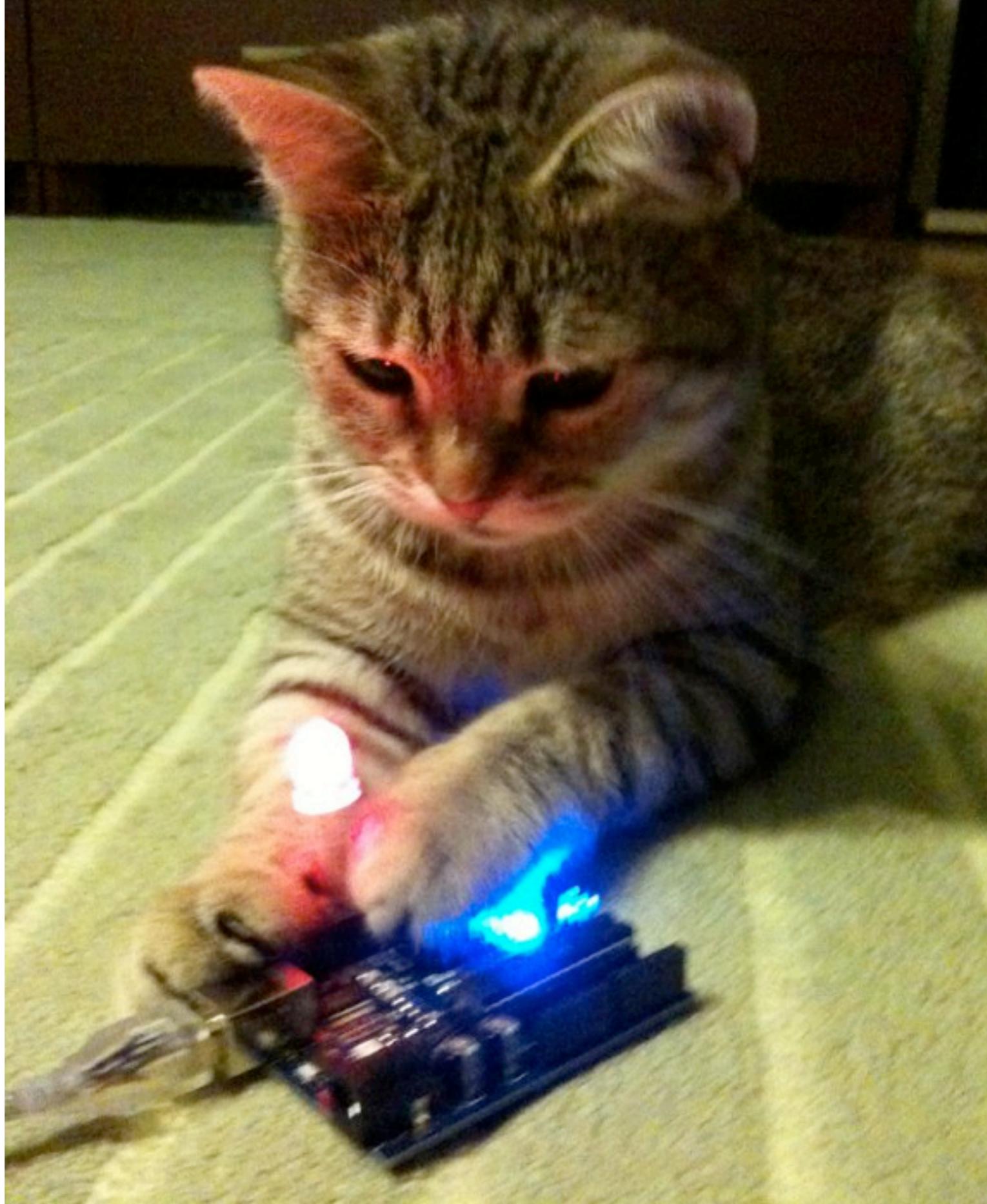
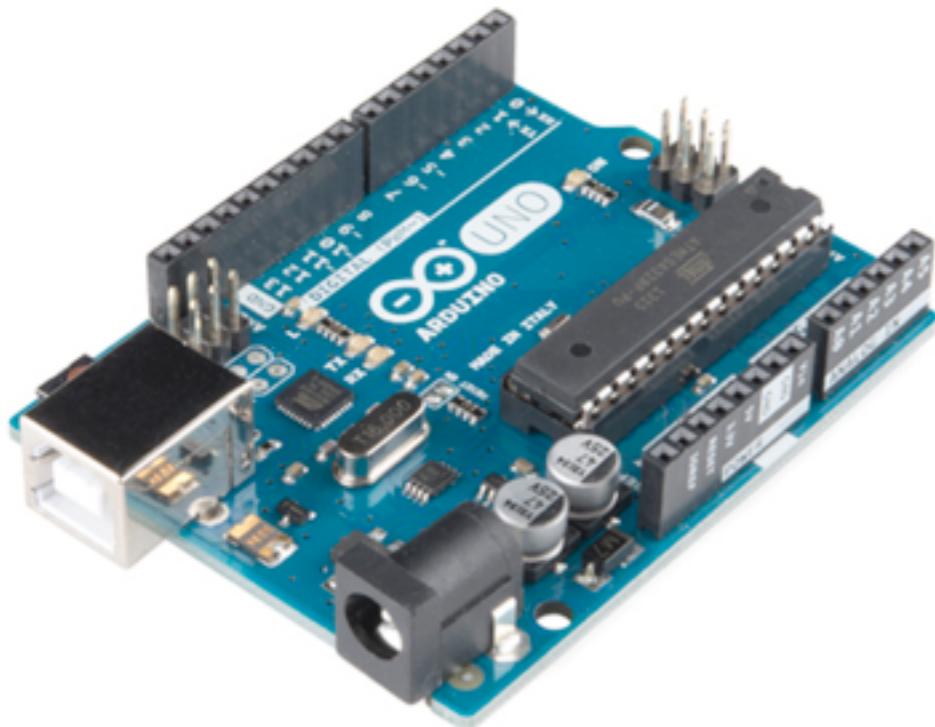


I HAZ LEET ARDUINO SKILZZ



Board - IDE - Library



Blink | Arduino 1.0

File Edit Sketch Tools Help

Blink

```
/*
Blink
Turns on an LED on for one second, then off for one second, repeat

This example code is in the public domain.
*/
```

