

Designing Interaction with Electronics workshop

About myself

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Brief introductions by participants

Your background

Why you joined the workshop

What would you like to do in your thesis

Schedule

Monday

- Introduction
- Group discussions
- Assembling electronics

Tuesday

- Basics programming on microcontroller
- Architecture
- Controls
- I/O commands

Wednesday

- Serial communication
- Connecting microcontroller to PC
- Group work

Thursday

- Group work

Friday

- Group work
- **Presentations (13:00 - 15:00)**
- Returning tools and components

The goal of this workshop

This workshop gives you tools to prototype interactive systems. It is **NOT** aiming to **UNDERSTAND** technical tools **BUT USE THEM** in research projects and design practices of your own.

It requires your **CREATIVE MINDS** otherwise you cannot use them.

My role in this workshop

I am an **INTERACTION DESIGNER**, not engineer. So I will not be able to instruct all technical details.

The workshop focuses on introducing the tools and giving instructions how to make **RAPID PROTOTYPES**.

Your participations in this workshop

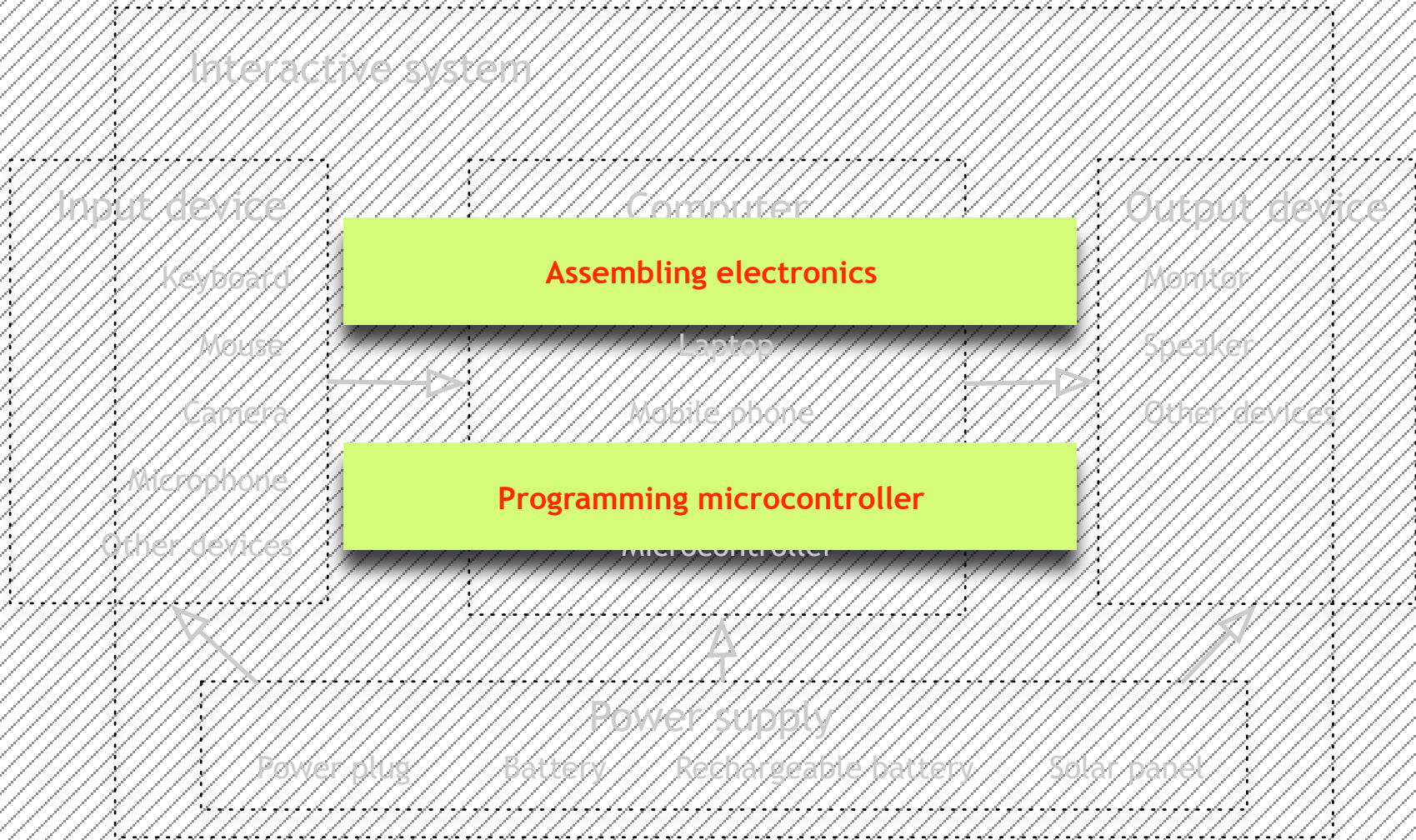
You don't need to prototype everything from scratch. By sharing knowledge and experiences, we can prototype things even more rapidly.

You can **SEARCH SNIPPETS** online. But please also **SHARE YOUR CODES AND SCHEMATICS** online.

