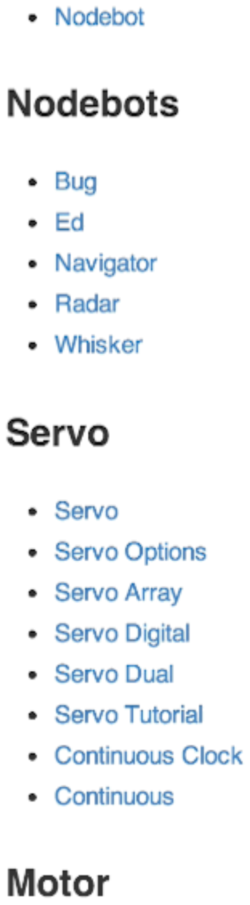


Johnny-Five is jQuery for robots

Johnny-Five is jQuery for the physical world

Johnny-Five

- Supports over 99 hardware devices
- Started by Rick Waldren now has over 61 Contributers
- Most active JavaScript Robot Community



- Nodebot

Nodebots

- Bug
- Ed
- Navigator
- Radar
- Whisker

Servo

- Servo
- Servo Options
- Servo Array
- Servo Digital
- Servo Dual
- Servo Tutorial
- Continuous Clock
- Continuous

Motor

> "A blinking light is the hello world of robotics."
>
> -Sara Chipps

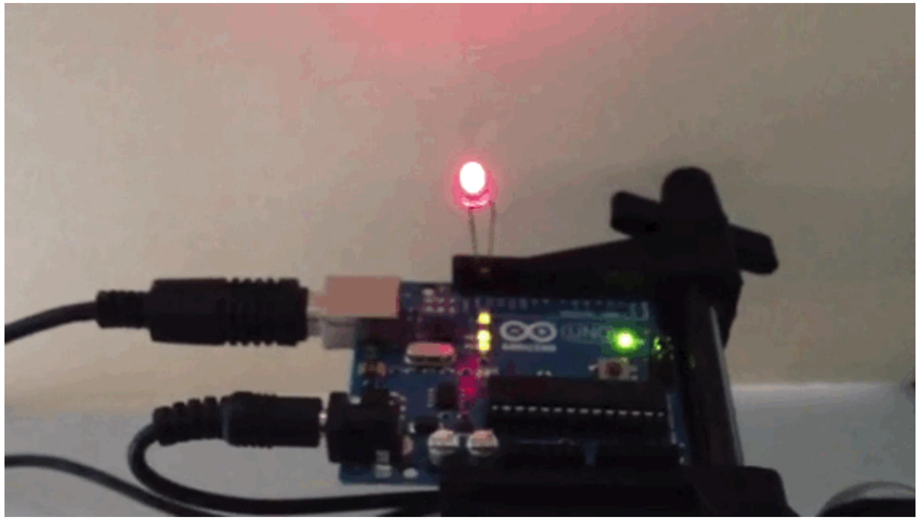
Blink for Arduino

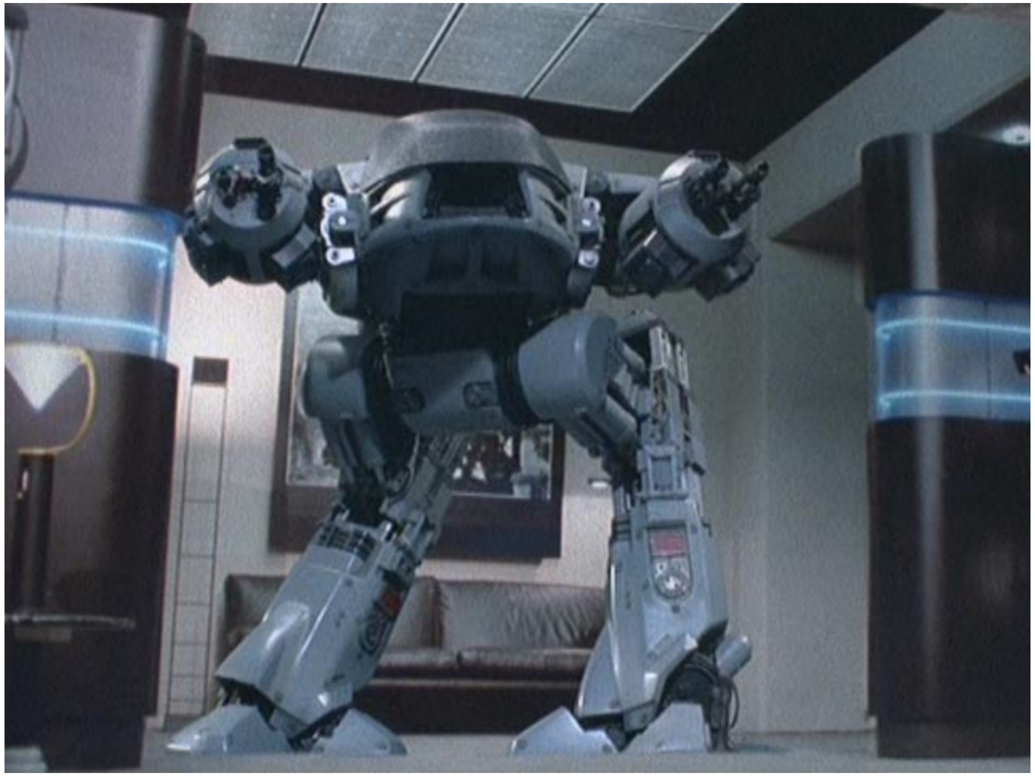
```
int led = 13;

// 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
}
```

Blink for Johnny Five

```
var five = require("johnny-five");
var board = new five.Board();

// Connect to the arudino
board.on("ready", function() {
  // Create a new Led object on pin 13
  var led = new five.Led(13);
  led.blink(); // blink!
});
```

Das Blinkenlights

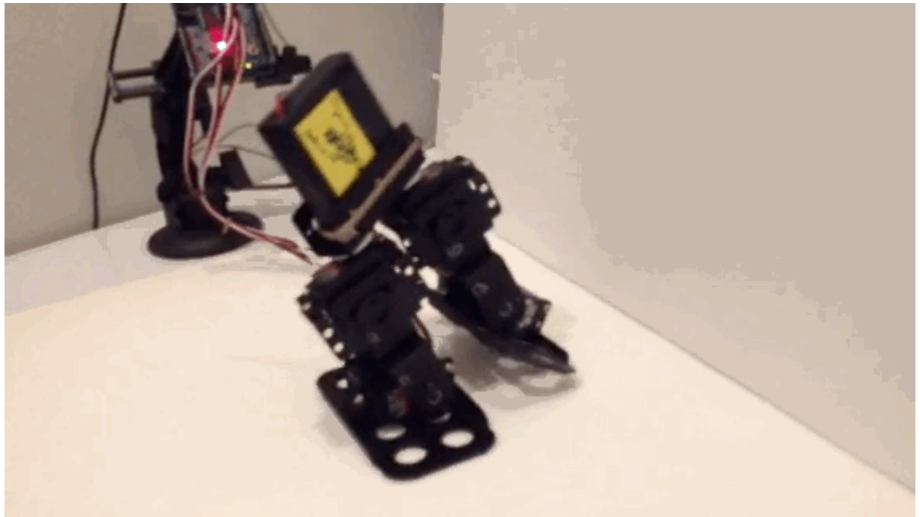




ED 209

```
var ED = require('johhny-five/eg/ed.js');

// Create a new Enforcer Droid
var ed209 = new ED({
  // assign servos
  right: { hip: 9, foot: 11 },
  left: { hip: 10, foot: 12 }
});

// Stand upright!
ed209.attn();

// Walk forward!
ed209.fwd();

// Dance!
ed209.dance();

// another Rick Waldron creation
```

ED 209



Parrot AR Drone 2.0

HD CAMERA

LINUX

GYROSCOPE

1GHZ CPU

WIFI

ACCELEROMETER

MAGNETOMETER

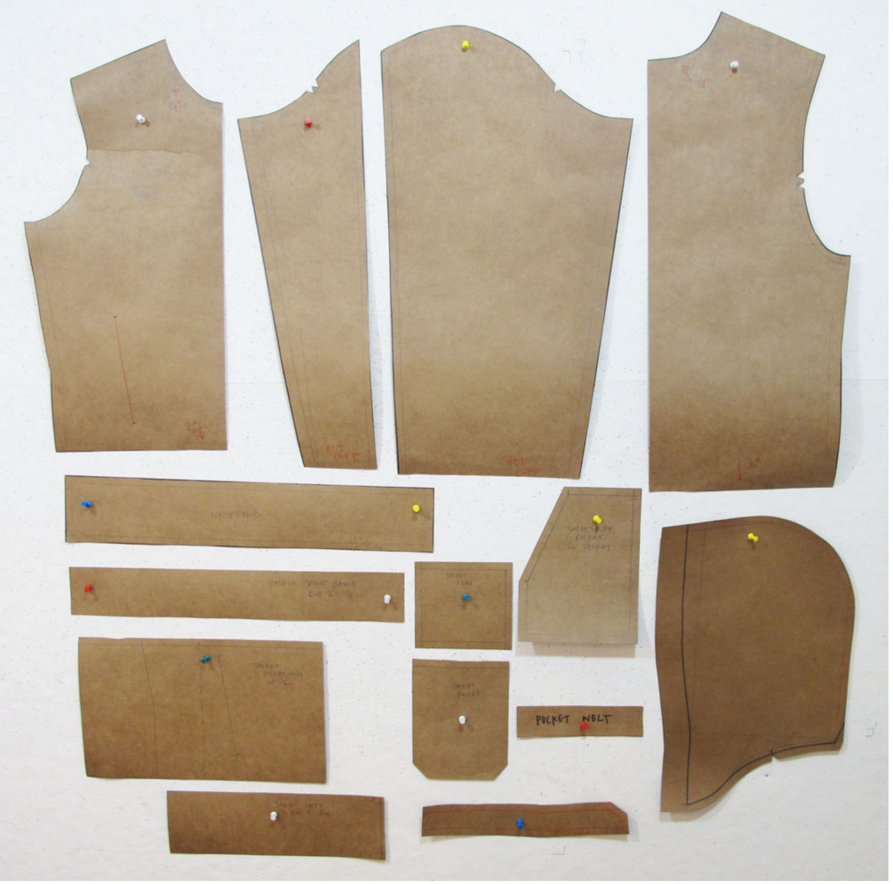
DOWNFACING CAMERA

ULTRASOUND

AR Drone

```
npm install ar-drone
```

```
var arDrone = require('ar-drone');
var client = arDrone.createClient();

client.takeoff();

client
  .after(5000, function() {
    this.clockwise(0.5);
  })
  .after(3000, function() {
    this.animate('flipLeft', 15);
  })
  .after(1000, function() {
    this.stop();
    this.land();

  });
```


WAISTBAND
JACKET FRONT BAND
JACKET FLAP
SWEAT SHIRT POCKET ON JACKET
JACKET FACINGS
JACKET POCKET
POCKET WELT
JACKET CUFF
ADD CUFF

High-tech Observation & Orientation Device Interaction Enabler

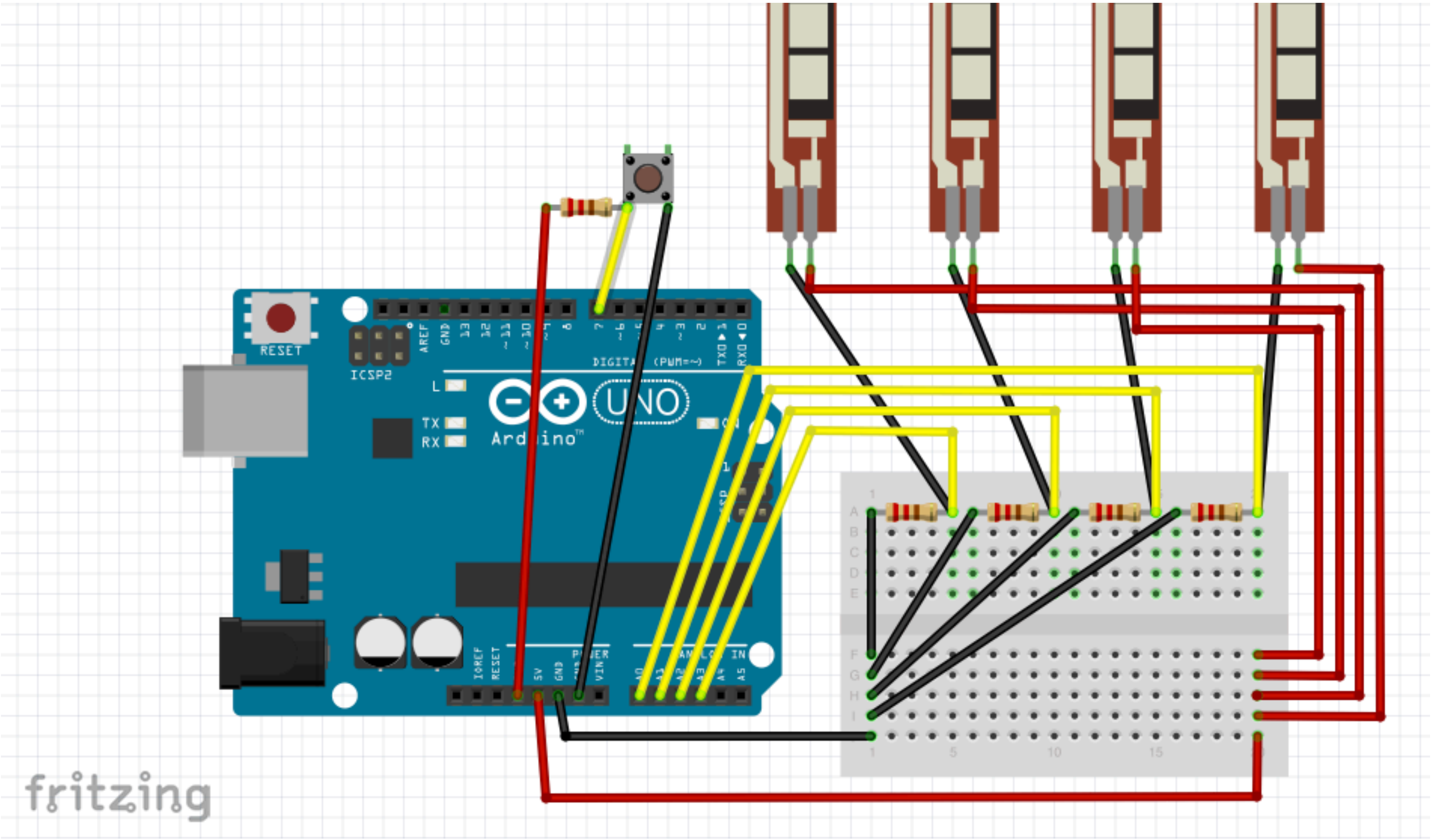
High-tech Observation & Orientation Device Interaction Enabler

H.O.O.D.I.E

High-tech Observation & Orientation Device Interaction Enabler

H.O.O.D.I.E

Patent Pending


RESET
ICSP2
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX▶1
RX◀0
DIGITAL (PWM=~)
L
TX
RX
UNO
Arduino™
ON
ICSP
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
ANALOG IN
A0
A1
A2
A3
A4
A5
A
B
C
D
E
F
G
H
I
J
1
5
10
15
fritzing

H.O.O.D.I.E

```
// we're already connected to the drone and arduino
var button = new five.Button(7);
var leftYFlexSensor = new five.Sensor("A0");
var rightYFlexSensor = new five.Sensor("A1");
var leftZFlexSensor = new five.Sensor("A2");
var rightZFlexSensor = new five.Sensor("A3");

// push the button to turn on flying
button.on("up", function() {
  toggleFlying();
});
```

H.O.O.D.I.E

```
// Map the flex sensors to both the drone and the VR simulation
leftYFlexSensor.on("read", function(err, value){
  var a= five.Fn.map(value, 100, 500, -90, 90);
  leftY = five.Fn.constrain(a, -80, 80);
  io.sockets.emit('leftY', { angle: leftY, value: value });
  move();
});

rightZFlexSensor.on("read", function(err, value){
  var a = five.Fn.map(value, 500, 200, -60, 60);
  rightZ = five.Fn.constrain(a, -60, 60);
  io.sockets.emit('rightZ', { angle: rightZ, value: value });
  move();
});
```

Wrapping up

- As web developers, you are in the perfect position for the future of internet connect devices.

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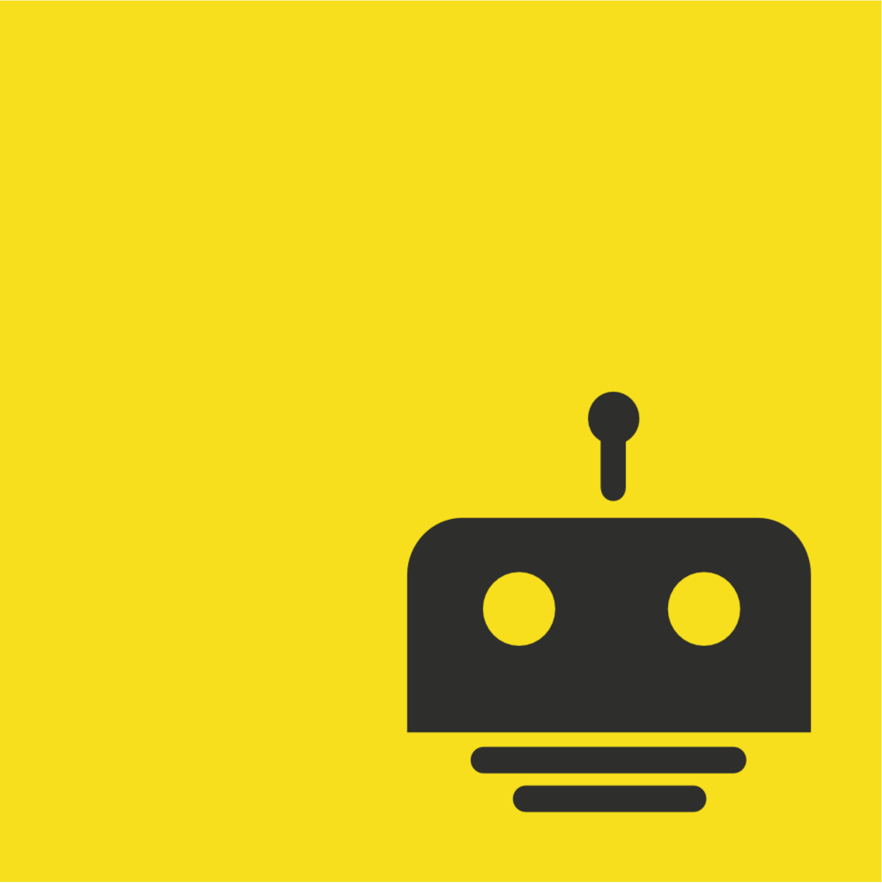
- This new breed of hardware and software brings jQuery-like levels of accessibility to Hardware Hacking.

Wrapping up

- As web developers, you are in the perfect position for the future of internet connect devices.
- This new breed of hardware and software brings jQuery-like levels of accessibility to Hardware Hacking.
- Making things with you hands is incredibly rewarding



NodeBots

- Any robot controlled by Node.js (or JS in general)
- Coined by Chris Willams in "Rise of JS Robotics"
- Cool Logo

NodeBots Events

- Chapters all over the world (4 countries, 6 cities)
- Reach out to Oli Evans (@olizilla) about NodeBots London
- Start a new chapter near you with just a github pull request?
- Nodebots are better with friends

NodeCopter

- AR Drones controlled with nodejs
- Hackdays with flying robots
- Community event (affordable & inclusive)
- Learning, sharing, fun and being nice to each other

Get out the and start hacking!

Thanks

@teabass @reconbot

github.com/andrew/jquery-uk