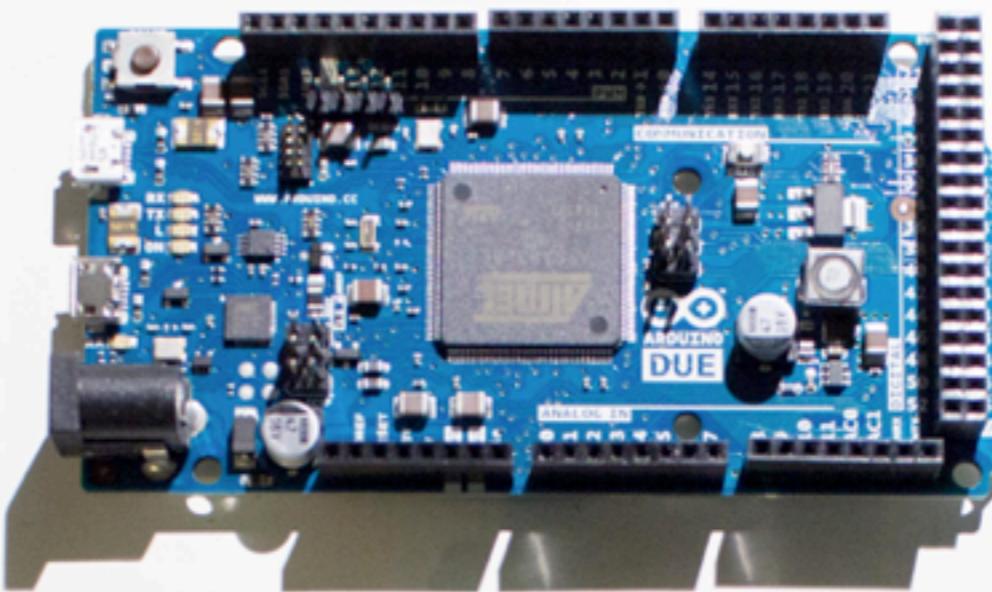
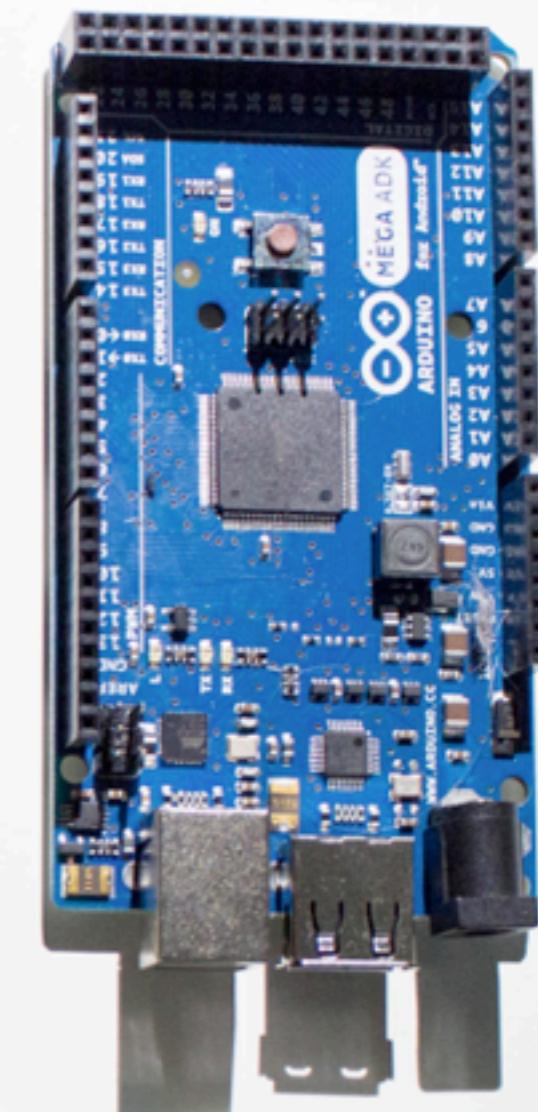
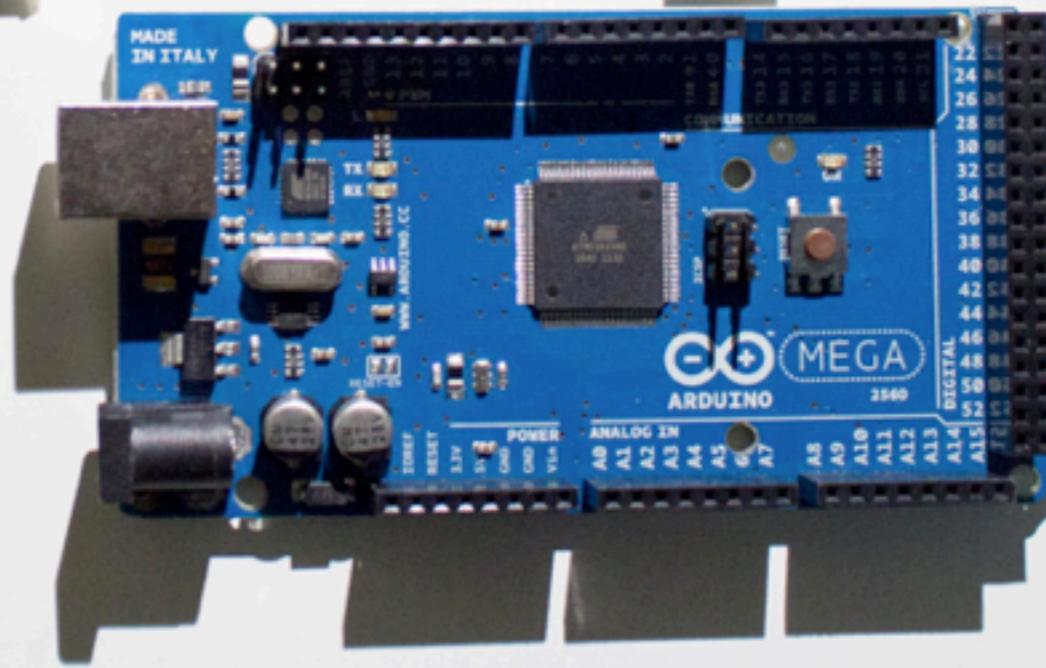
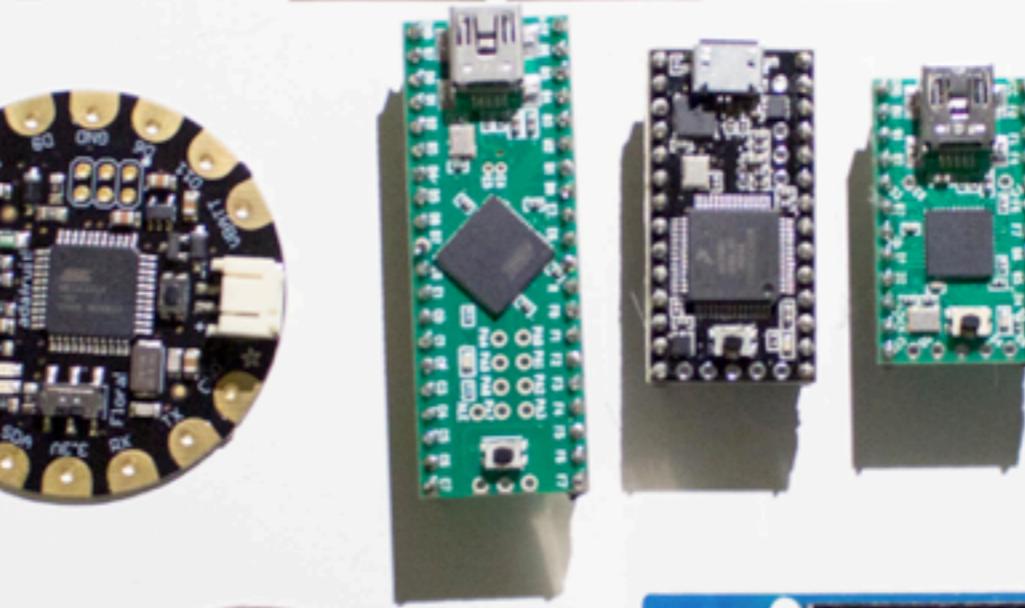
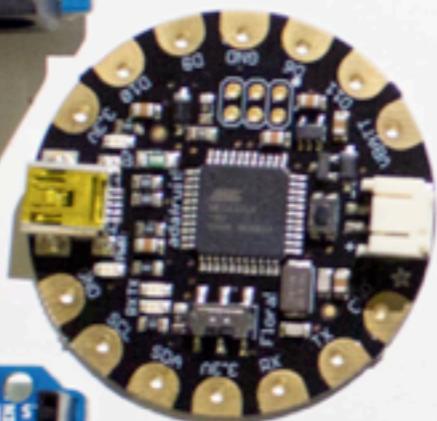
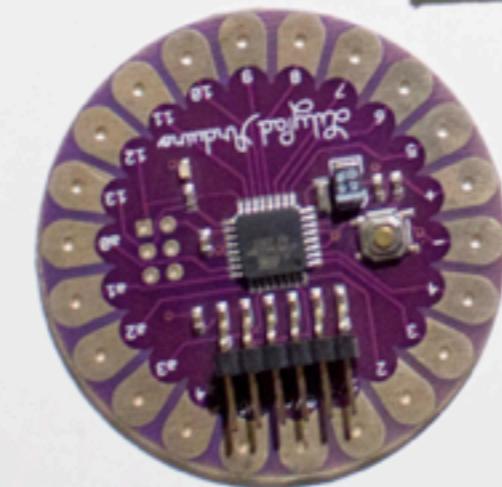
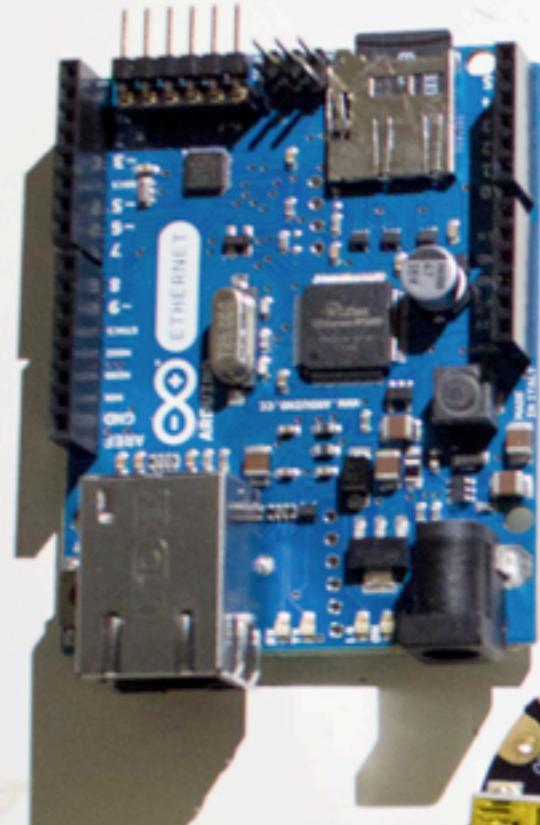
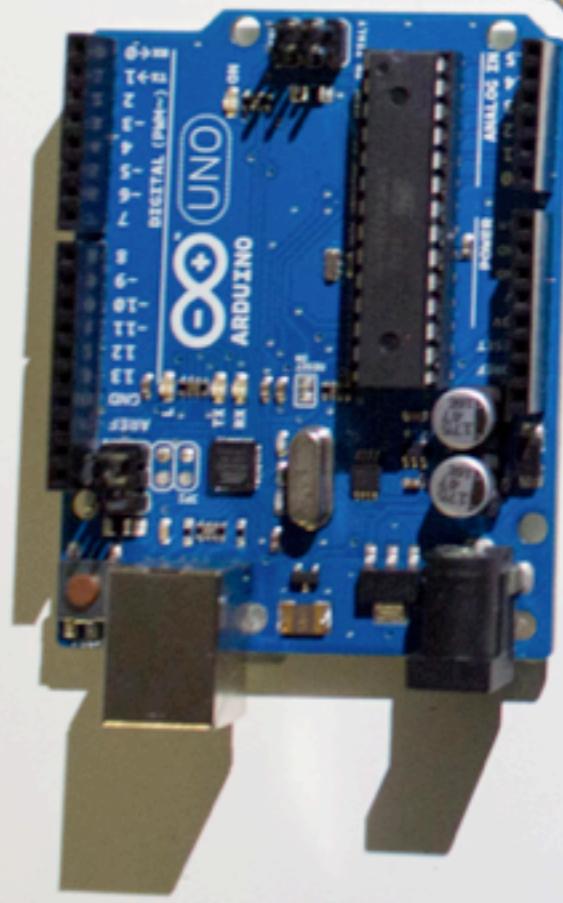
```
void setup() {
    // initialize the digital pin as an output.
    // Pin 13 has an LED connected on most Arduino boards:
    pinMode(13, OUTPUT);
}

void loop() {
    digitalWrite(13, HIGH);      // set the LED on
    delay(1000);                // wait for a second
    digitalWrite(13, LOW);       // set the LED off
    delay(1000);                // wait for a second
}
```

Done uploading.