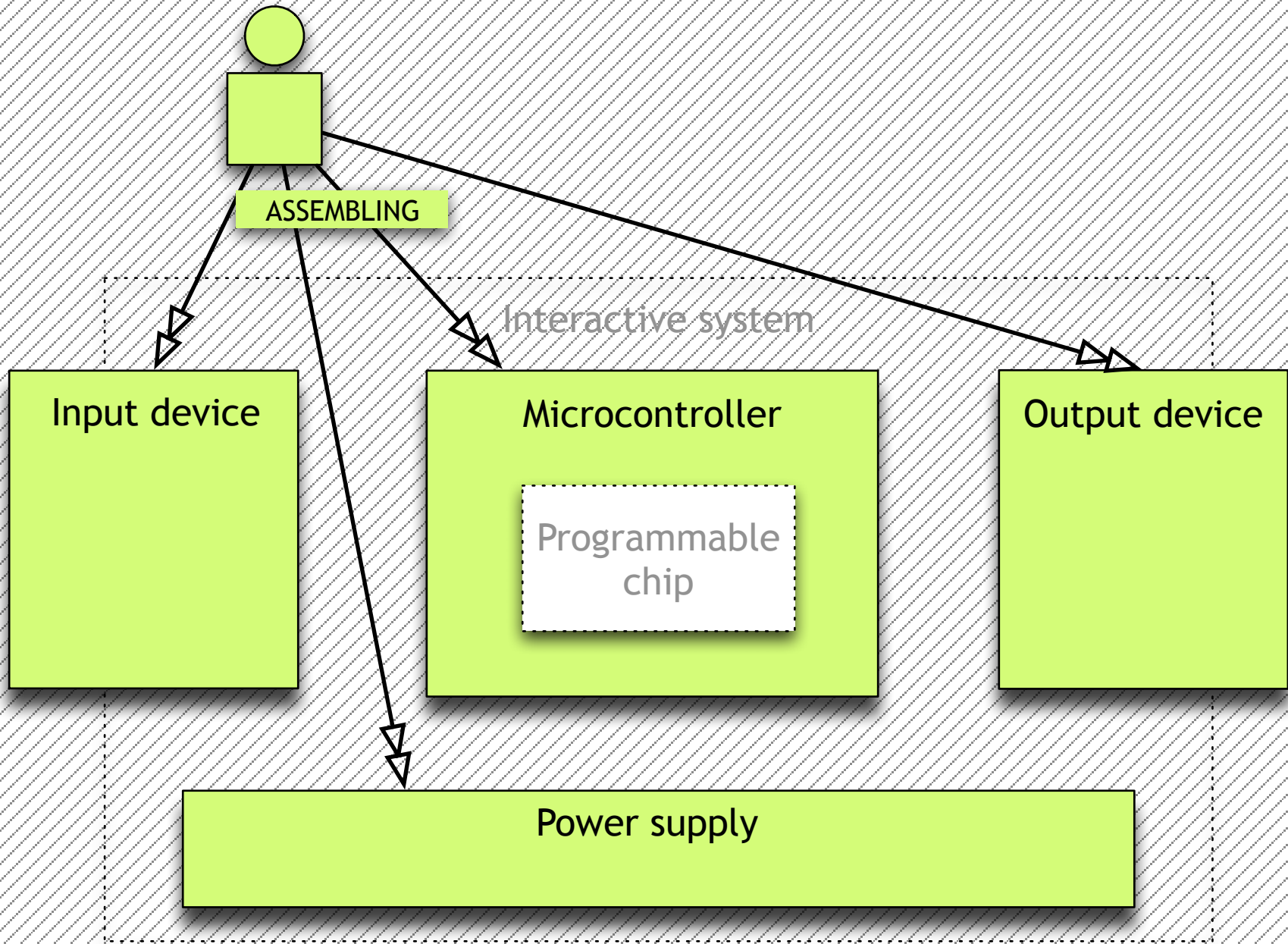
Final demos from previous workshops

What are we going to do in this workshop?

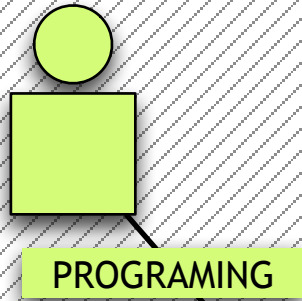
What are we going to do in this workshop?



