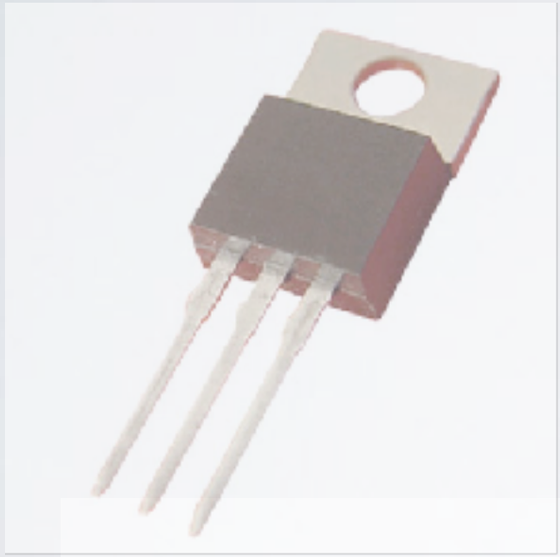
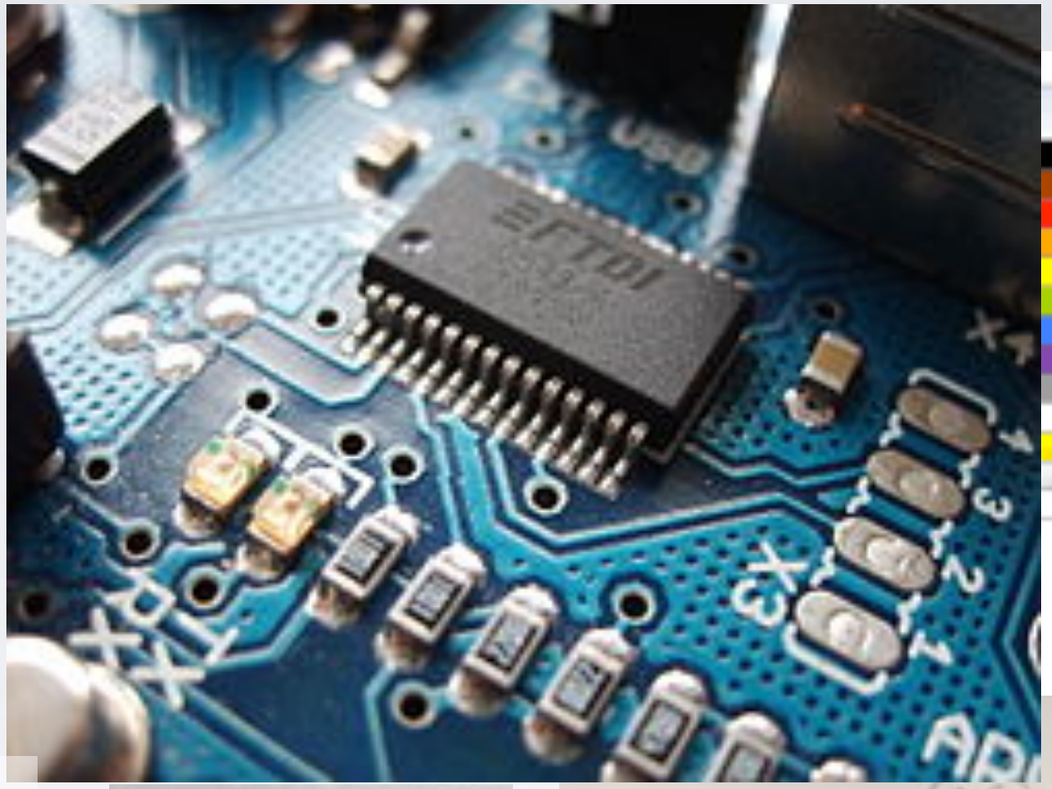
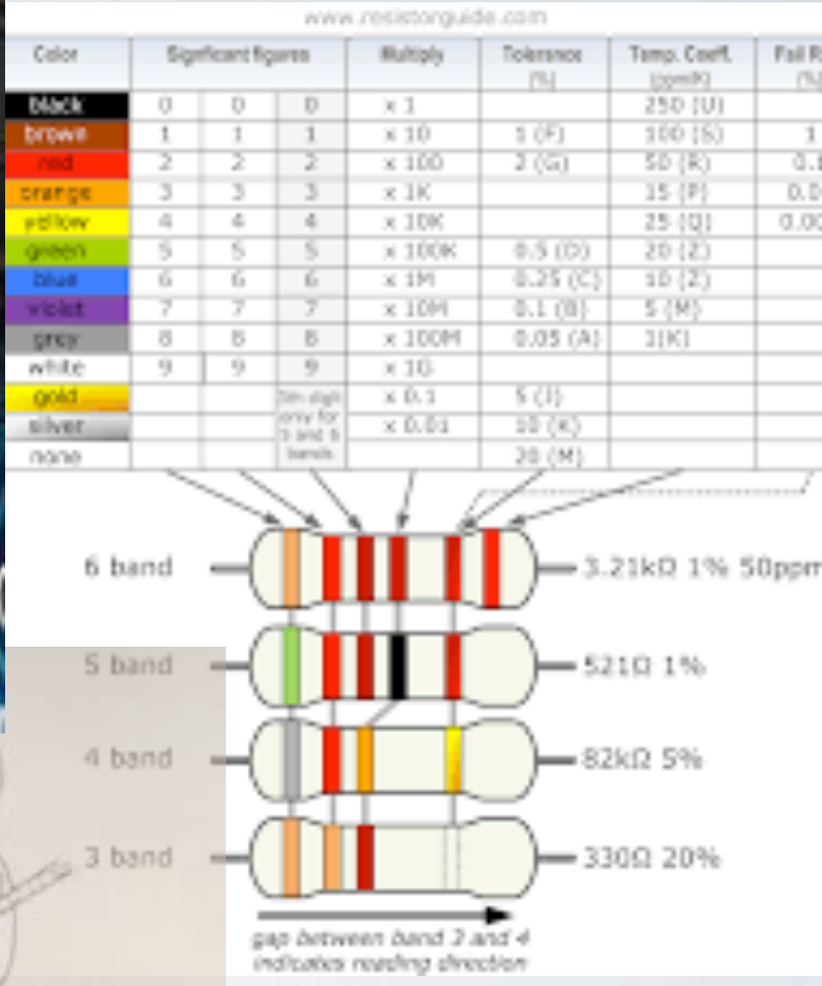
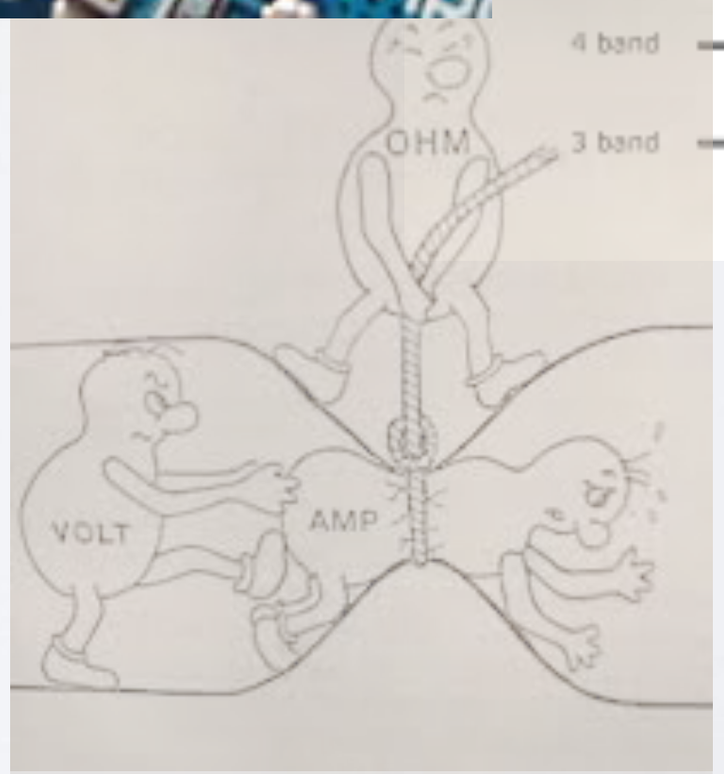
Introduction to Electronics
Artscience BA1 2019-2020