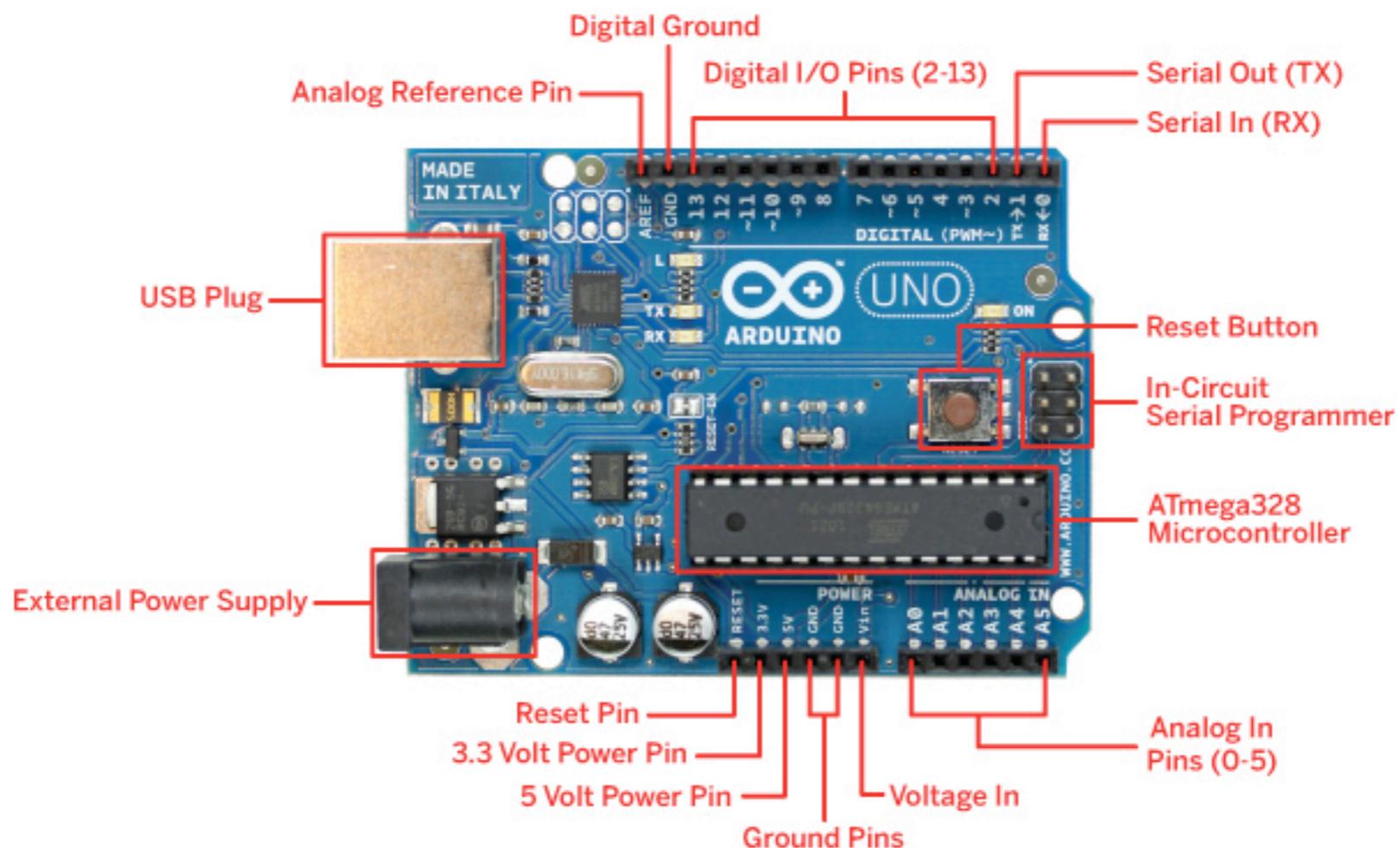
Binary sketch size: 1556 bytes (of a 258048 byte maximum)

1 Arduino Mega 2560 or Mega ADK on /dev/ttyACM0

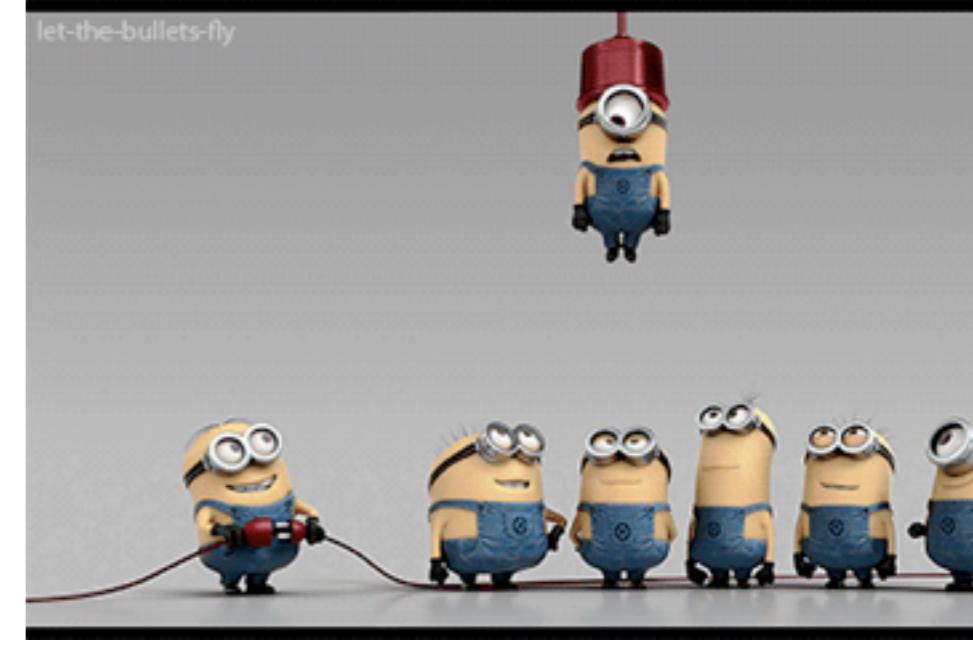


Arduino Anatomy

“The Arduino board is a small microcontroller board, which is a small circuit (the board) that contains a whole computer on a small chip (the micro- controller).”



Electricity



“An electric circuit is formed when a conductive path is created to allow free electrons to continuously move.”