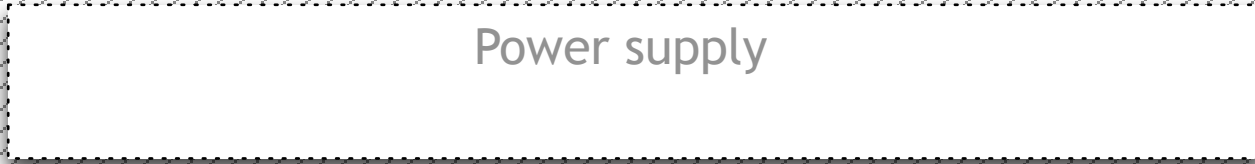
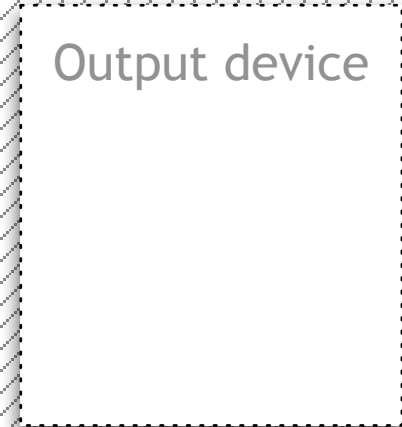
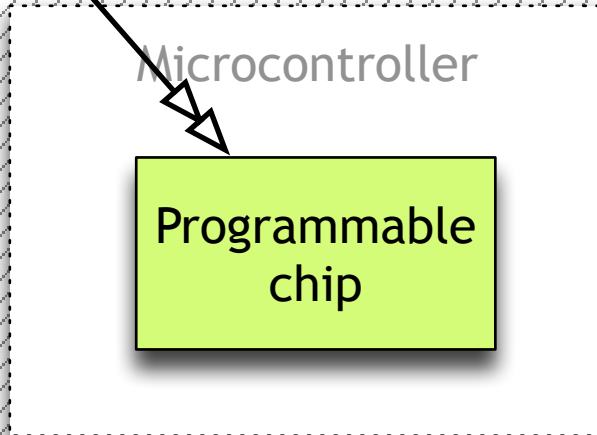
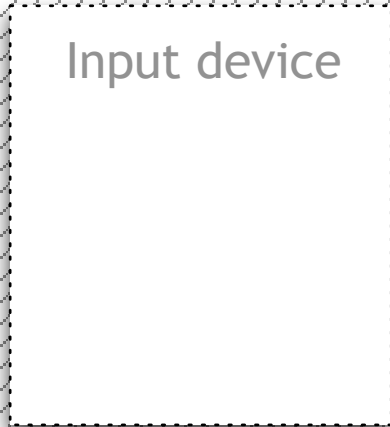
Assembling Electronics



Programming Microcontroller



Interactive system



Assignment

Create a rapid prototype with your group.

Credits from this workshop

Students are expected to **share experiences** (descriptions, codes, photos and videos) in following blog to explain how you developed your work.

<http://mlab.taik.fi/paja/>

Create an account in the blog

Please do not forget to **fill your full name in your profile** otherwise I won't know who you are when you made a post.

<http://mlab.taik.fi/paja/>

Assembling electronics

Basic tools

Each group receives a candy box. It has all you need.
Please returned the box as it is now when this workshop ends.

Arduino NG

Ground pin

Digital pins (2-13)

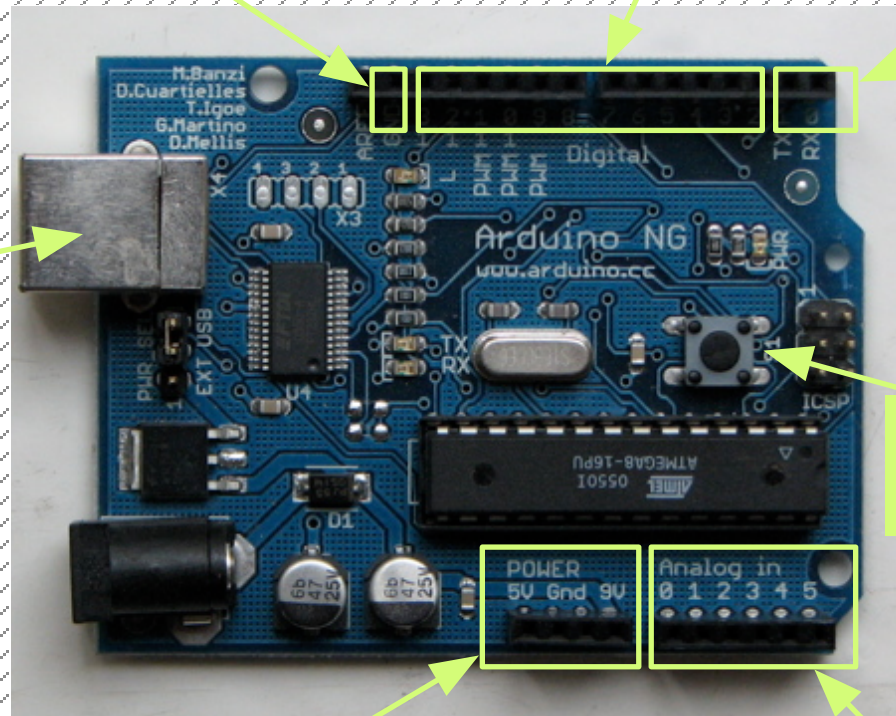
Digital pins (0-1)
shared with USB

Plug a USB cable
(5V is also supplied)

Reset button (click when
you upload program)

5V output, Ground and 9V output pins
(9V output is not in use)

Pins for analog in pins (0 - 5). These
can used as digital pins (14 - 19)