My name: Lex van den Broek
Head of the Electronics Workshop. Teacher introduction to Electronics.

http://ewp.koncon.nl

Borrowing of electronic equipment
(recorders, microphones, interfaces, amplifiers, cables, speakers, ...)

Maintenance of all electronic studio's
(Sonology, ArtofSound, Composition studio's ...)

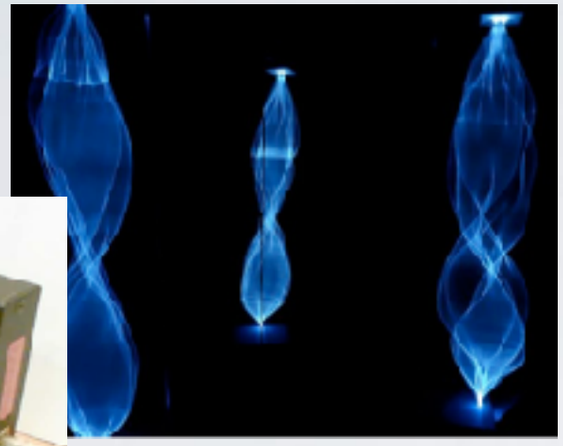
Technical advice
(repairs, electronic problem solving, ...)

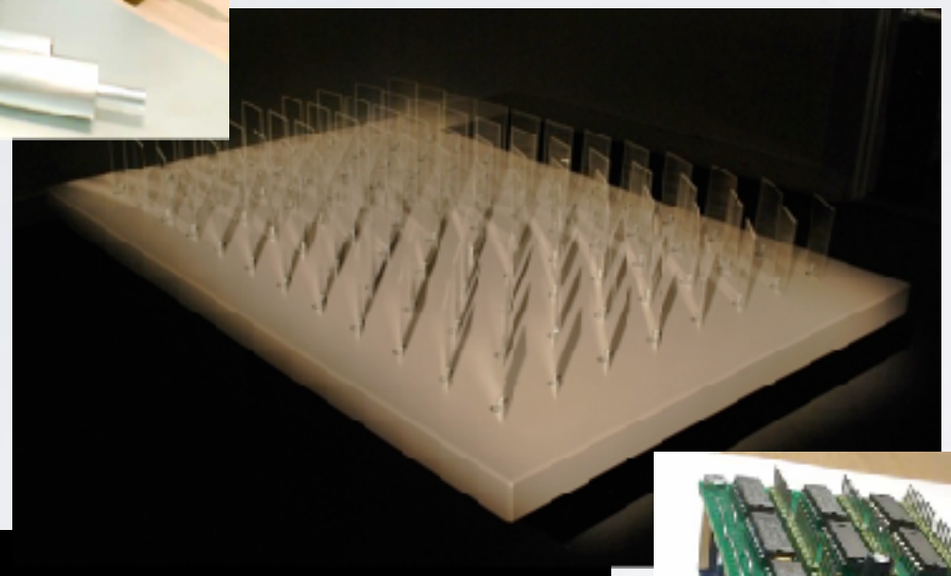
Electronic development, guiding (exam) projects,
(electronic design, prototyping, building, documenting ...)