Voltage

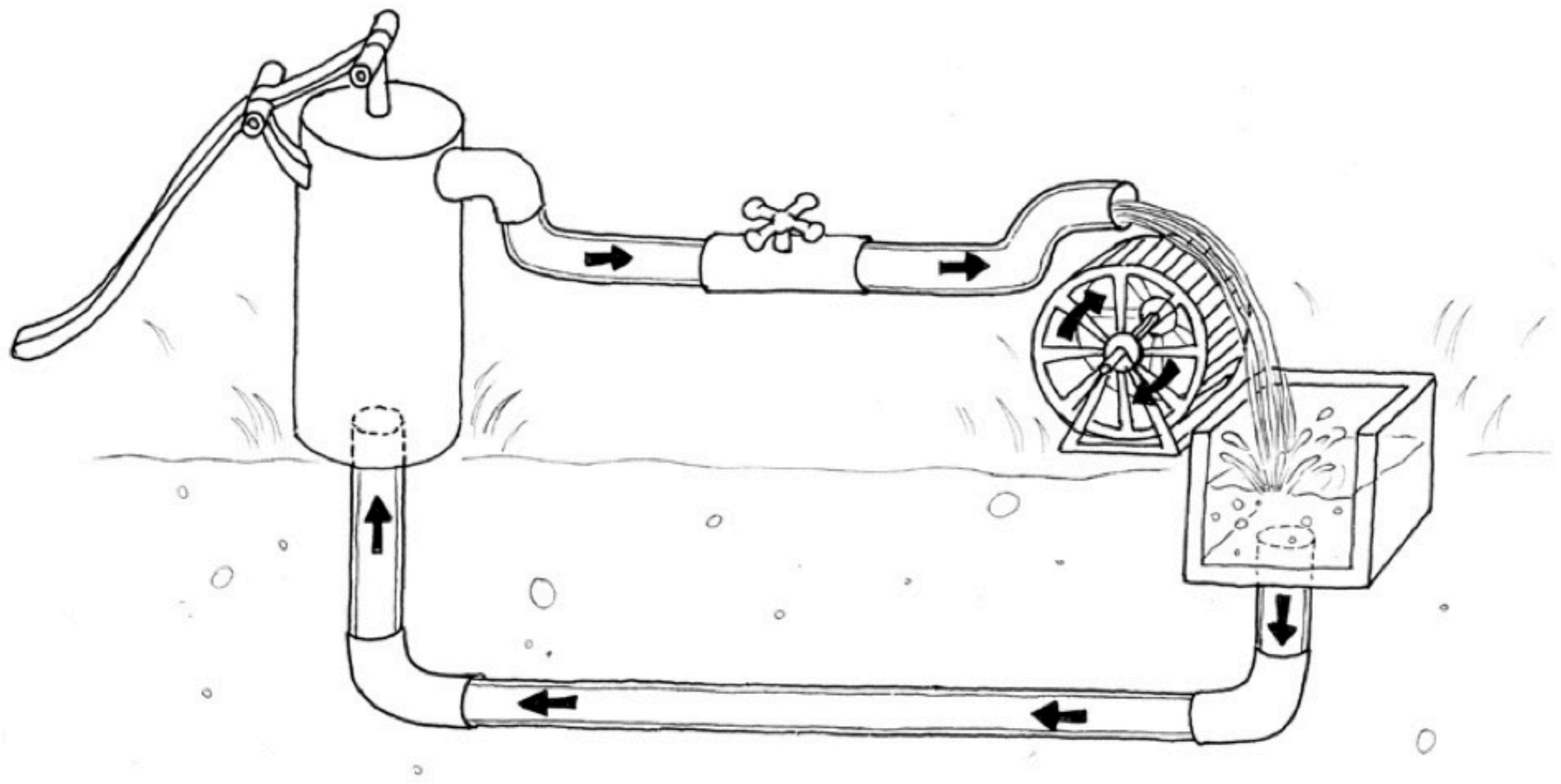
force motivating electrons to "flow" in a circuit

Current

continuous movement of free electrons through the conductors of a circuit

Resistance

opposition to motion of free electrons (friction)





Georg Ohm
(1789-1854)

Ohm's Law

Voltage = Current * Resistance

E : voltage (volts)

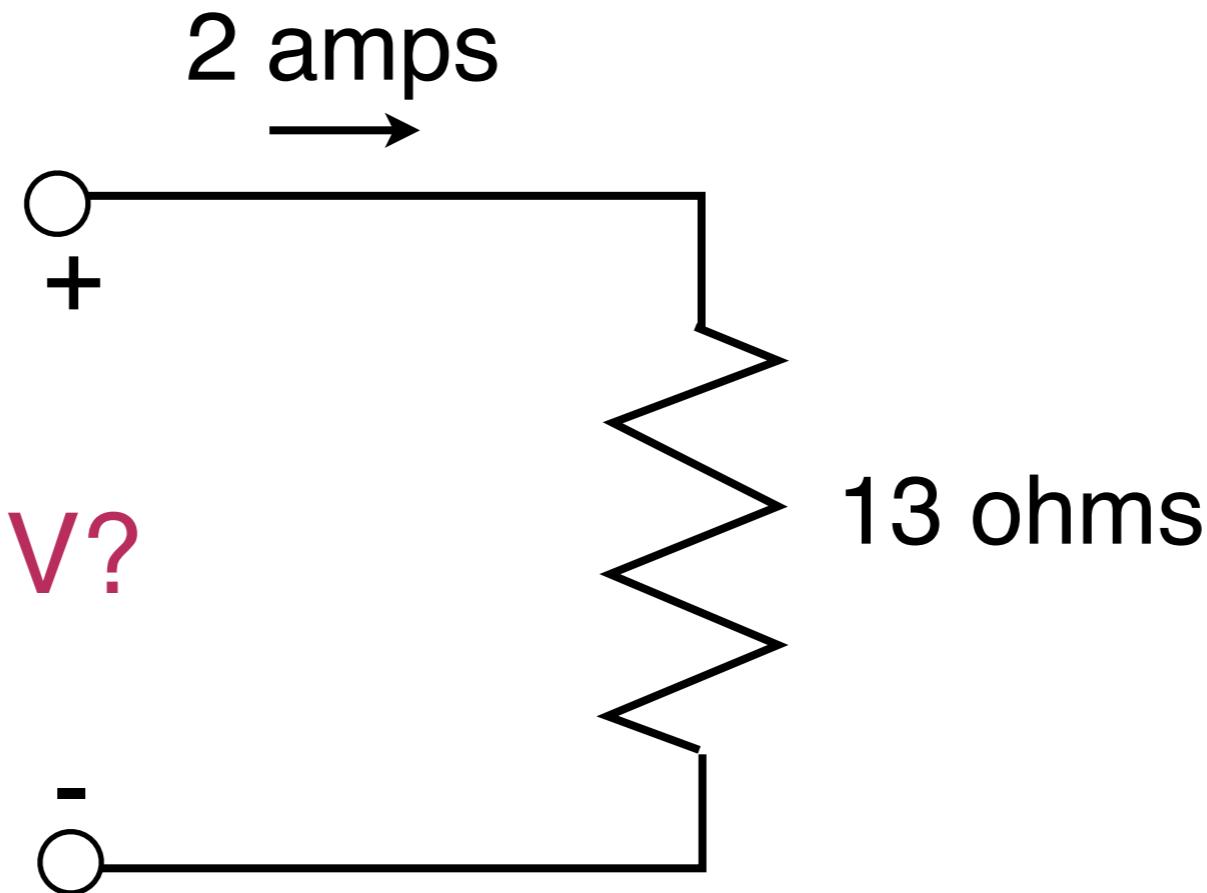
I : current (amps)

R : resistance (ohms)

$$E = I * R$$

$$I = E / R$$

$$R = E / I$$



E : voltage (volts)

I : current (amps)

R : resistance (ohms)