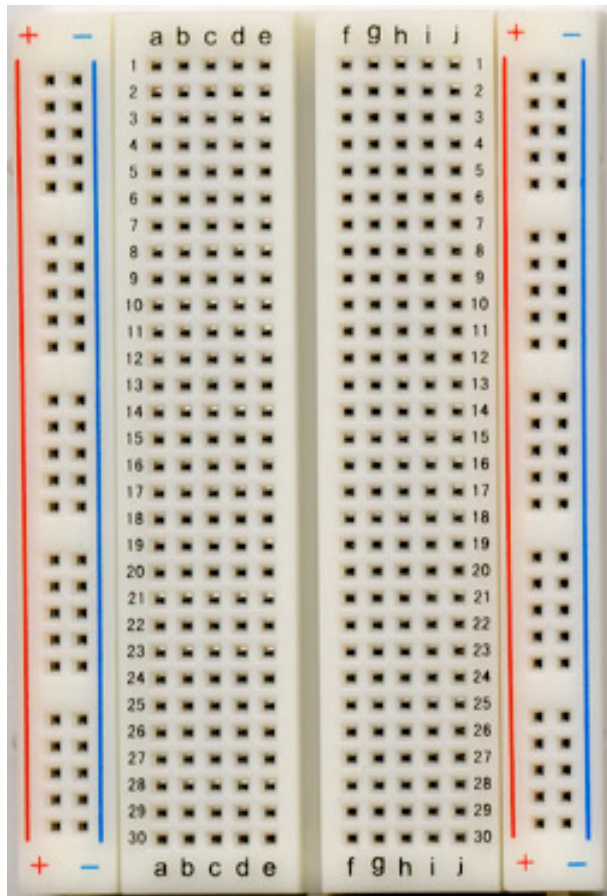
USB cable



USB A-B cable

Breadboard

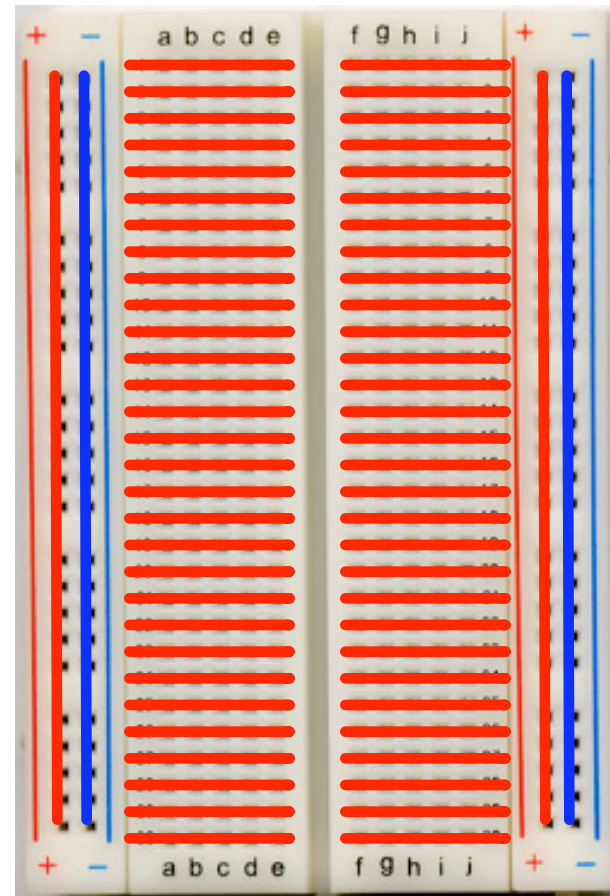
Breadboard (photo)



Video and Website © 2004 ClarkZapper.net

Breadboard (schematic)