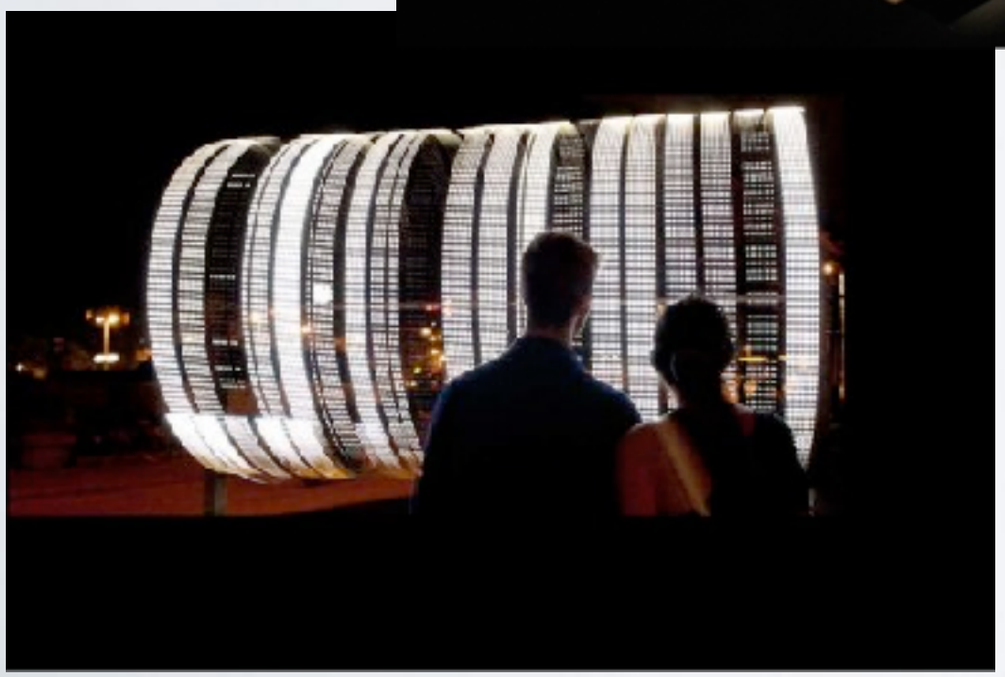
Place for working on your own project
(building, testing and measuring your own electronics with expert help and good tools...)

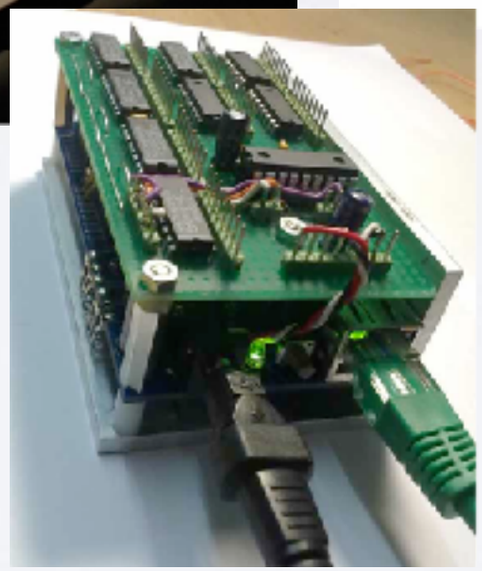
Sound reinforcement for all concerts within the Conservatory
(PA, digital mixing, stage, ...)

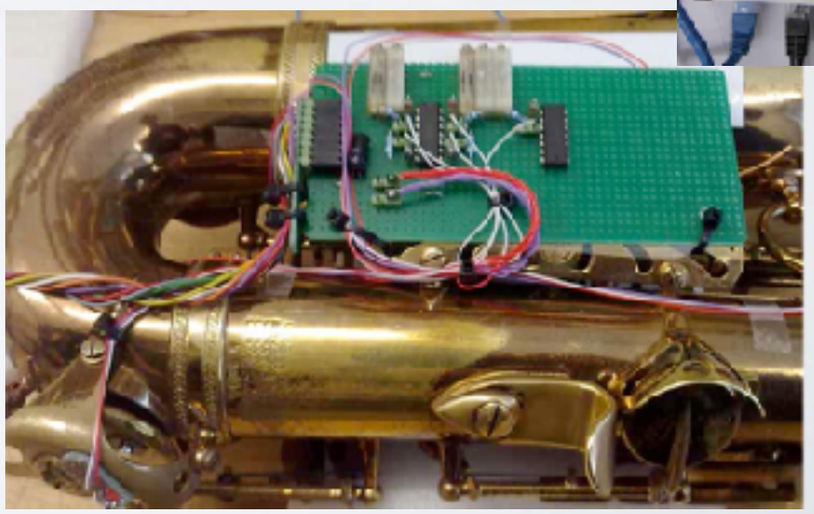
Some project examples:









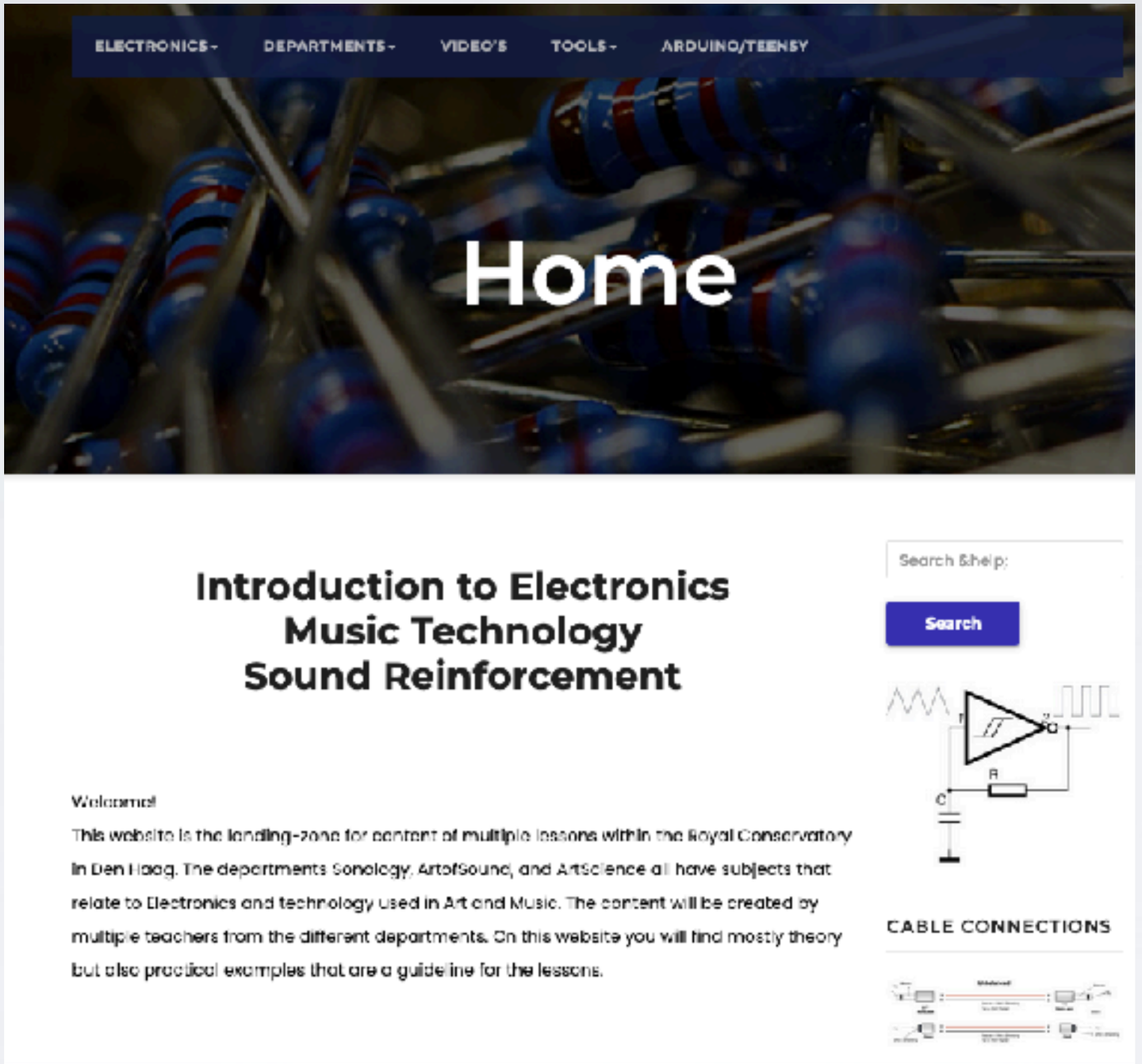


Introduction to Electronics

4 lessons with the 2 groups (covid measures)

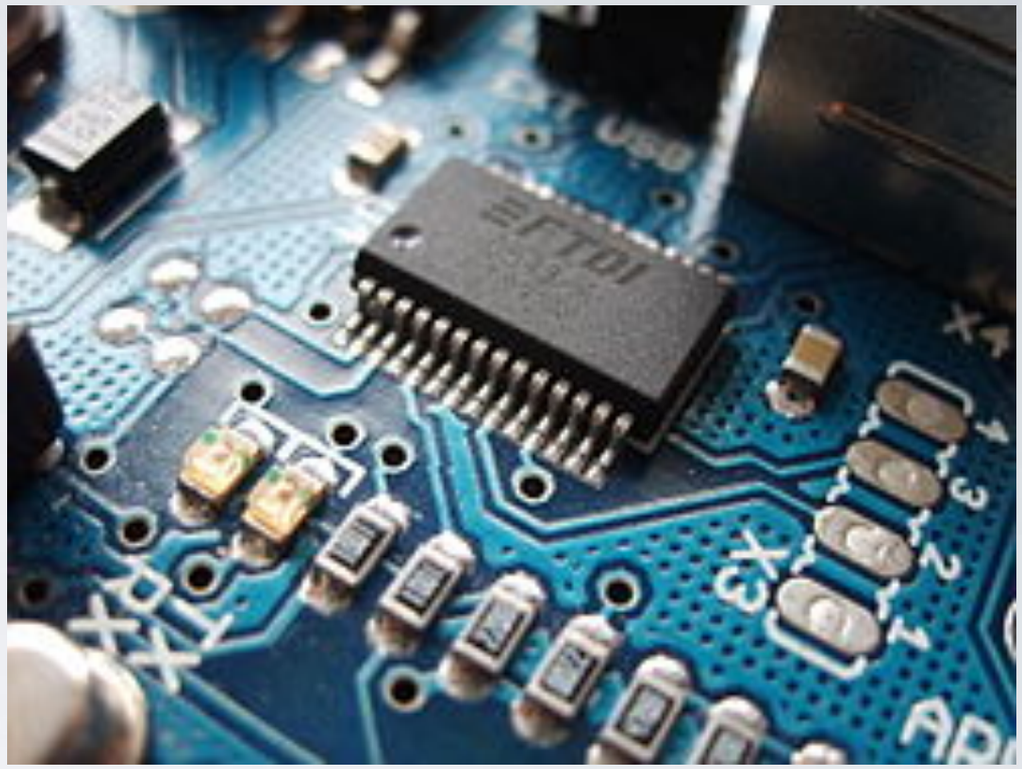
Theory and practice
Ohms law, current, resistance, voltage, AC, DC and much more ...