$$E = I * R$$

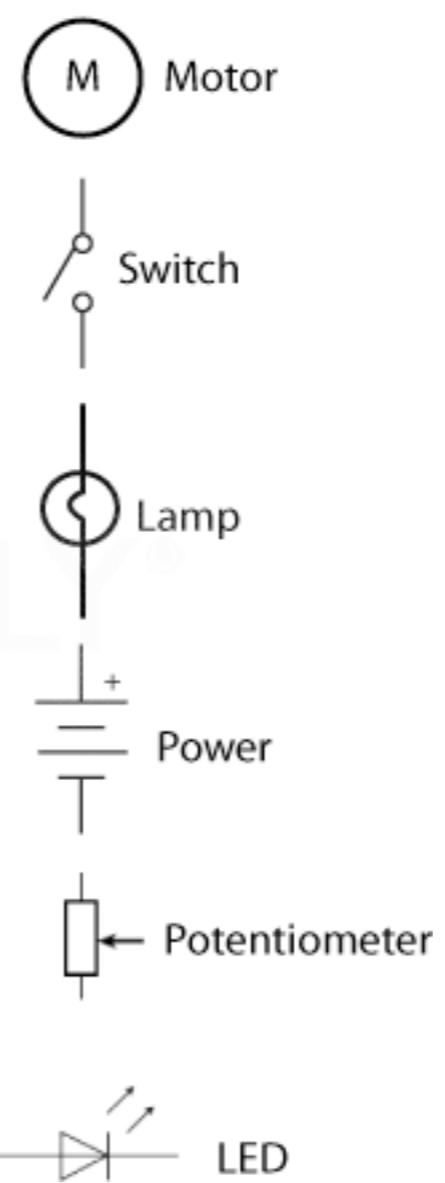
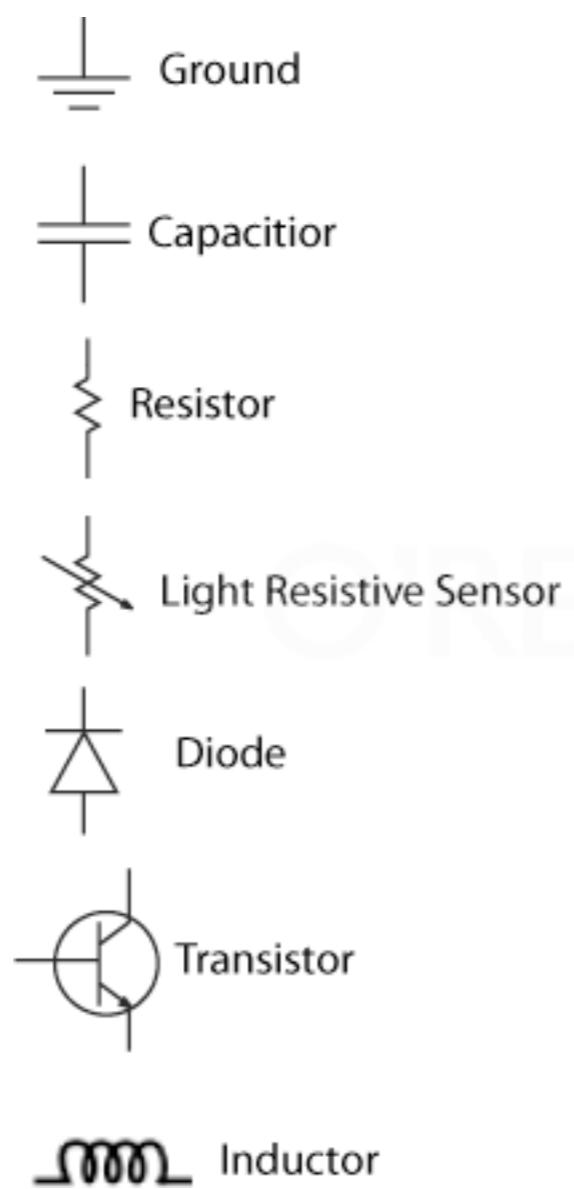
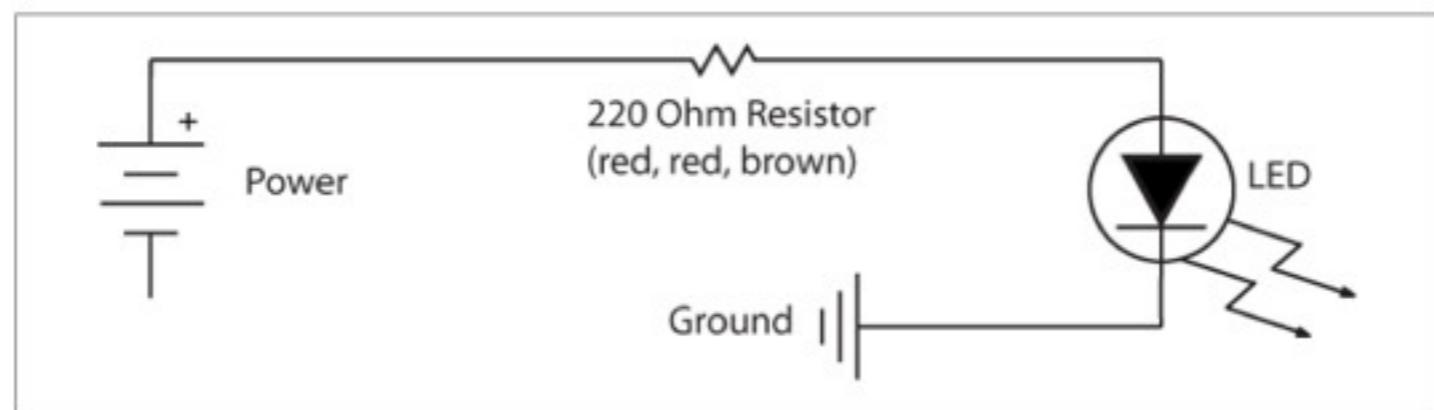
$$I = E / R$$

$$R = E / I$$

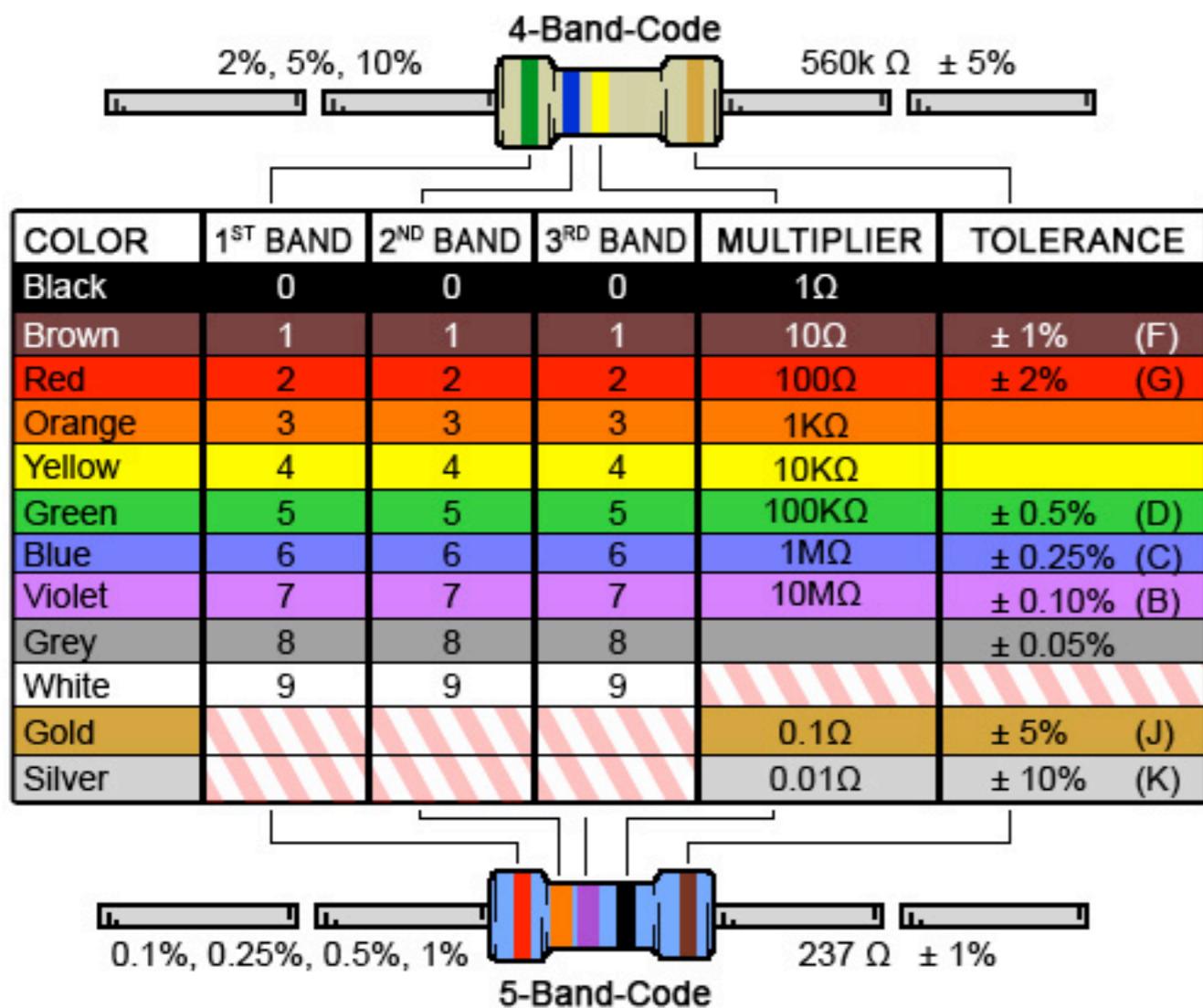
$$E = I * R$$

$$V = 13 * 2$$

$$V = 26 \text{ volts}$$



Resistors



Read left to right with gold strip always on the right

1st band is Green: 5 (first digit)

2nd band is Blue: 6 (second digit)

3rd band is Yellow: 10k (multiplier)

$$56 * 10k = 560k$$



Variable resistance



What is the resistance?

(use the chart below not an online calculator - you can use that in the future)

Read left to right with gold strip always on the right

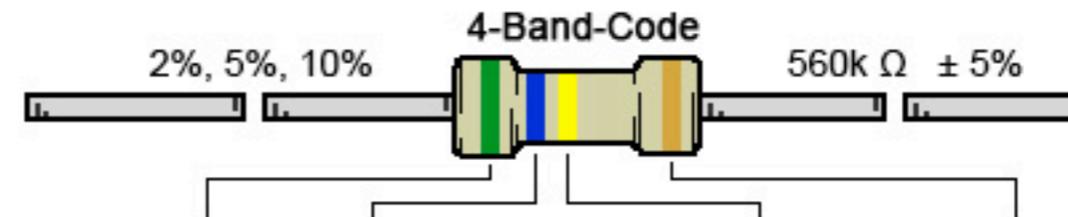
1st band is first digit

2nd band is second digit

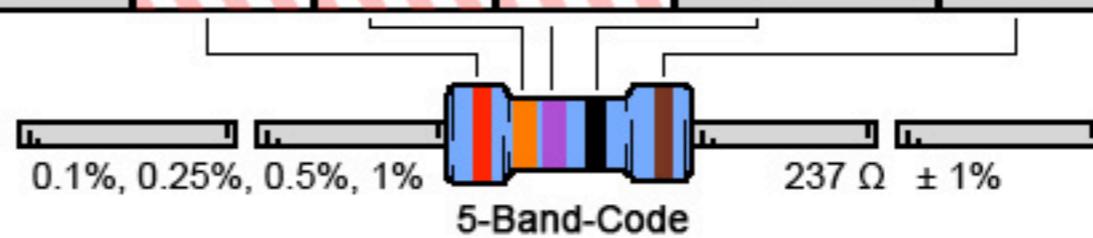
3rd band is multiplier

1000 ohms

1k ohms

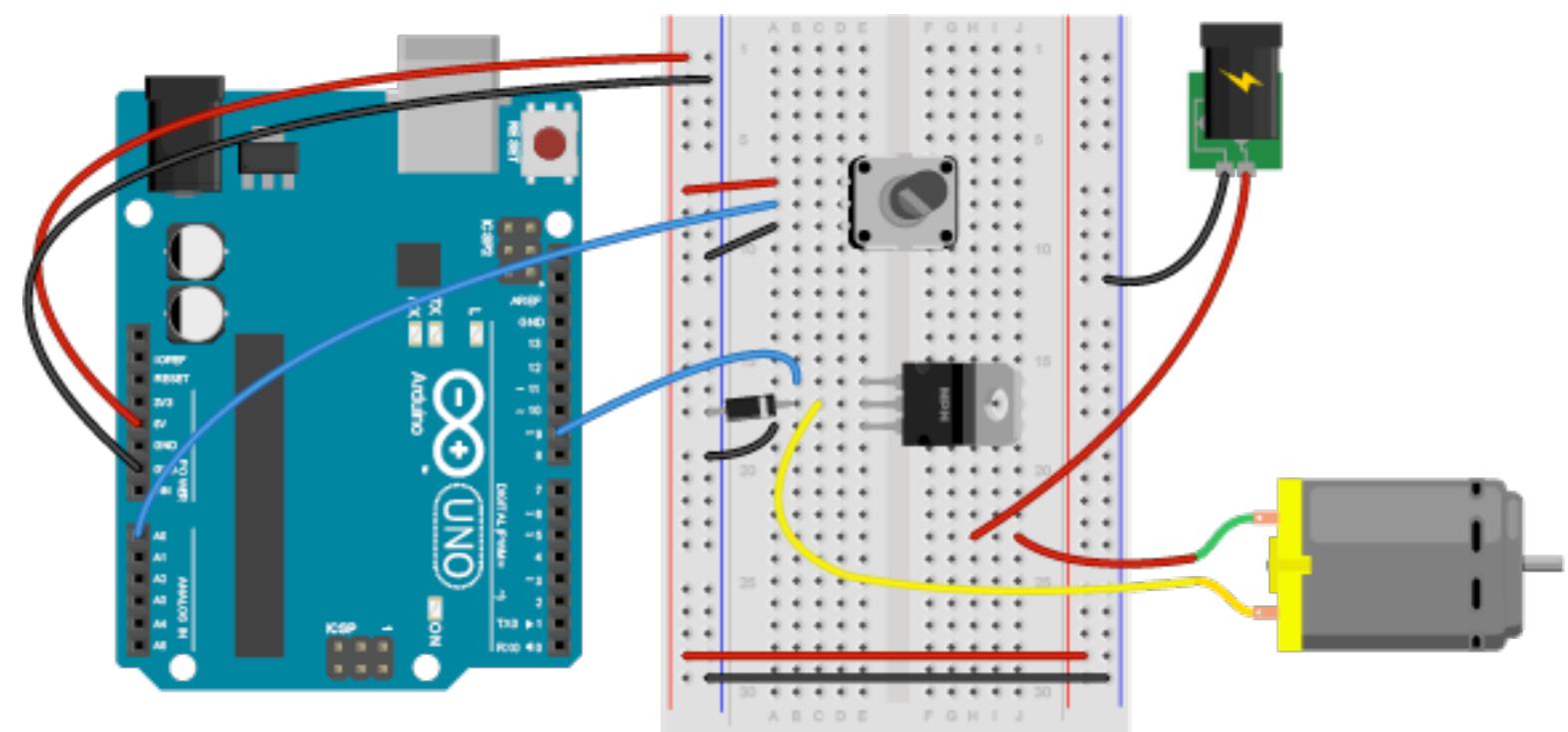
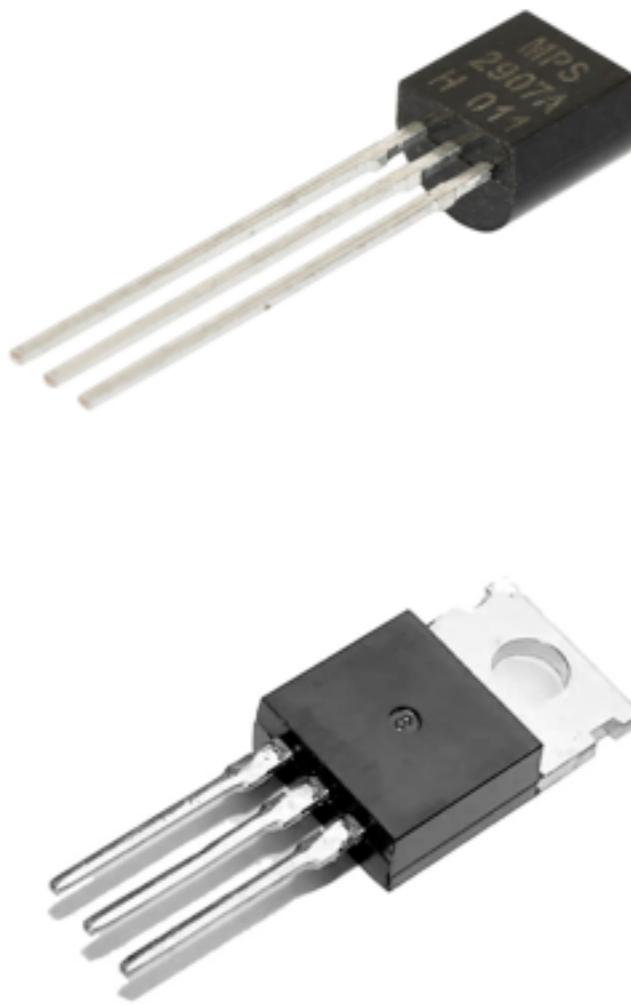


COLOR	1 ST BAND	2 ND BAND	3 RD BAND	MULTIPLIER	TOLERANCE
Black	0	0	0	1Ω	
Brown	1	1	1	10Ω	± 1% (F)
Red	2	2	2	100Ω	± 2% (G)
Orange	3	3	3	1KΩ	
Yellow	4	4	4	10KΩ	
Green	5	5	5	100KΩ	± 0.5% (D)
Blue	6	6	6	1MΩ	± 0.25% (C)
Violet	7	7	7	10MΩ	± 0.10% (B)
Grey	8	8	8		± 0.05%
White	9	9	9		
Gold				0.1Ω	± 5% (J)
Silver				0.01Ω	± 10% (K)



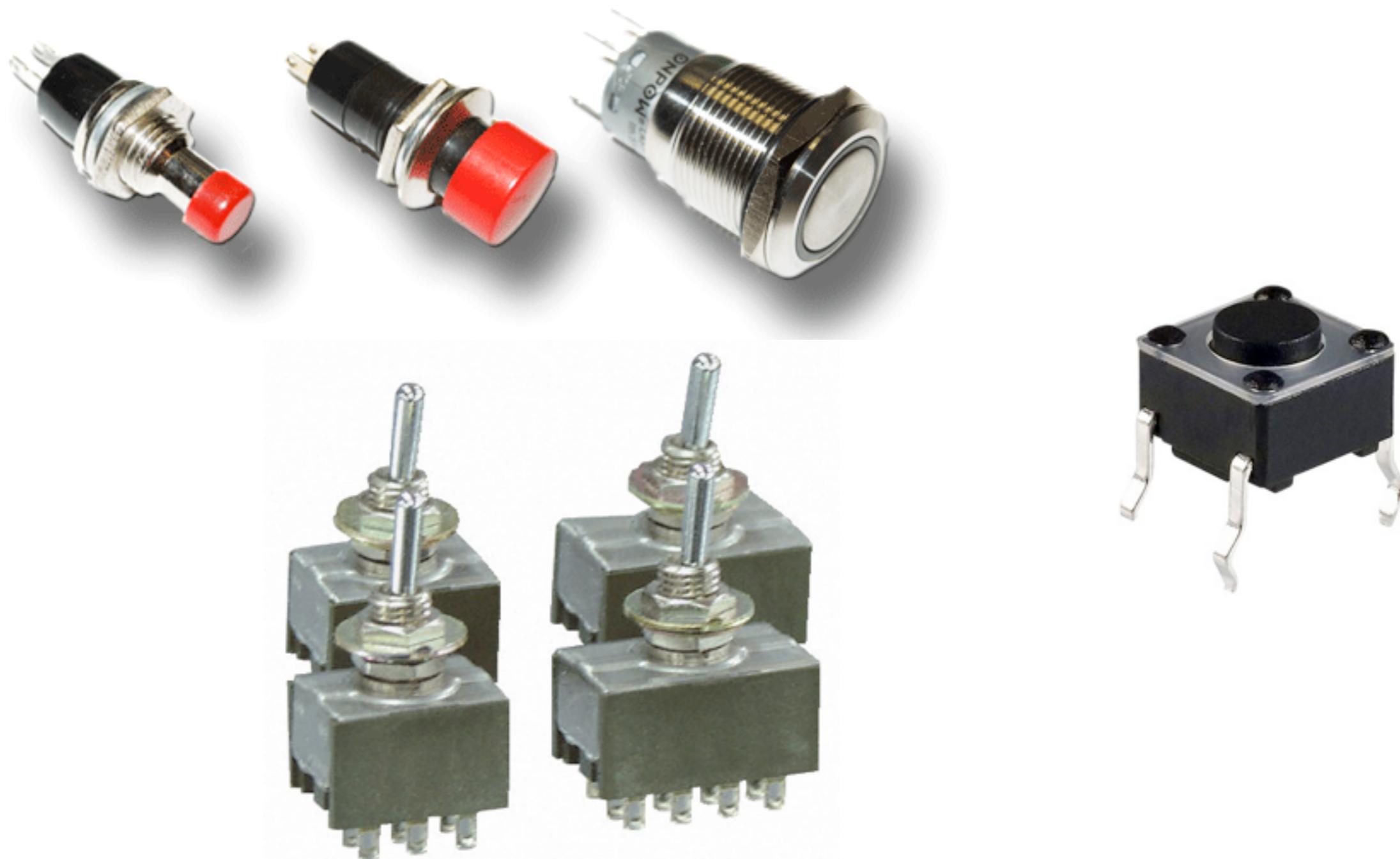
Transistors

“The transistor allows you to control a circuit that’s carrying higher current and voltage from the microcontroller. It acts as an electronic switch.”



In this example a transistor is needed to control a DC motor.

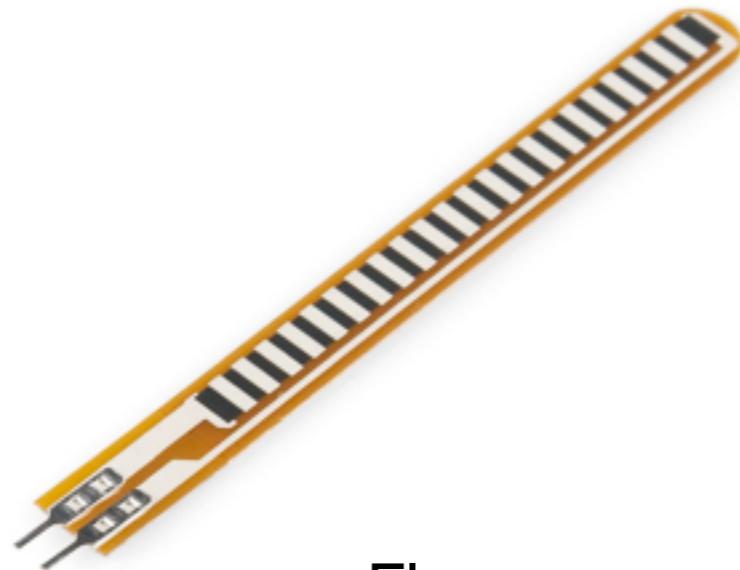
Buttons and Switches



Sensors



Ultrasonic



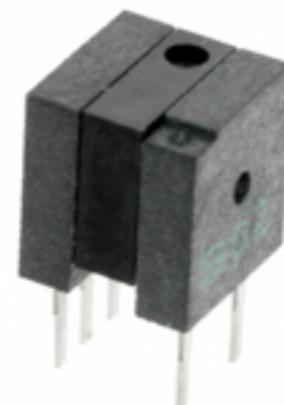
Flex



Photoresistor



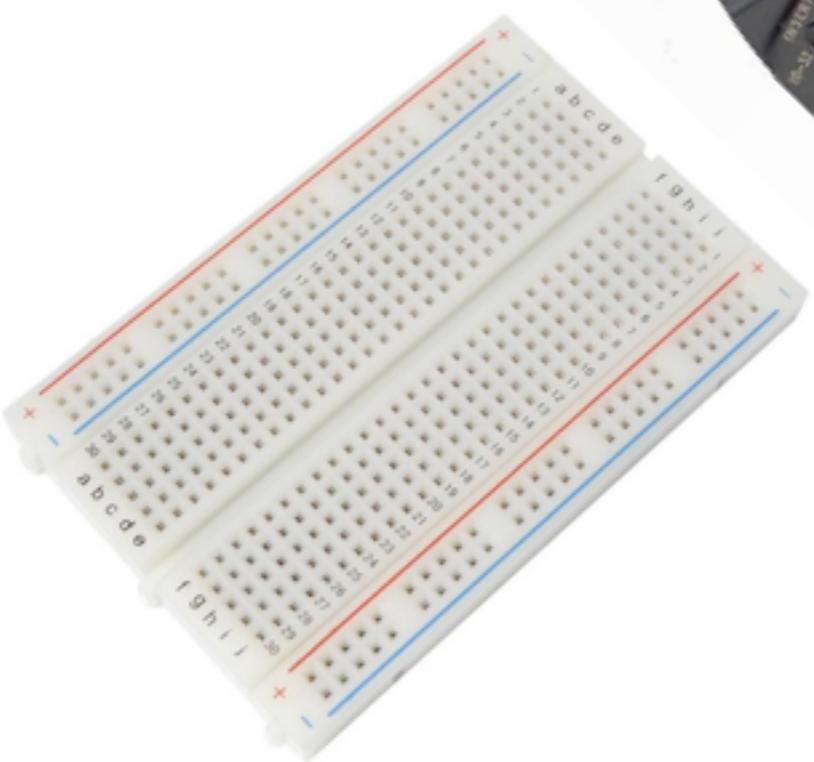
Pulse



Tilt



Accelerometor

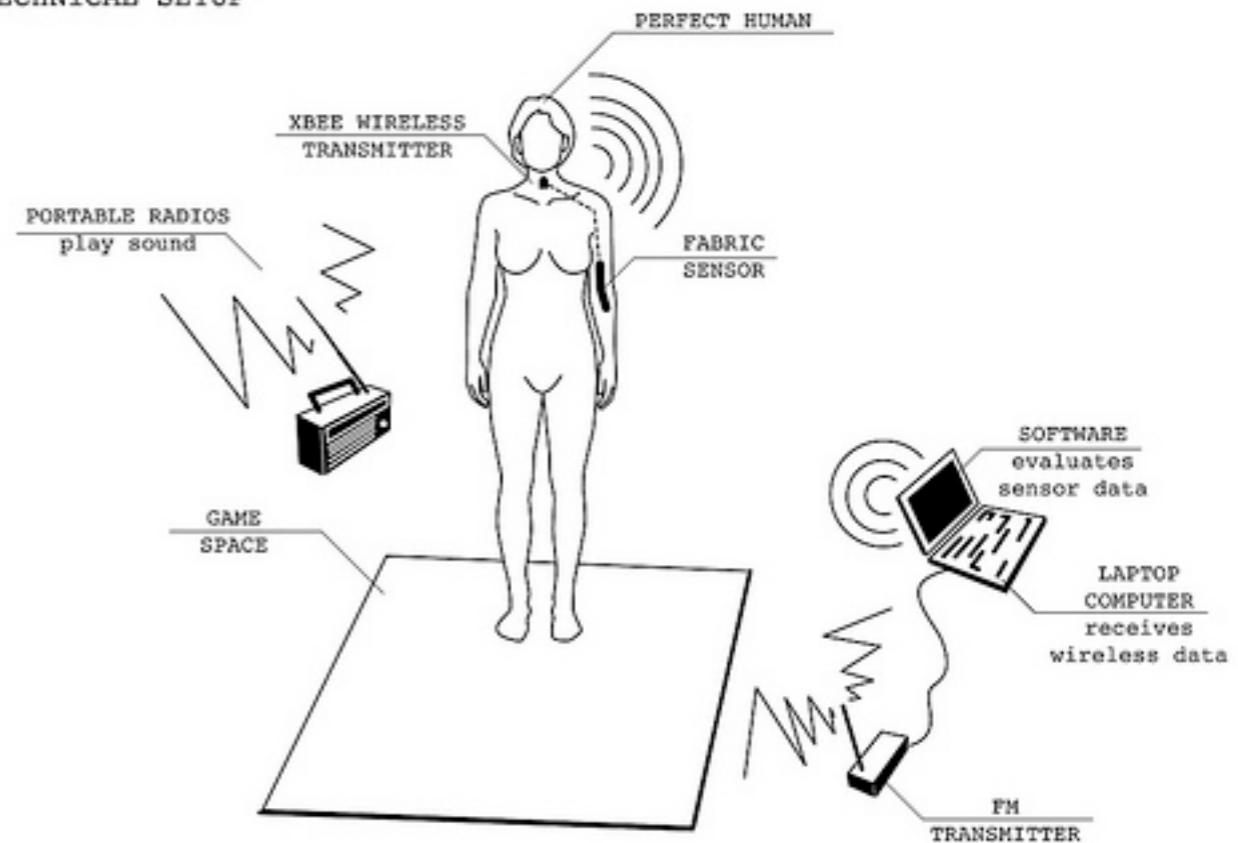


Perfect Human

Kobakant: Hannah Perner-Wilson and Mika Satomi



PERFECT HUMAN PERFORMANCE
TECHNICAL SETUP



HOW TO GET WHAT YOU WANT

EXAMPLE PROJECTS

WORKSHOPS

ACTUATORS

CONNECTIONS

POWER

SENSORS

TRACES

CIRCUITS AND CODE

WIRELESS

CONDUCTIVE

MATERIALS

NON-CONDUCTIVE

MATERIALS

TOOLS

TECHNIQUES

SENSORS

3D PRINTED SENSORS

BALLOON SENSOR

CIRCULAR KNIT INFLATION SENSOR

CIRCULAR KNIT STRETCH SENSORS

CONDUCTIVE POMPOM

CONSTRUCTED STRETCH SENSORS

CROCHET BUTTON

CROCHET CONDUCTIVE BEAD

CROCHET FINGER SENSOR

CROCHET PRESSURE SENSOR

CROCHET TILT POTENTIOMETER

CROCHET/KNIT PRESSURE

SENSORS

CROCHET/KNIT SQUEEZE SENSORS

DANISH KROWN SLIDE-SWITCH

EMBROIDERED POTENTIOMETERS

FABRIC BUTTON

FABRIC POTENTIOMETER

FABRIC STRETCH SENSORS

FELTED CROCHET PRESSURE

SENSOR

FELTED POMPOM PRESSURE

SENSOR

FINGER SENSOR

SENSORS

LIGHT TOUCH PRESSURE SENSOR



To make custom fabric pressure sensors that react to even the lightest touch. Ideally less than 10g of force.

BALLOON SENSOR



Sewn from pieces of non-conductive stretch jersey and Eontex piezoresistive knit stretch fabric. The fabric of this ball with a balloon inside stretches when the balloon is inflated and the Eontex fabric becomes less conductive the more it is stretched. Two contacts sewn with conductive thread on either side of one of the Eontex segments [...]

DANISH KROWN SLIDE-SWITCH

Eternity

Alicia Eggbert

ETERNITY

ETERNITY

Transparency Grenade

Julian Oliver

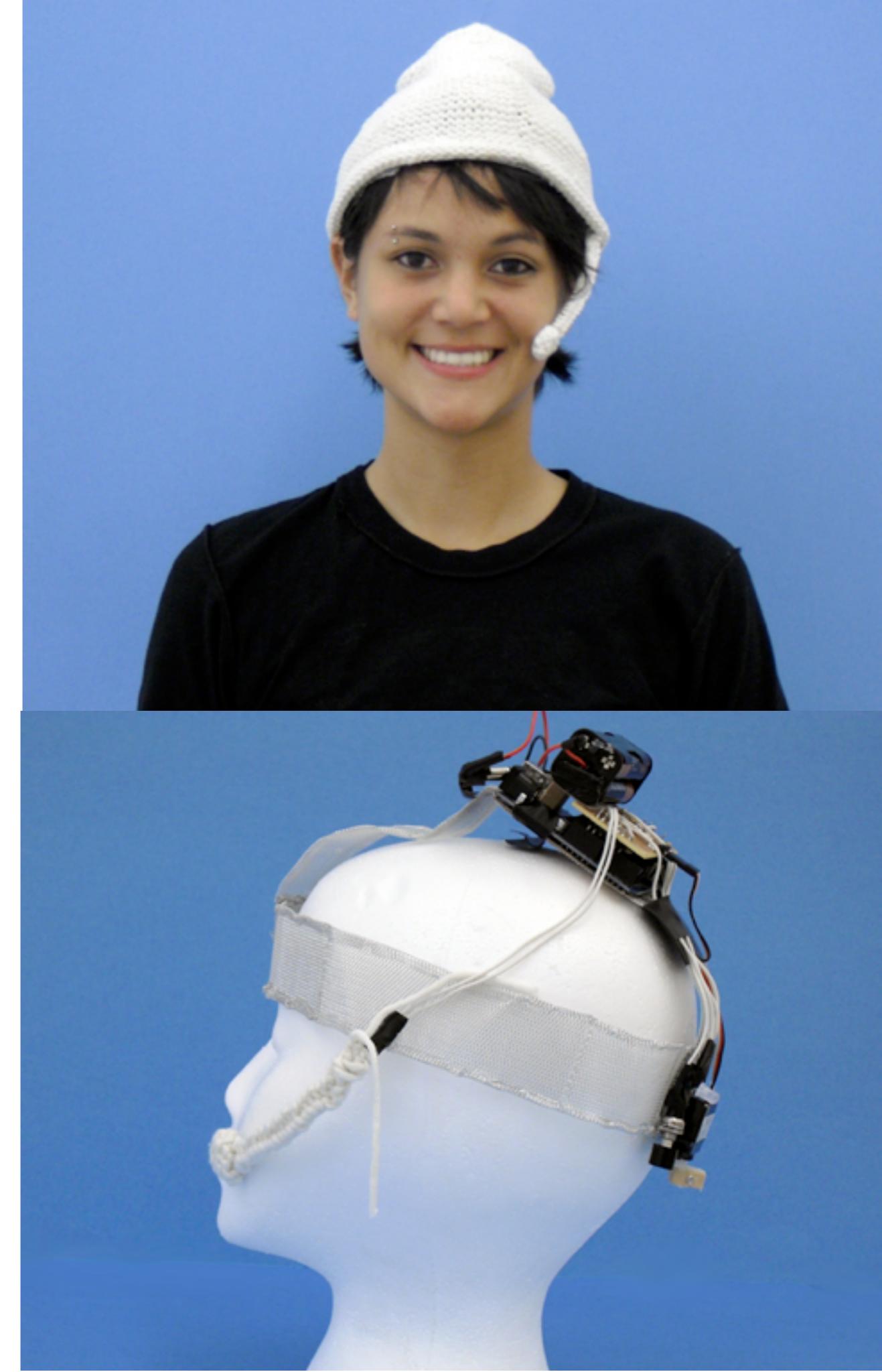
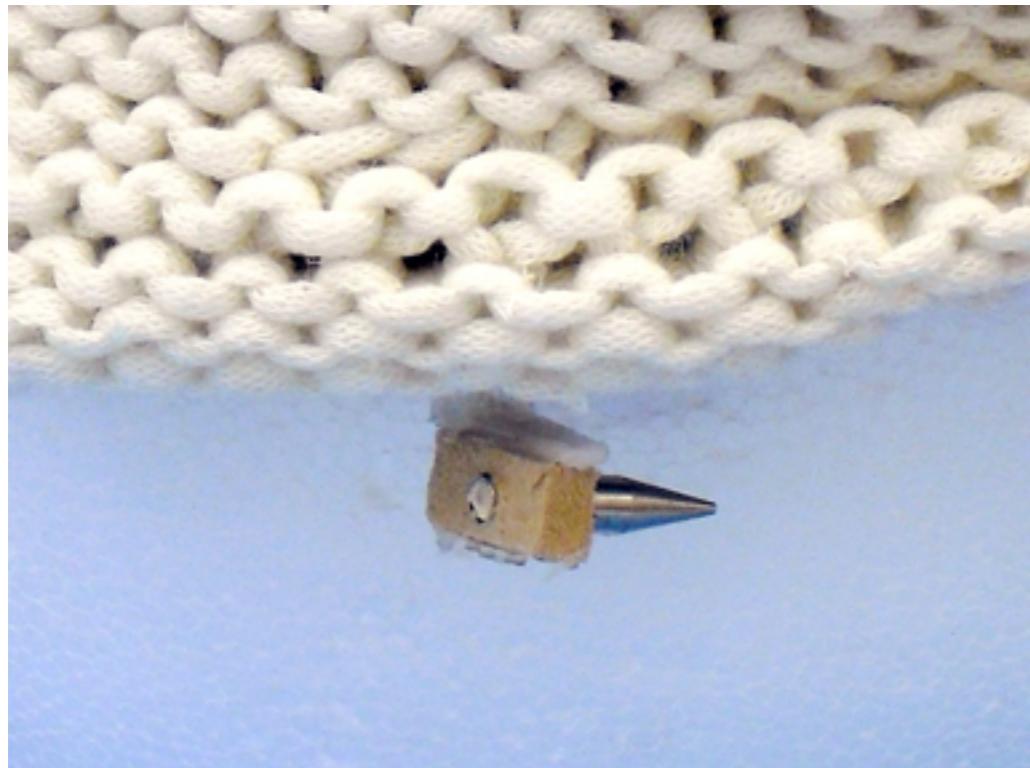
“Equipped with a tiny computer, microphone and powerful wireless antenna, the Transparency Grenade captures network traffic and audio at the site and securely and anonymously streams it to a dedicated server where it is mined for information.”



Happiness Hat

Lauren McCarthy

"An enclosed bend sensor attaches to the cheek and measures smile size, a servo motor moves a metal spike into the head inversely proportional to the degree of smile. Through repeated use of this conditioning device you can train your brain to smile all the time. The device runs on Arduino."



Pins

A *pin* provides an input or output through which the controller can communicate with components.

Digital I/O Pins

- two values: HIGH or LOW
- HIGH: 5 volts sent to the pin
- LOW: pin is at 0 volts

Analog Input Pins

- read analog values (0 - 1023) that represent 0 - 5 volts

Analog Output (PWM)

- output values between 0 - 255
- uses particular digital pins
- not true analog - uses a technique called *pulse width modulation* to get analog results using a digital means