5V GND 5V GND



Video and Website © 2004 ClarkZapper.net



Jumper wires

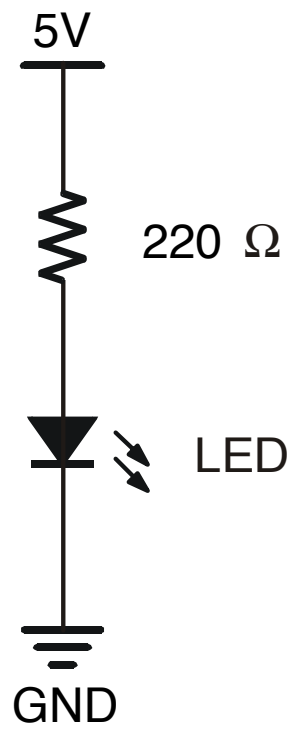


Multimeter

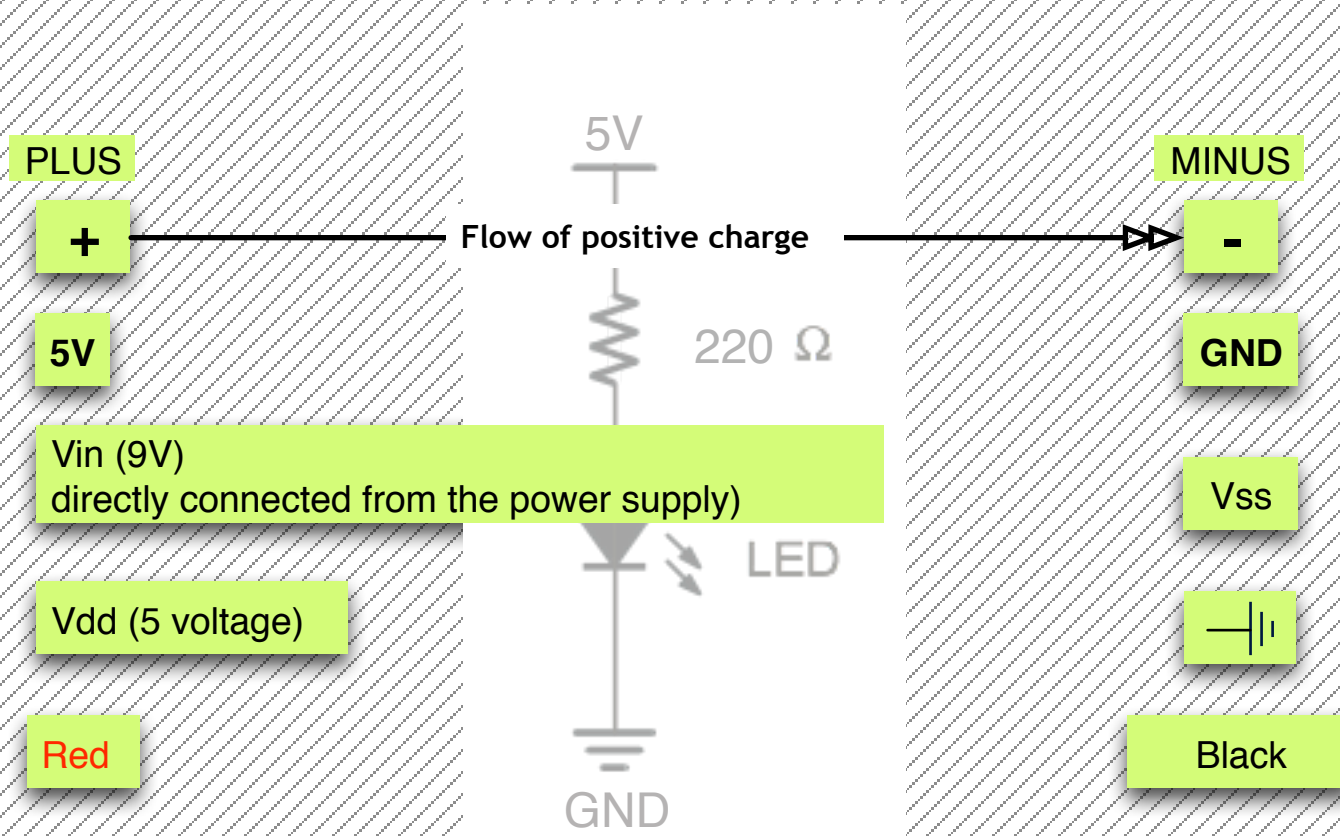


Understanding schematics

What does this mean?

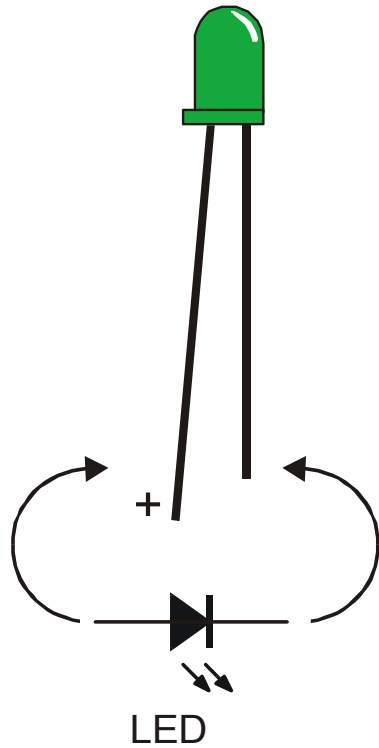


Flow of positive charge



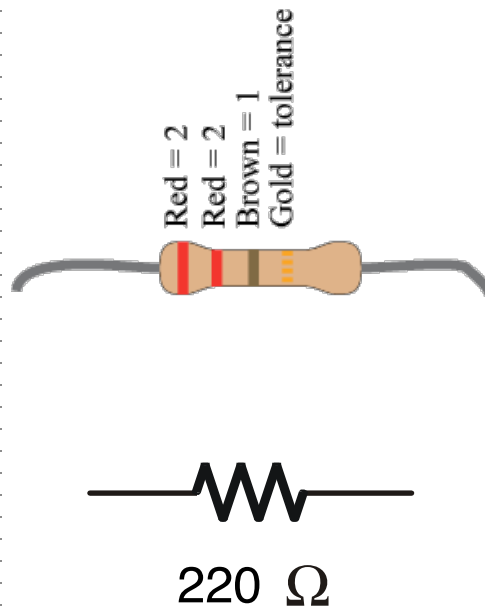
Most Popular components

LED (Light emitting diode)



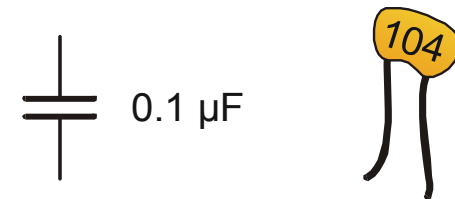
a semiconductor device with two terminals, typically allowing the flow of current in one direction only. LED has polarity

Resistor



a device having a designed resistance to the passage of an electric current.

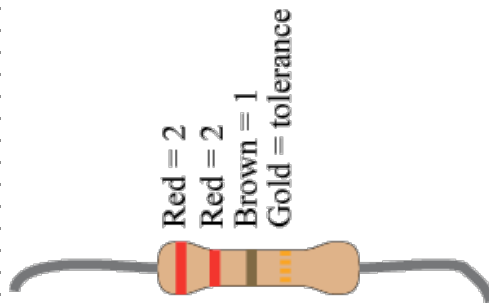
Capacitor



a device used to store an electric charge

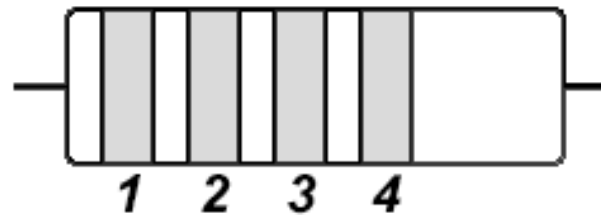
Markings for resistors

Resistor



220 Ω

a device having a designed resistance to the passage of an electric current.