Introduction to Electronics



https://electronics.koncon.nl

What is electronics: (Wikipedia)



Electronics deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes and integrated circuits, and associated passive interconnection technologies. The nonlinear behaviour of active components and their ability to control electron flows makes amplification of weak signals possible and electronics is widely used in information processing,telecommunications, and signal processing.....

Short history of Electronics

Some great names:

Marconi (Radio invention)

Georg Ohm (Ohm's law)

Thevenin (Thevenin's theorem)

Gustav Kirchoff (Kirchoffs law)

Short history of Electronics

1906

Invention of the vacuum tube :

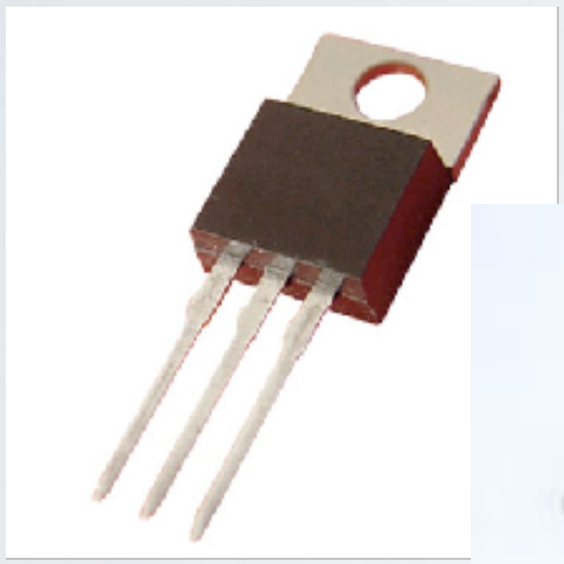
Short history of Electronics

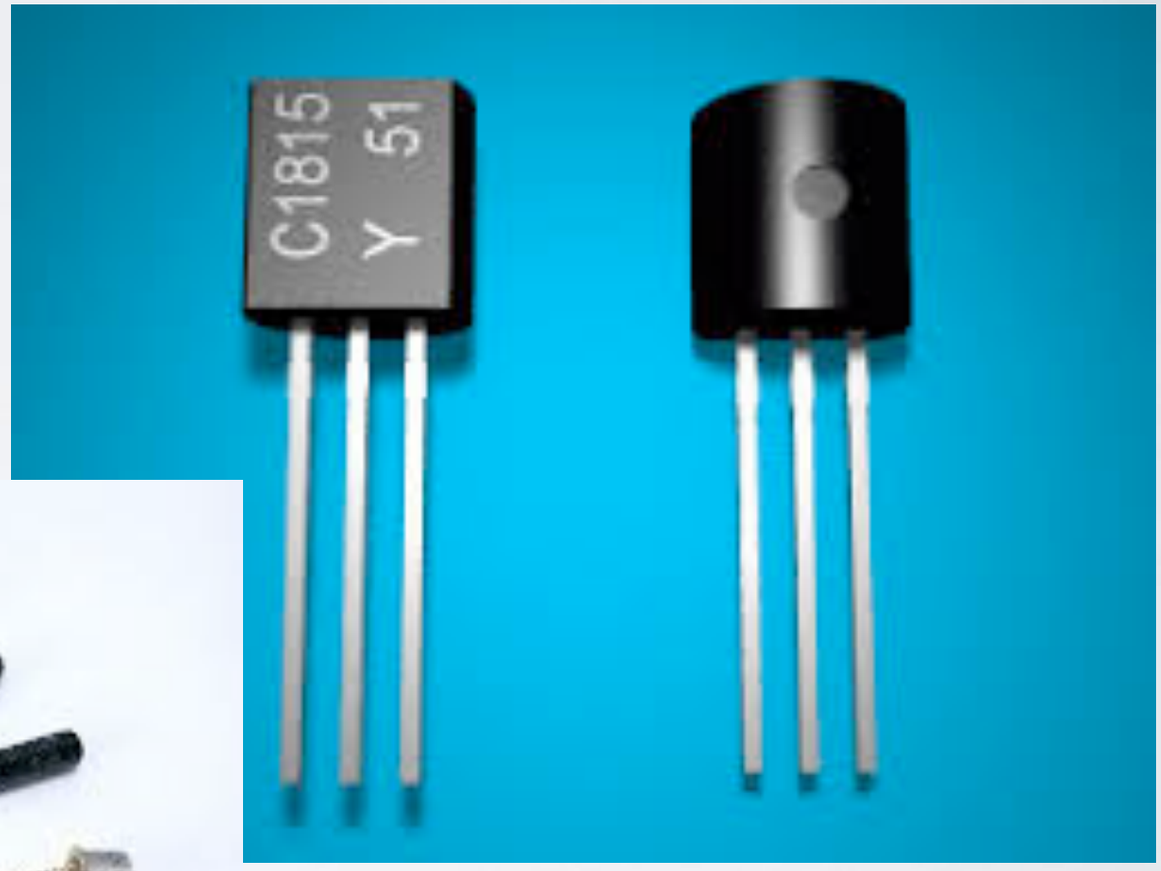
1906

Invention of the vacuum tube

1925-1948

The transistor was invented





Short history of Electronics

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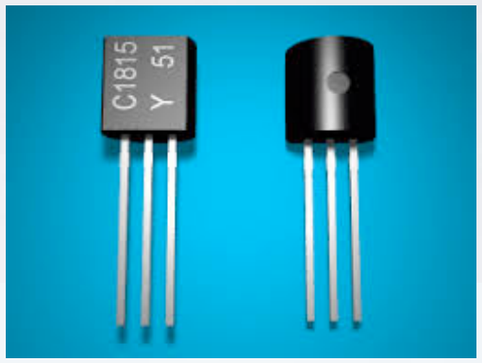
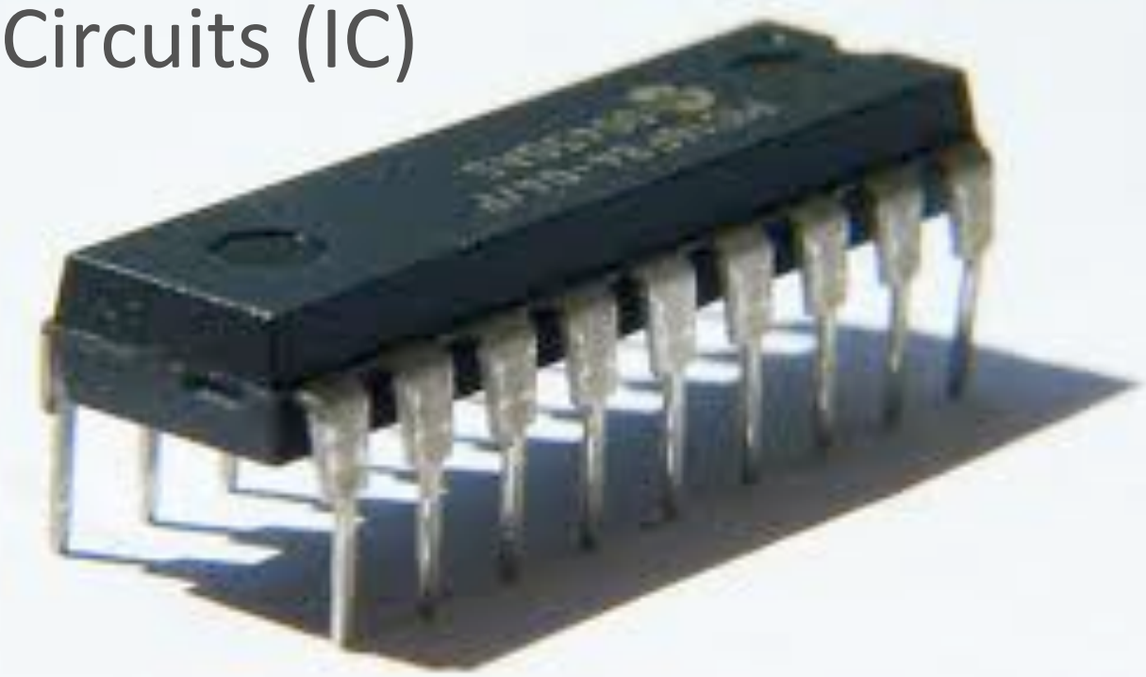


1950

Introduction of the Integrated Circuits (IC)



Short history of Electronics

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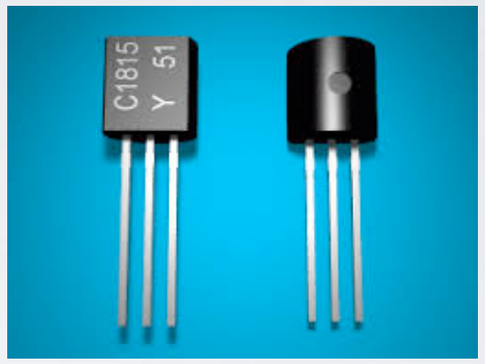

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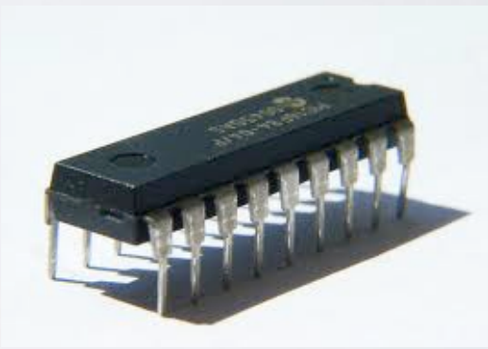
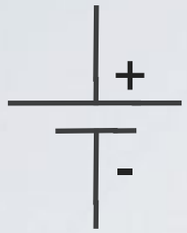
Introduction of the Integrated Circuits (IC)



Now:
about **2.300.000.000** transistors are placed onboard of **one** 8 core Xeon processor!

Basic components and symbols (european):



= Battery *Provides energy*

= Plus *Plus connection of a power source*

= Ground *Ground connection*

= Wire *Makes connections (resistance = 0 Ohm)*

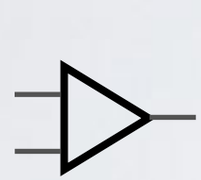
= Resistor *Limits the current*

= Capacitor *Can 'hold' charge.*

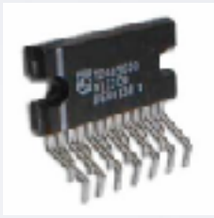
Basic components and symbols (european):

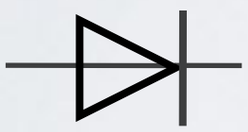
= Switch *Switch On/Off*

= Connector *Connection point in circuit*

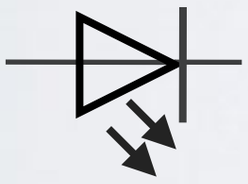


= Amplifier *Generic symbol for Amplifiers*





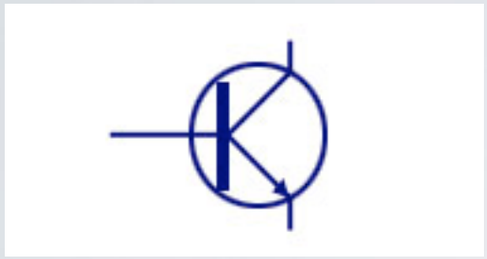
= Diode *Current flow one direction only*