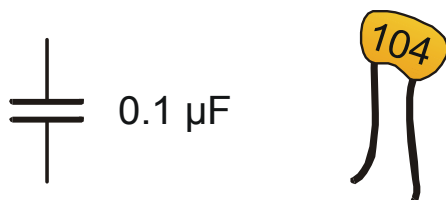
1, 2 3 4

Color	Number	Multiplier	Tolerance
Black	0	1	-
Brown	1	10	±1%
Red	2	10 ²	±2%
Orange	3	10 ³	±0.05%
Yellow	4	10 ⁴	-
Green	5	10 ⁵	±0.5%
Blue	6	10 ⁶	±0.25%
Purple	7	10 ⁷	±0.1%
Gray	8	10 ⁸	-
White	9	10 ⁹	-
Shiver	-	10 ⁻²	±10%
Gold	-	10 ⁻¹	±5%
No color	-	-	±20%

Download a widget called "Resistulator" in your Mac

Markings for capacitors

Capacitor



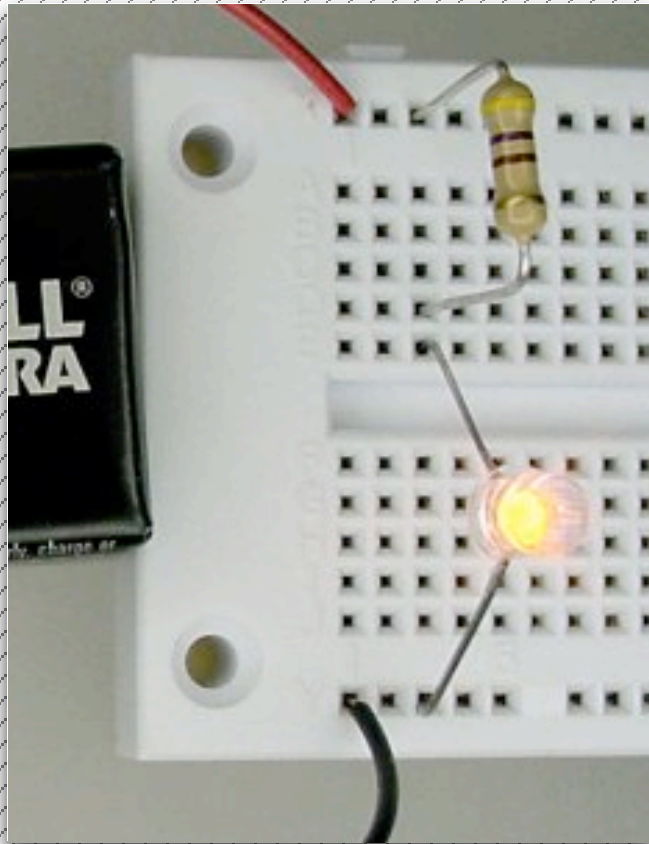
a device used to store an electric charge

Capacitor three digit markings

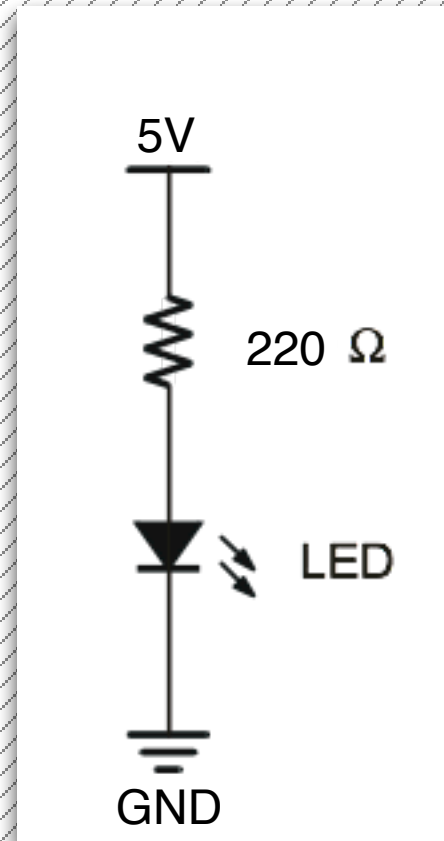
CODE / Marking	μF microfarads	nF nanofarads	pF picofarads
1R0	0.000001	0.001	1
100	0.00001	0.01	10
101	0.0001	0.1	100
102	0.001	1	1,000
103	0.01	10	10,000
104	0.1	100	100,000
105	1	1,000	1,000,000
106	10	10,000	10,000,000
107	100	100,000	100,000,000

Assemble electronics

Breadboard (photo)