= Led *Light Emitting Diode, like diode but will light up*

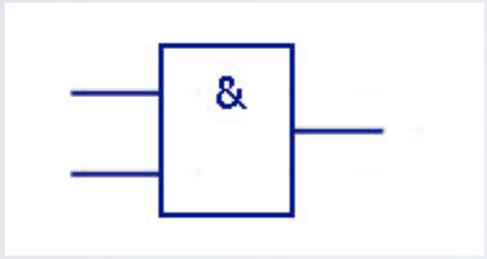
http://www.circuitstoday.com/electronic-circuit-symbols

Basic components and symbols (european):

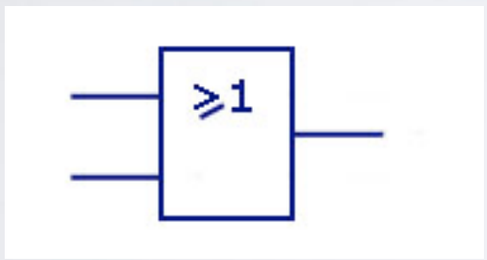


Transistor (NPN)

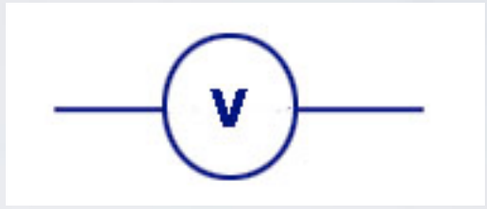
FET (Field Effect Transistor)



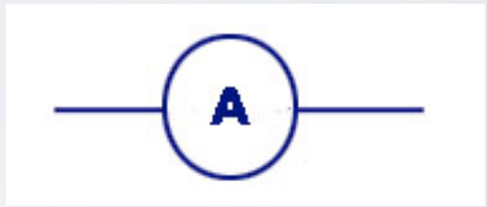
Logic gate (AND)



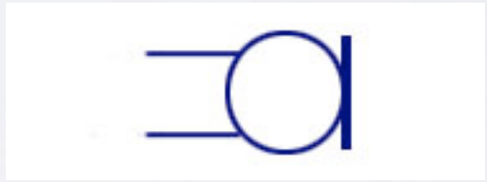
Logic gate (OR)



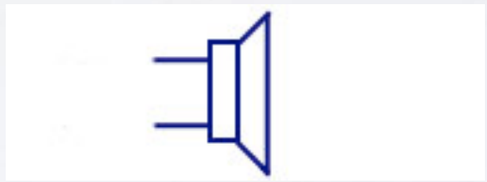
Voltmeter (voltage)



Amp meter (current)



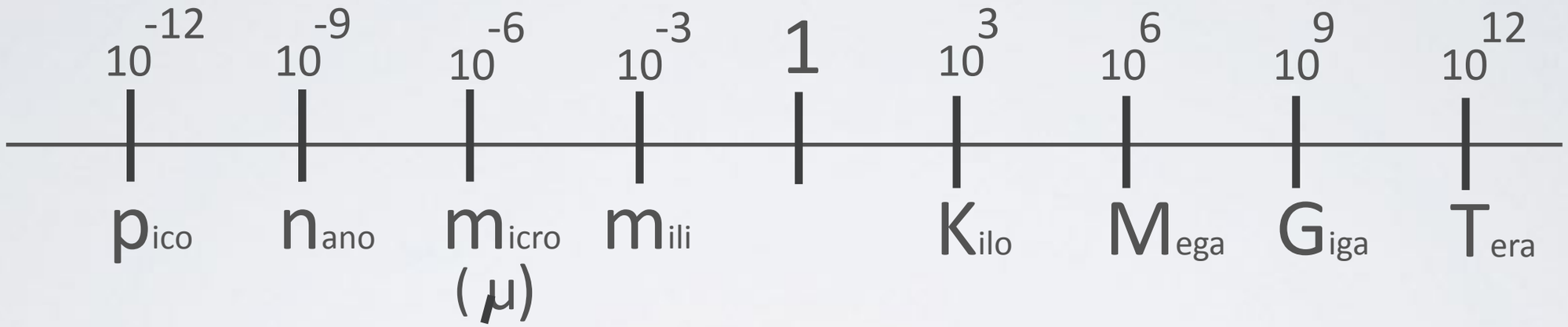
Microphone



Loudspeaker

http://www.circuitstoday.com/electronic-circuit-symbols

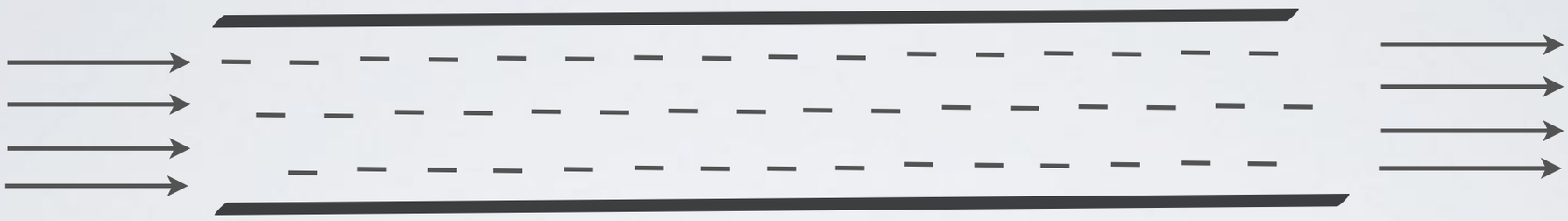
Unity line (engineering values)