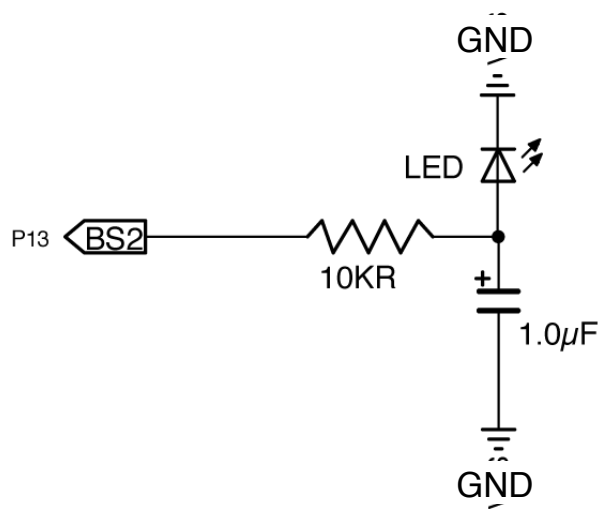
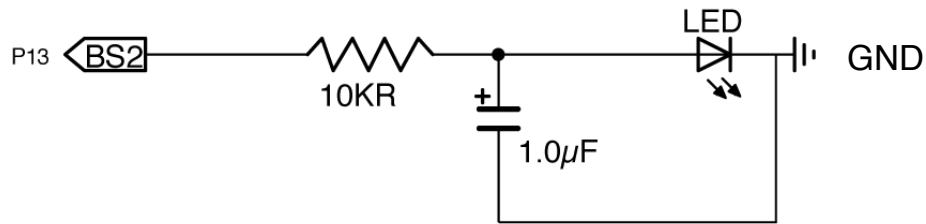
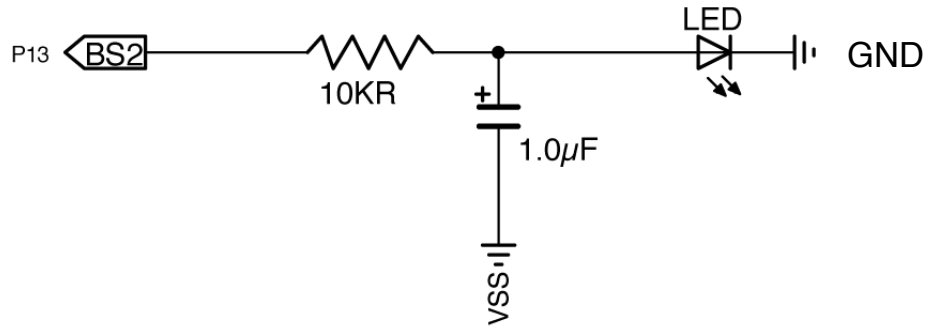
Breadboard (schematic)



+	-
Vdd	GND
5V	Vss

Schematic plans

These are all same schematics.

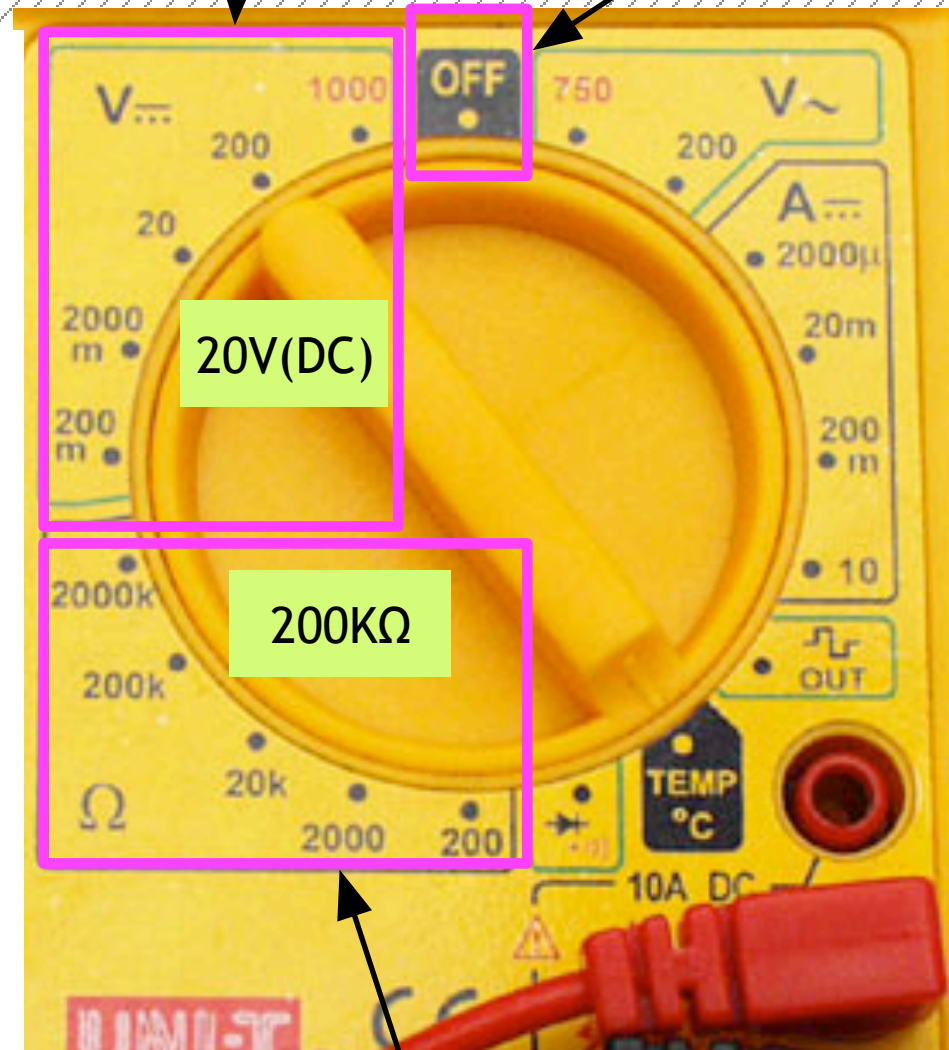


Checking your circuit

Multimeter

Measuring voltages

Off switch



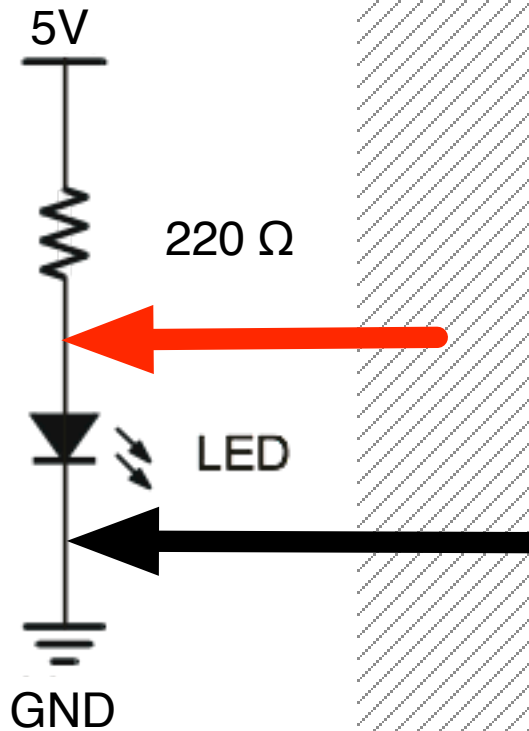
20V(DC)

200KΩ

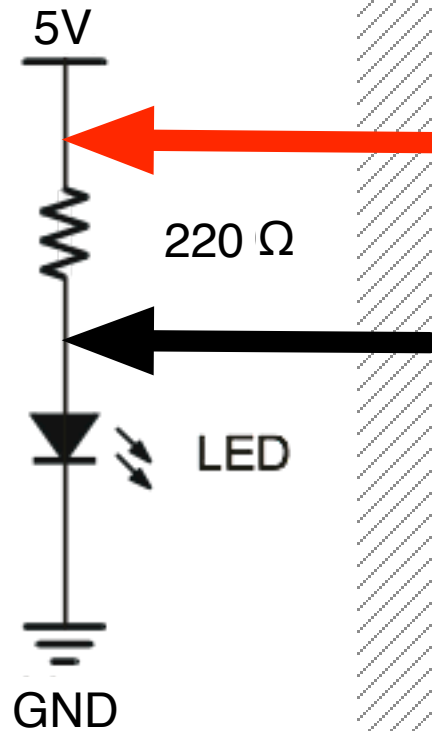
Measuring conductivity and resistance

Measuring electricity with multimeter

Voltage

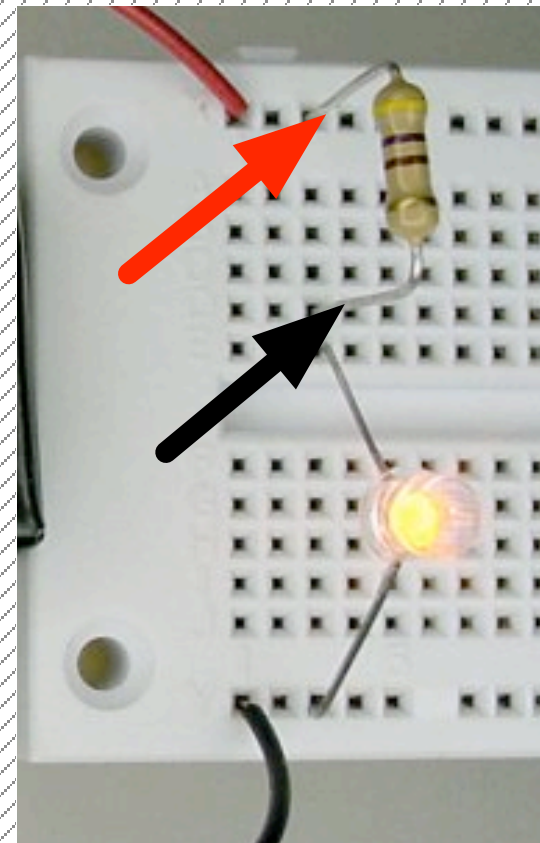


Resistance



Turn off power.

Conductivity

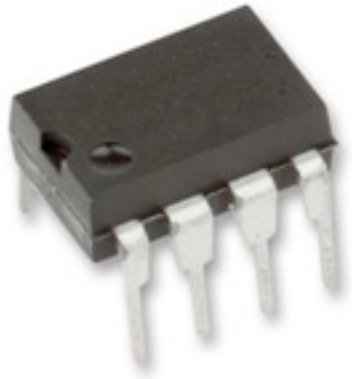


Turn off power.

Assembling sensor

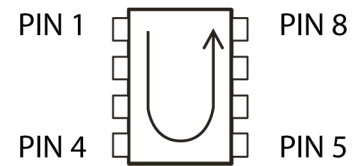
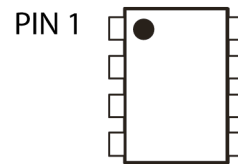
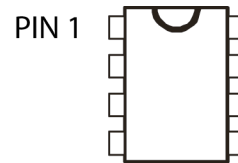
IC (Integrated Circuit)

It's a magic blackbox!



E.g. QT113 touch sensor

PIN assignment



IC (Integrated Circuit)