Calculation Refresh: $\frac{1}{1000} = \frac{1}{10 \times 10 \times 10} = \frac{1}{10^3} = 10^{-3} =$ *0,001 (milli)*

http://htwins.net/scale2/

Around **6.242×10^{18}** electrons passing a given point **each second**, equals **one ampere (=1A)**



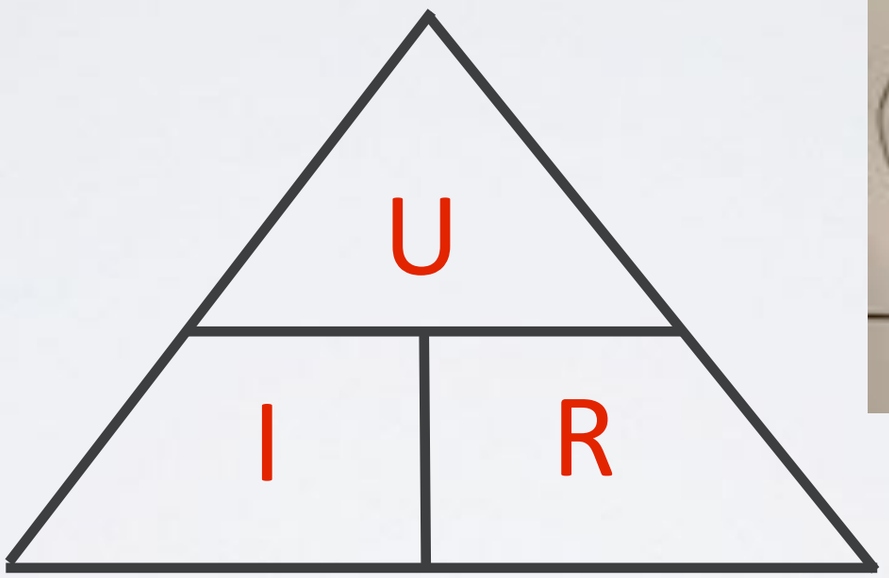
With voltage and current is like water: the less resistance, the more current (with a constant pressure/voltage). The higher the voltage, the higher the current at a given resistance.

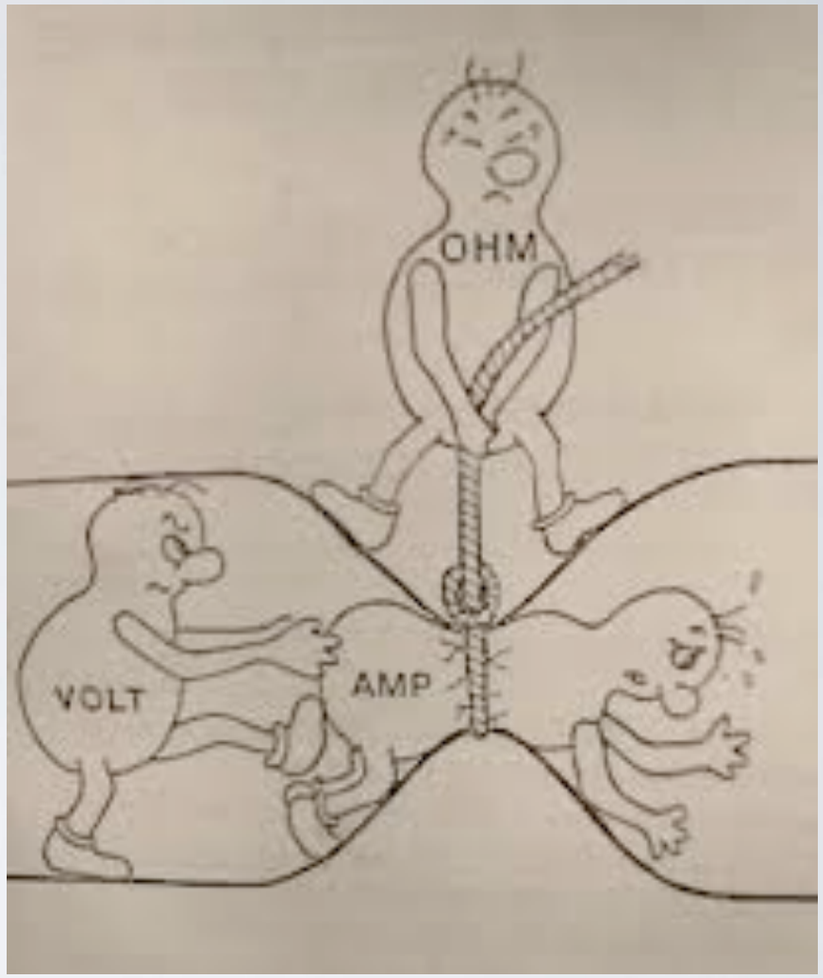
Ohm’s law!

Ohm’s Law:

$$U = I * R$$

(Volt)





$$I = \frac{U}{R}$$

(Ampere)

$$R = \frac{U}{I}$$

(Ohm)

PowerSupply (= constant pressure)

U = Voltage

U = constant

Resistance R = infinite

Current I = 0A (nul!)

Ohm's Law:

U = I * R

Ohm's Law:

U = I * R

PowerSupply (constant pressure)

U = constant

Resistance R = very big

Current I = small

PowerSupply (constant pressure)

U = constant

U = constant

Resistance R = small(er)

Current I = big(ger)

PowerSupply (constant pressure)

fuse is blown!

R= 0

I not defined

Introduction to Electronics

Let’s start experimenting: