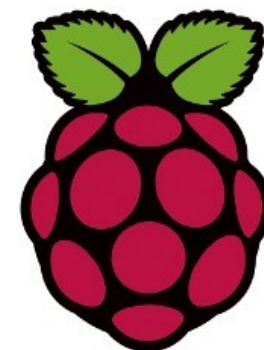


Tecnologies creatives a l'aula

Ús d'Arduino i Raspberry Pi



FÒRUM 2016

Jordi Binefa i Martínez

Responsable d'R+D+i a

Professor de cicles formatius a

4, 5, 7 i 8 de juliol



JESUÏTES El Clot
Escola del Clot



Tecnologies creatives a l'aula

Distribució de les quatre sessions

- * Introducció i Arduino 1a part**
- * Arduino 2a part**
- * Raspberry Pi**
- * Comunicació entre Raspberry Pi i Arduino**

FÒRUM 2016



Tecnologies creatives a l'aula

Interacció amb el món físic

Sensors



Lectura
d'informació

Actuadors

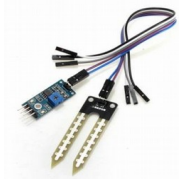


Espectura
d'informació

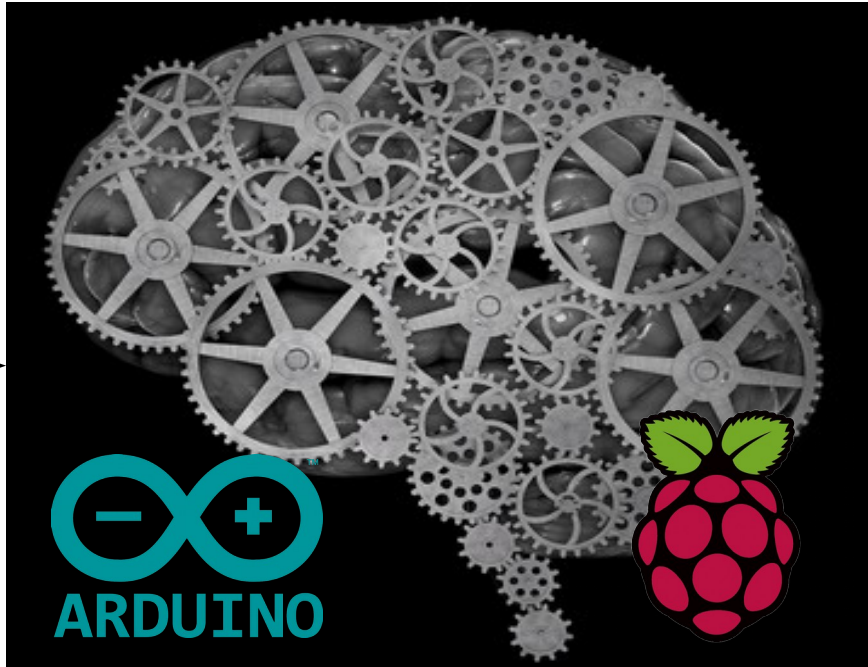


Tecnologies creatives a l'aula

Automatització del món físic



Sensors



Actuadors



Sortida
de sensors
Escriptura -->

Entrada
d'informació
--> Lectura

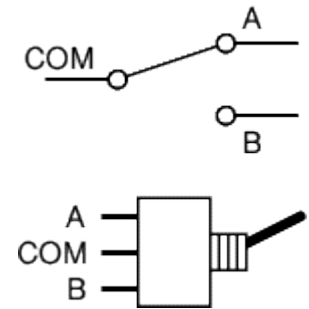
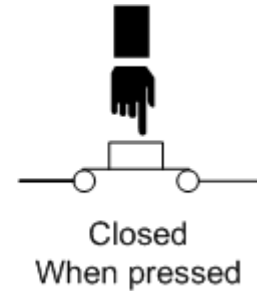
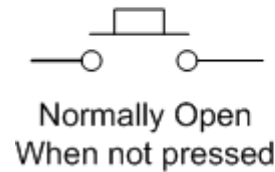
Sortida
d'informació
Escriptura -->

Entrada
d'actuadors
--> Lectura



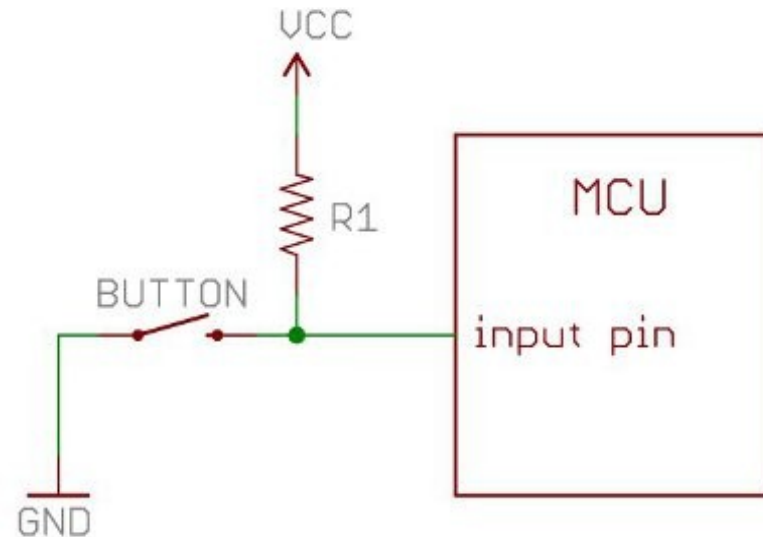
Tecnologies creatives a l'aula

Lectura de l'estat d'un sensor digital



**Cert : 1.8v, 3.3V,
5V**
Fals : 0v

True / False
High / Low

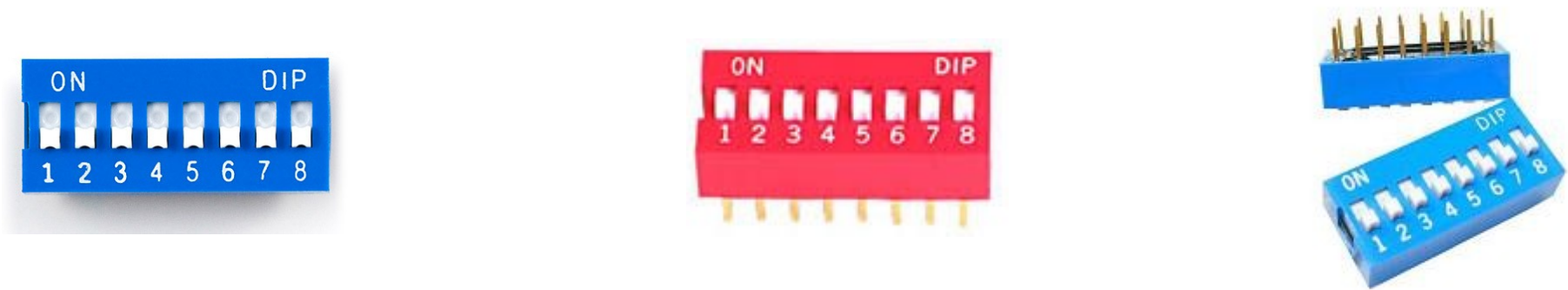




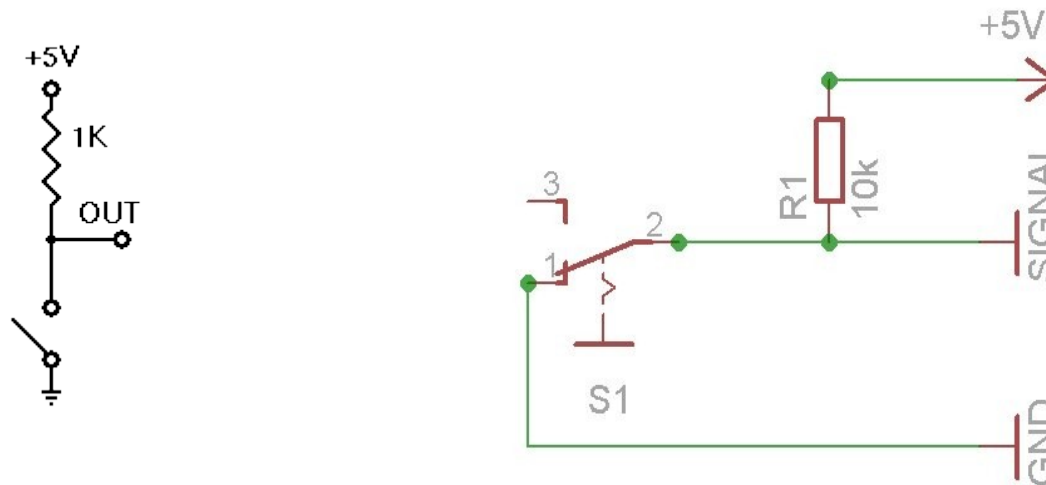
Tecnologies creatives a l'aula

Lectura de l'estat d'un sensor digital

uSW : Microrruptor (dip-switch, microswitch)



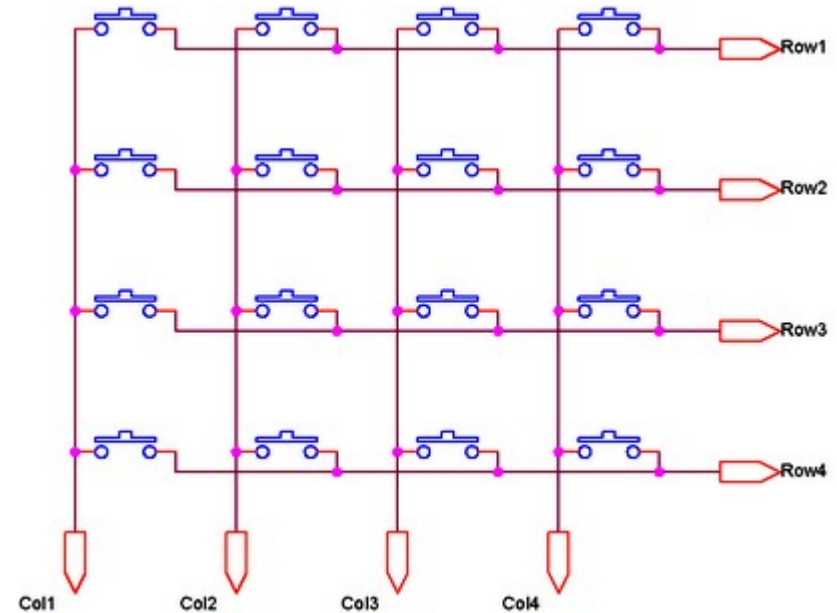
Pull-up : Connexió d'un resistor a alimentació per assegurar un nivell lògic a una entrada digital





Tecnologies creatives a l'aula

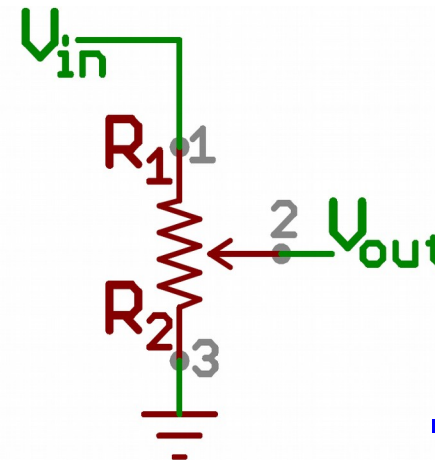
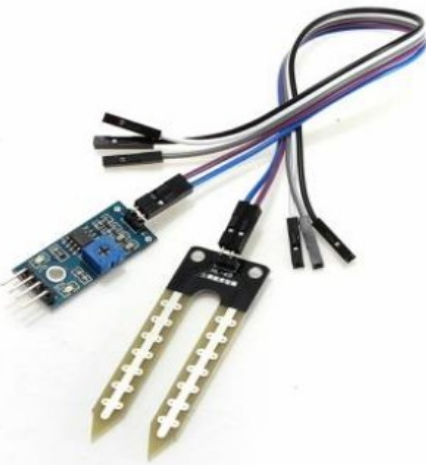
Lectura de la informació d'un teclat





Tecnologies creatives a l'aula

Lectura d'informació analògica



0..3,3V

0..5V

0..10V

-10..10V



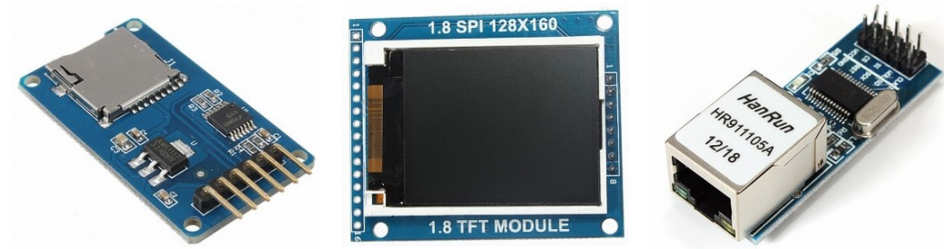
Tecnologies creatives a l'aula

Protocols I2C (TWI), SPI i 1-Wire

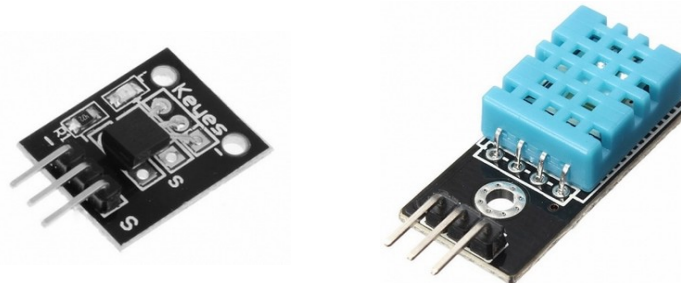
I2C : Inter-Integrated Circuit



SPI : Serial Peripheral Interface Bus



1-Wire

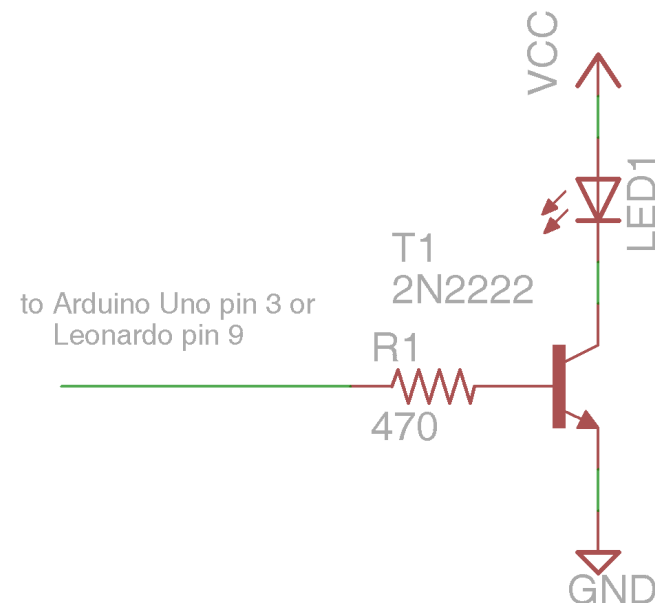
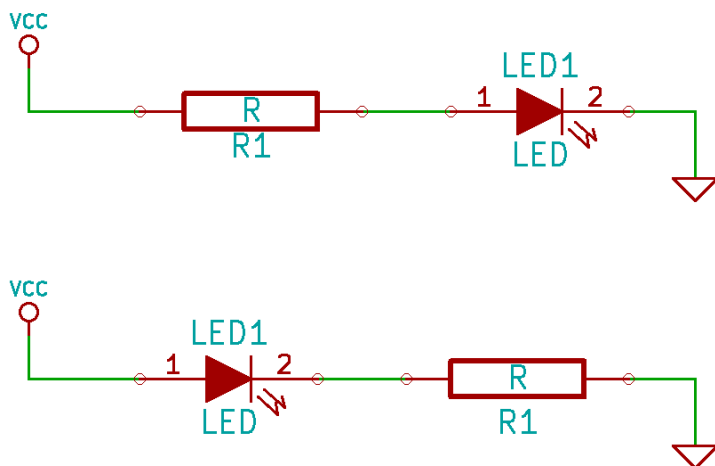
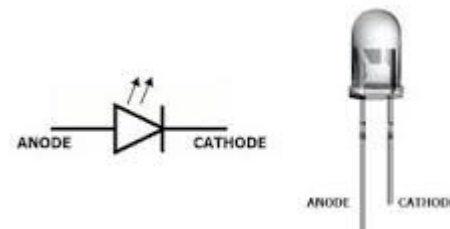
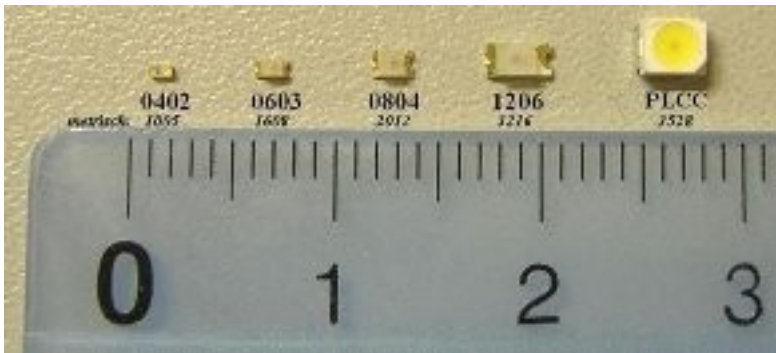




Tecnologies creatives a l'aula

Espectura d'estat a un actuator digital

LED : Díode emissor de llum

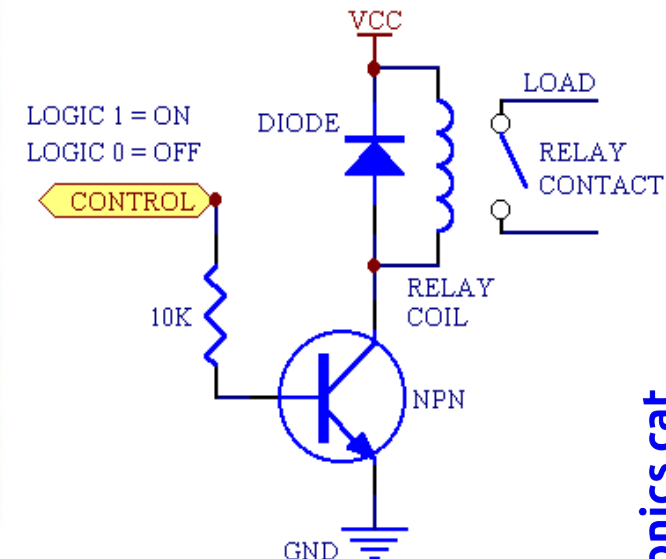
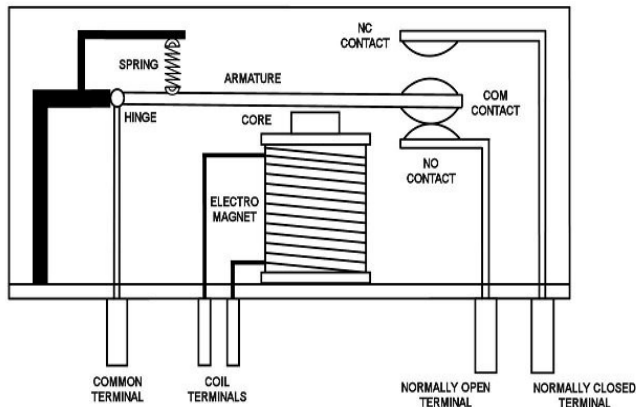
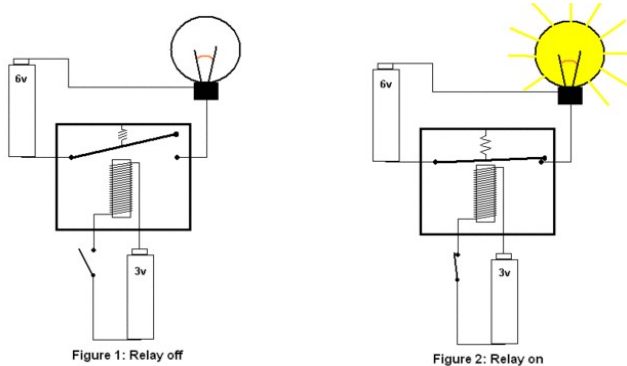




Tecnologies creatives a l'aula

Esriptura d'estat a un actuador digital

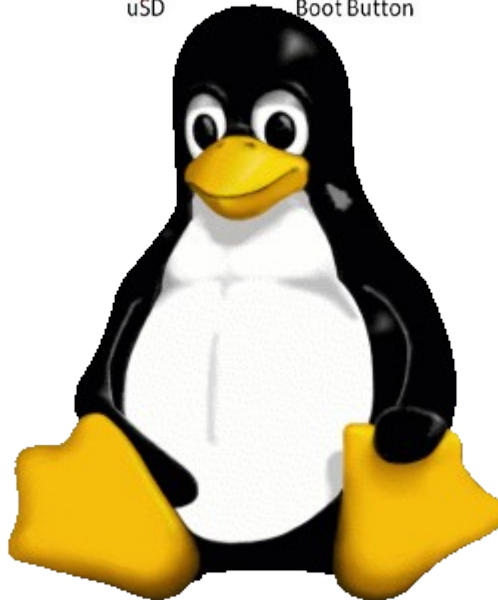
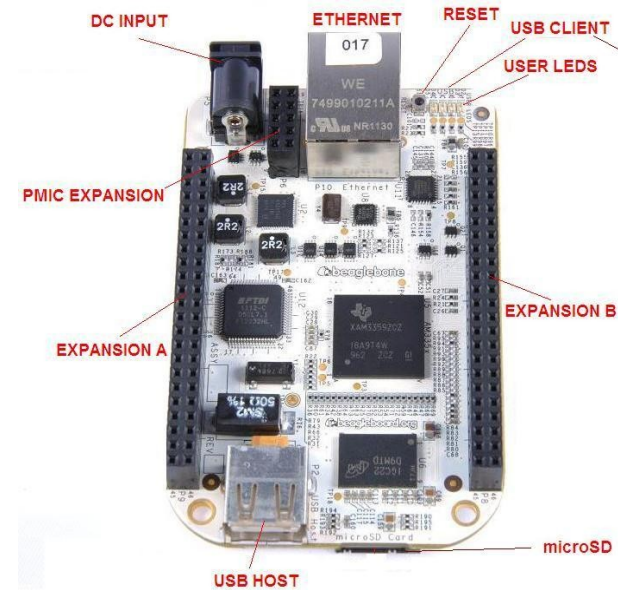
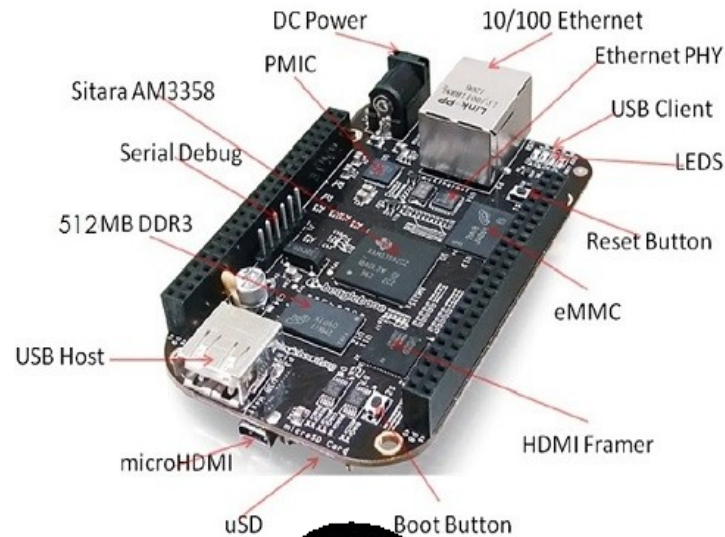
Relé : Sistema electromecànic que modifica l'estat d'un commutador. Amb una tensió de control petita s'activa un electroimant podent controlar tensions molt superiors.





Tecnologies creatives a l'aula

Processadors de 32 bits





Tecnologies creatives a l'aula

Família d'Arduinos i Teensy



Arduino Uno



Arduino Leonardo



Arduino Due



Arduino Yún



Arduino Tre



Arduino Micro



Arduino Robot



Arduino Esplora



Arduino Mega ADK



Arduino Ethernet



Arduino Mega 2560



Arduino Mini



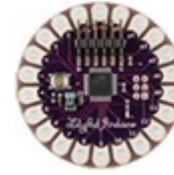
LilyPad Arduino USB



LilyPad Arduino Simple



LilyPad Arduino SimpleSnap



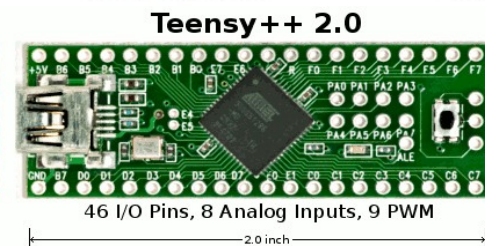
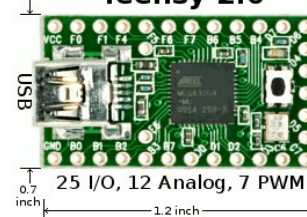
LilyPad Arduino Teensy 2.0



Arduino Nano



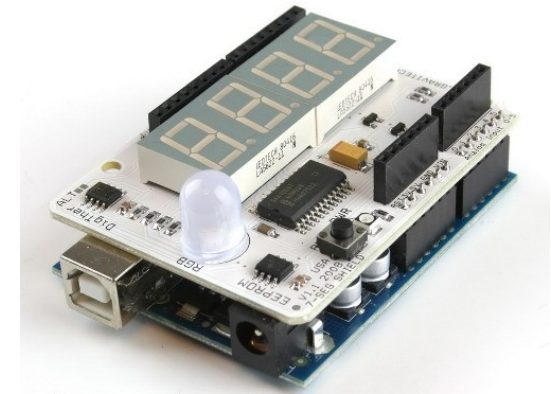
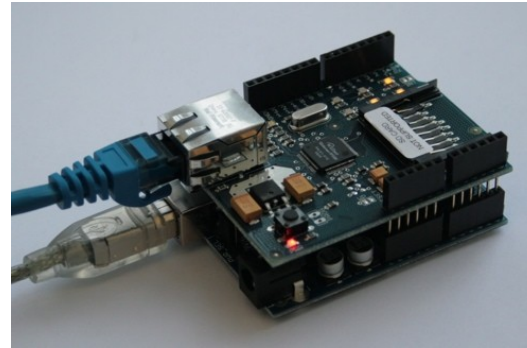
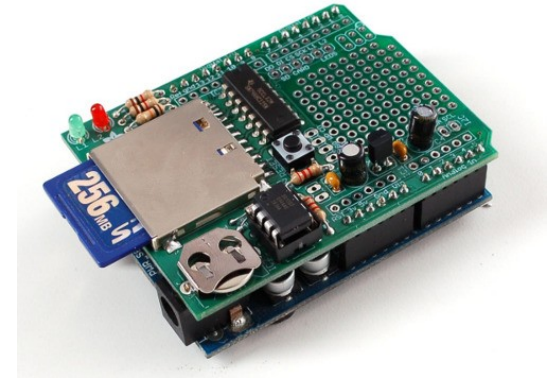
Arduino Pro Mini





Tecnologies creatives a l'aula

Plaques complementàries (shield / hat)



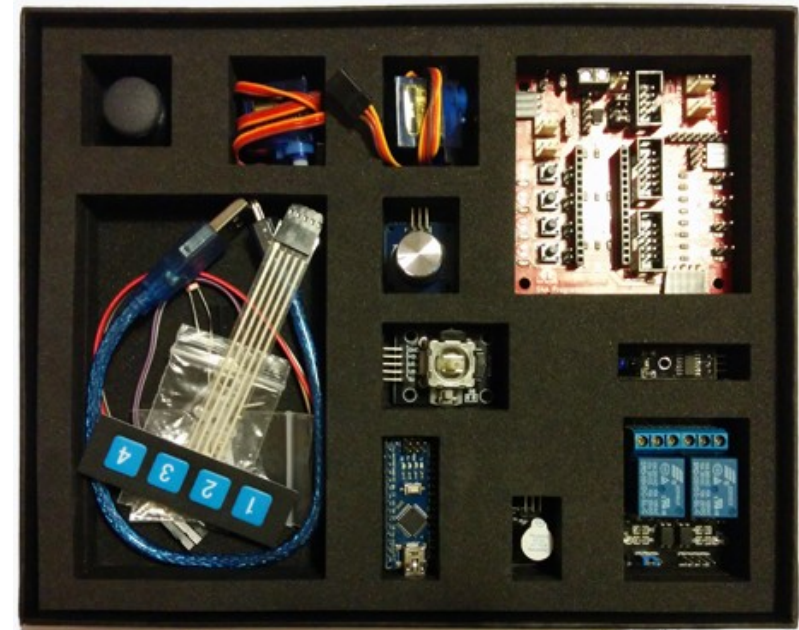
La majoria de plaques complementàries venen amb biblioteques i arxius de capçalera que acceleren el procés de funcionament.

<http://arduino.cc/en/pmwiki.php?n=Main/ArduinoShields>



Tecnologies creatives a l'aula

Make It !



<http://www.makeit.cat>



Tecnologies creatives a l'aula

Alguns llenguatges de programació

SCRATCH



```
#include <stdio.h>
int main(void)
{
    printf("Hello World!\n");
    return 0;
}
```

C/C++



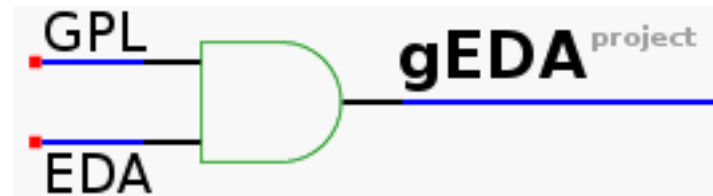
ArduBlock



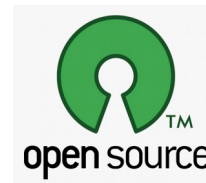
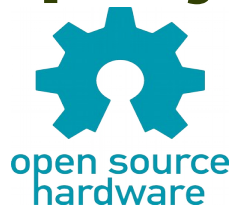
e tecnologies creatives a l'aula

El perquè de la introducció a l'aula del maquinari lliure

- Preus baixos (www.banggood.com)
- Promoció STEM (Science, Technology, Engineering and Maths)
- Disseny accessible
 - KiCad, gEDA



- Circuits impresos (www.pcbway.com)
- Munió de projectes de codi obert



Tecnologies creatives a l'aula

Exemple: Trepant / fresadora - qtCnc

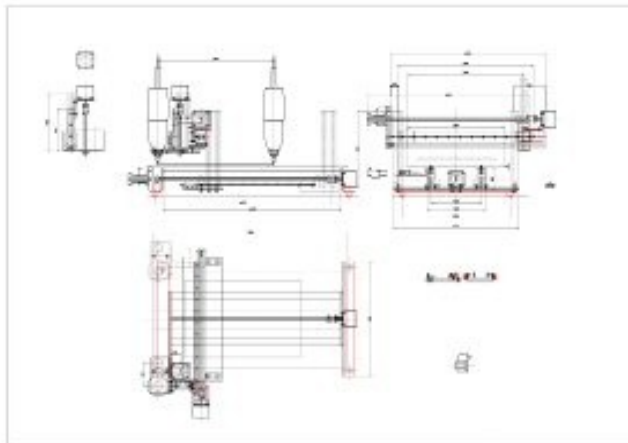
- Programari allotjat a sourceforge.net :
(<http://sourceforge.net/projects/qtCnc/files/>)



Home 

Name ▾	Modified ▾	Size ▾	Downloads ▾
 Desktop Software	2011-12-21		
 FirmwareAtmega	2011-12-21		

Totals: 2 Items





Tecnologies creatives a l'aula

Eines per a simular

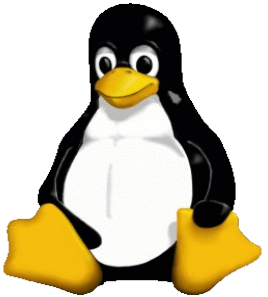
The screenshot displays the 123D Circuits website. The browser address bar shows '123d.circuits.io'. The navigation bar includes links for '123D Circuits', 'Circuits', 'Components', and 'Circuit Scribe', along with a 'Shop' button and a search bar. A 'Sign up' button and a 'Sign in' button are also present. The main content area features a large banner with the text 'Simulate Arduino online and easily create custom circuit boards'. Below this, it says 'Design and simulate circuit boards with our breadboard, schematic and PCB editor. Share your designs and collaborate as a team.' A blue button reads 'Get started designing electronics online!' and a green button says 'Show me an example!'. The background of the banner shows a simulation of an Arduino Uno board connected to an LED shield. A large blue play button is overlaid on the simulation. At the bottom of the banner, there is a video thumbnail with the text 'DRAW CONDUCTIVE TRACES' and the description 'Easily create and simulate Circuit Scribe sketches online.'

<http://123d.circuits.io/>



Tecnologies creatives a l'aula

Sistemes operatius



Els sistemes basats en GNU/Linux permeten fer metadistribucions



debian



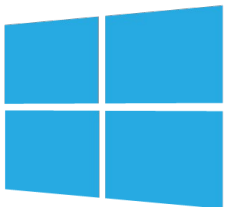
ubuntu



redhat



Puppy Linux



Els sistemes propietaris no permeten fer metadistribucions



Tecnologies creatives a l'aula

Metadistribució basada en Debian

- Els alumnes poden tenir una còpia funcional sense cap mena de restricció legal

- Escriptoris :



Gnome3 / Gnome clàssic / LXDE

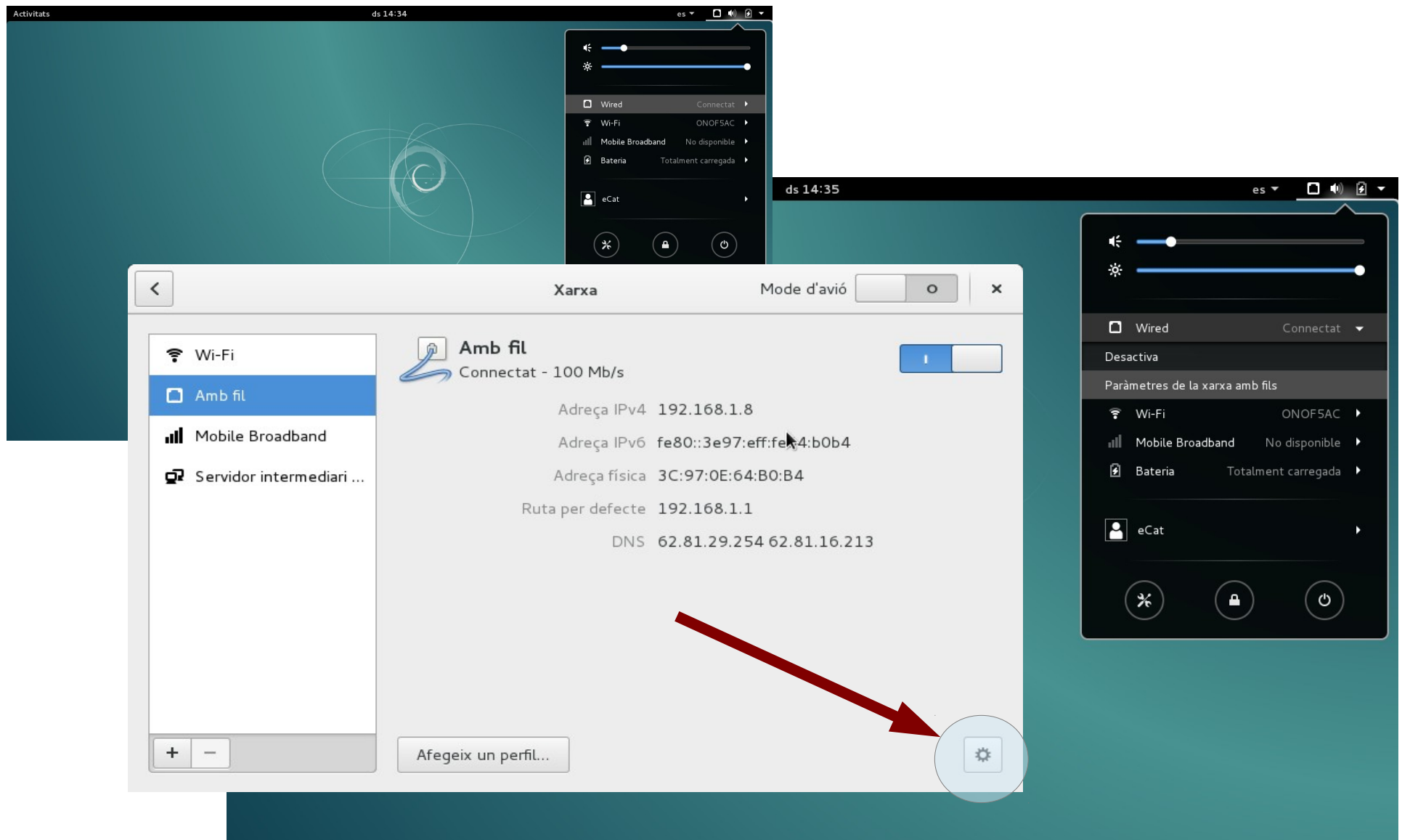
- Uuaris :

- Primari o **root** (**#**). Contrasenya : **clot**
- Usuari **ecat** (**\$**). Contrasenya : **clot**



Tecnologies creatives a l'aula

Assignació d'IP





Tecnologies creatives a l'aula

Assignació d'IP

**XX : valor entre 12 i 78
(repartim ara cada IP a cada ordinador)**

Detalls
Seguretat
Identitat
IPv4
IPv6
Reinicia

IPv4
Adreces
DNS
Rutes

Adreces
Manual
Adreça: 172.17.239.XX
Màscara de xarxa: 255.255.0.0
Porta d'enllaç: 172.17.0.1

DNS
Automàtic
Servidor: 8.8.8.8

Detalls
Seguretat
Identitat
IPv4
IPv6
Reinicia

Reinicia: Reinicia els paràmetres d'aquesta xarxa, incloent les contrasenyes, però recorda-la com una xarxa preferida
Oblida: Suprimeix totes les dades relacionades amb aquesta xarxa i no intentis connectar-t'hi automàticament

Cancel·la Aplica

Tecnologies creatives a l'aula **Reconeixement de les plaques de comunicació**

ecat@ecatian:~\$ lsusb

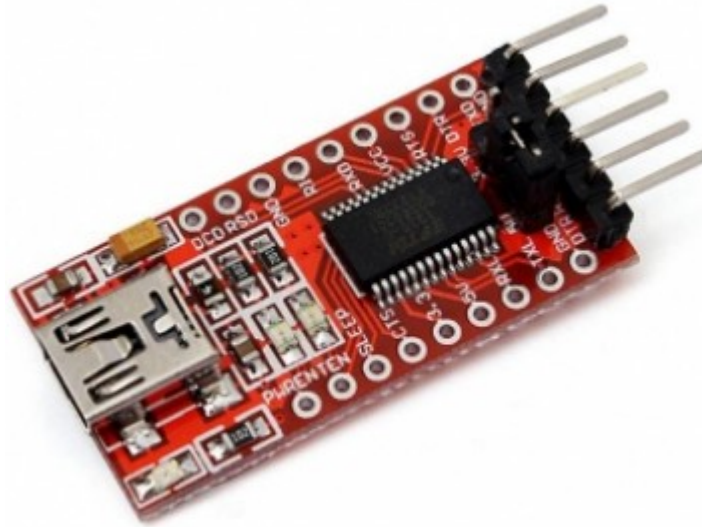
```
ecat@ecatian:~$ lsusb
Bus 004 Device 002: ID 8087:0024 Intel Corp. Integrated Rate Matching Hub
Bus 004 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 003 Device 005: ID 5986:0299 Acer, Inc
Bus 003 Device 004: ID 0461:4d81 Primax Electronics, Ltd Dell N889 Optical Mouse
Bus 003 Device 003: ID 0bdb:1926 Ericsson Business Mobile Networks BV
Bus 003 Device 002: ID 8087:0024 Intel Corp. Integrated Rate Matching Hub
Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 002: ID 0781:5581 SanDisk Corp.
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 005: ID 0403:6001 Future Technology Devices International, Ltd FT232 USB-Serial (UART) IC
Bus 001 Device 004: ID 0403:6001 Future Technology Devices International, Ltd FT232 USB-Serial (UART) IC
Bus 001 Device 003: ID 1a40:0101 Terminus Technology Inc. 4-Port HUB
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
ecat@ecatian:~$ ls /dev/ttyUSB*
/dev/ttyUSB0 /dev/ttyUSB1
ecat@ecatian:~$ ls /dev/ttyUSB* -ls
0 crw-rw---- 1 root dialout 188, 0 jun 27 14:53 /dev/ttyUSB0
0 crw-rw---- 1 root dialout 188, 1 jun 27 14:53 /dev/ttyUSB1
ecat@ecatian:~$ █
```

ecat@ecatian:~\$ ls /dev/ttyUSB* -ls



Tecnologies creatives a l'aula

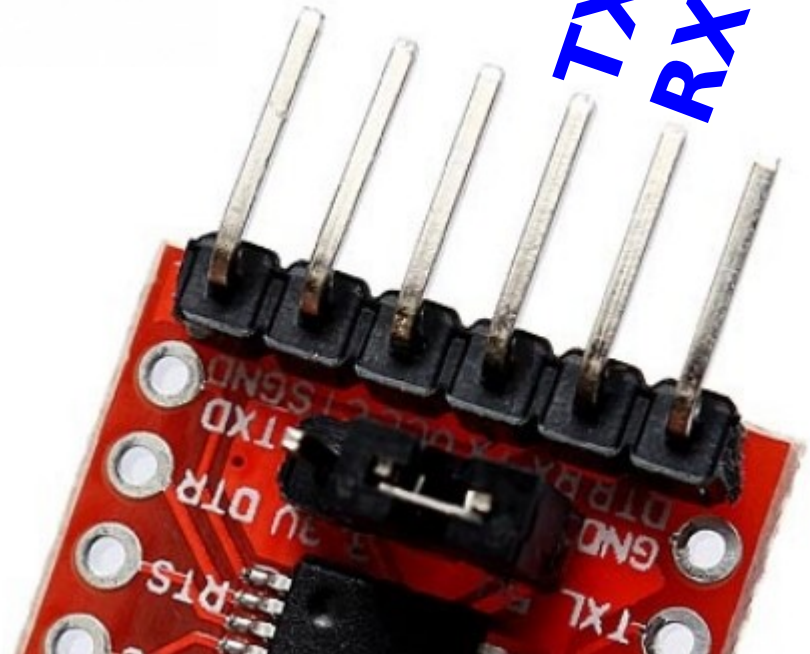
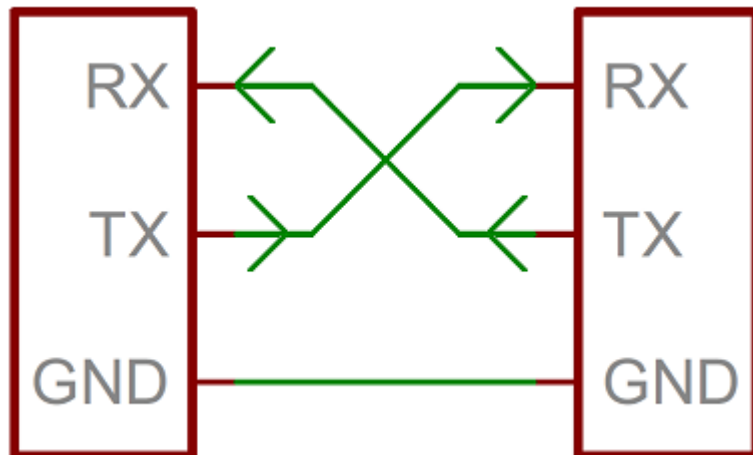
Plaques de comunicació



GND

TX

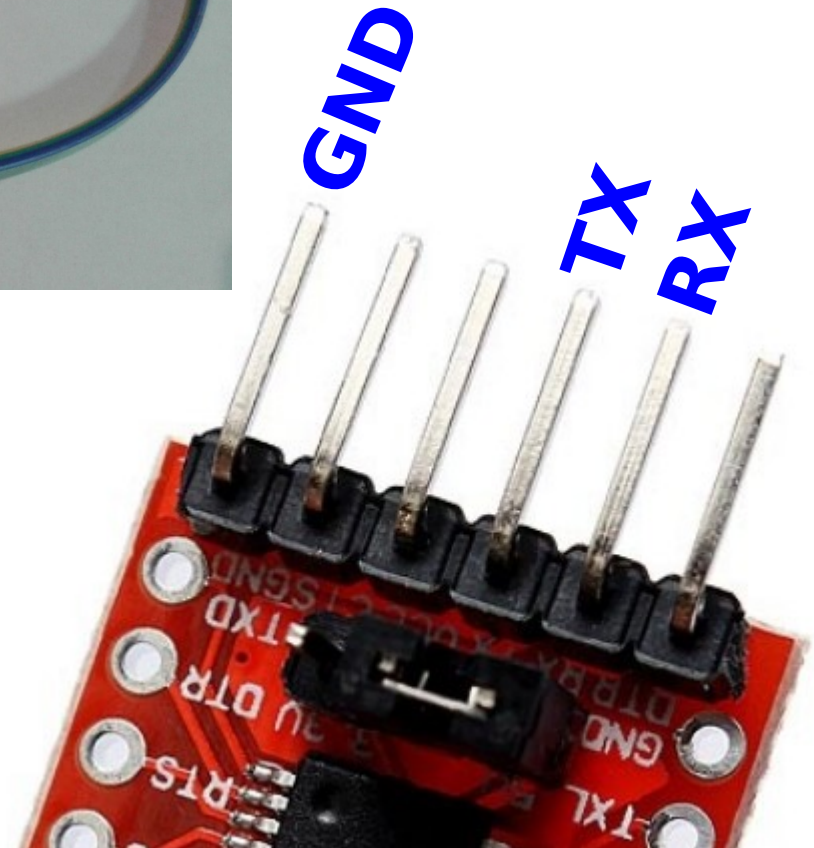
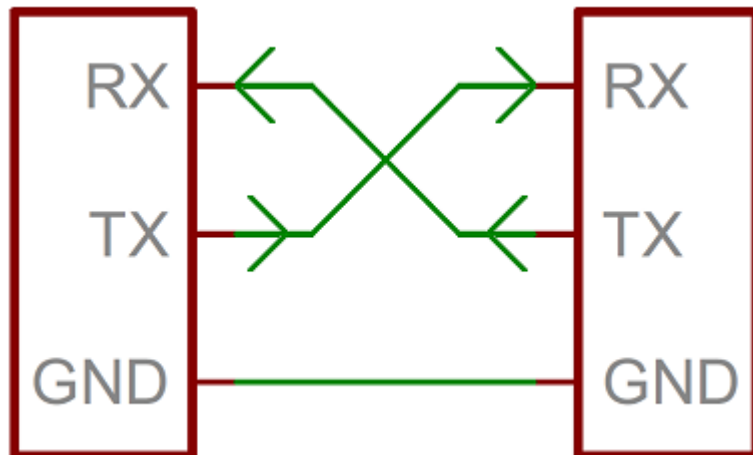
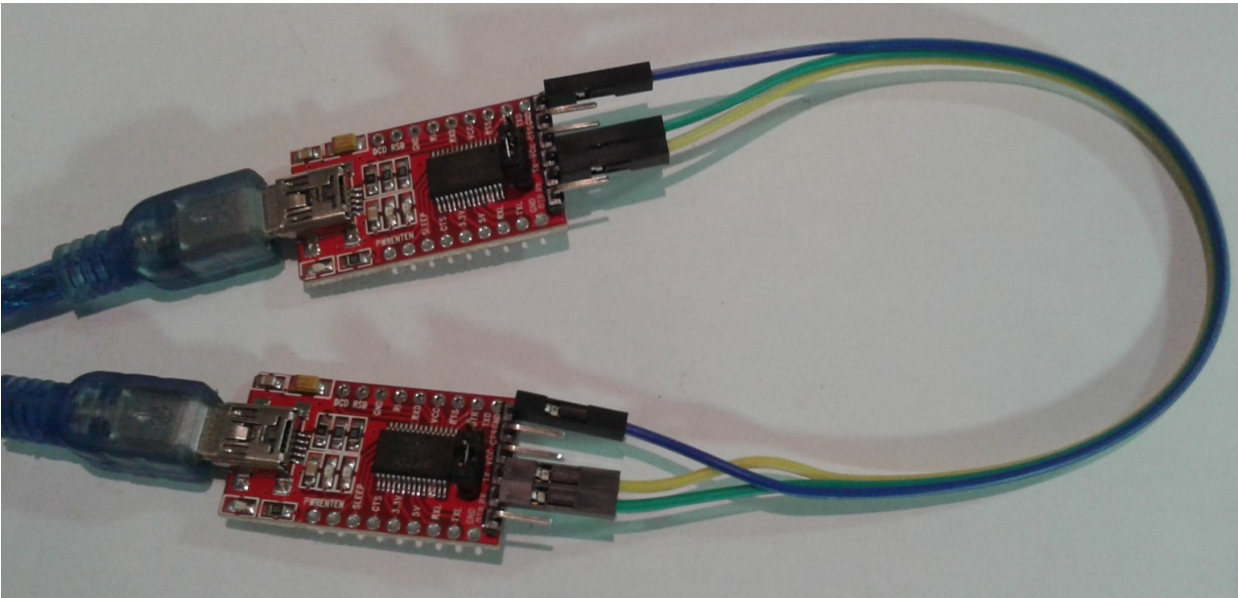
RX





Tecnologies creatives a l'aula

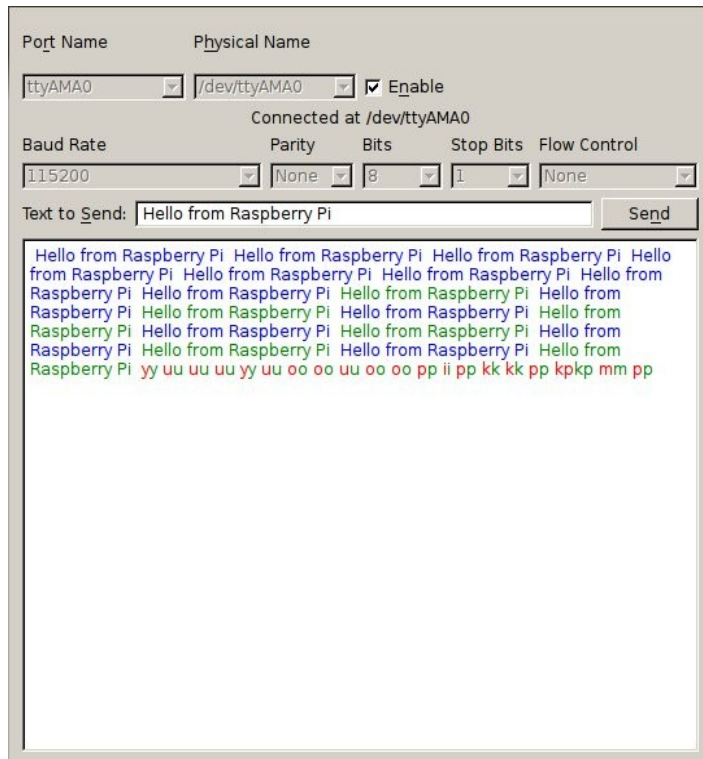
Plaques de comunicació





Tecnologies creatives a l'aula

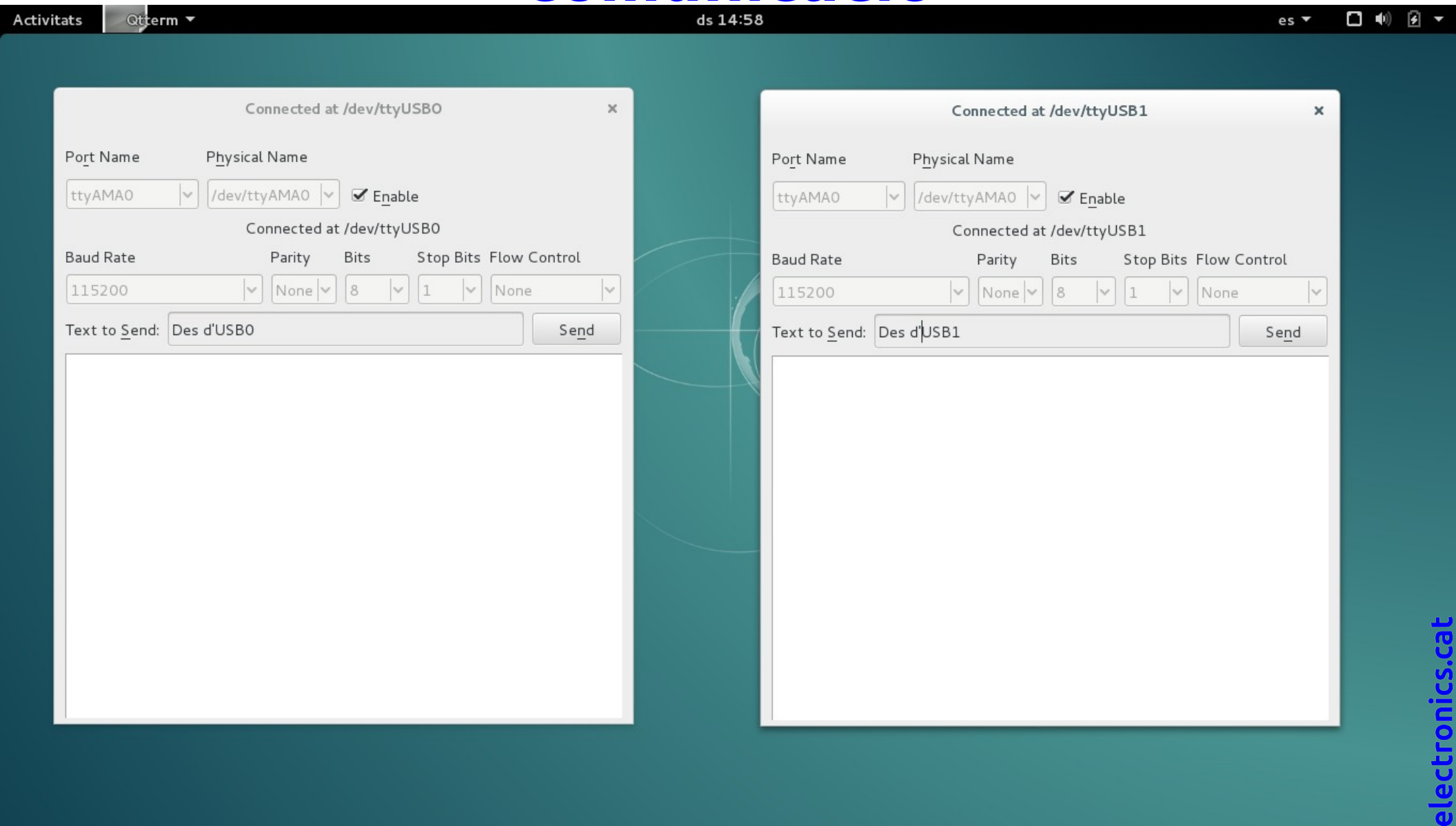
qtTerm



<http://code.google.com/p/qtterm/>

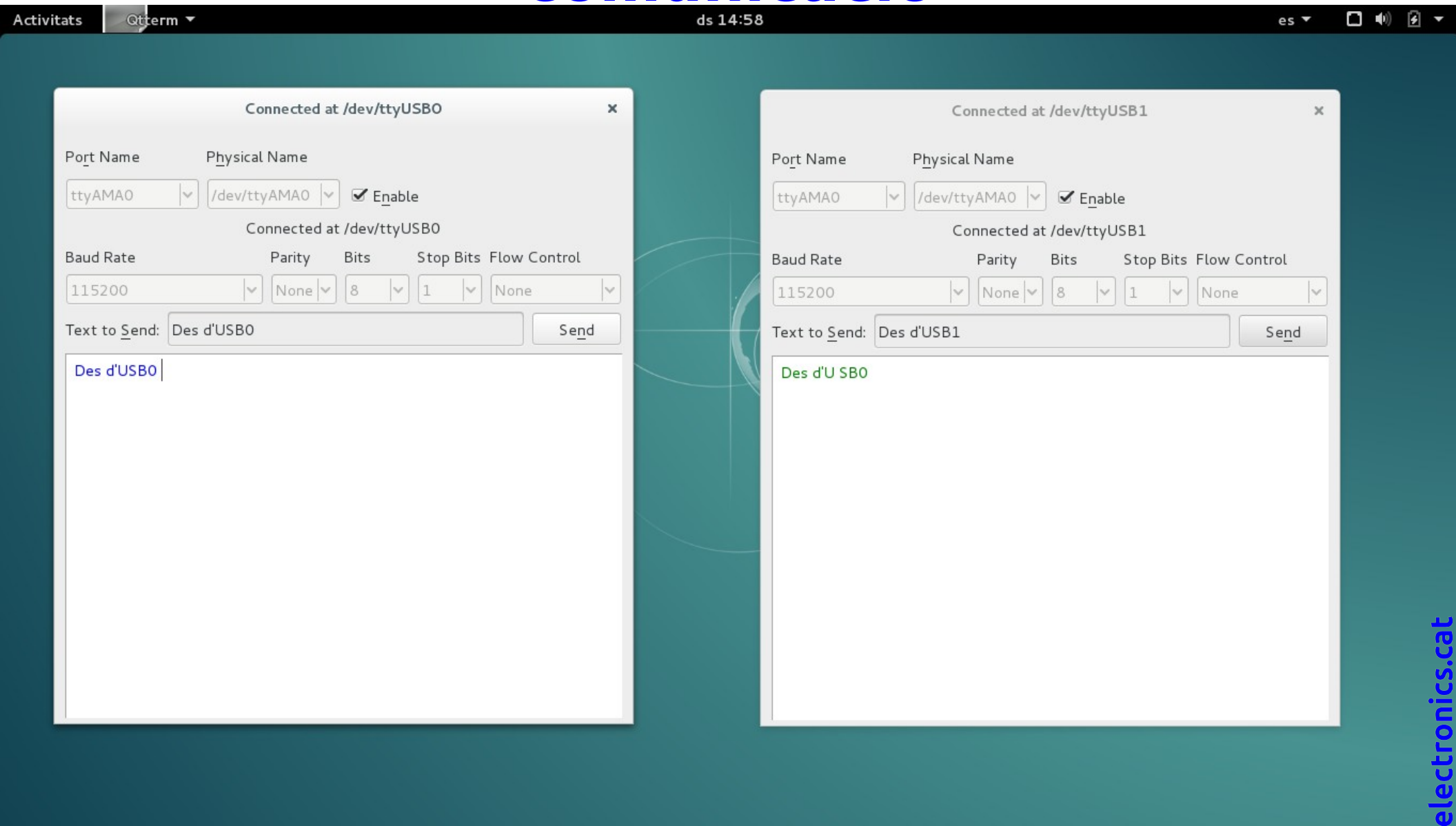
Tecnologies creatives a l'aula

Ús del qtTerm amb les plaques de comunicació



Tecnologies creatives a l'aula

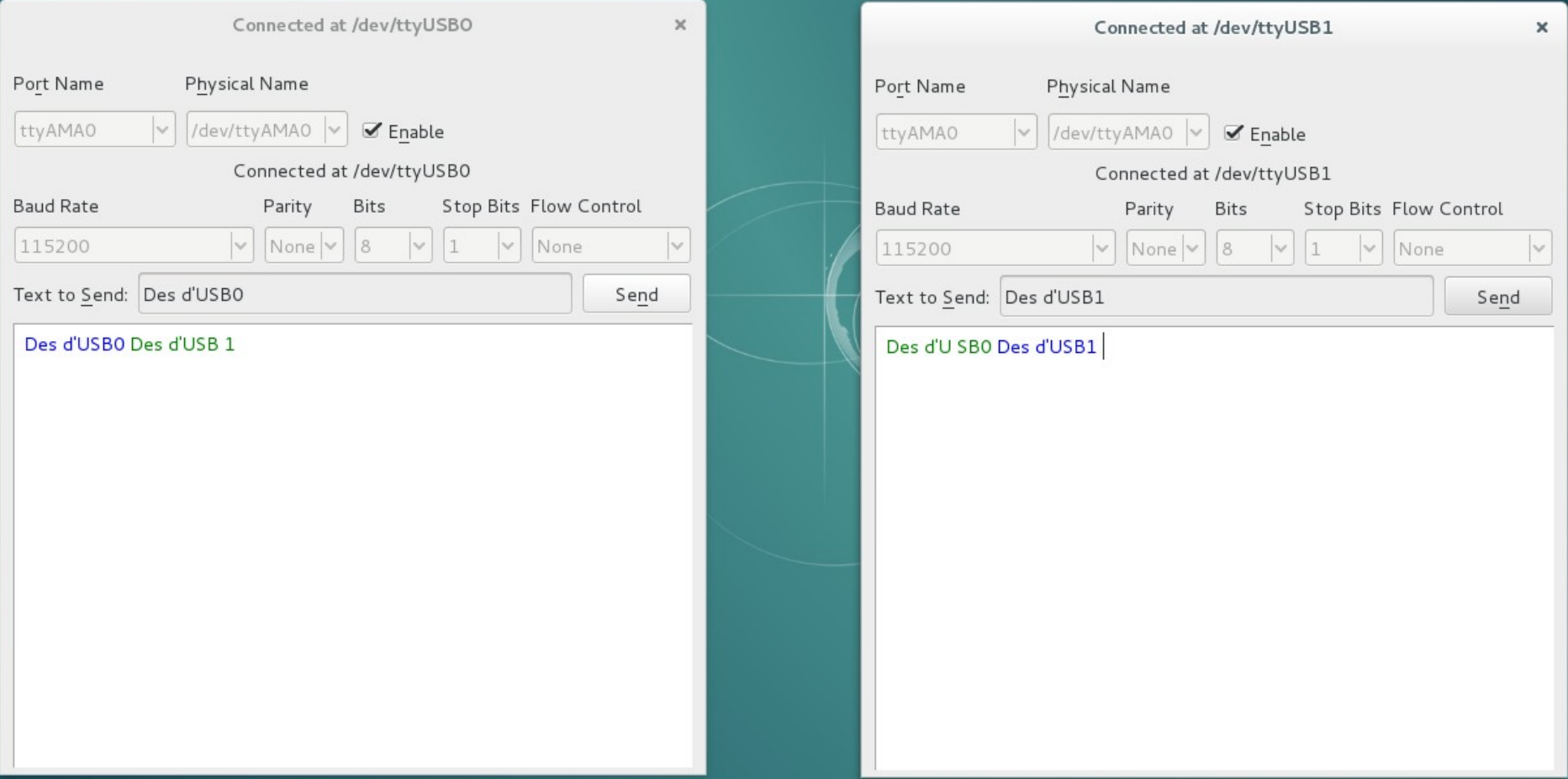
Ús del qtTerm amb les plaques de comunicació



Tecnologies creatives a l'aula

Ús del qtTerm amb les plaques de comunicació

Activitats Qtterm ds 14:58 es



The image displays two side-by-side screenshots of the QtTerm application interface. Both windows show the same configuration settings: Port Name is 'ttyAMA0', Physical Name is '/dev/ttyAMA0', and the 'Enable' checkbox is checked. The connection path is set to '/dev/ttyUSB0' for the left window and '/dev/ttyUSB1' for the right window. The Baud Rate is 115200, Parity is None, Bits is 8, Stop Bits is 1, and Flow Control is None. The 'Text to Send' field contains 'Des d'USB0' for the left window and 'Des d'USB1' for the right window. The output area of the left window shows 'Des d'USB0' in blue and 'Des d'USB 1' in green. The output area of the right window shows 'Des d'U SB0' in green and 'Des d'USB1' in blue.

Connected at /dev/ttyUSB0

Port Name: ttyAMA0 Physical Name: /dev/ttyAMA0 ☒ Enable

Connected at /dev/ttyUSB0

Baud Rate: 115200 Parity: None Bits: 8 Stop Bits: 1 Flow Control: None

Text to Send: Des d'USB0

Des d'USB0 Des d'USB 1

Connected at /dev/ttyUSB1

Port Name: ttyAMA0 Physical Name: /dev/ttyAMA0 ☒ Enable

Connected at /dev/ttyUSB1

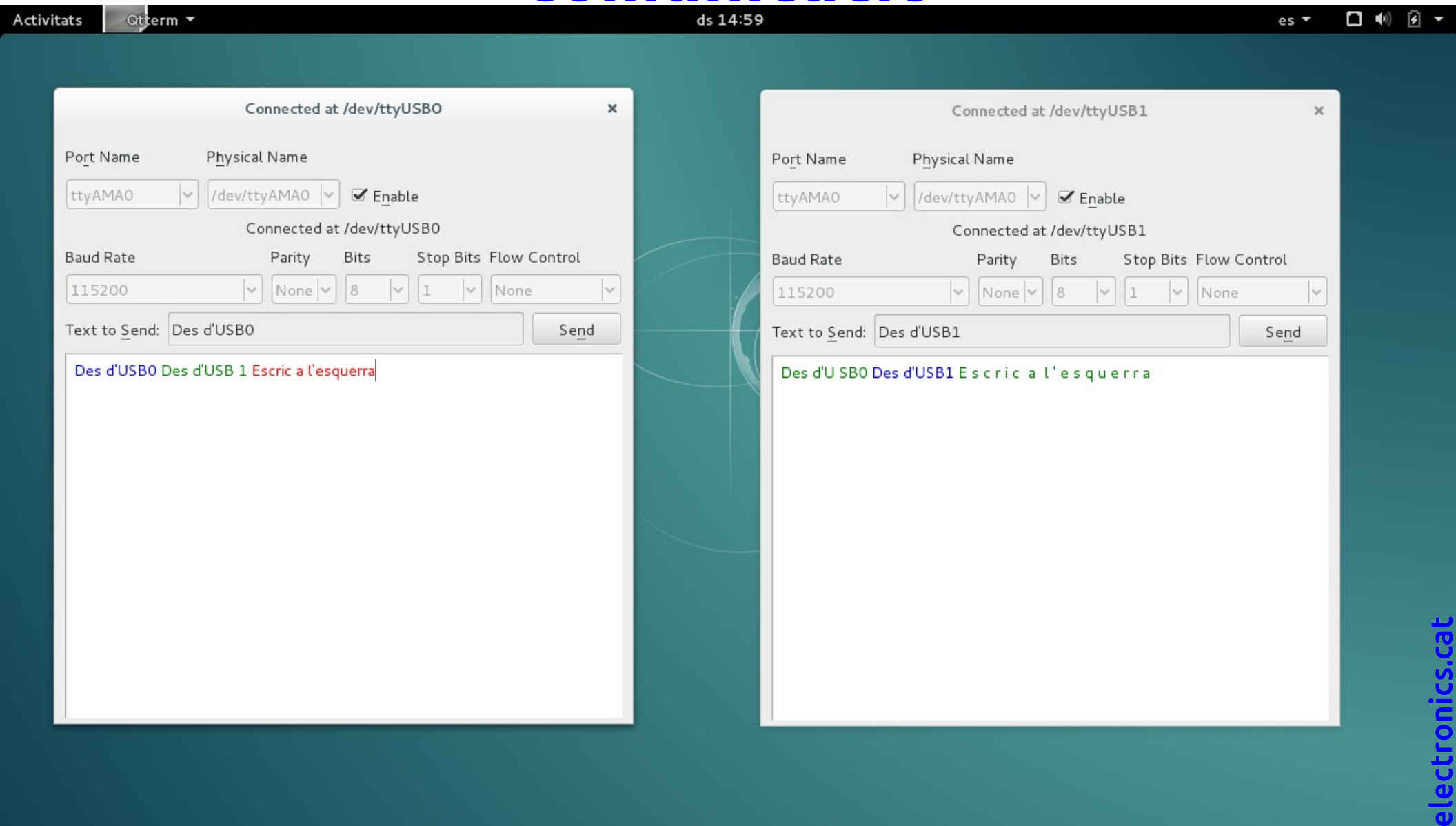
Baud Rate: 115200 Parity: None Bits: 8 Stop Bits: 1 Flow Control: None

Text to Send: Des d'USB1

Des d'U SB0 Des d'USB1

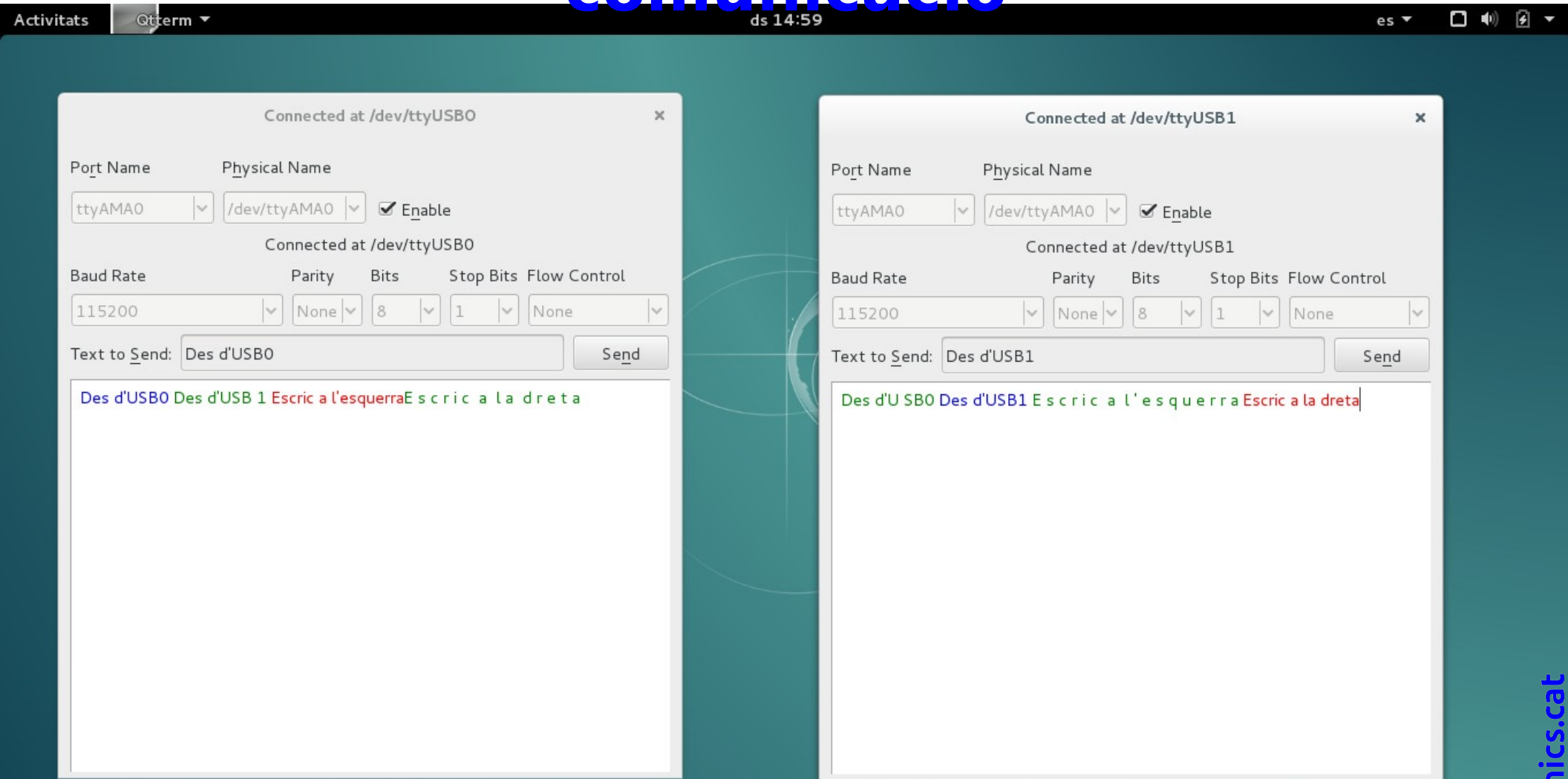
Tecnologies creatives a l'aula

Ús del qtTerm amb les plaques de comunicació



Tecnologies creatives a l'aula

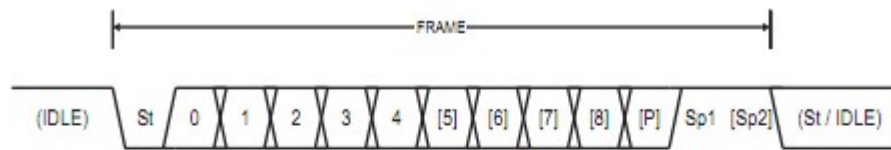
Ús del qtTerm amb les plaques de comunicació





Tecnologies creatives a l'aula

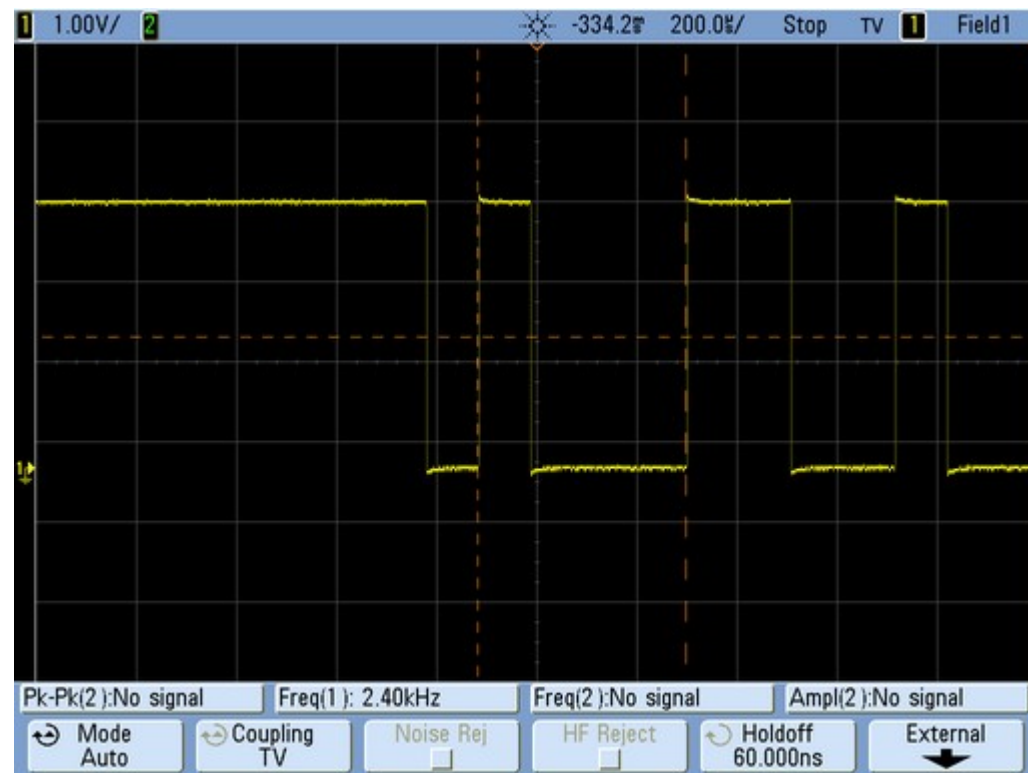
Senyal de comunicació sèrie



- St** Start bit, always low.
- (n)** Data bits (0 to 8).
- P** Parity bit. Can be odd or even.
- Sp** Stop bit, always high.
- IDLE** No transfers on the communication line (RxDn or TxDn). An IDLE line must be high.

UART Settings

Baudrate	Data Bits	Parity	Stop Bits
☐ 300	☐ 5	☒ none	☒ 1
☐ 1200	☐ 6	☐ even	☐ 1.5
☐ 2400	☒ 7	☐ odd	☐ 2
☐ 4800	☐ 8		
☒ 9600	Software Flow Control		
☐ 19200	☒ on ☐ off		
☐ 38400	Xon/Xoff karakter		
☐ 57600	Xon Char (HEX) 11 (0x11)		
☐ 115200	Xoff Char (HEX) 13 (0x13)		





Tecnologies creatives a l'aula

Comunicació amb minicom

ecat@ecatian:~\$ minicom -b 9600 -o -D /dev/ttyUSB1

```

ecat@debian8: ~
Fitxer  Edita  Visualitza  Cerca  Terminal  Ajuda

Welco+-----+
|                                     |
|               Minicom Command Summary               |
|                                     |
| Commands can be called by CTRL-A <key>               |
|                                     |
|               Main Functions                   Other Functions               |
|                                     |
| Press | Dialing directory..D | run script (Go)....G | Clear Screen.....C |
| [F1] | Send files.....S | Receive files.....R | cOnfigure Minicom..O |
| [F2] | comm Parameters...P | Add linefeed.....A | Suspend minicom...J |
| [F3] | Capture on/off....L | Hangup.....H | eXit and reset....X |
| [F4] | send break.....F | initialize Modem...M | Quit with no reset.Q |
| [F5] | Terminal settings..T | run Kermit.....K | Cursor key mode....I |
| [F6] | lineWrap on/off...W | local Echo on/off..E | Help screen.....Z |
| [F7] | Paste file.....Y | Timestamp toggle...N | scroll Back.....B |
| [F8] | Add Carriage Ret...U |                                     |
|                                     |
|               Select function or press Enter for none. |
|                                     |
+-----+
| CTRL-A Z for help | 9600 8N1 | NOR | Minicom 2.7 | VT102 | Offline | ttyUSE

```

```

+-----[configuration]-----+
| Filenames and paths               |
| File transfer protocols           |
| Serial port setup               |
| Modem and dialing                 |
| Screen and keyboard               |
| Save setup as dfl                 |
| Save setup as..                   |
| Exit                               |
+-----+
| A - Serial Device      : /dev/ttyUSB0 |
| B - Lockfile Location  : /var/lock    |
| C - Callin Program     :              |
| D - Callout Program    :              |
| E - Bps/Par/Bits       : 9600 8N1     |
| F - Hardware Flow Control : No        |
| G - Software Flow Control : No        |
+-----+
+-----[conf. change]-----+
| Filenames |                                     |
| File tran: |                                     |
| Serial port setup |                                     |
| Modem and dialing |                                     |
| Screen and keyboard |                                     |
| Save setup as dfl |                                     |
| Save setup as.. |                                     |
| Exit |                                     |
+-----+

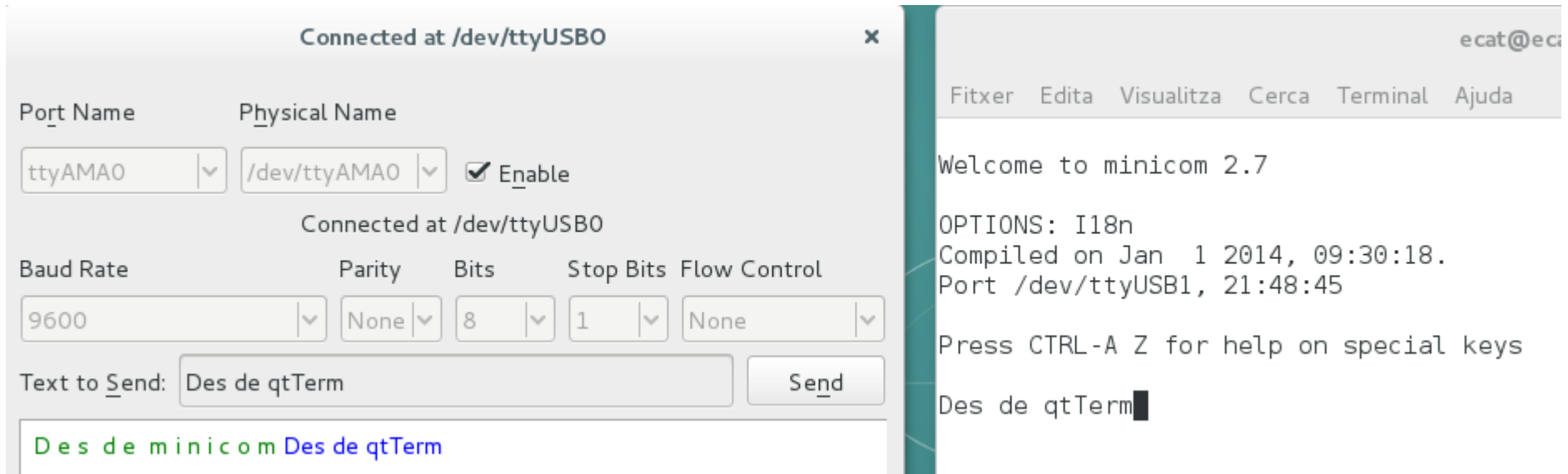
```

Deseu com a «per defecte» al finalitzar la configuració sense «Hardware Flow Control»



Tecnologies creatives a l'aula

Comunicació qtTerm amb minicom



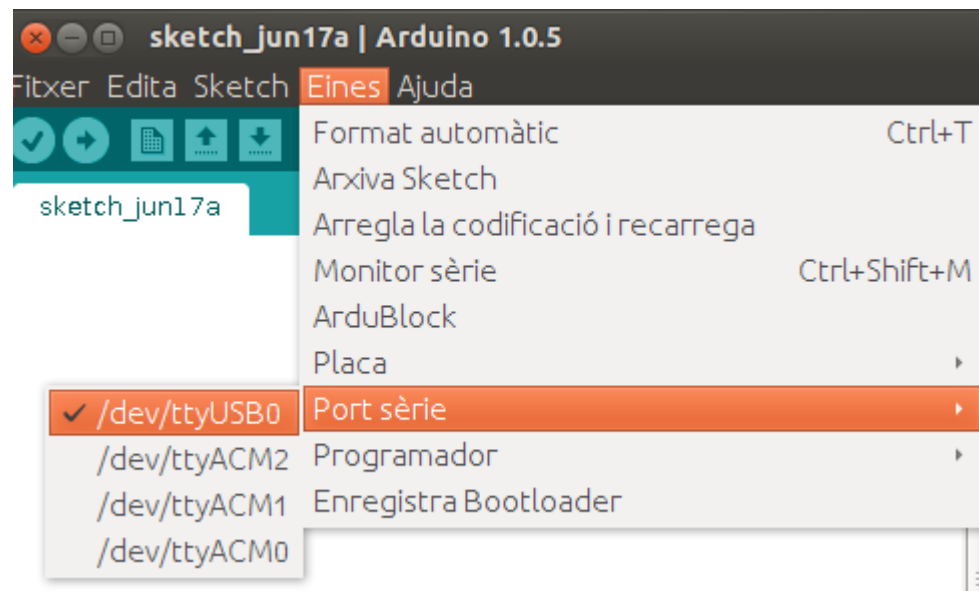
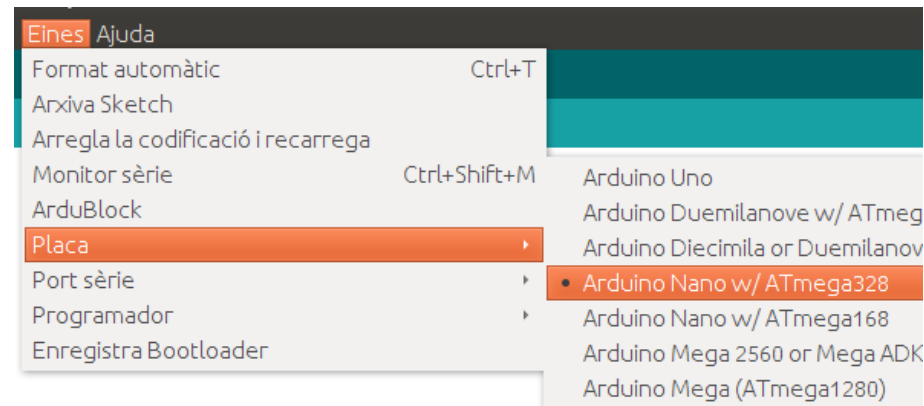
qtTerm està configurat a /dev/ttyUSB0 a 9600-N-8-1

```
ecat@ecatian:~$ minicom -b 9600 -o -D /dev/ttyUSB1
```




Tecnologies creatives a l'aula

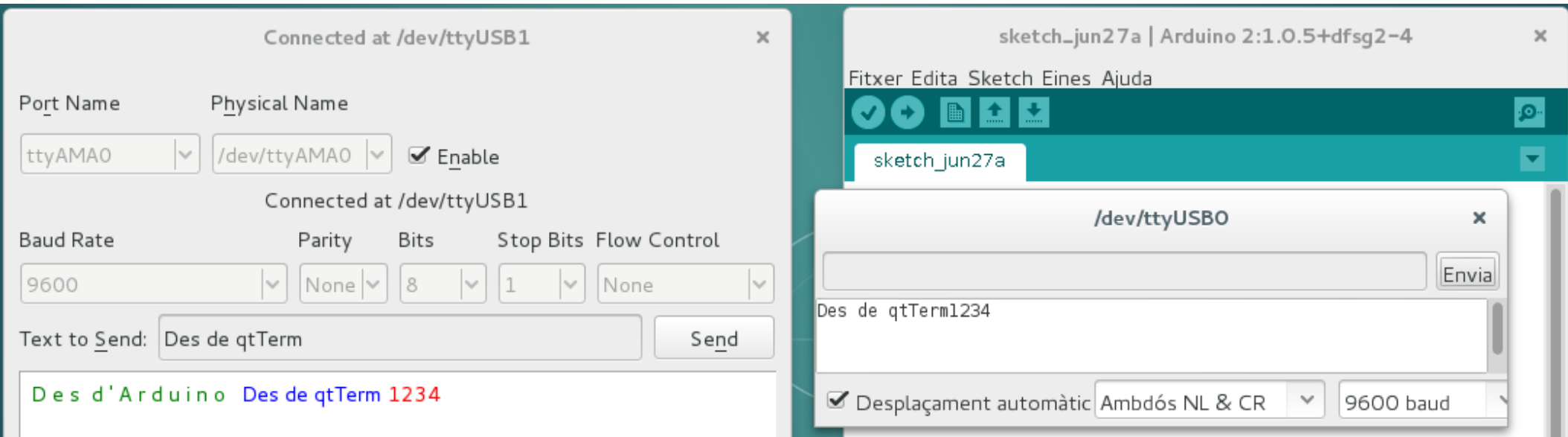
Comunicació qtTerm amb IDE d'Arduino





Tecnologies creatives a l'aula

Comunicació qtTerm amb IDE d'Arduino



qtTerm està configurat a /dev/ttyUSB1 a 9600-N-8-1

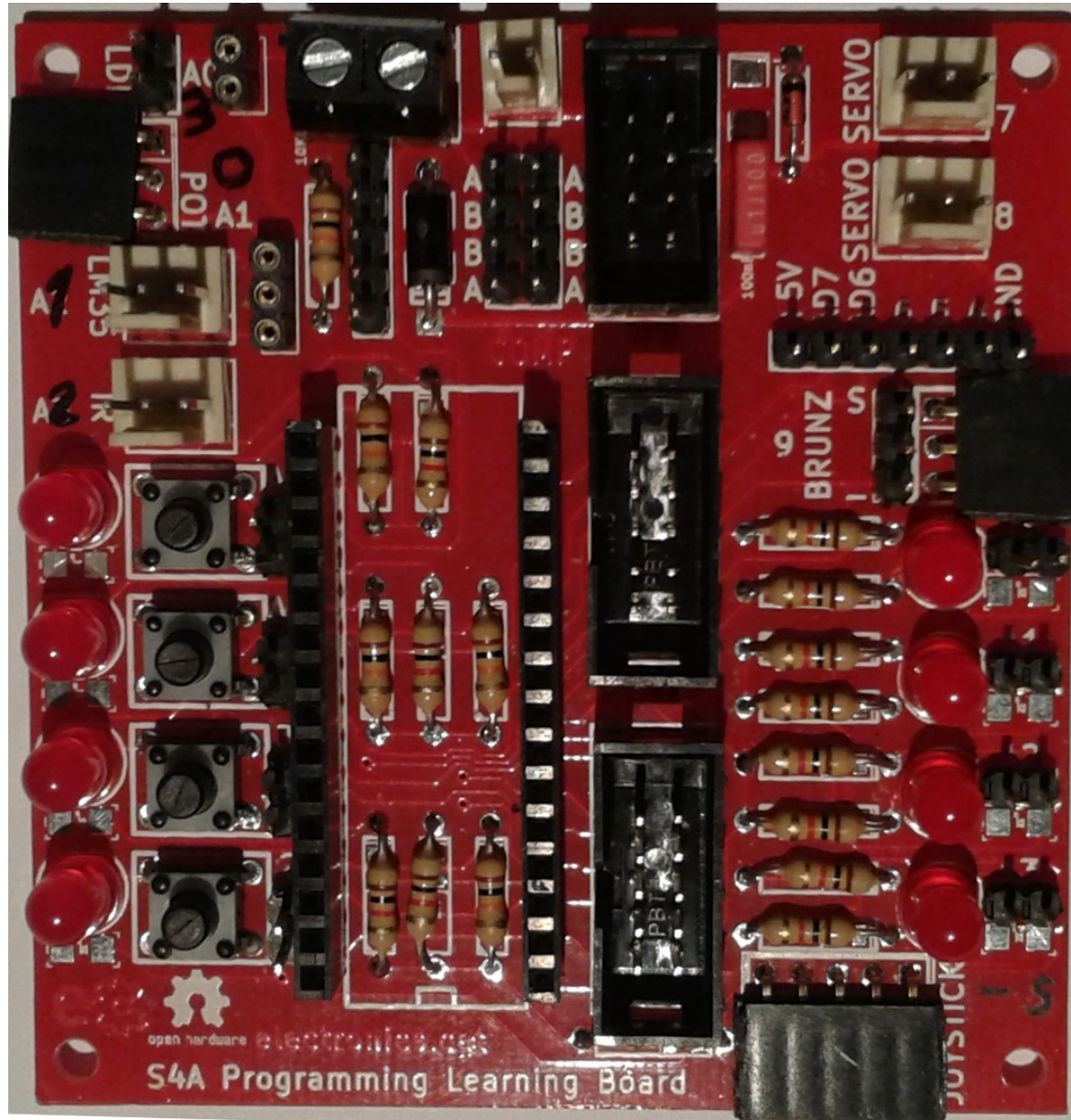
IDE d'Arduino està configurat a /dev/ttyUSB0 a 9600

El monitor sèrie de l'IDE d'Arduino és a Eines/Monitor sèrie



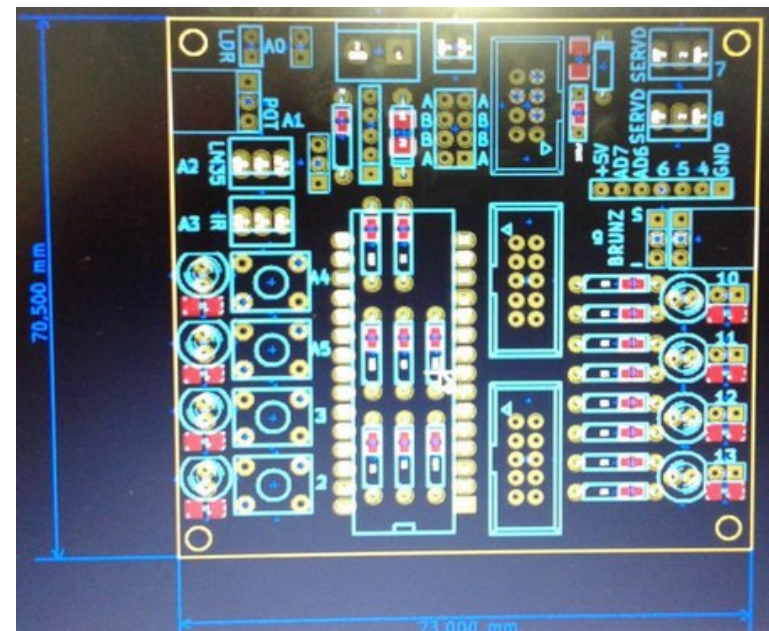
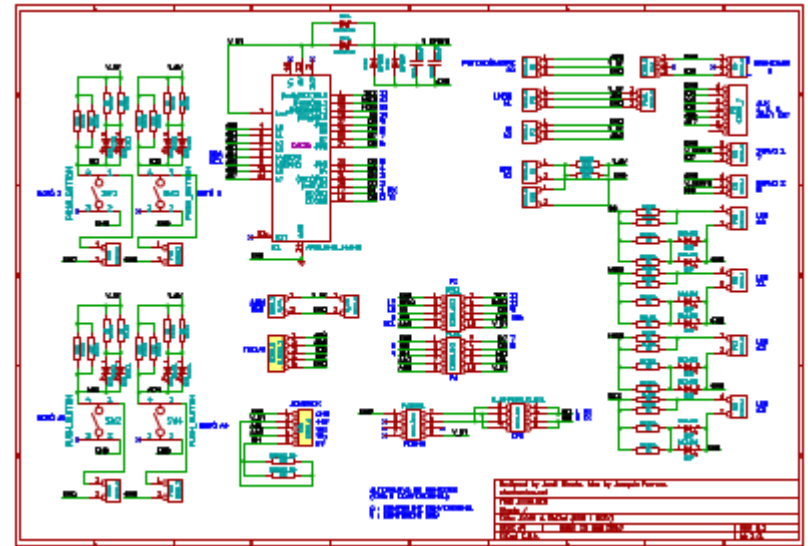
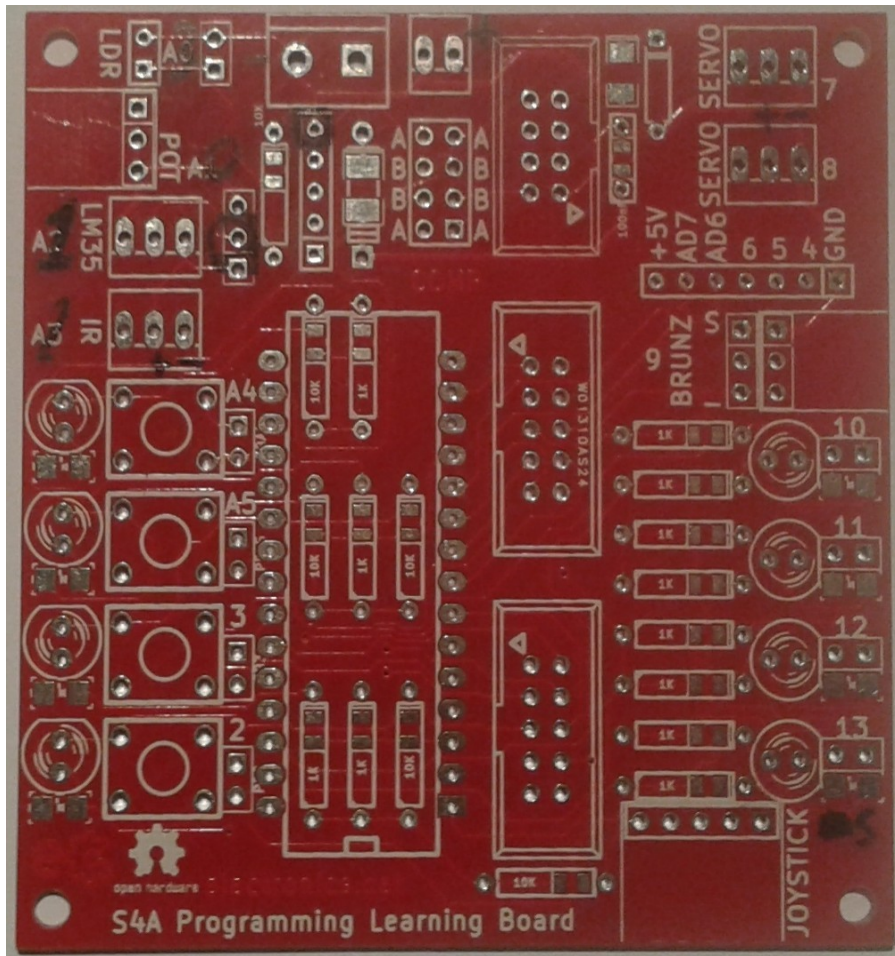
Tecnologies creatives a l'aula

La placa S4A Programming Learning Board



Tecnologies creatives a l'aula

La placa S4A Programming Learning Board



Placa desenvolupada amb l'entorn de disseny integrat de programari lliure





Tecnologies creatives a l'aula

Ús d'S4A

Based on Scratch from the MIT Media Lab

Fitxer Edita Ajuda

Moviment Control Aspecte Sensors Sons Operadors Lapis Variables

Nova variable Nova llista

Arduino1

x: 0 y: 0 direcció: 90

Programes Vestits Sons

al prémer

per sempre

si ¿sensor Digital2 premut?

digital 13 apagat

si no digital 13 encès

si ¿sensor Digital3 premut?

digital 12 apagat

si no digital 12 encès

si valor del sensor Analog5 < 15

digital 11 encès

si no digital 11 apagat

si valor del sensor Analog4 < 15

digital 10 encès

si no digital 10 apagat

al prémer

per sempre

si no ¿sensor Digital2 premut?

analògic 9 valor 255

si no analògic 9 valor 0

pcbS4A_01

Arduino1 port: USB0

Analog0 628

Analog1 522

Analog2 519

Analog3 114

Analog4 1023

Analog5 1023

Digital2 true

Digital3 true

Nova animació:

Escenari

Arduino...

x: -636 y: -87

www.s4a.cat



Tecnologies creatives a l'aula

Ús d'S4A

El microprogramari és el programari del maquinari

Català

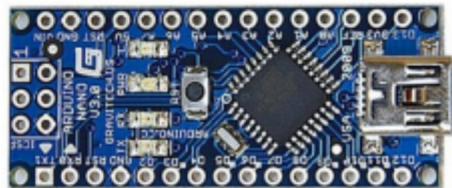
Programari
Maquinari
Microprogramari

Anglès

Software
Hardware
Firmware



Arduino Nano



S4AFirmware16 | Arduino 1.6.5

Fitxer Edita Sketch Eines Ajuda

S4AFirmware16

```
// NEW IN VERSION 1.6c (by Jorge Gomez):
// Fixed variable type in pin structure: pin.state should be bool
// Optimized speed of execution while receiving data from S4A

// NEW IN VERSION 1.6b (by Jorge Gomez):
// Added new structure arduinoPins to hold the pins info
// - This makes the code easier to read and modify (IMH)
// - Allows to change the type of pin more easily to me
// - Eliminates the need of having to deal with different pin types
// - By using an enum to hold all the possible output pins
// Changed all functions using old style pin access: conPin to pin
// Fixed possible overflow every 70 minutes (2e32 us) in digitalWrite
// Some minor coding style fixes
```

1 Arduino Nano, ATmega328 on /dev/ttyUSB0

Microprogramari per l'Arduino per funcionar amb l'S4A :
<http://vps34736.ovh.net/S4A/S4AFirmware16.ino>



Tecnologies creatives a l'aula

Ús d'S4A

The screenshot shows the Arduino IDE interface. In the foreground, a dialog box titled "Obre un sketch d'Arduino..." is open, displaying a list of sketches. The sketch "S4AFirmware16" is selected. The background shows the Arduino IDE editor with the "S4AFirmware16" sketch loaded. The editor title bar indicates "S4AFirmware16 | Arduino 2:1.0.5+dfsg2-4". The menu bar includes "Fitxer", "Edita", "Sketch", "Eines", and "Ajuda". The toolbar shows icons for opening, saving, and running. The code editor displays the following code:

```

6c (by Jorge Gomez):
type in pin structure: pin.state should be int, no
of execution while receiving data from computer i

6b (by Jorge Gomez):
are arduinoPins to hold the pins information:
e code easier to read and modify (IMHO)
ge the type of pin more easily to meet non stand
e need of having to deal with different kind of i
um to hold all the possible output pin states th
tions using old style pin access: configurePins()
erflow every 70 minutes (2e32 us) in pulse() whi
style fixes

6a (by Jorge Gomez):
ty with Arduino Leonardo by avoiding the use of
optimized:
machine for reading the two bytes of the S4A mes
r() is only called if the state is changed
ization
ts of code
global variables
  
```

The status bar at the bottom indicates "Arduino Nano w/ ATmega328 on /dev/ttyUSB0".



Tecnologies creatives a l'aula

Ús d'S4A

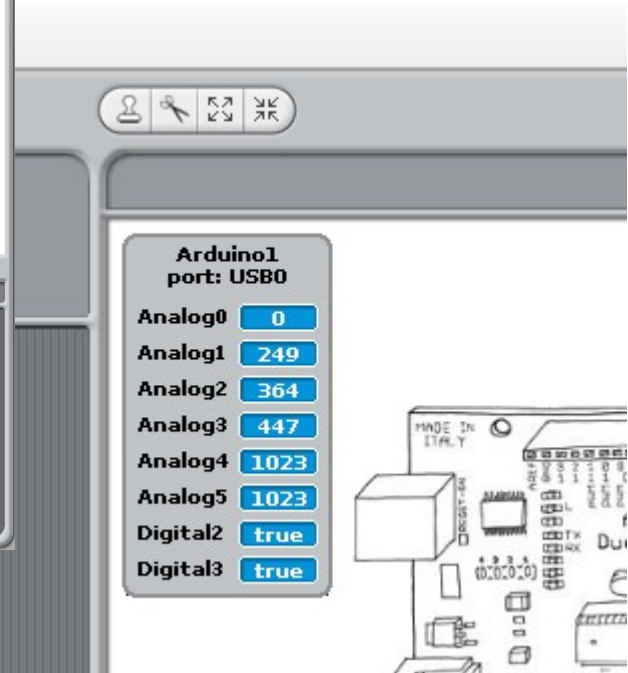
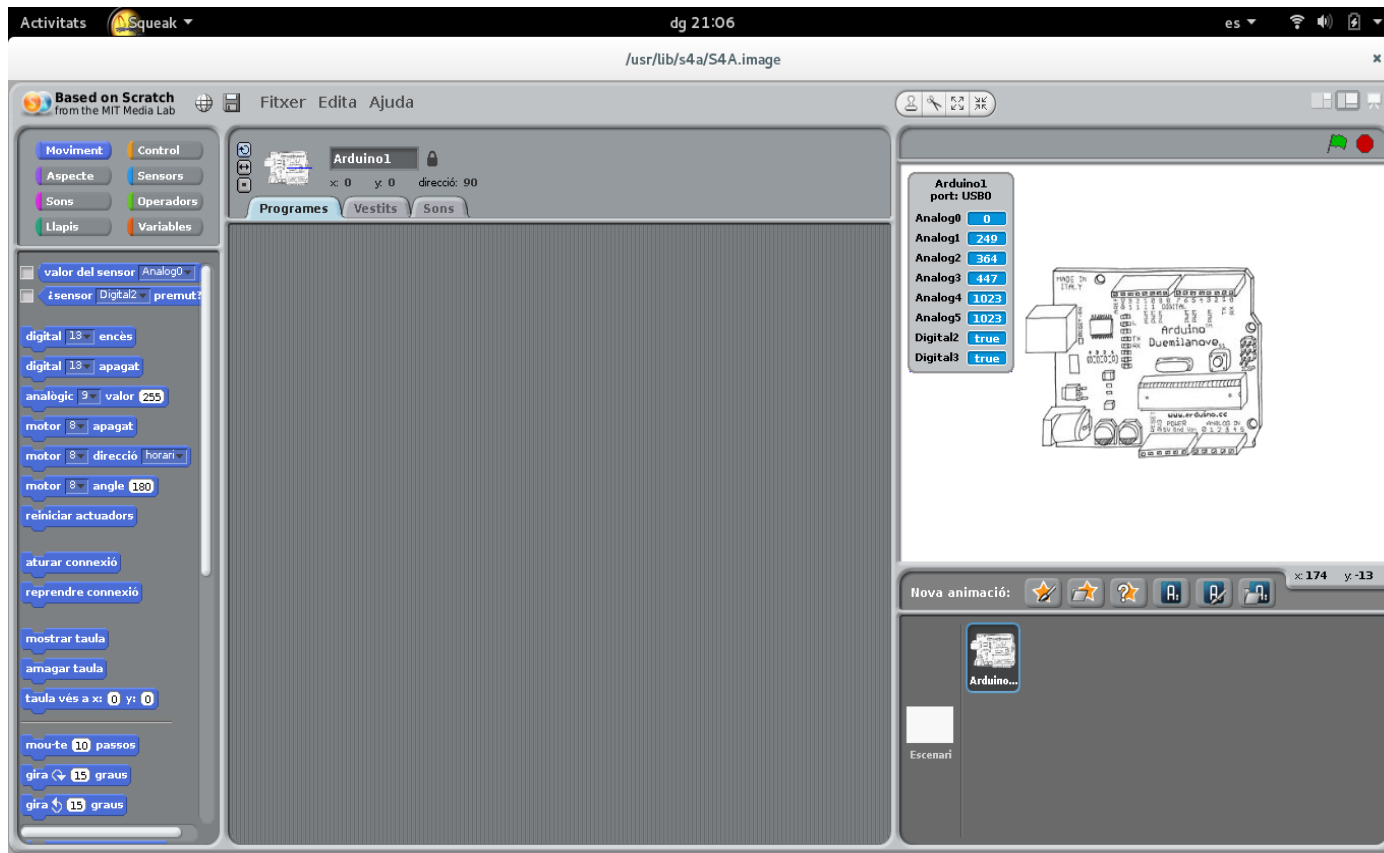


Connecteu la placa S4A PLB al vostre ordinador i premeu la supertecla (botó amb la icona d'una finestra a l'esquerra de la barra espaciadora) i després escriviu S4A i ho seleccioneu amb el ratolí.



Tecnologies creatives a l'aula

Ús d'S4A

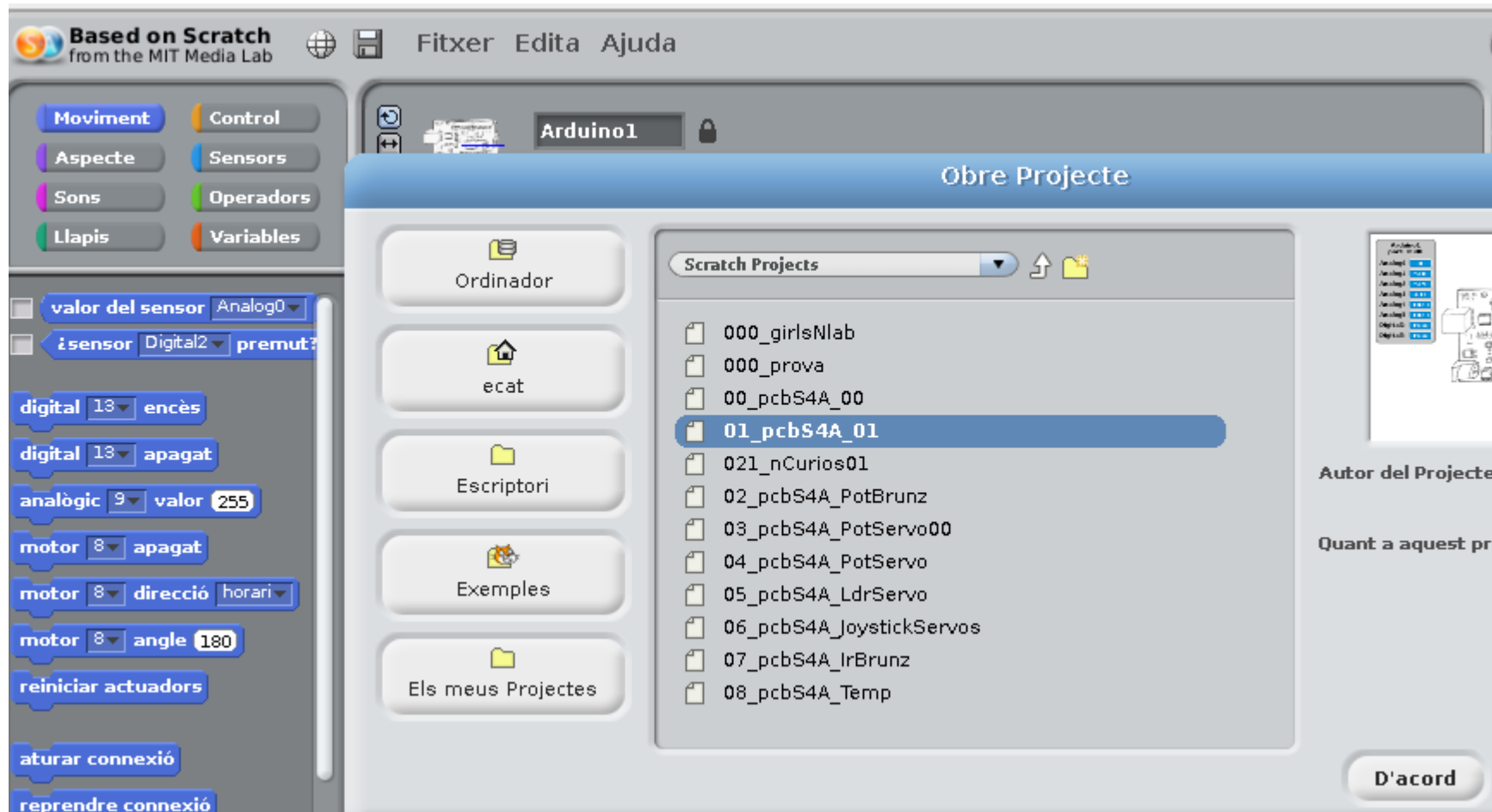


Un cop es detecta la placa, apareixen nombres que es van movent al panell d'entrades analògiques i digitals.



Tecnologies creatives a l'aula

Ús d'S4A



Obriu l'arxiu 01_pcbS4A_01



Tecnologies creatives a l'aula

Ús d'S4A



Us apareixerà un programa com aquest

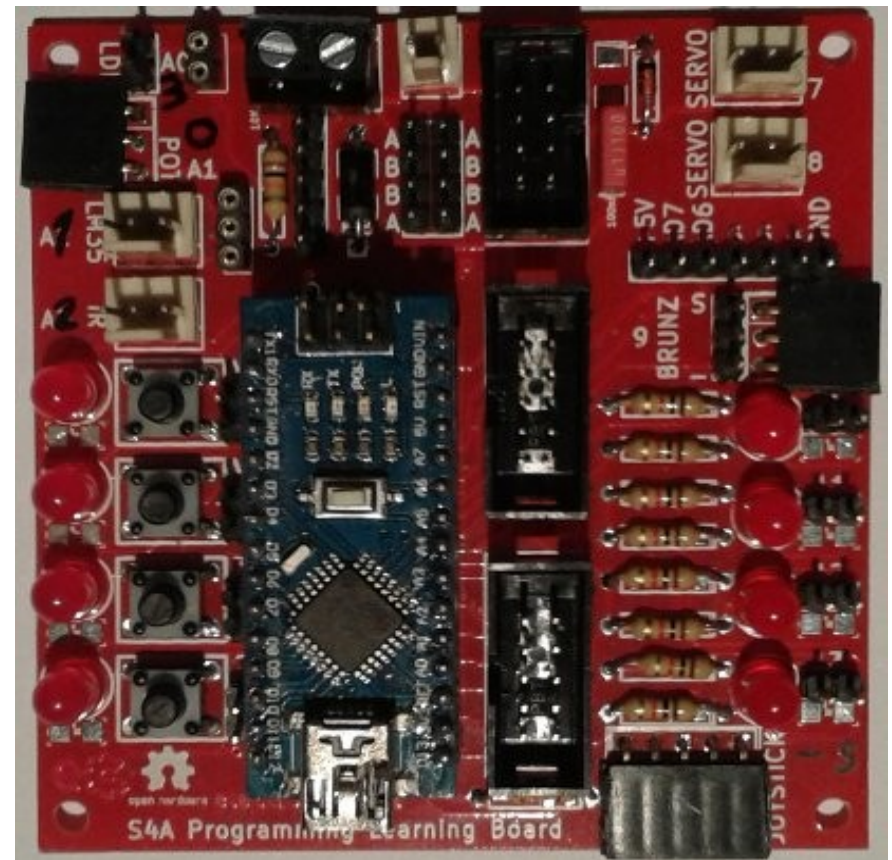


Tecnologies creatives a l'aula

Ús d'S4A



A5
A4
3
2



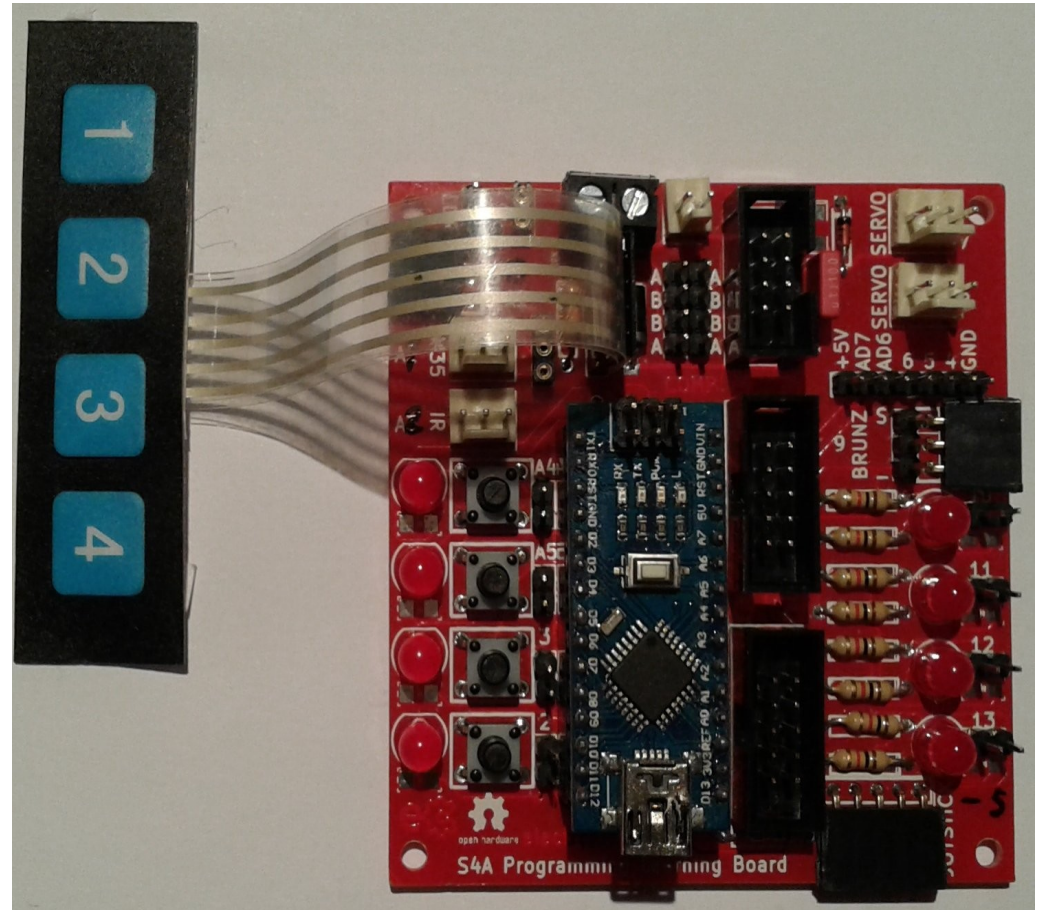
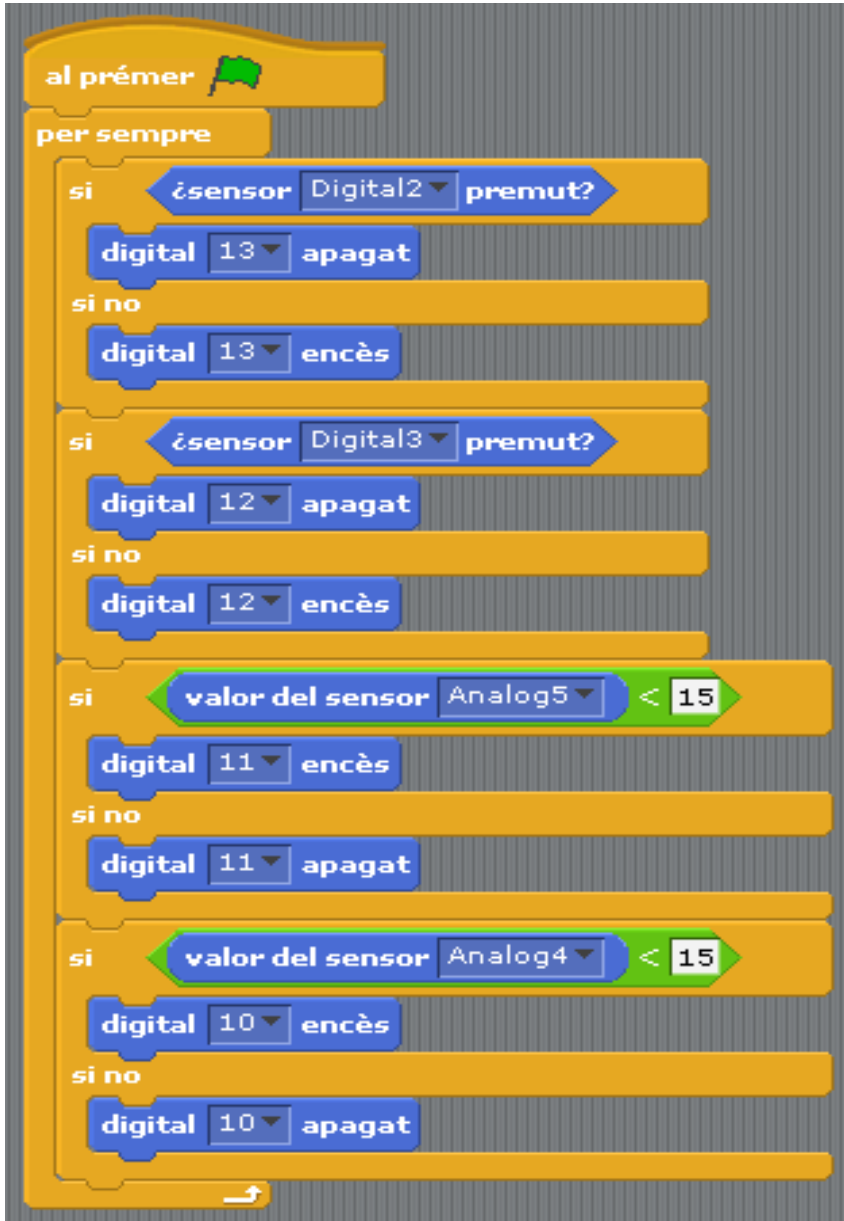
10
11
12
13

Premeu la bandera verda de l'S4A
I després premeu els botons de la placa



Tecnologies creatives a l'aula

Ús d'S4A



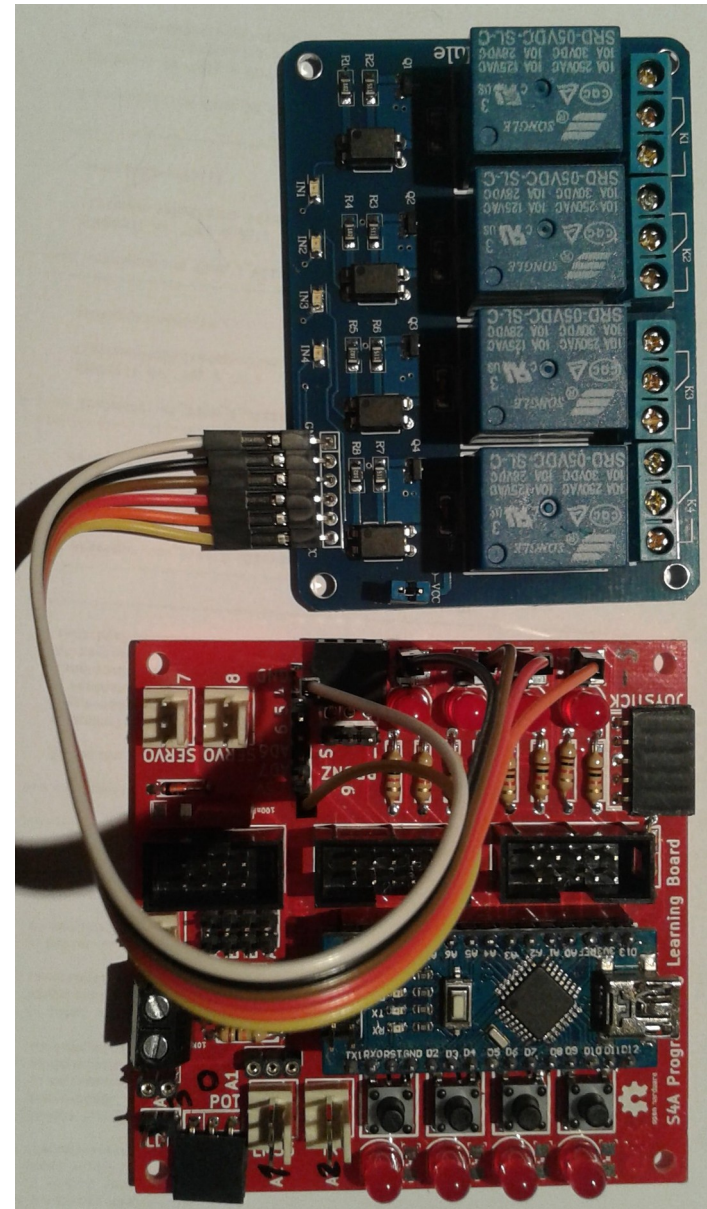
Connecteu el teclat de membrana. Torneu a prémer la bandera verda de l'S4A i després premeu els botons del nou teclat.

Potser haureu de canviar el número 15 per un altre de superior.



Tecnologies creatives a l'aula

Ús d'S4A





Tecnologies creatives a l'aula

Com funciona un relé

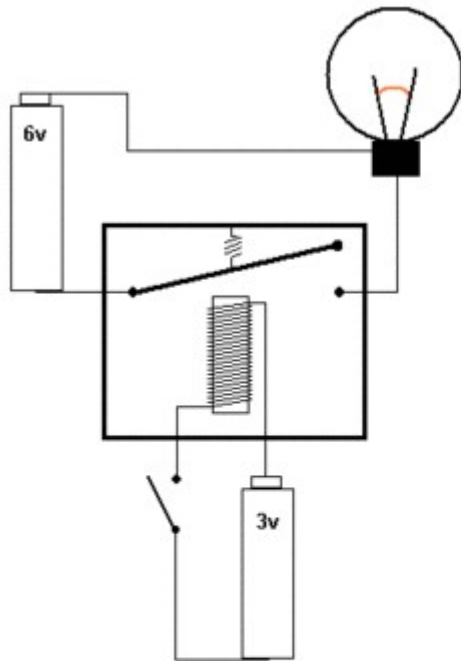


Figure 1: Relay off

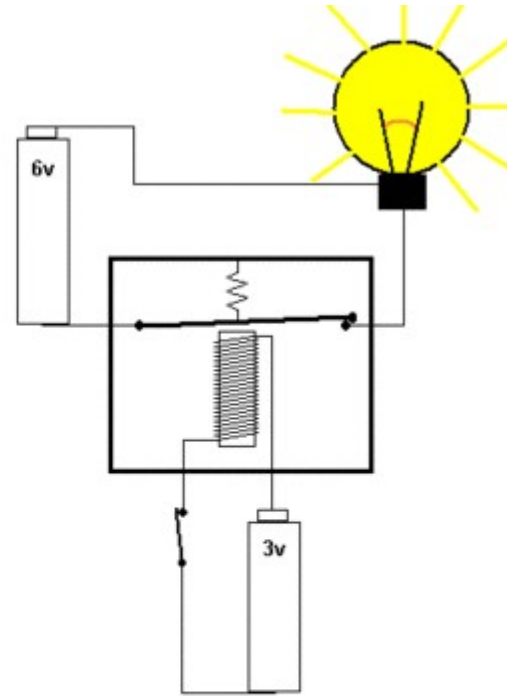
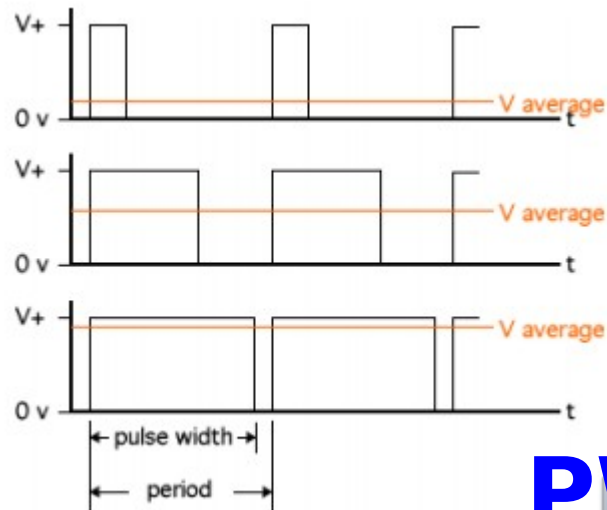
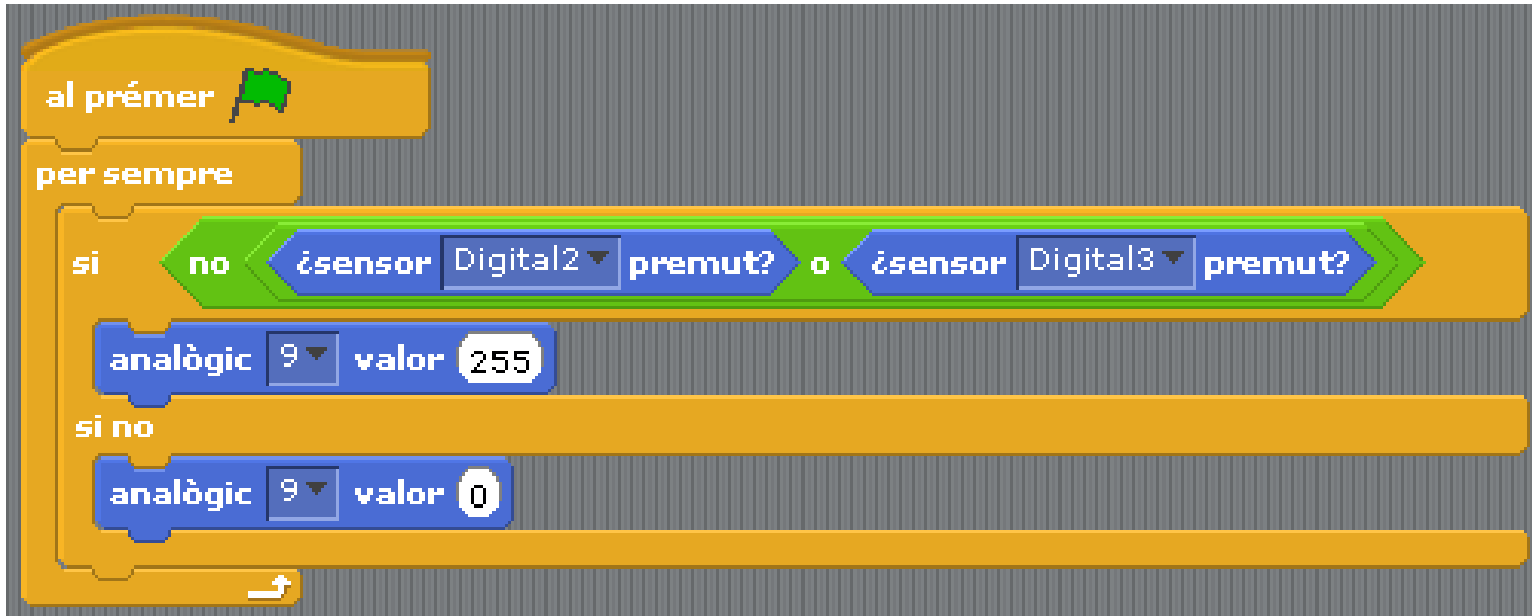


Figure 2: Relay on



Tecnologies creatives a l'aula

Ús d'S4A - El brunzidor



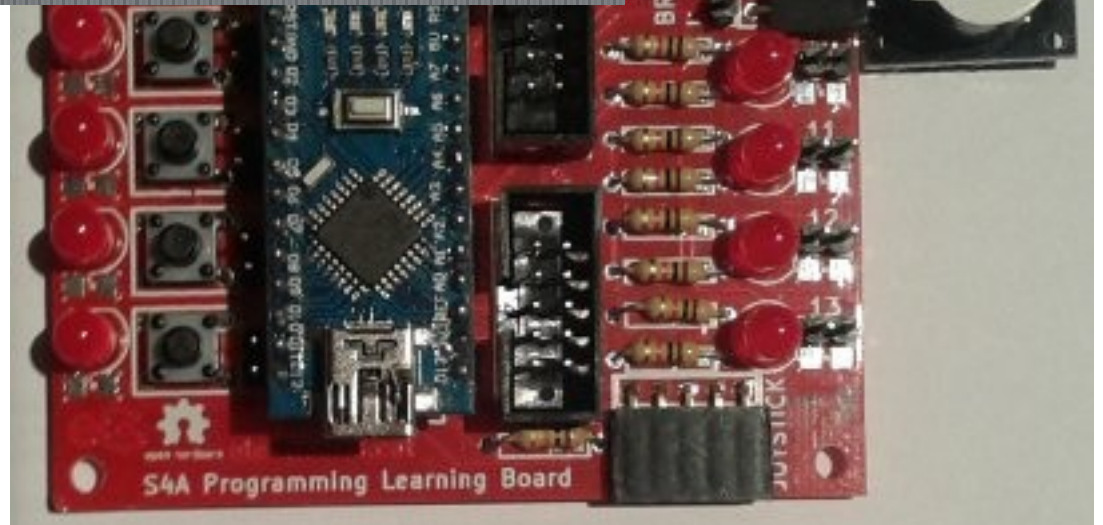
A4

A5

3

2

PWM

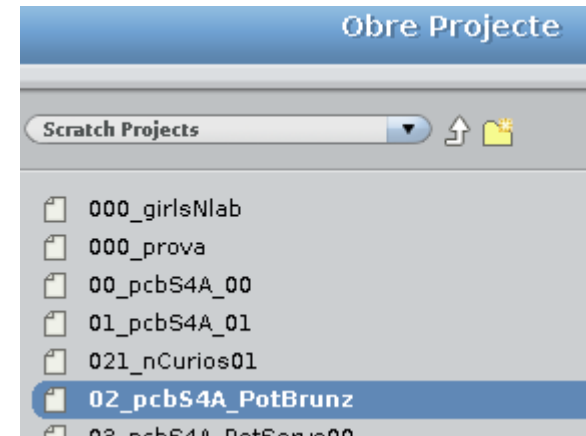
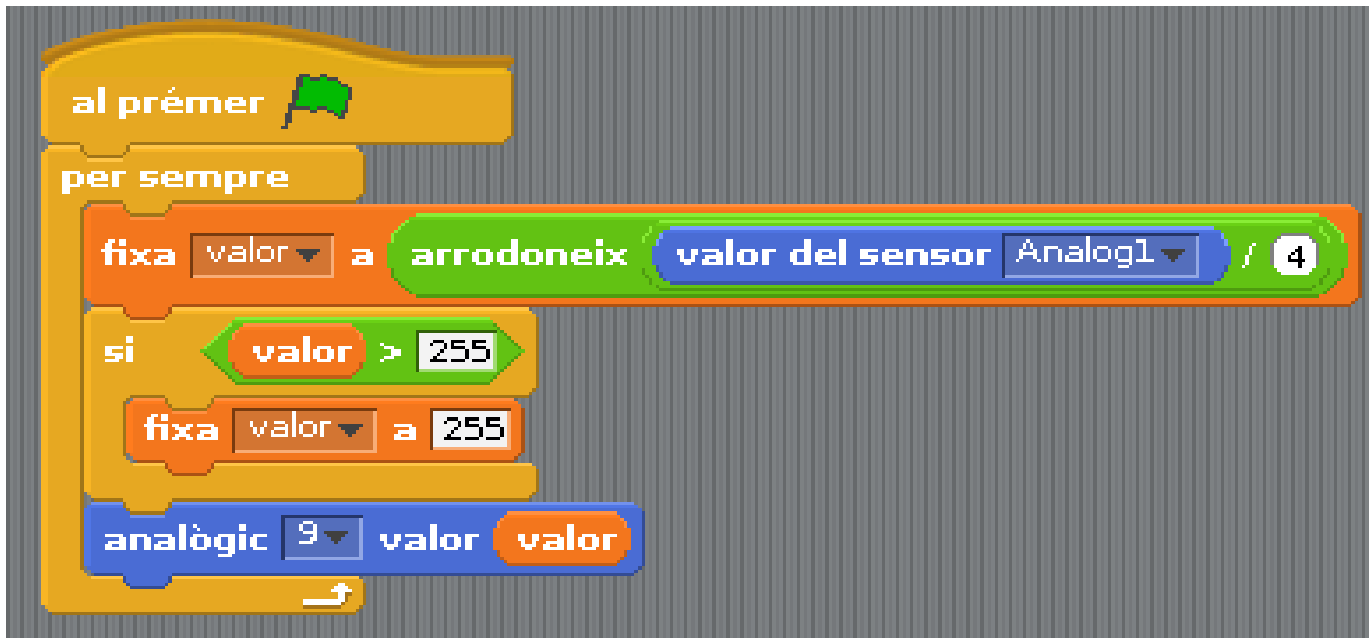


9



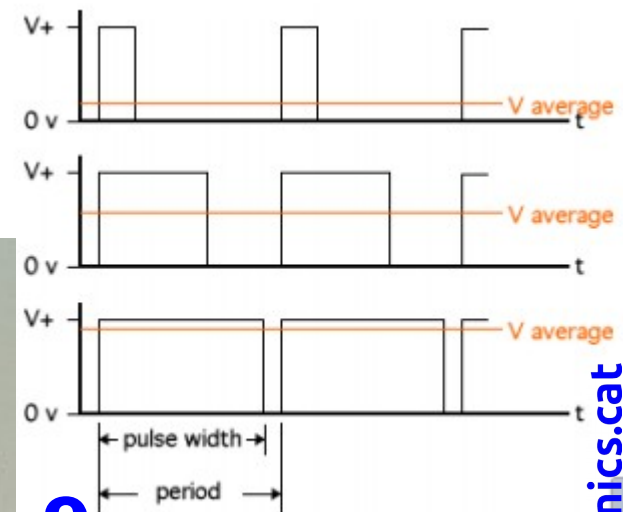
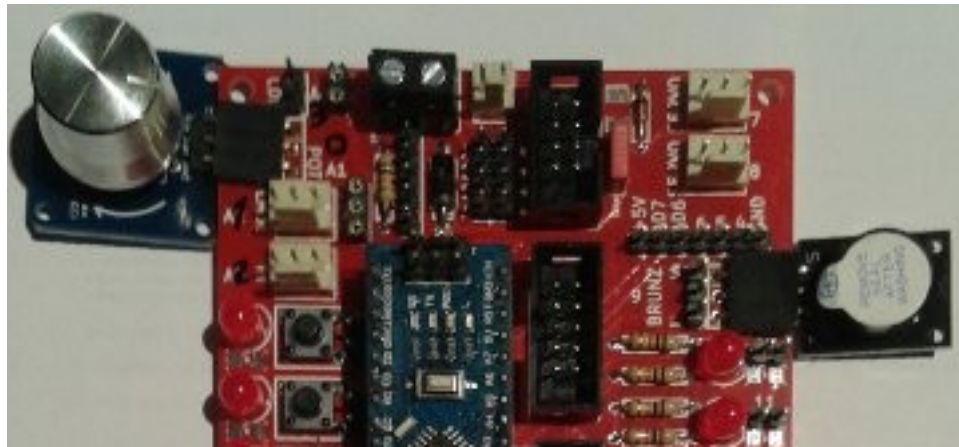
Tecnologies creatives a l'aula

Ús d'S4A - Potenciòmetre i brunzidor



Verifiquen que està seleccionat Analog1 i no Analog0

A1



9



Tecnologies creatives a l'aula

Ús d'Snap for Arduino

Per a l'Snap for Arduino i l'Scratch 2.0 offline
el microprogramari
és el Firmata estàndar

Català

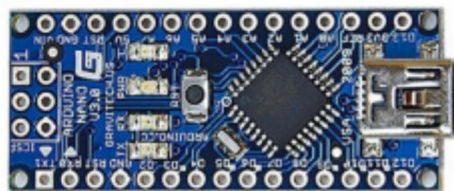
Anglès

Programari
Maquinari
Microprogramari

Software
Hardware
Firmware



Arduino Nano



```
StandardFirmata | Arduino 2:1.0.5+dfsg2-4
Fitxer Edita Sketch Eines Ajuda
StandardFirmata
* any host computer software package.
*
* To download a host software package, please click on the following
* to open the download page in your default browser.
*
* http://firmata.org/wiki/Download
*/

/*
Copyright (C) 2006-2008 Hans-Christoph Steiner. All rights reserved.
Copyright (C) 2010-2011 Paul Stoffregen. All rights reserved.
Copyright (C) 2009 Shigeru Kobayashi. All rights reserved.
Copyright (C) 2009-2011 Jeff Hoefs. All rights reserved.

This library is free software; you can redistribute it and/or
modify it under the terms of the GNU Lesser General Public
License as published by the Free Software Foundation; either
version 2.1 of the License, or (at your option) any later version.

See file LICENSE.txt for further informations on licensing terms.

formatted using the GNU C formatting and indenting
*/

Guardat enllestit.
```

1 Arduino Nano w/ ATmega328 on /dev/ttyUSB0

Microprogramari per l'Arduino per funcionar amb l'Snap for Arduino i l'Scratch 2 Offline:
<http://binefa.cat/php/training/s4a/StandardFirmata.tar.gz>



Tecnologies creatives a l'aula

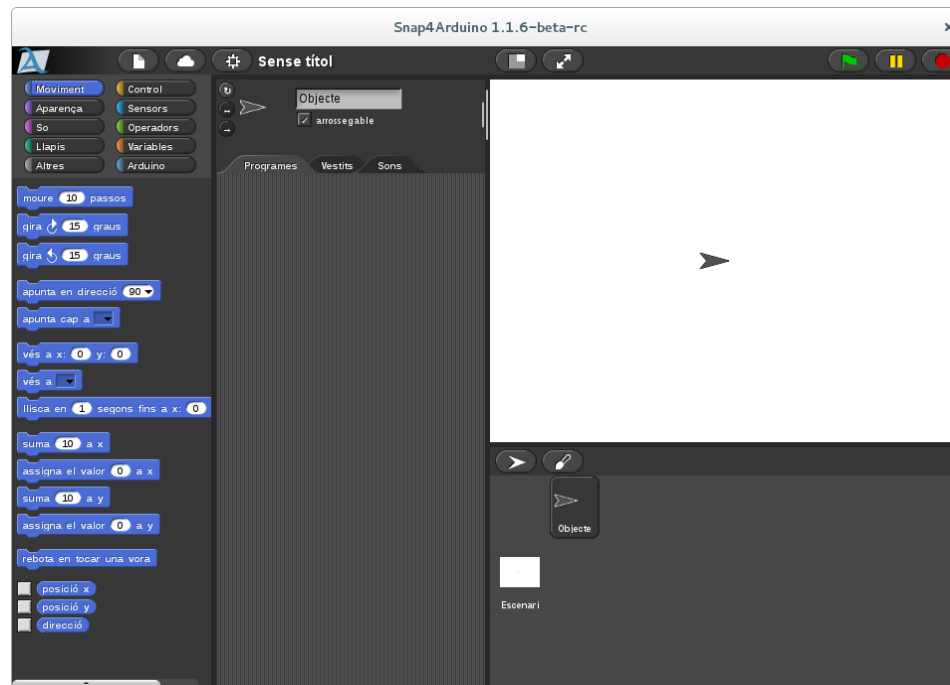
Ús d'Snap for Arduino

Feu la crida a Snap for Arduino des del terminal:

```
ecat@debian8: ~/Snap4Arduino
```

Fitxer Edita Visualitza Cerca Terminal Ajuda

```
ecat@debian8:~$ cd /home/ecat/Snap4Arduino  
ecat@debian8:~/Snap4Arduino$ ./Snap4Arduino
```





Tecnologies creatives a l'aula

Ús d'Snap for Arduino

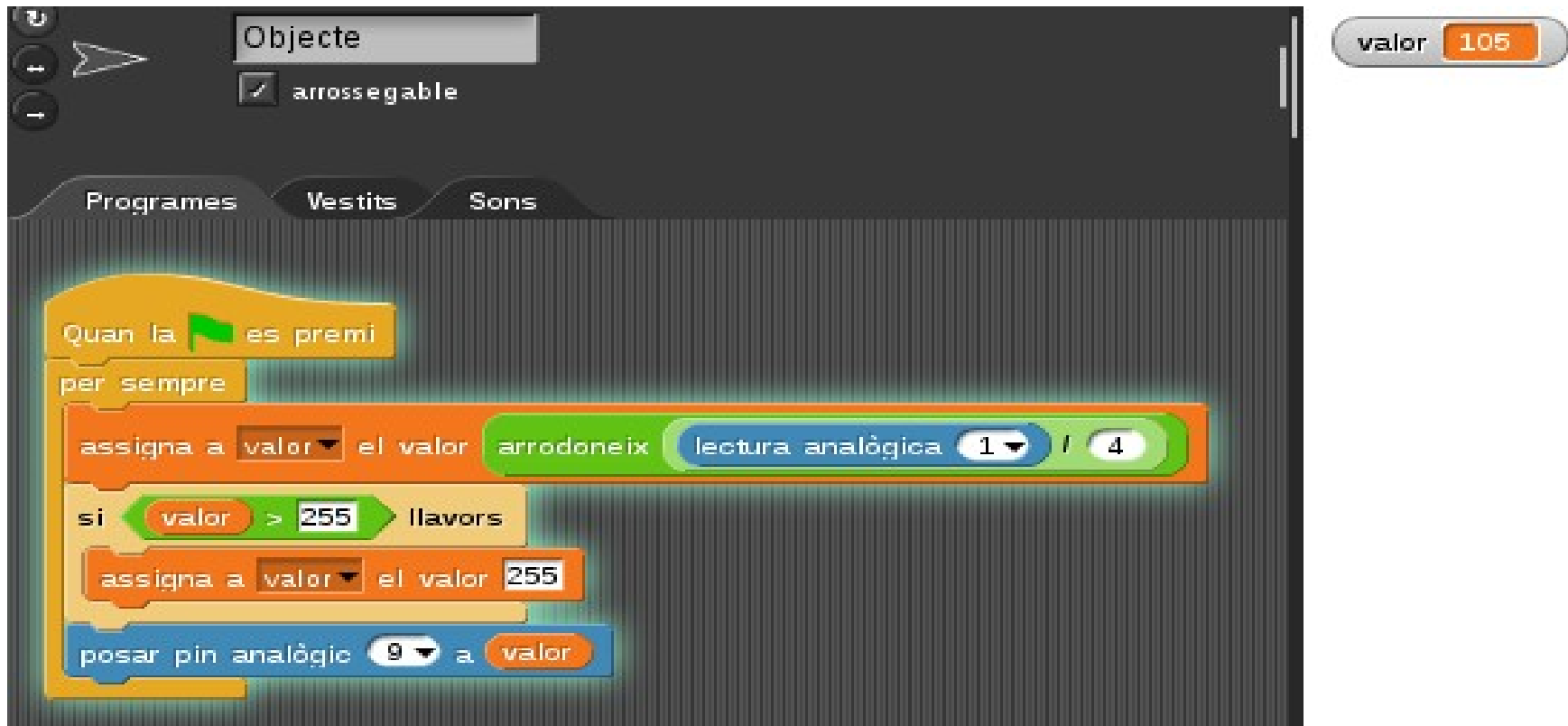


Assegureu-vos d'haver programat l'Arduino amb el programari del protocol Firmata estàndar. Quan connecteu l'Arduino seleccioneu el port /dev/ttyUSB0.



Tecnologies creatives a l'aula

Ús d'Snap for Arduino



La sortida PWM la interpreta com a sortida analògica



Tecnologies creatives a l'aula

Ús d'Snap for Arduino

Exercici

Implementeu a l'Snap for Arduino el control dels 4 relés des dels quatre botons del teclat de membrana i feu que soni el bronzidor quan es premen alhora els botons connectats a les entrades digital 2 i 3.



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

Per a l'Snap for Arduino i l'Scratch 2.0 offline
el microprogramari
és el Firmata estàndar

Català

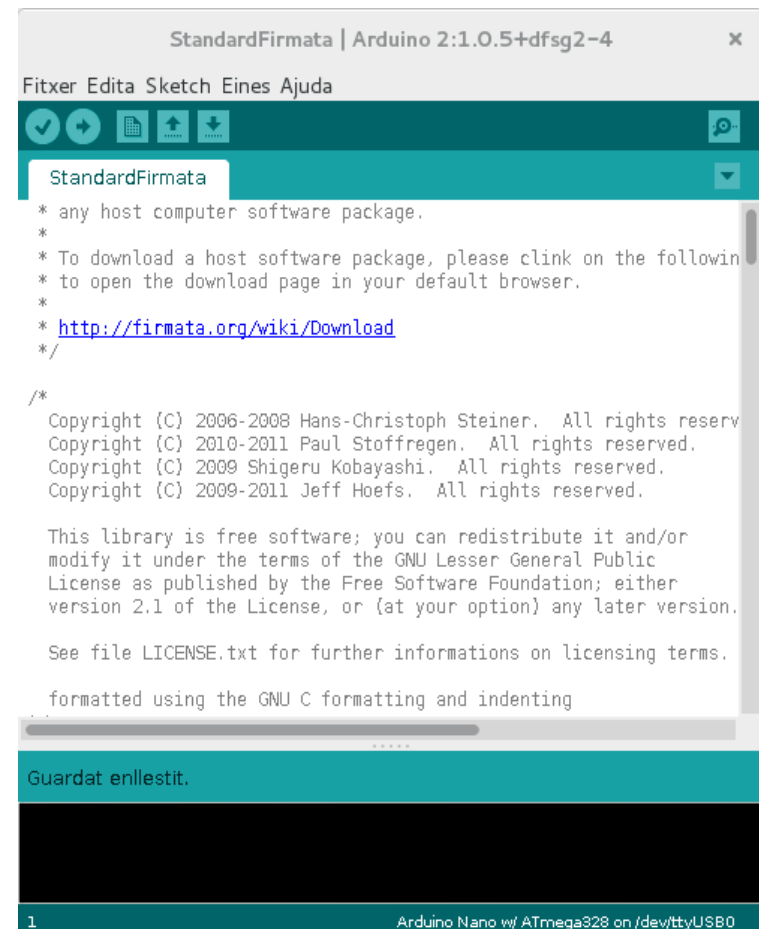
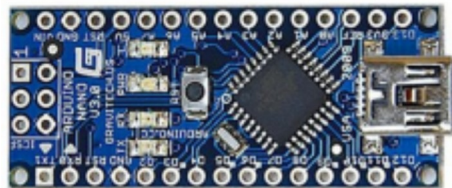
Anglès

Programari
Maquinari
Microprogramari

Software
Hardware
Firmware



Arduino Nano



Per tant, si ja l'heu programat per a l'Snap for Arduino **no cal** tornar-ho a **reprogramar**



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

s2aio

<https://github.com/MrYsLab/s2aio/wiki>

The Arduino Hardware Extension For Snap! and the Scratch 2.0 Offline Editor



s2a_fm

Previous version of ***s2aio***

https://github.com/MrYsLab/s2a_fm



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

```

ecat@debian8: ~/Baixades/scratch/s2a_fm-master
Fitxer  Edita  Visualitza  Cerca  Terminal  Ajuda

Could not instantiate PyMata - is your Arduino plugged in?
ecat@debian8:~/Baixades/scratch/s2a_fm-master$ ./s2a_fm.py /dev/ttyUSB0
s2a_fm version 1.5  Copyright(C) 2013-14 Alan Yorinks  All Rights Reserved

Python Version 2.7.9 (default, Mar 1 2015,
[GCC 4.9.2])

PyMata version 2.12  Copyright(C) 2013-16 Alan Yorinks

Opening Arduino Serial port /dev/ttyUSB0

Please wait while Arduino is being detected.
Board initialized in 0 seconds
Total Number of Pins Detected = 22
Total Number of Analog Pins Detected = 8
Please wait for Total Arduino Pin Discovery
additional seconds.
Arduino Total Pin Discovery completed in 0 seconds
Starting HTTP Server!
Use <Ctrl-C> to exit the extension

Please start Scratch or Snap!
Scratch detected! Ready to rock and roll...

```

A un terminal:

```

$ cd /home/ecat/prg/s2a_fm-master
$ ./s2a_fm.py /dev/ttyUSB0

```

A un altre terminal:

```

$ cd /home/ecat/prg
$ ./Scratch2

```

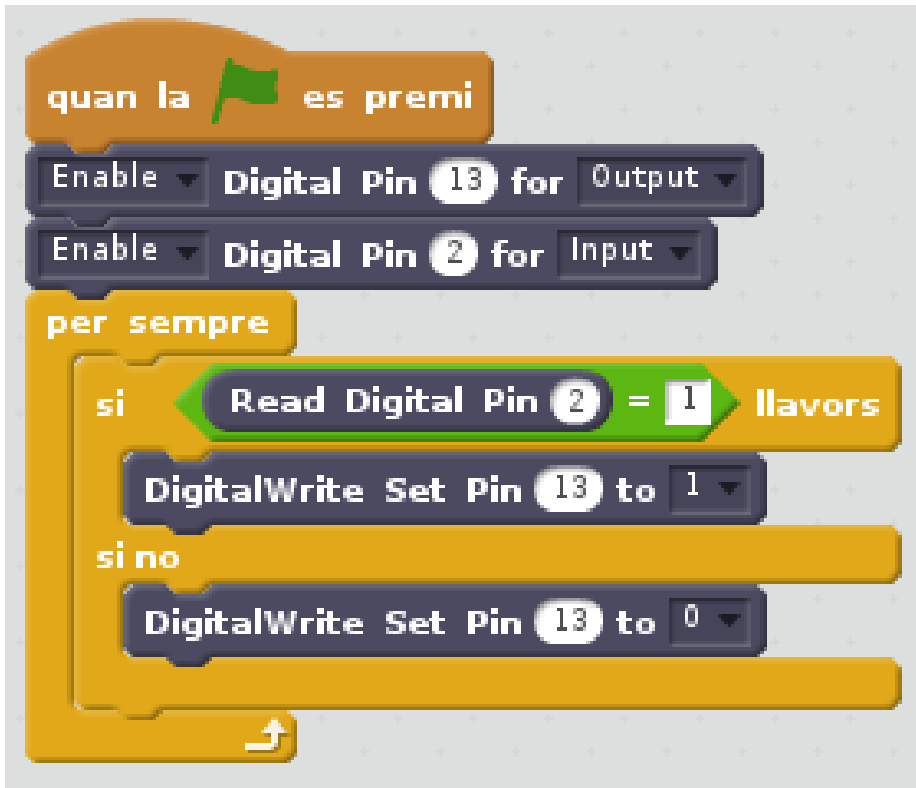
https://github.com/MrYsLab/s2a_fm



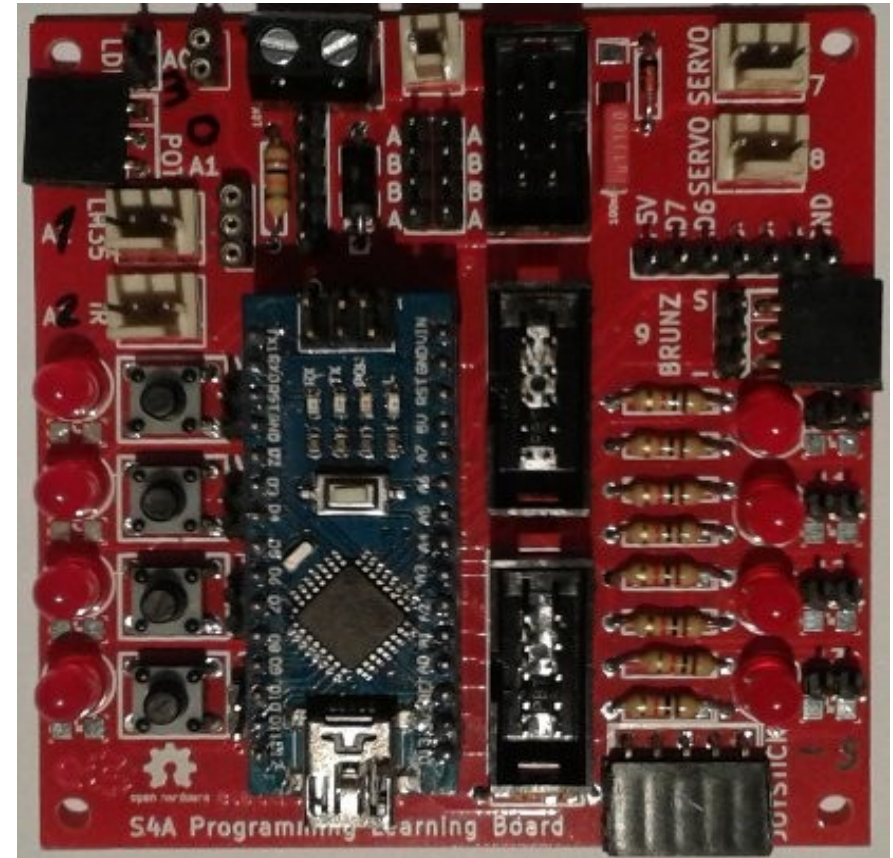
Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

sc2_prova00.sb2



A4
A5
3
2



10
11
12
13

A diferència dels programes anteriors, cal configurar si les pots són entrades o sortides.

Per a fer un programa des de zero cal carregar l'extensió de maquinari s2a_fm.s2e

<http://binefa.cat/php/training/s4a/codi.tar.gz>



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

Ús del potenciòmetre



Obriu el programa sc2_prova04_potA1.sb2

<http://binefa.cat/php/training/s4a/codi.tar.gz>



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

sc2_prova05_Arkanoid.sb2

The screenshot shows the Scratch 2.0 offline editor interface for a project named 'sc2_prova05_Arkanoid'. The stage displays a game scene with a paddle at the bottom, a ball in the center, and several bricks at the top. A 'Reset' button is visible on the right. The 'Scripts' area on the right contains code blocks for handling the 'Reset Clicked' event, including setting the ball's position and direction. The 'Motion' area on the left shows movement and rotation blocks for the ball. The 'Characters' area at the bottom shows the sprite list with the paddle, ball, and bricks.

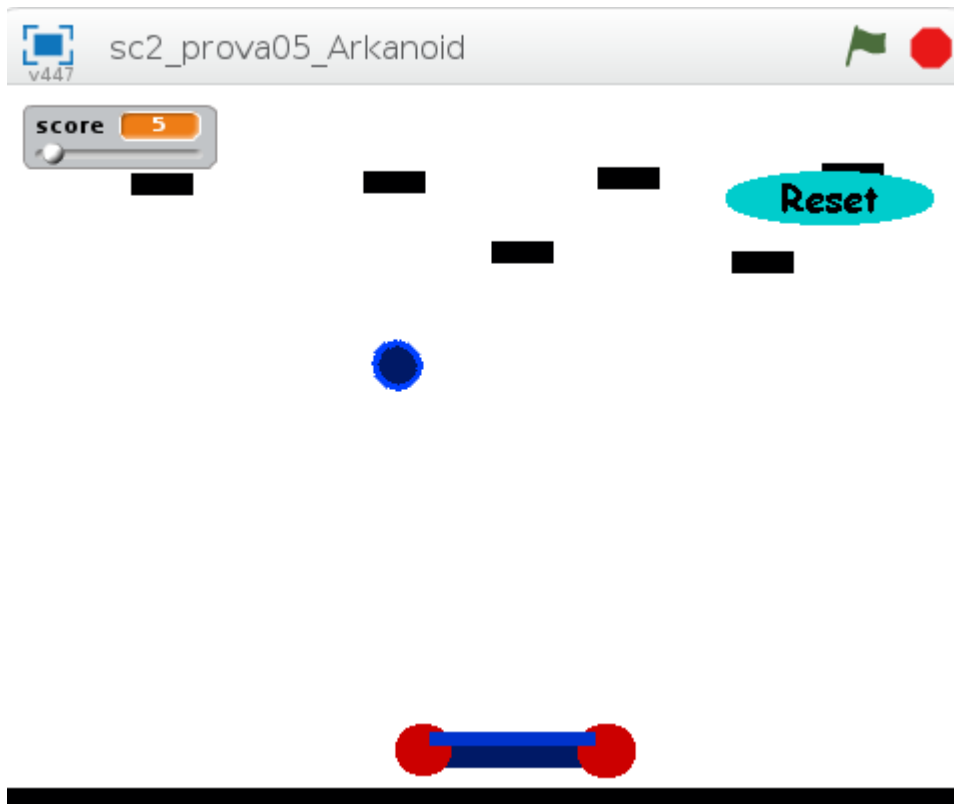
<http://binefa.cat/php/training/s4a/codi.tar.gz>



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

sc2_prova05_Arkanoid.sb2

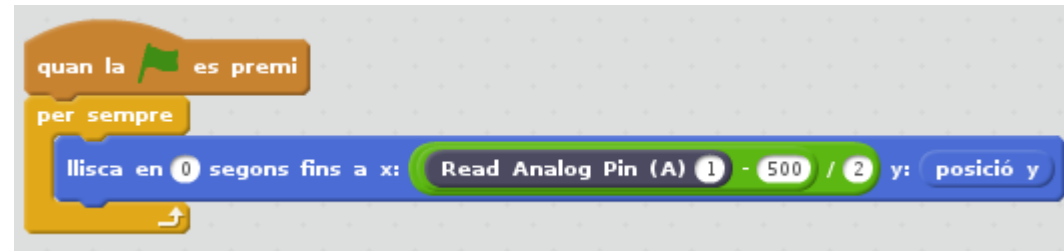




Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

sc2_prova06_ScratchArkanoid.sb2

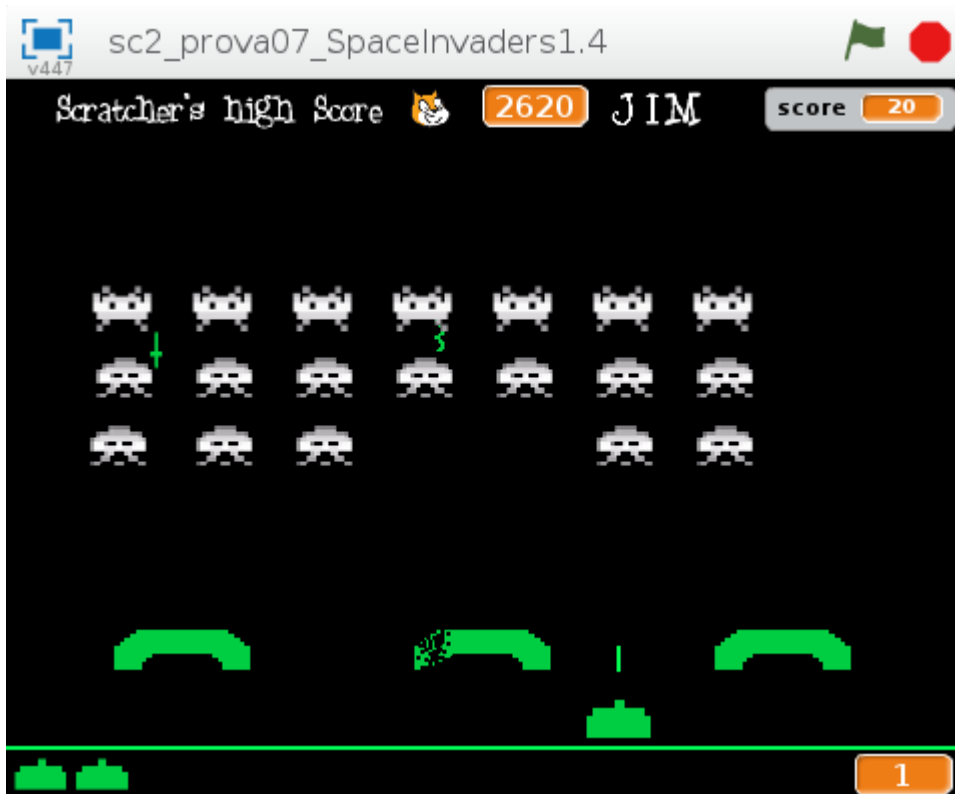




Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

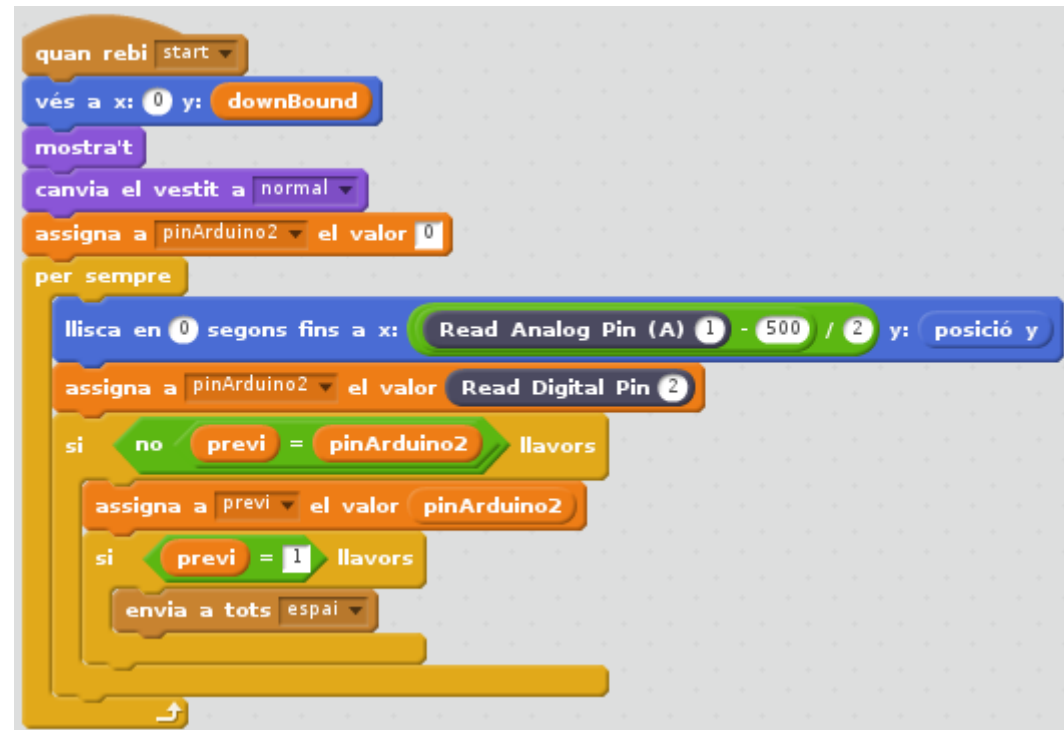
sc2_prova07_SpaceInvaders1.4.sb2



Podeu activar el volum.

Es fa servir el potenciòmetre A1 per a moure la nau i el botó 2 per a disparar.

<http://binefa.cat/php/training/s4a/codi.tar.gz>



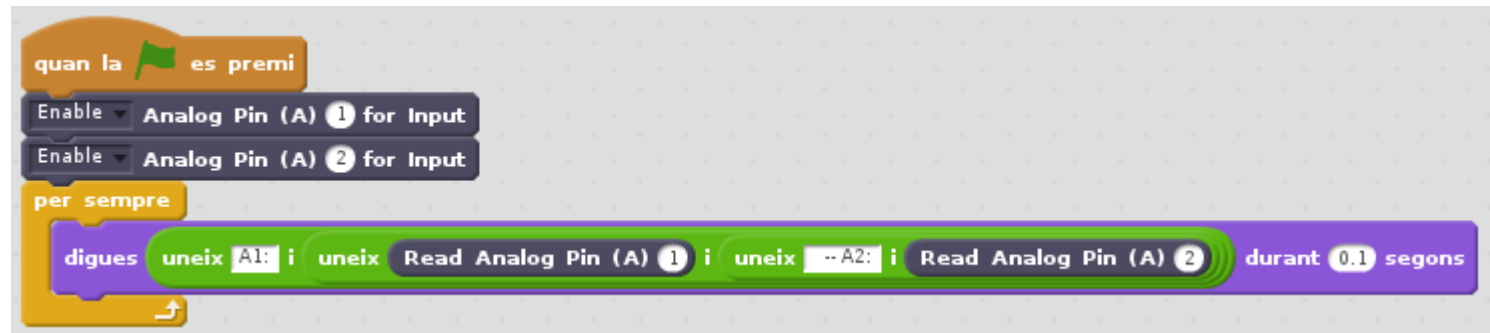
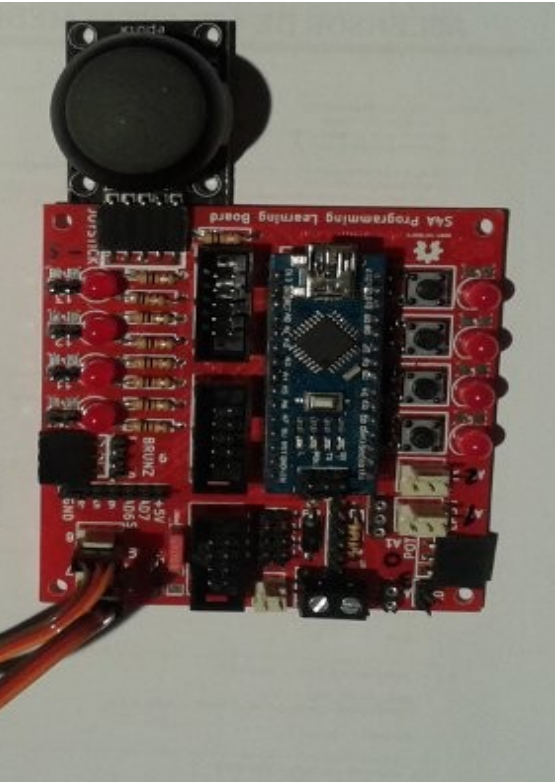


Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

Ús del joystick

sc2_prova08_JoystickA1A2.sb2



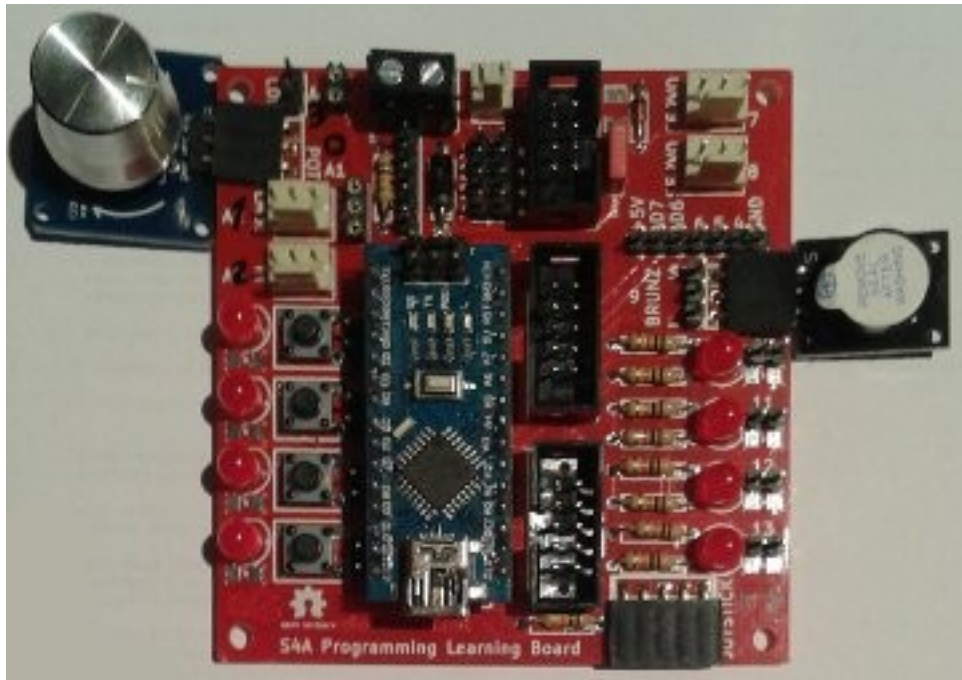
<http://binefa.cat/php/training/s4a/codi.tar.gz>



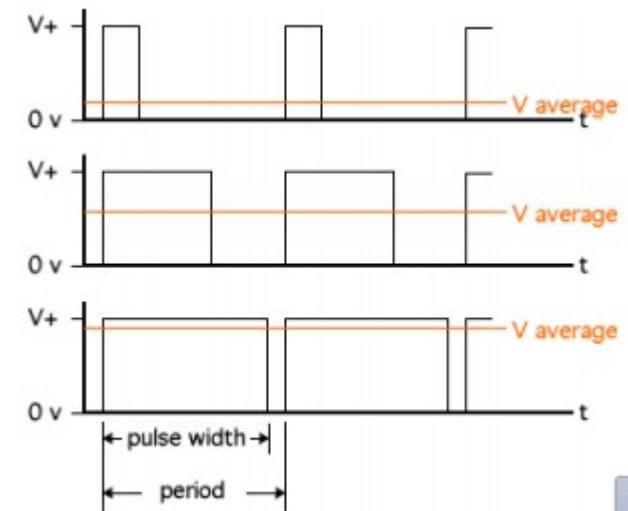
Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

sc2_prova09_potA1brunz.sb2



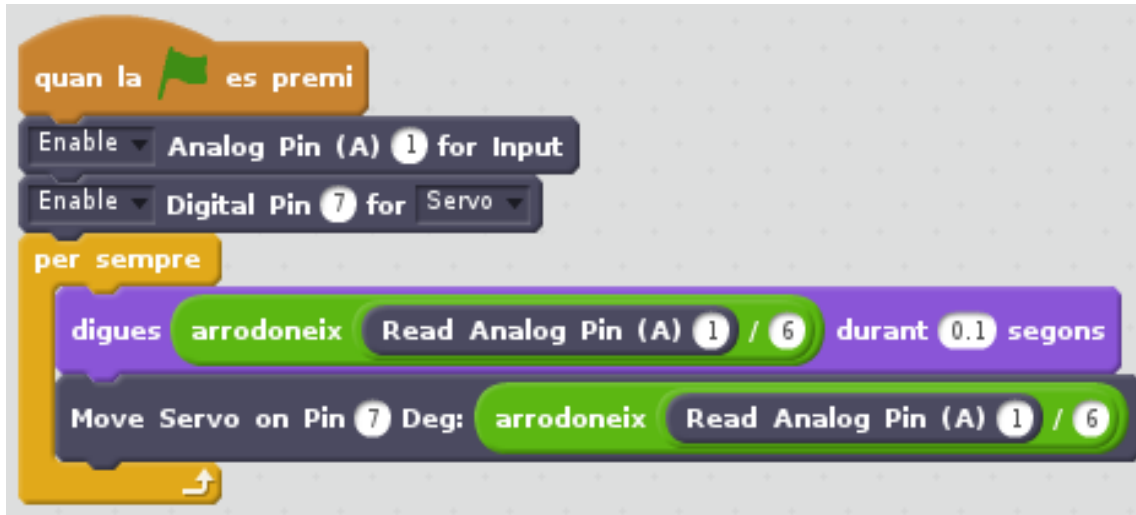
9





Tecnologies creatives a l'aula

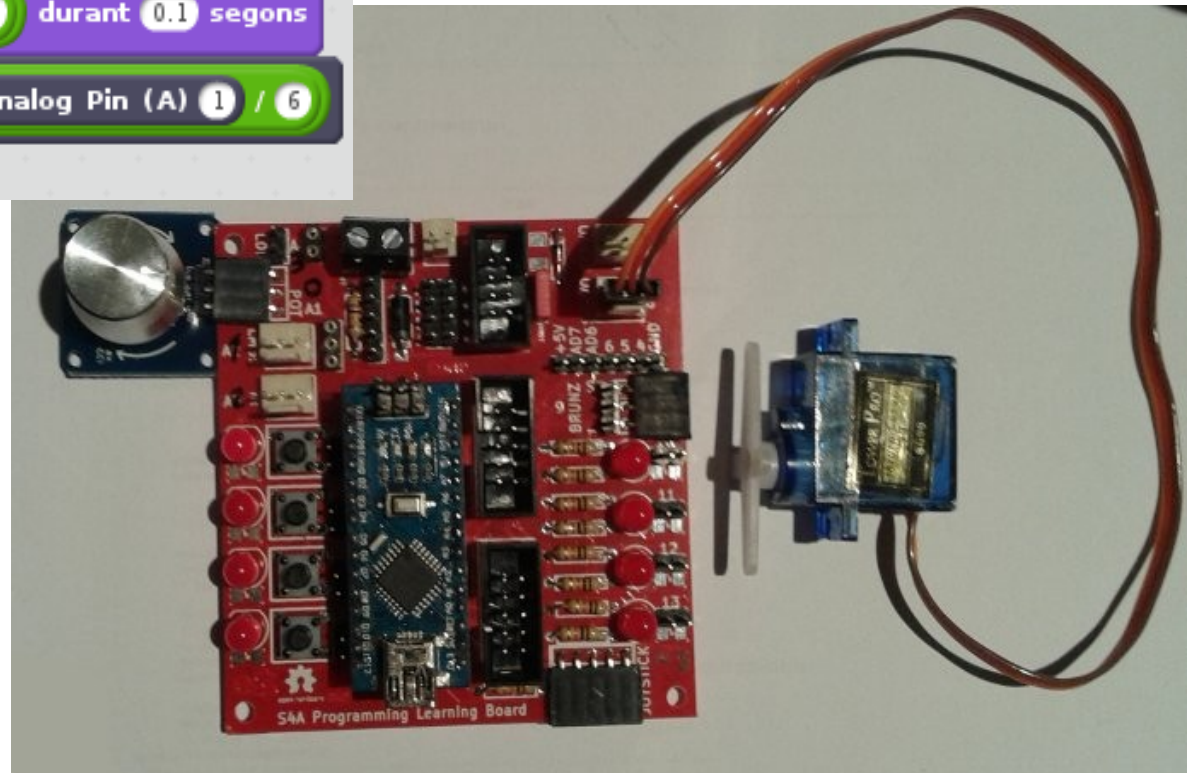
Ús d'Scratch 2.0 offline



sc2_prova10_potA1_servo7.sb2

Ús del servomotor (servo)

Abans de connectar el servo atureu
El programa en Python i l'Scratch.



<http://binefa.cat/php/training/s4a/codi.tar.gz>

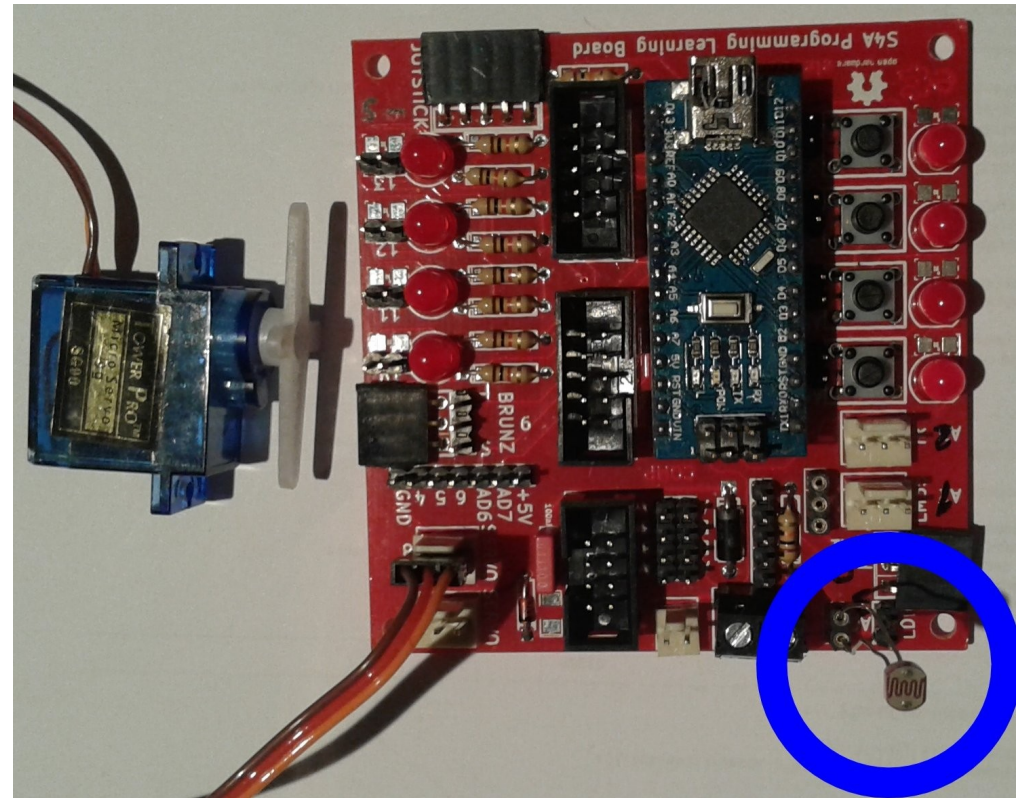


Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

Ús del fotoresistor (LDR)

sc2_prova11_ldrA0_servo7.sb2



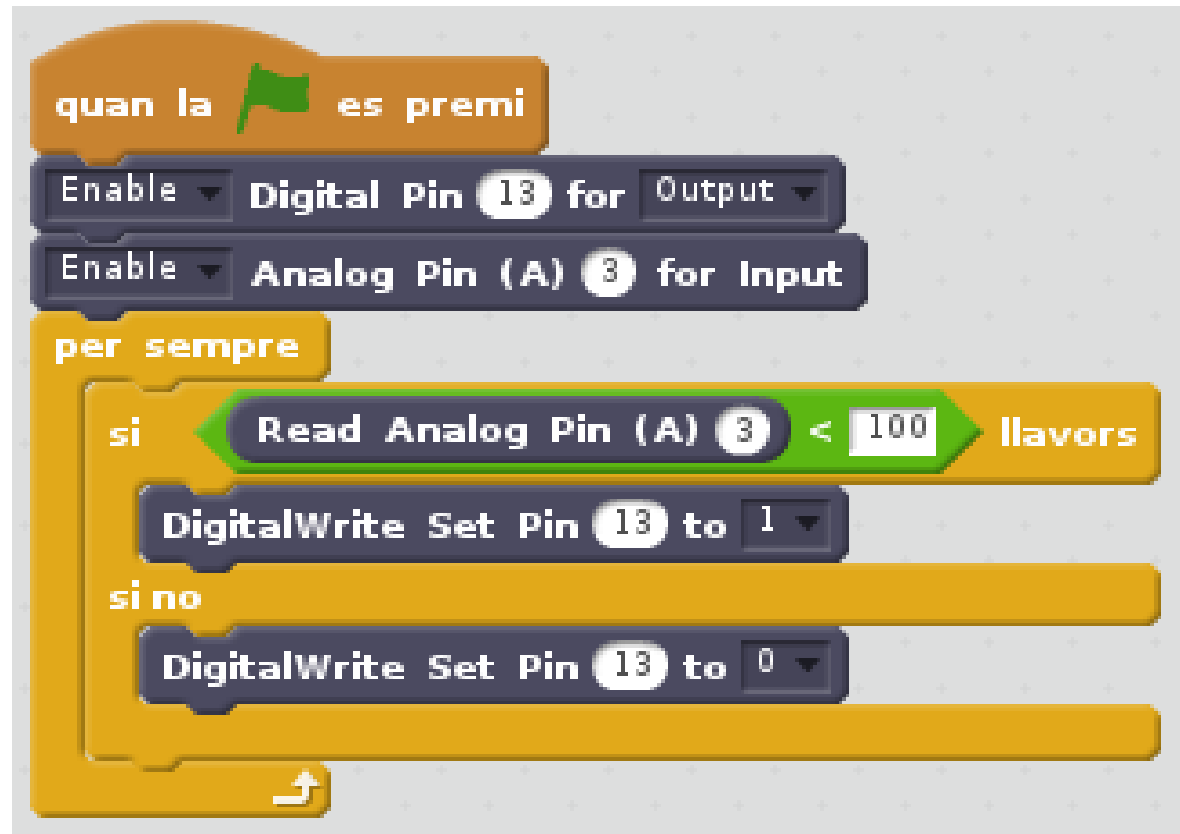
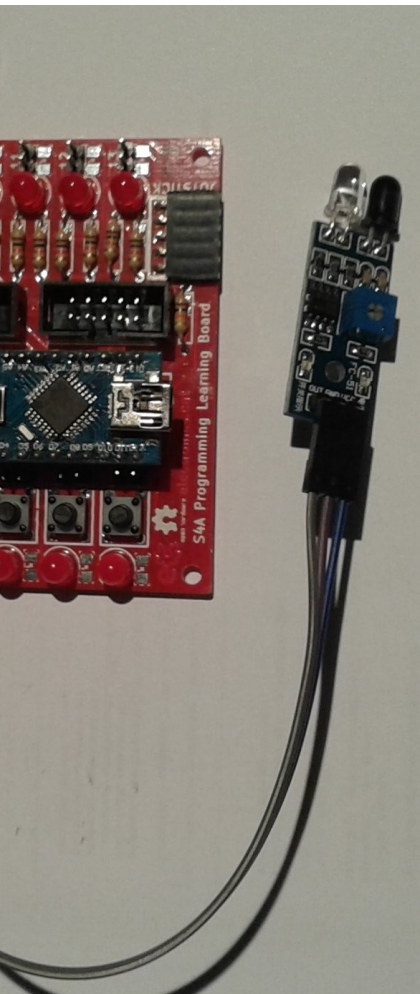
<http://binefa.cat/php/training/s4a/codi.tar.gz>



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

sc2_prova12irRelay.sb2



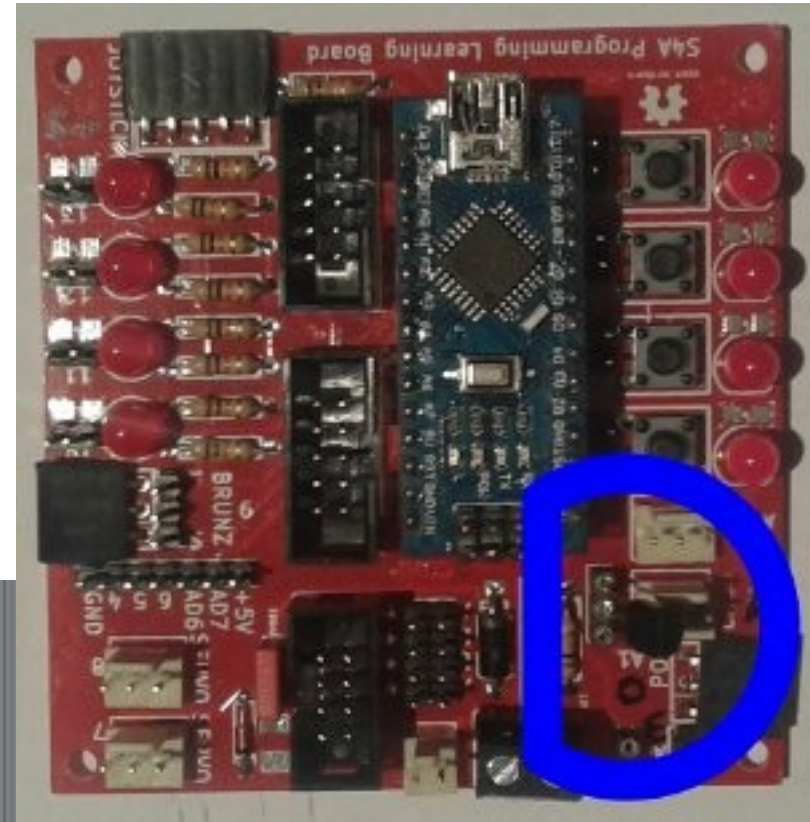
<http://binefa.cat/php/training/s4a/codi.tar.gz>



Tecnologies creatives a l'aula

Ús d'Scratch 2.0 offline

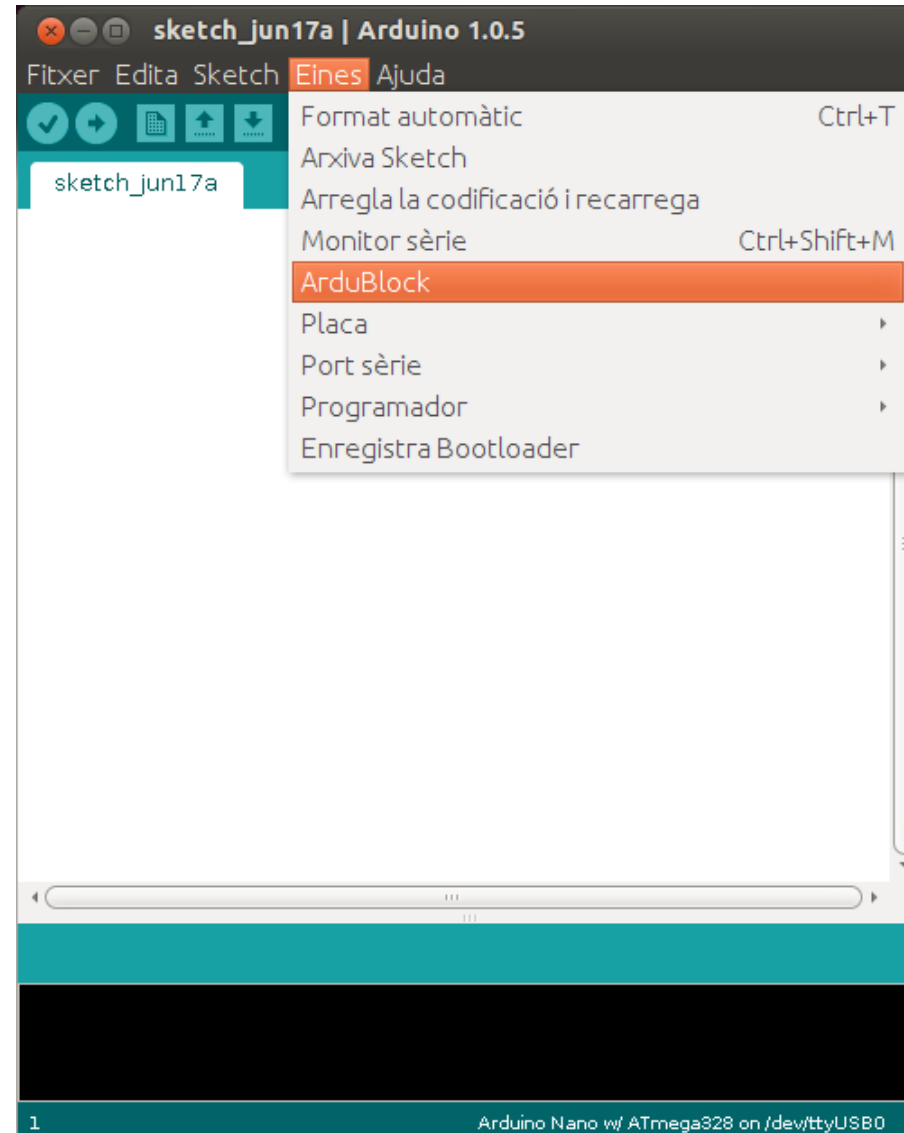
Exercici: Implementeu aquest codi en Scratch 2.0





Tecnologies creatives a l'aula

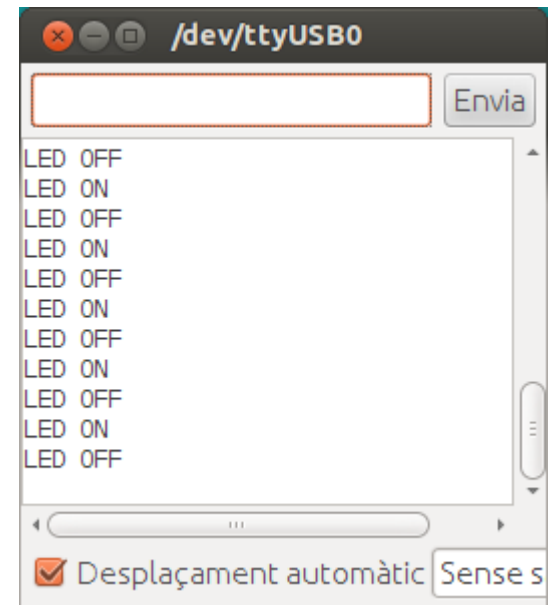
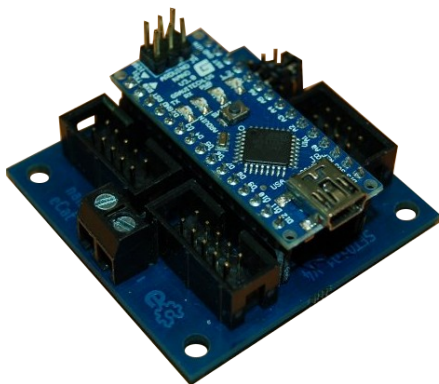
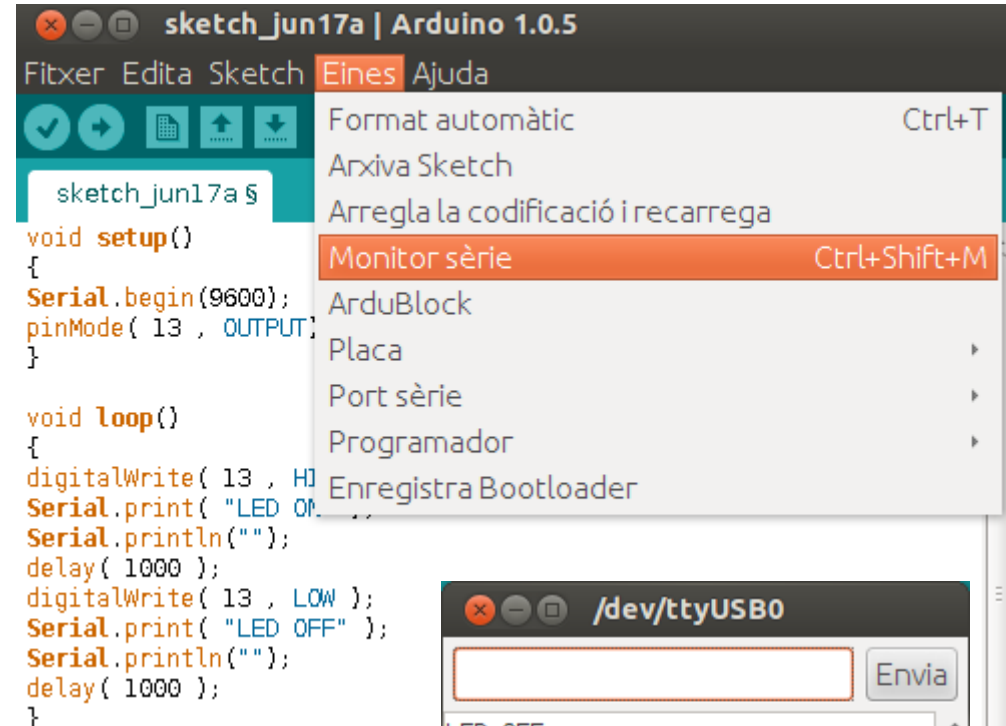
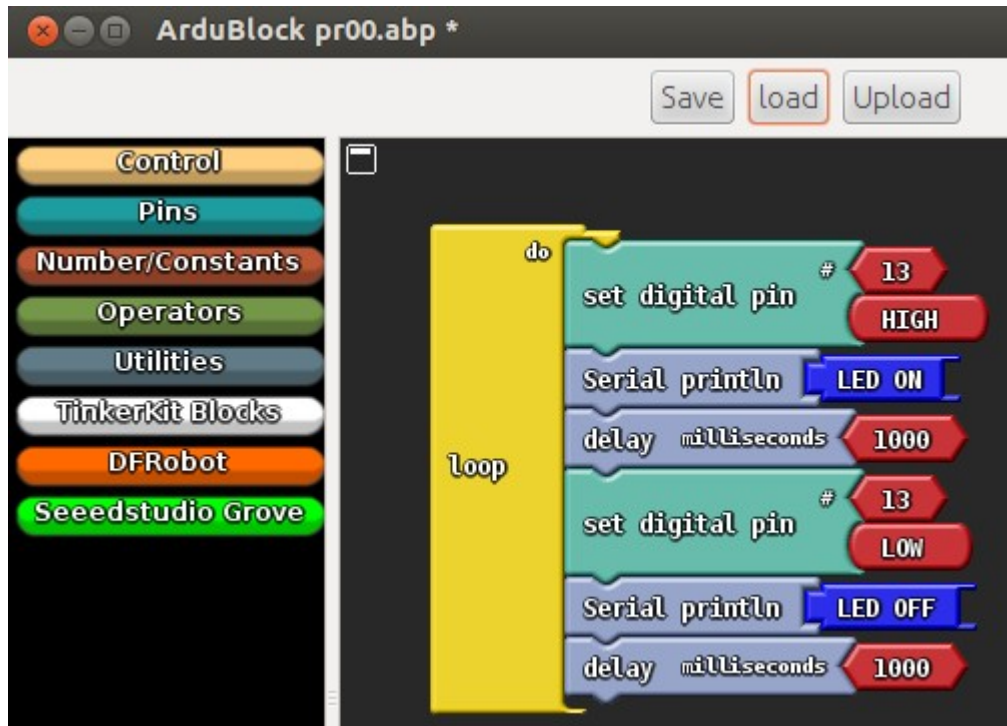
Ús d'ArduBlock





Tecnologies creatives a l'aula

pr00.abp - Sortides digitals

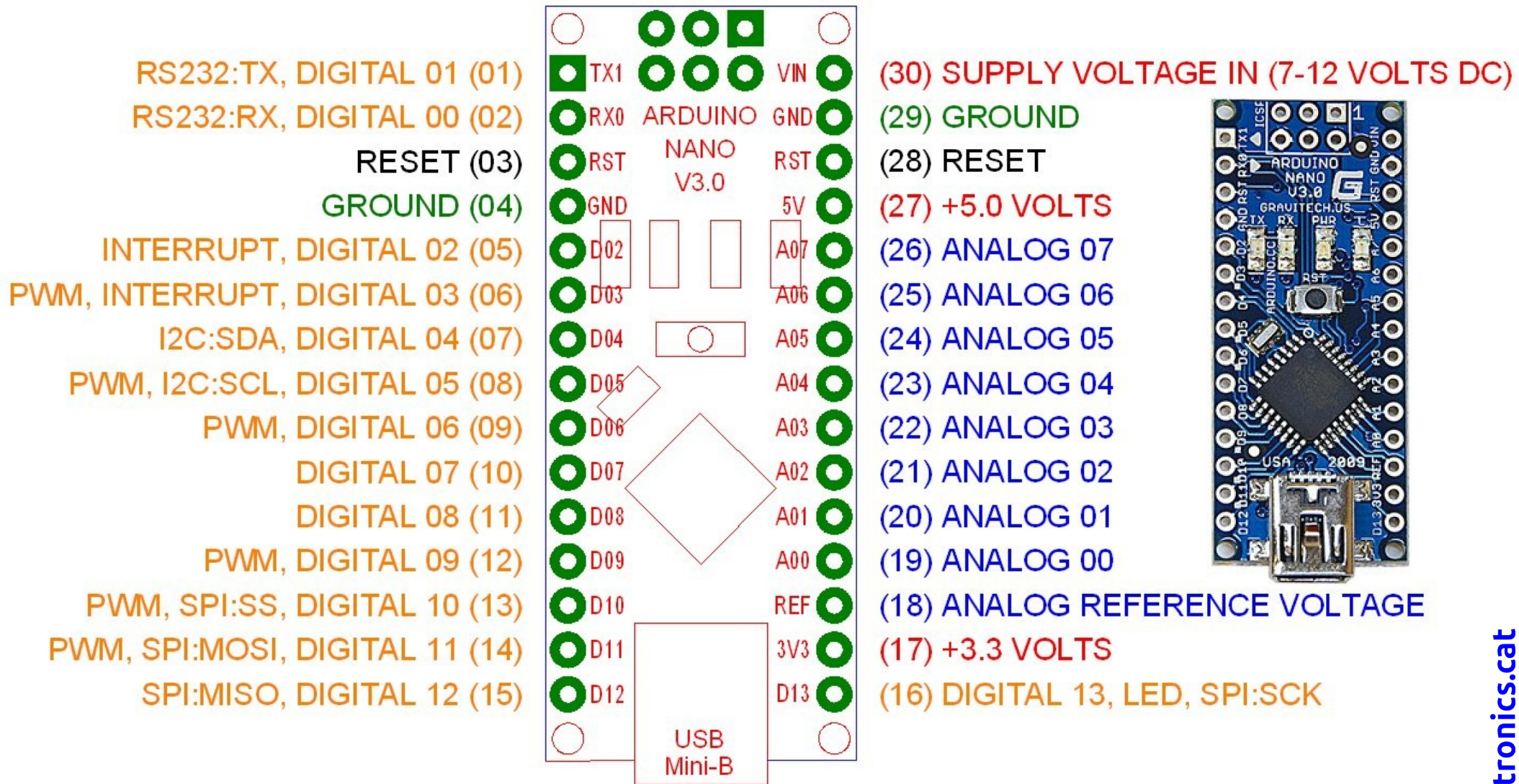


<http://www.binefa.cat/php/arduino/ardublock/pr00.abp>



Tecnologies creatives a l'aula

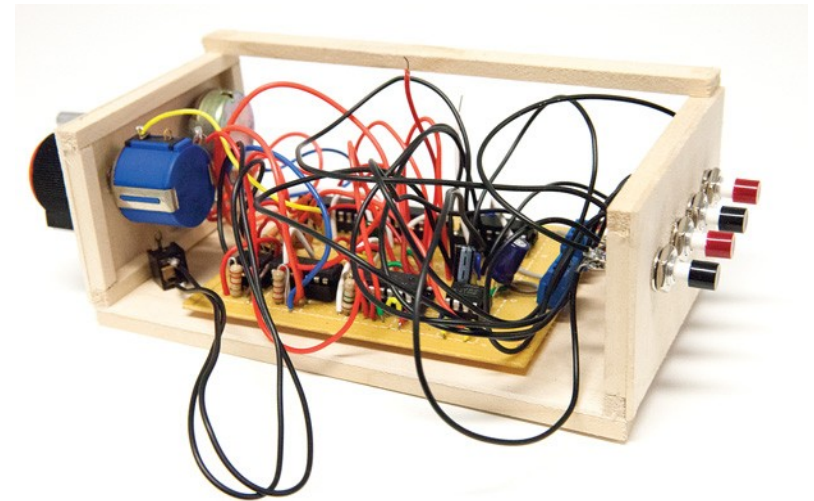
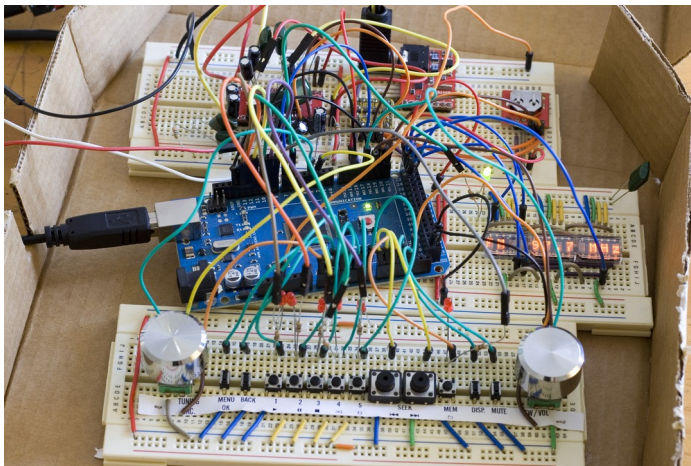
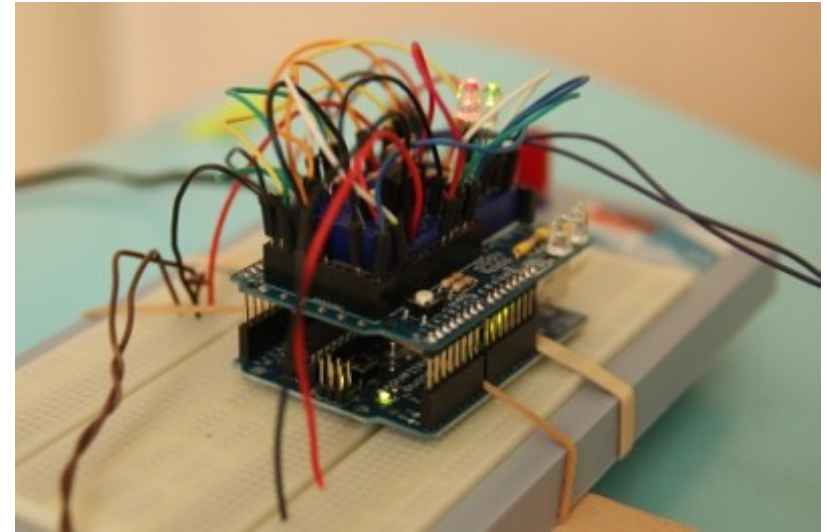
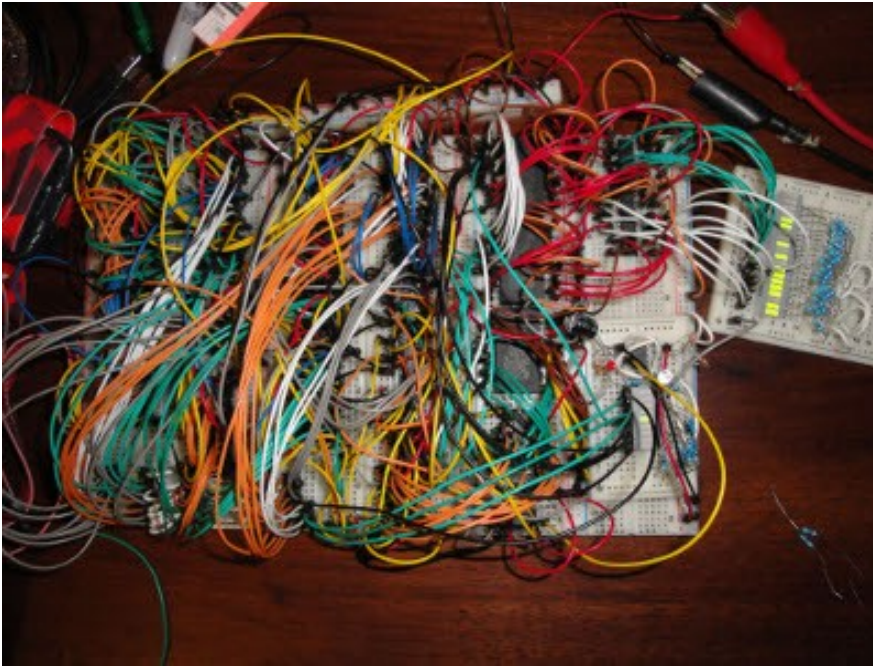
Arduino Nano





Tecnologies creatives a l'aula

Inconvenients per a novells, ... i experts





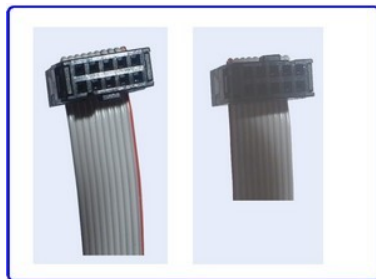
Tecnologies creatives a l'aula

Maquinari orientat a alumne

BUS : Sistema digital que transfereix dades entre dispositius electrònics

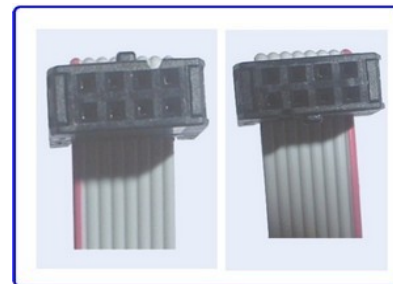
GND	b7
b6	b5
b4	b3
b2	b1
b0	+5V

Cable pla
5x2 a 5x2
(0104A)



CTS / RTS
TX / RX
RX / TX

+5V	o	CTS / RTS
o	X	
o	X	
o	GND	

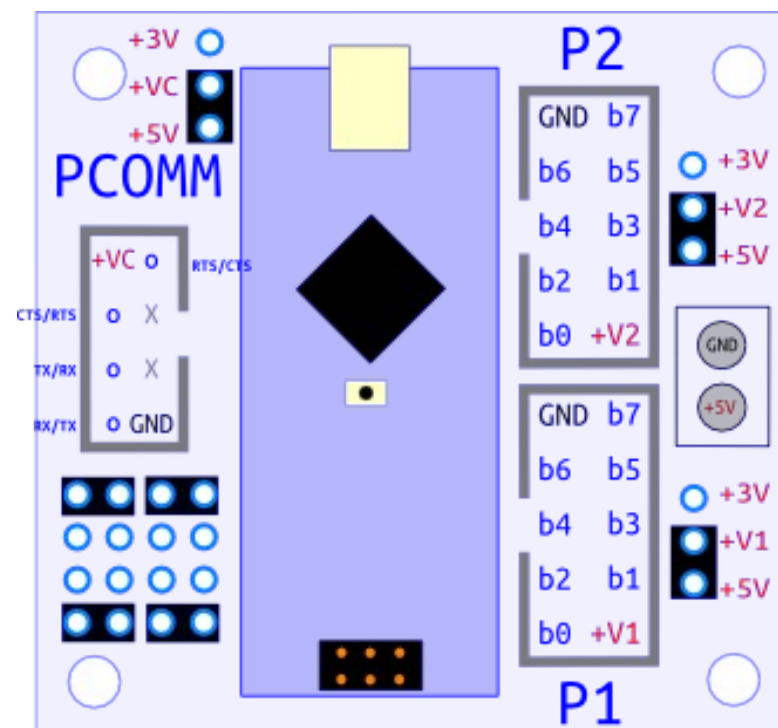
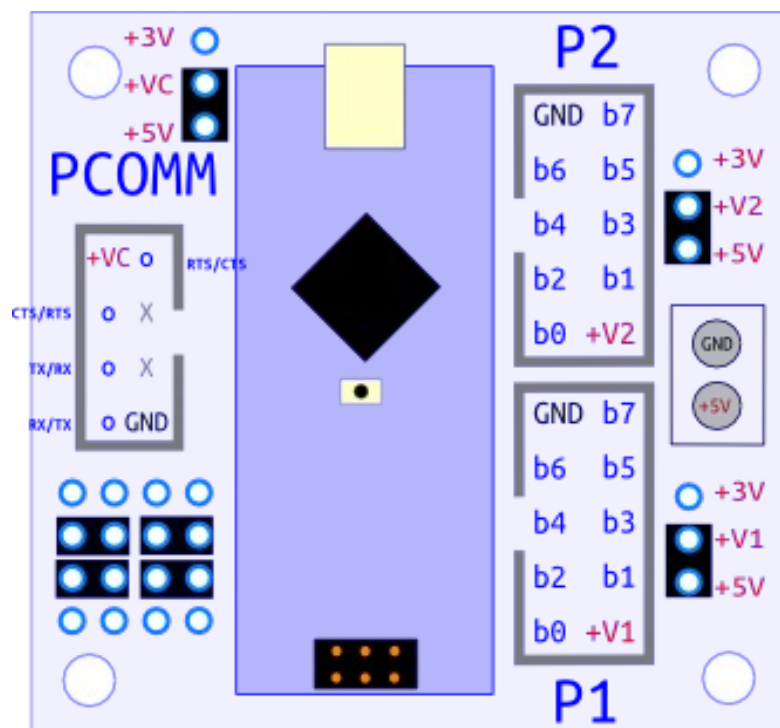


eCat System : Dos tipologies de BUS, dades (8 bits) i comunicacions



Tecnologies creatives a l'aula

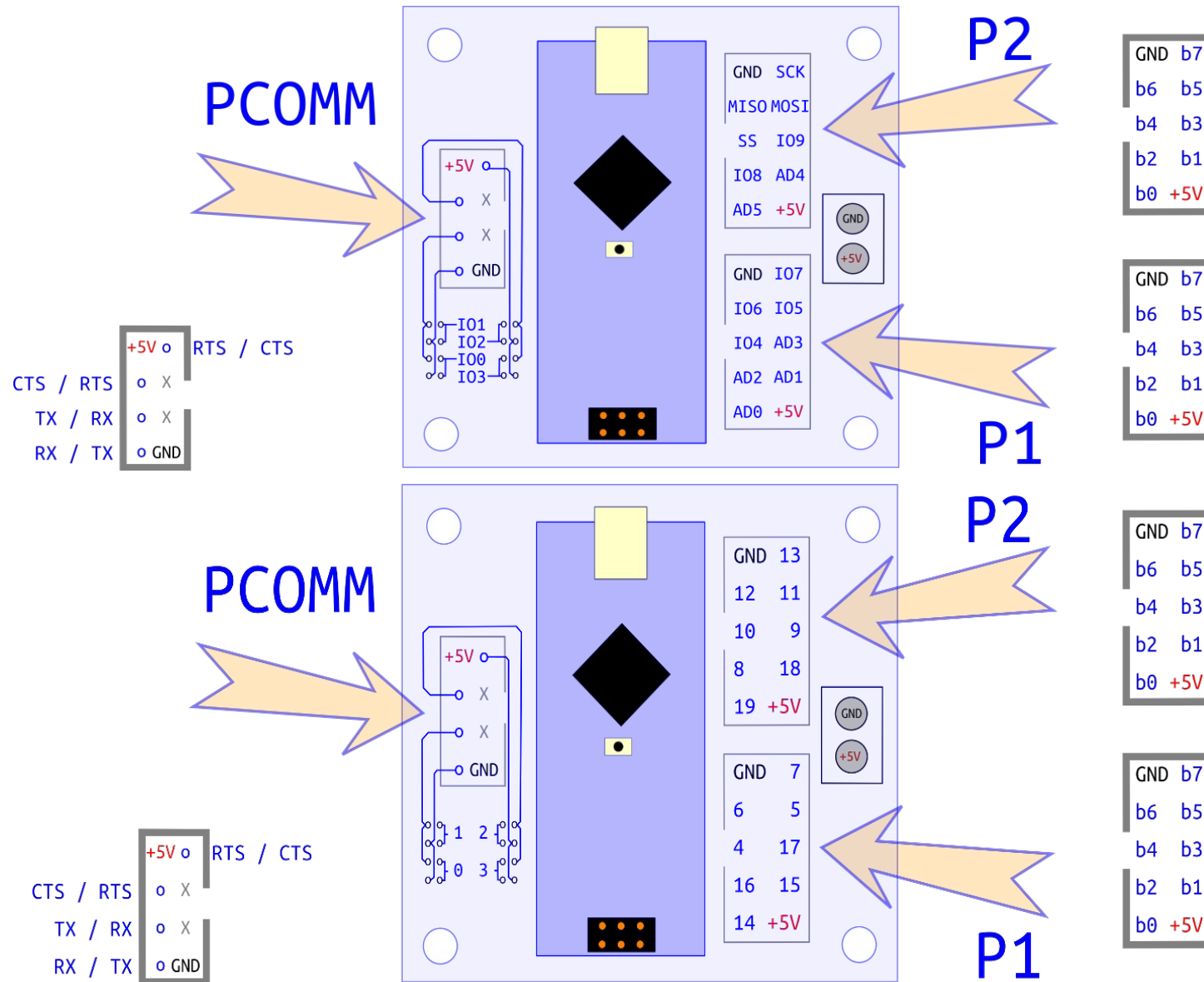
nano-eCat





Tecnologies creatives a l'aula

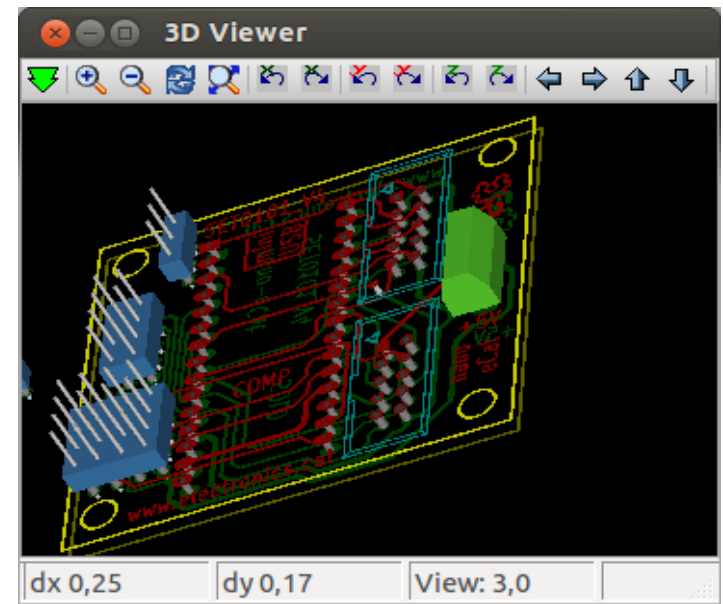
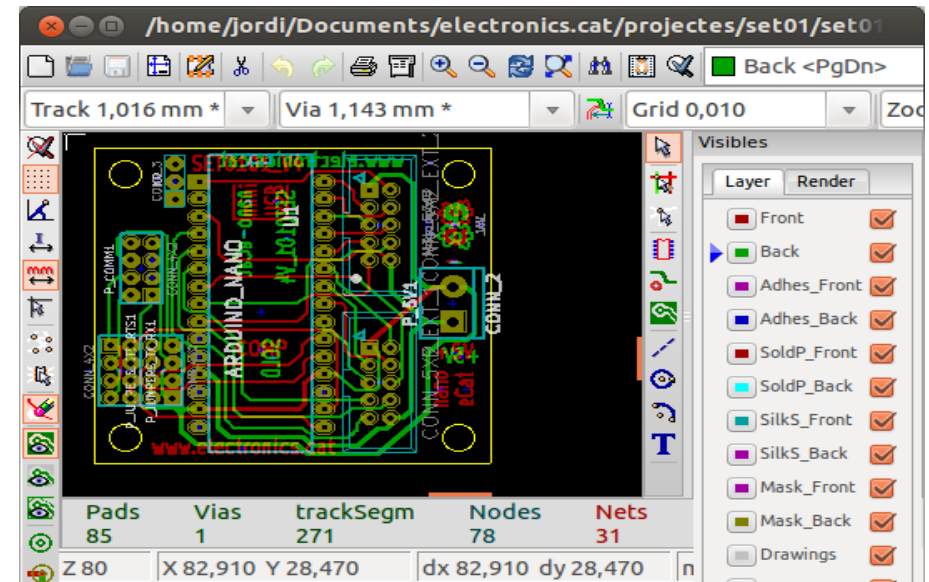
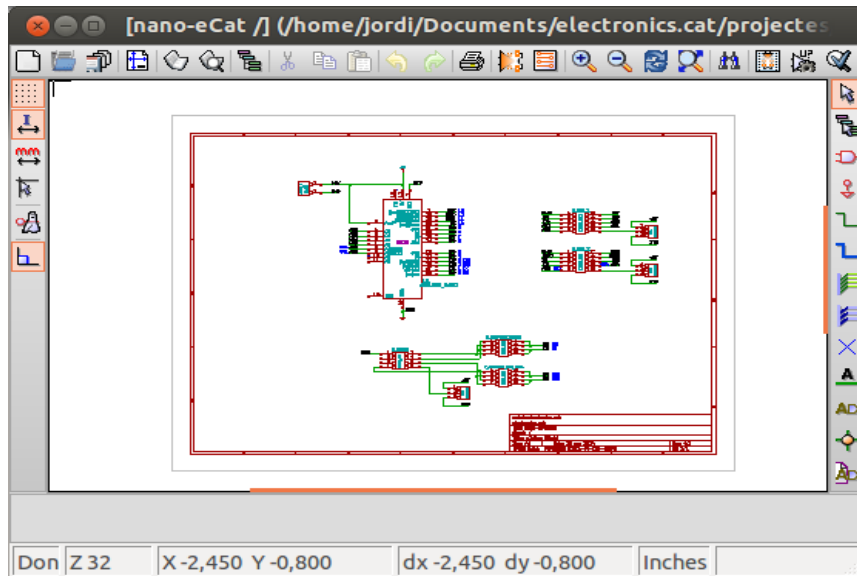
nano-eCat





Tecnologies creatives a l'aula

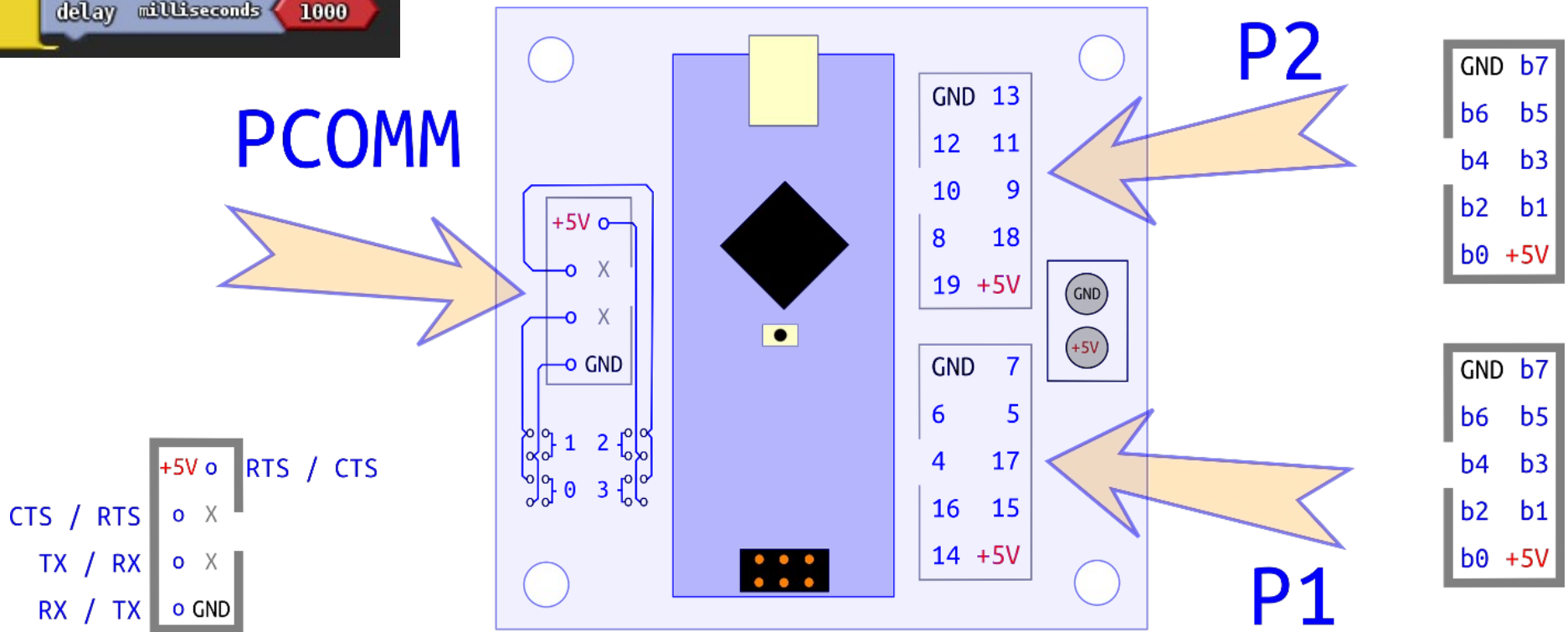
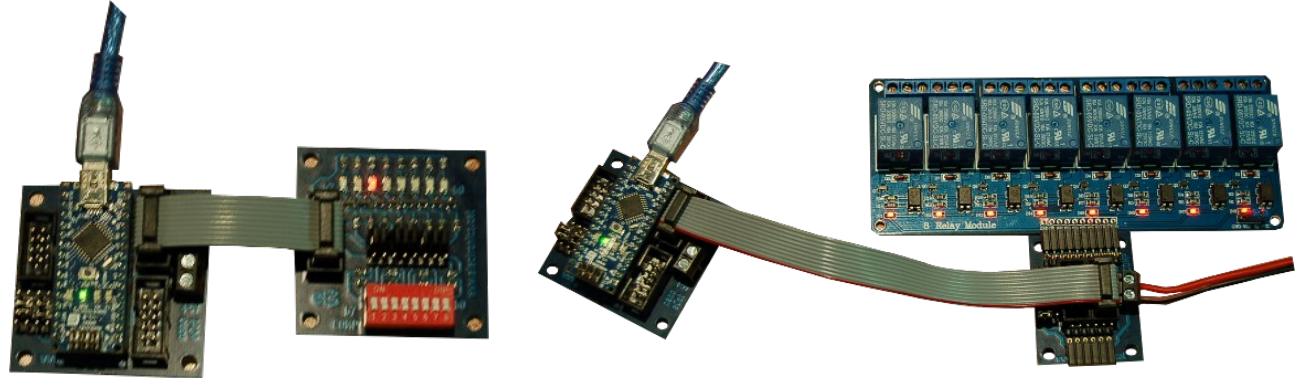
Maquinari lliure dissenyat amb KiCad





Tecnologies creatives a l'aula

pr00.abp - Sortides digitals

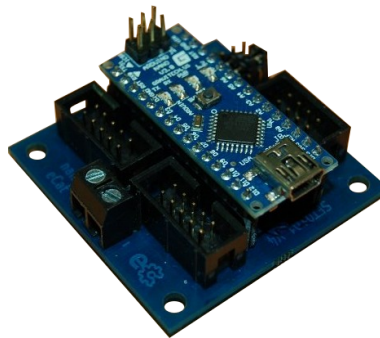




Tecnologies creatives a l'aula

minicom -b 9600 -o -D /dev/ttyUSB0

```
jordi@eCat:~/Documents/electronics.cat/projectes/arduino/install/arduino-1.0.5$ minicom -b 9600 -o  
-D /dev/ttyUSB1  
  
Welcome to minicom 2.5  
  
OPTIONS: I18n  
Compiled on May  2 2011, 10:05:24.  
Port /dev/ttyUSB1  
  
Press CTRL-A Z for help on special keys  
  
LED OFF  
LED ON  
LED OFF  
LED ON  
LED OFF  
LED ON  
LED OFF  
LED ON  
LED OFF  
LED ON  
LED OFF  
LED ON  
LED OFF
```



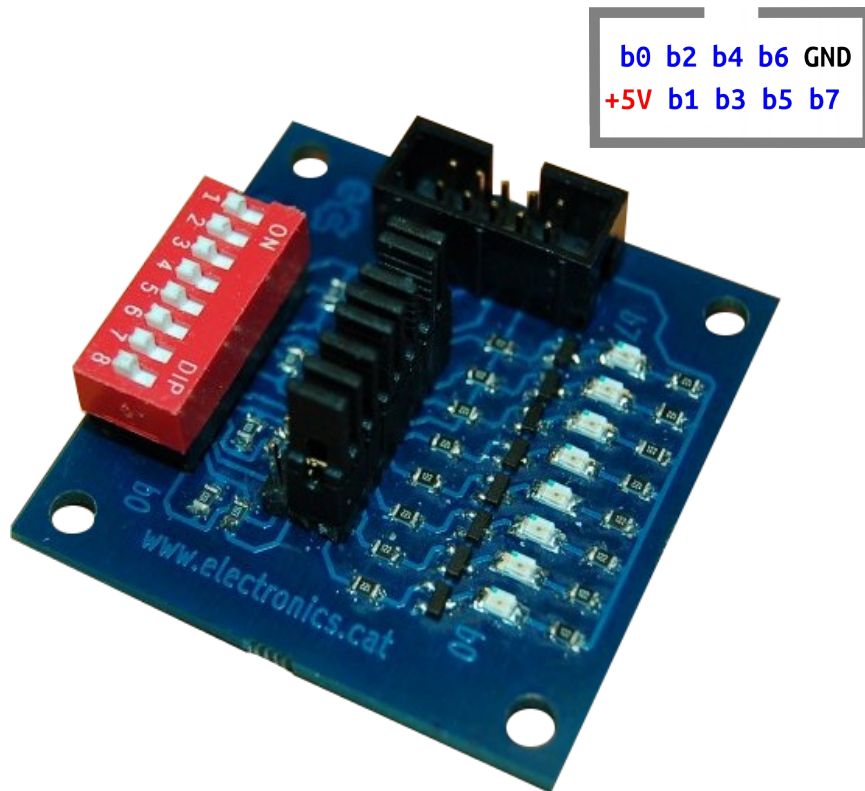


Tecnologies creatives a l'aula

Placa de microruptors i leds

uSW - LEDs

01_04 v3



Placa configurable d'entrades / sortides.

La configuració de cada bit es fa mitjançant un pont (jumper).

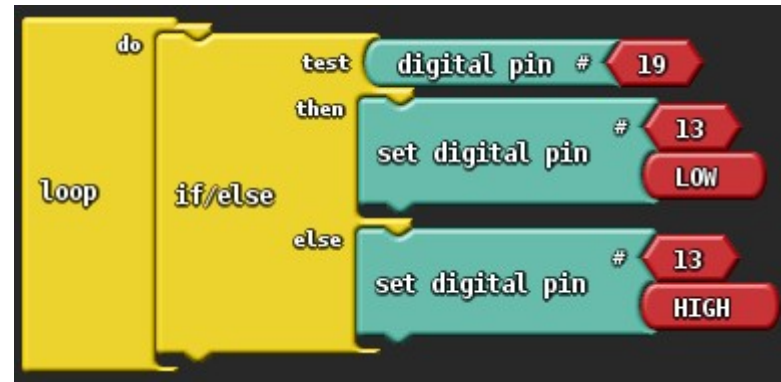
Les entrades es fan per microruptor (ON : zero lògic, OFF : u lògic).

Les sortides es visualitzen mitjançant leds (apagat : zero lògic, encès : u lògic).

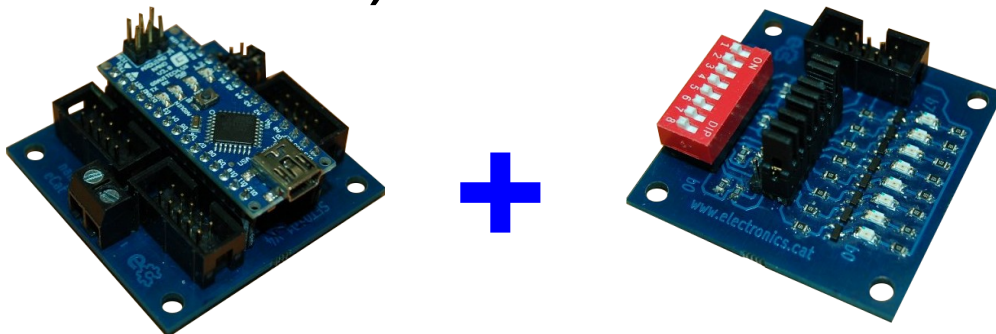


Tecnologies creatives a l'aula

pr01.abp - Entrades digitals



A la placa d'entrades i sortides, 01_04 v3, s'ha de configurar el pont del bit 7 de P2 (pin 13 d'Arduino) com a sortida i el bit 0 de P2 (pin 19 d'Arduino) com a entrada.



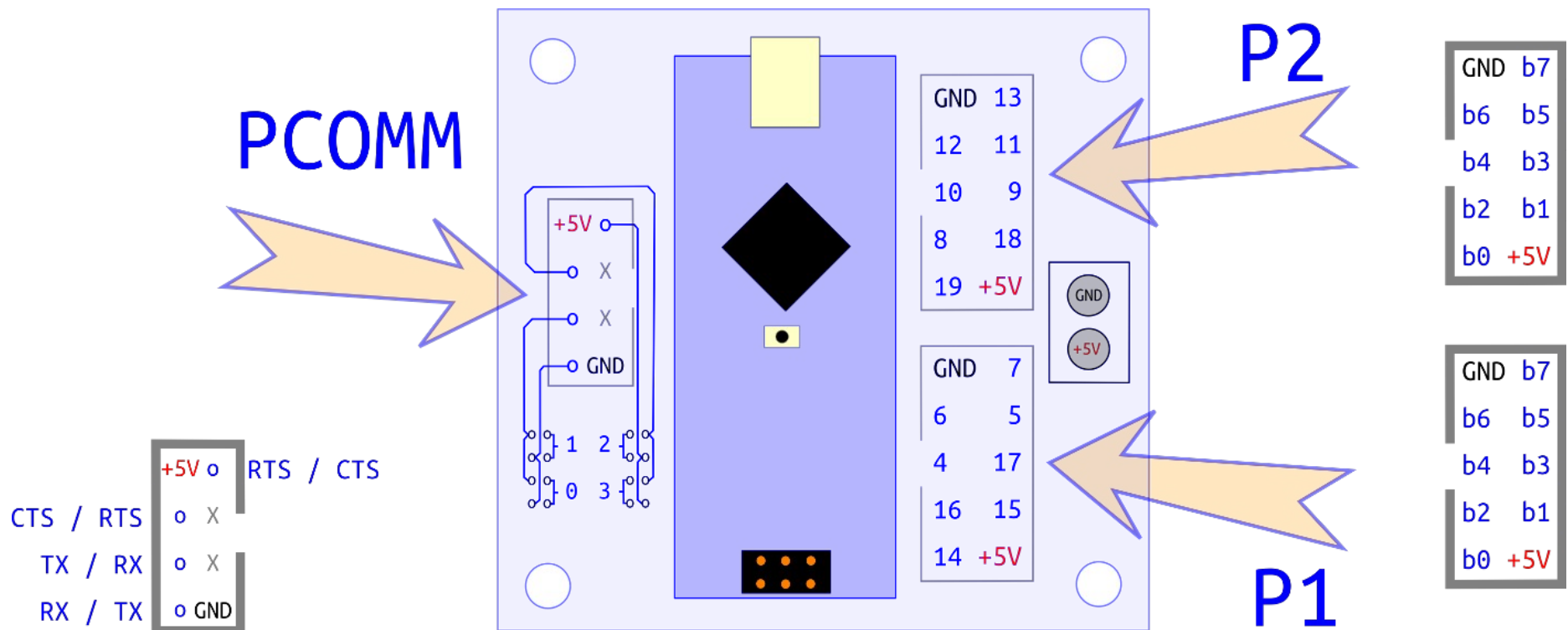
<http://www.binefa.cat/php/arduino/ardublock/pr01.abp>

e⚙️ Tecnologies creatives a l'aula

pr02.abp - Exercici

- Desenvolueu pr02_P2.abp per a crear una seqüència infinita des de b7 a b0 de P2 amb un interval de mig segon (500 ms):

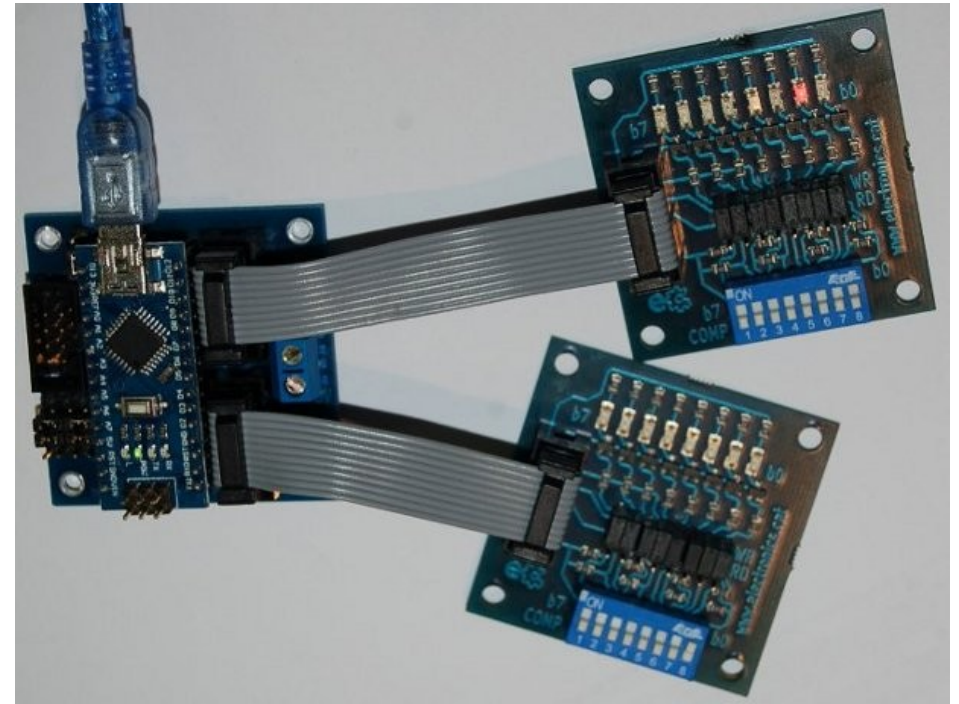
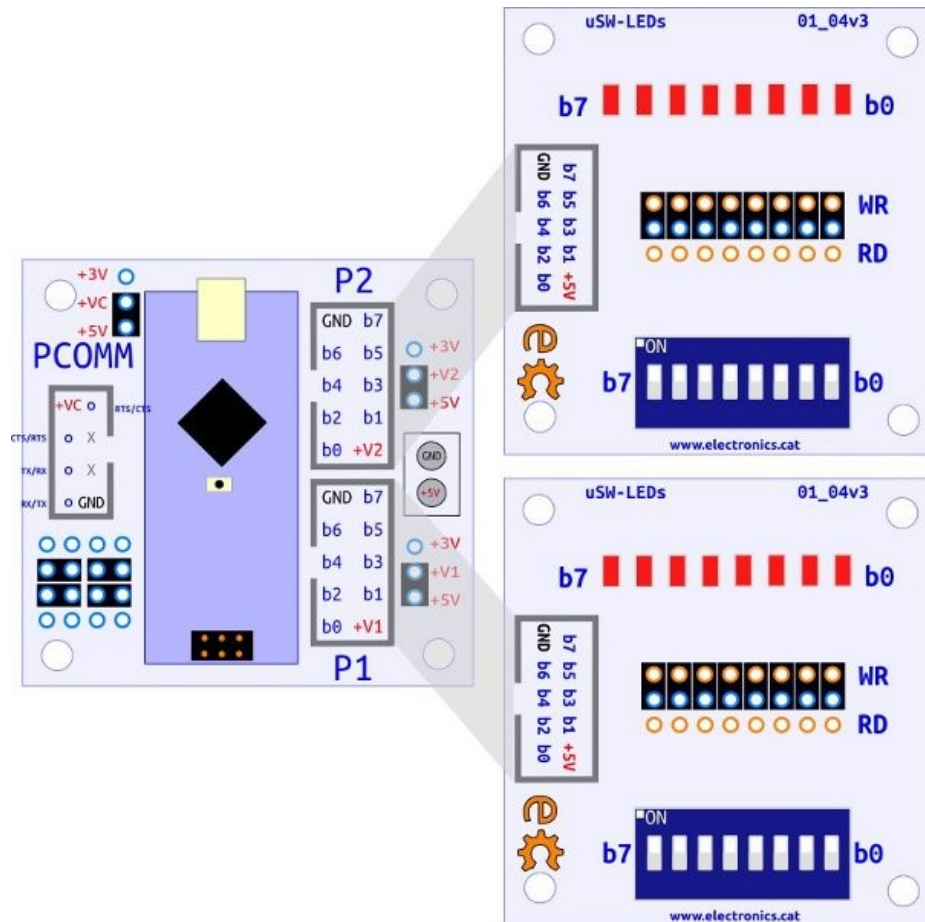
1000000, 00000000, 01000000, 00000000, 00100000, ... , 00000000, 00000001, 00000000



http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp
http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp

Tecnologies creatives a l'aula

pr02.abp - Exercici



Vídeo : <https://www.youtube.com/watch?v=efSOm-Zllq0>

http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp

http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp

Tecnologies creatives a l'aula

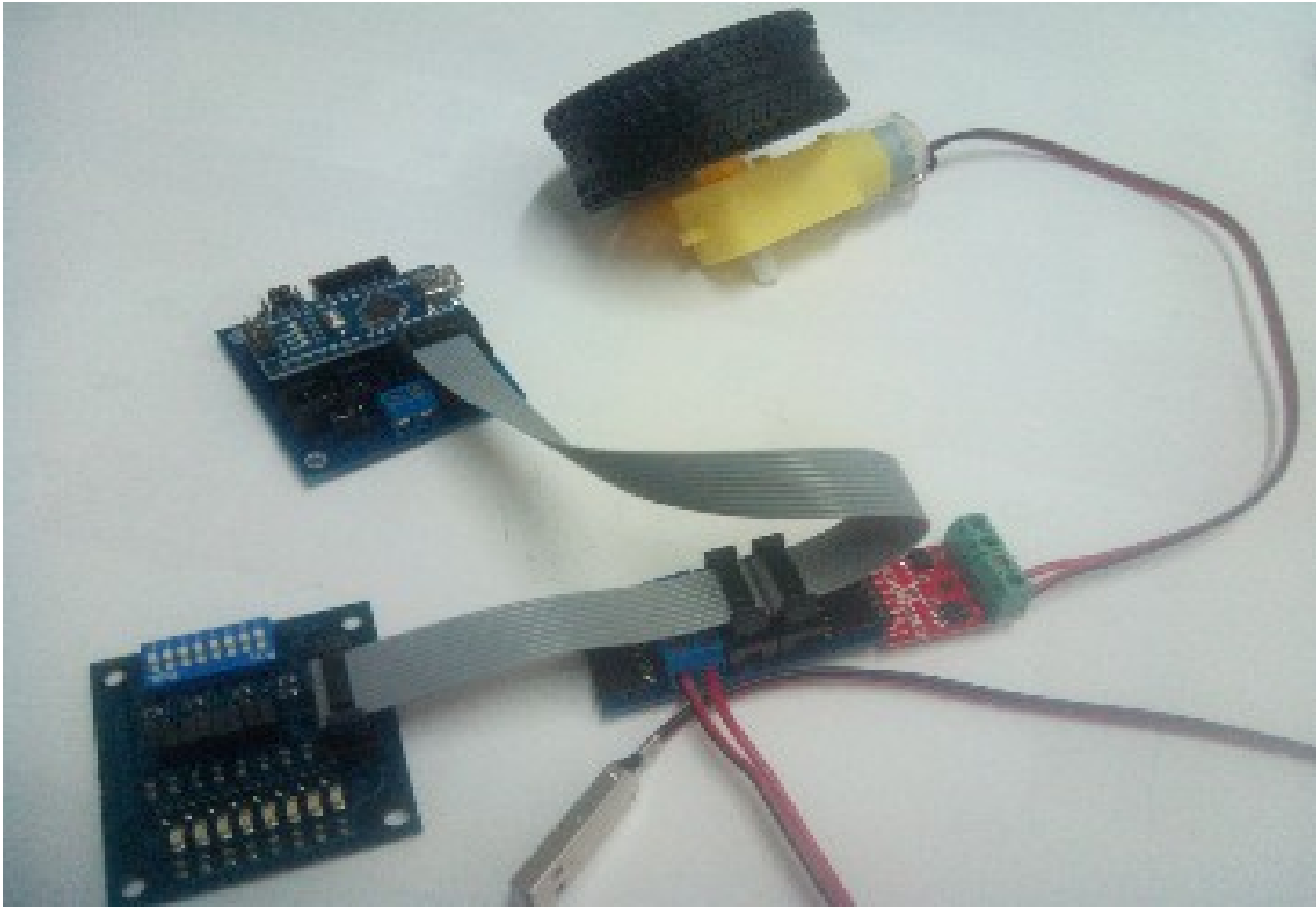
pr02.abp - Exercici



http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp
http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp

e⚙️ Tecnologies creatives a l'aula

pr02.abp - Exercici

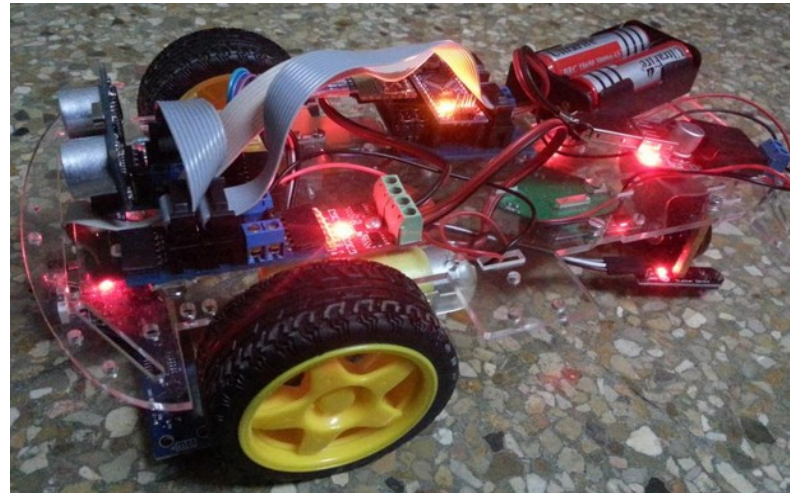
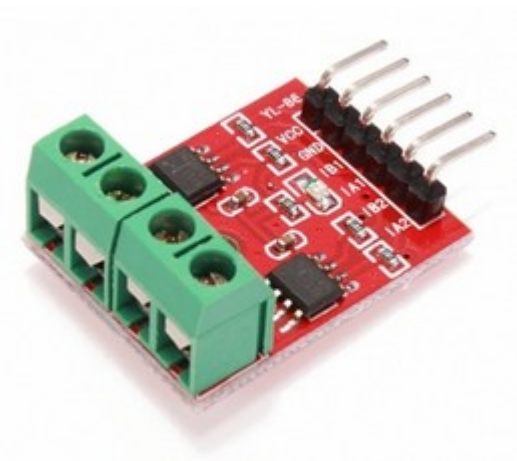
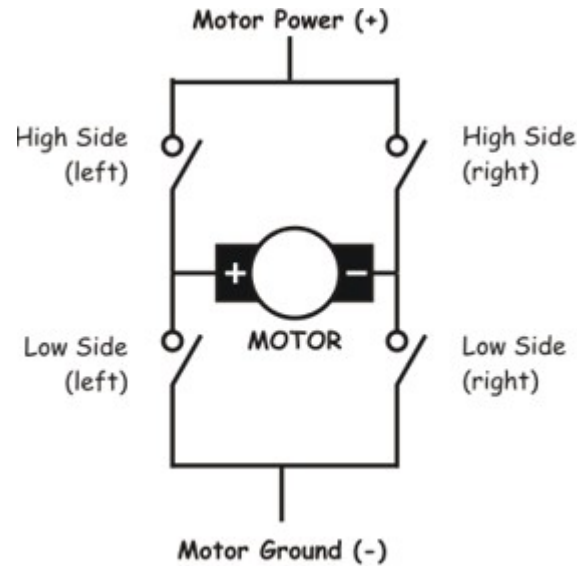


http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp
http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp



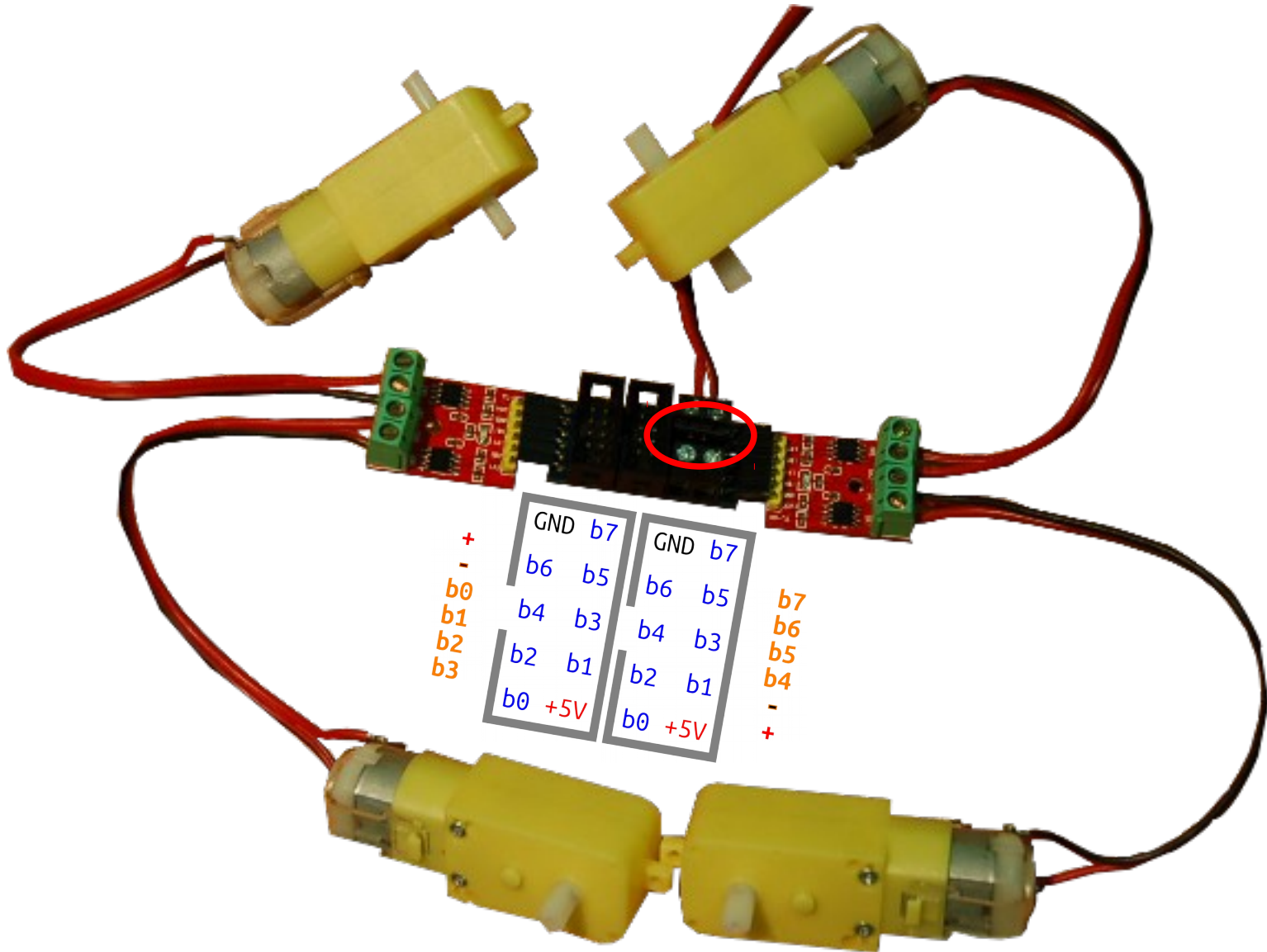
Tecnologies creatives a l'aula

Pont en H



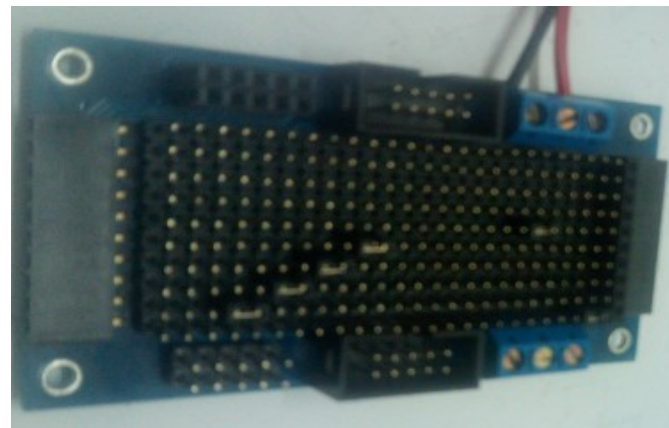
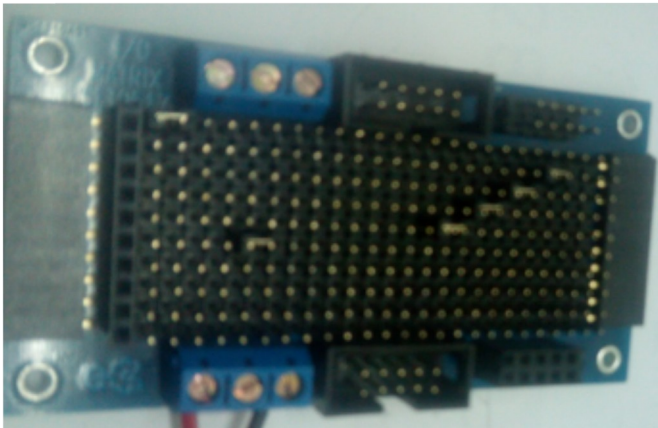
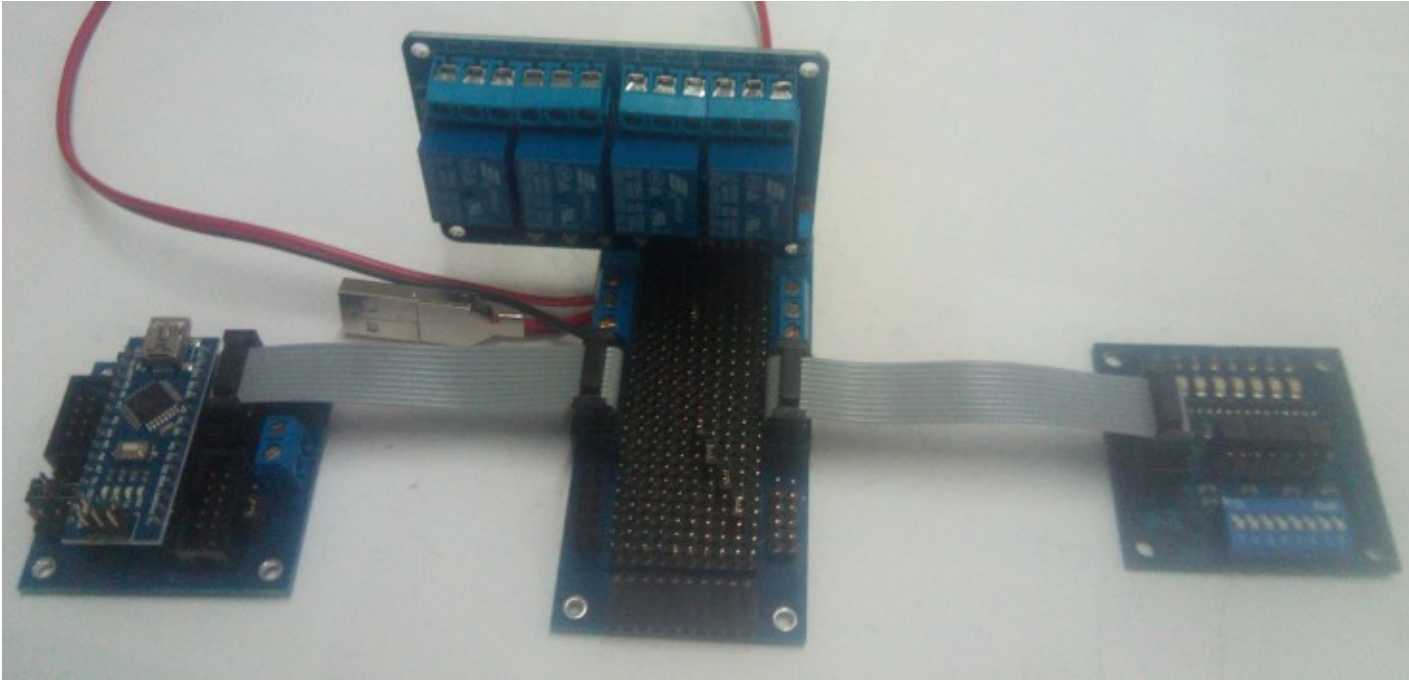
e Tecnologies creatives a l'aula

Pont en H



Technologies creatives a l'aula

pr02.abp - Exercici

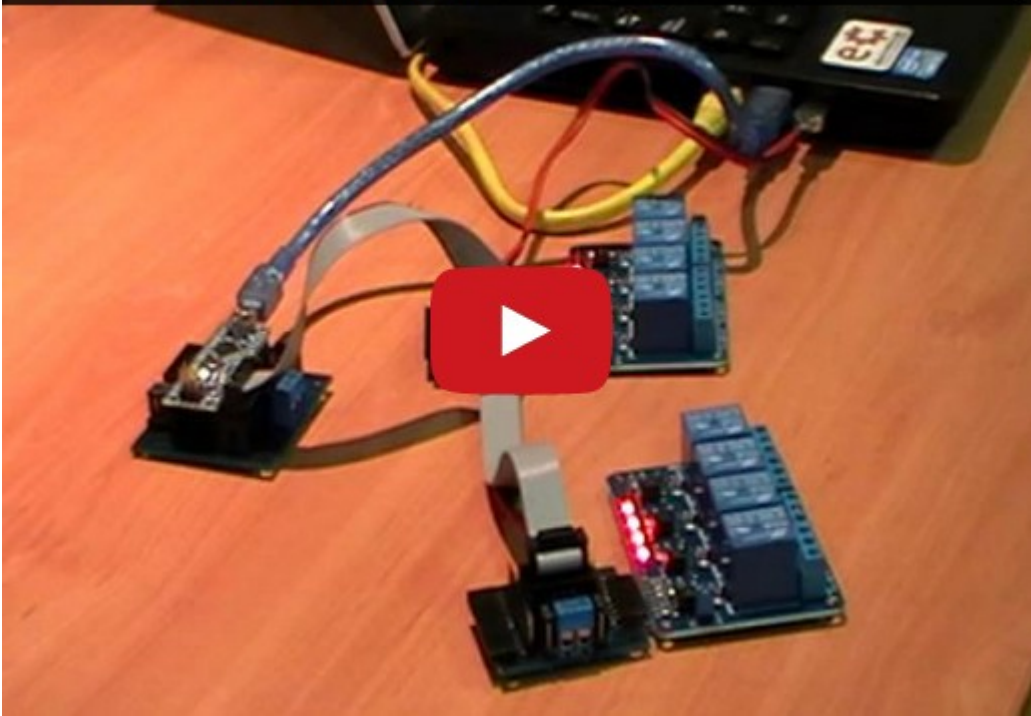


http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp
http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp

e⚙️ Technologies creatives a l'aula

pr02.abp - Exercici

2 boards of 4 relays in Daisy Chain



nano-eCat and 8 relays Banggood module (SKU075676)



<http://binefa.cat/blog/>

http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp
http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp

Maquinari

Concepte de relé

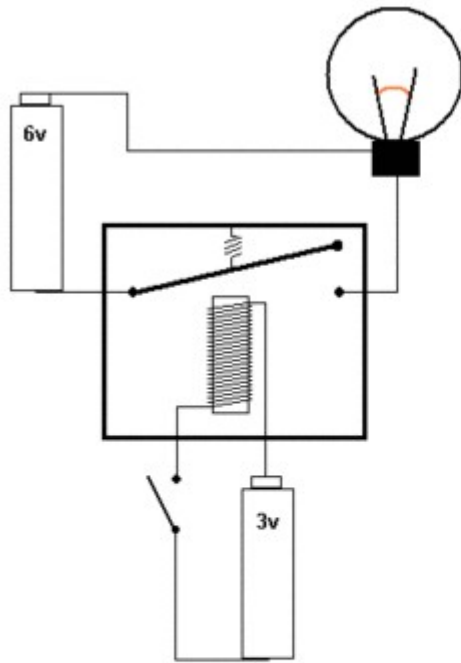


Figure 1: Relay off

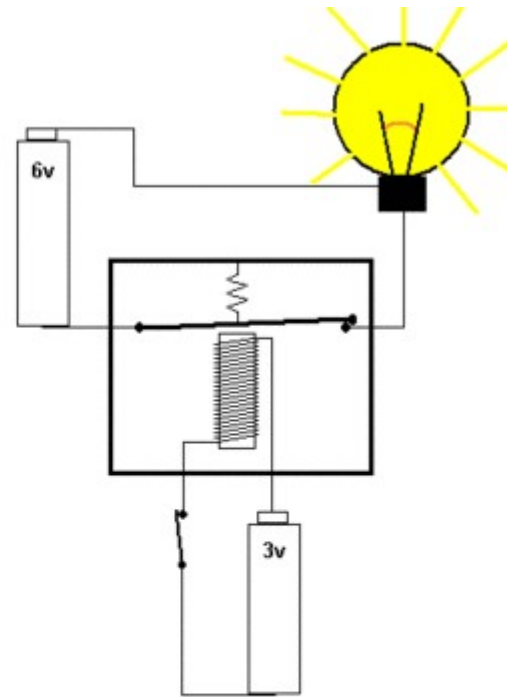
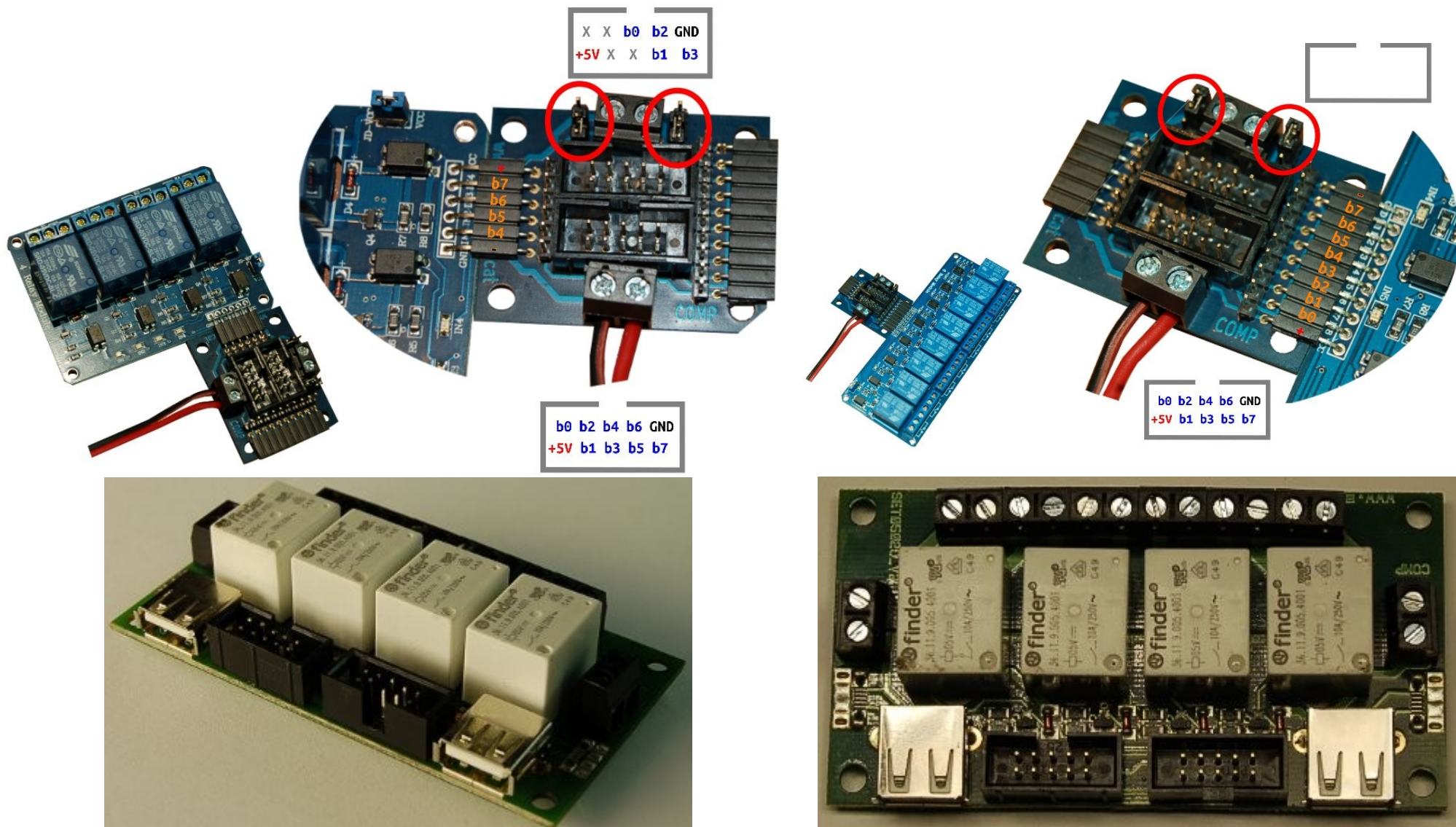


Figure 2: Relay on

Maquinari

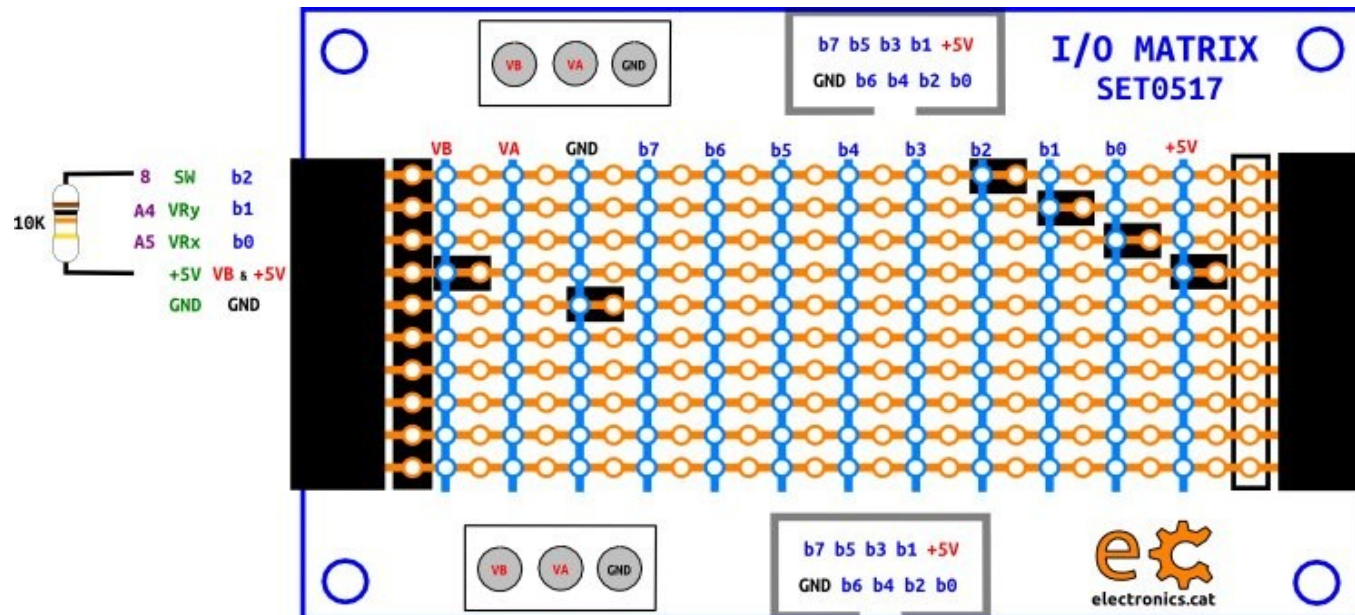
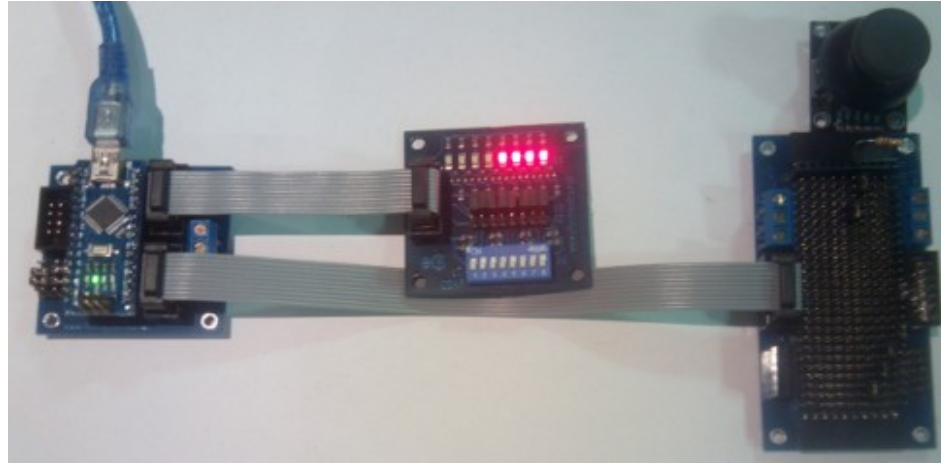
4 Relés - Placa set05_02





Tecnologies creatives a l'aula

pr03vuMeter.abp - Exercici



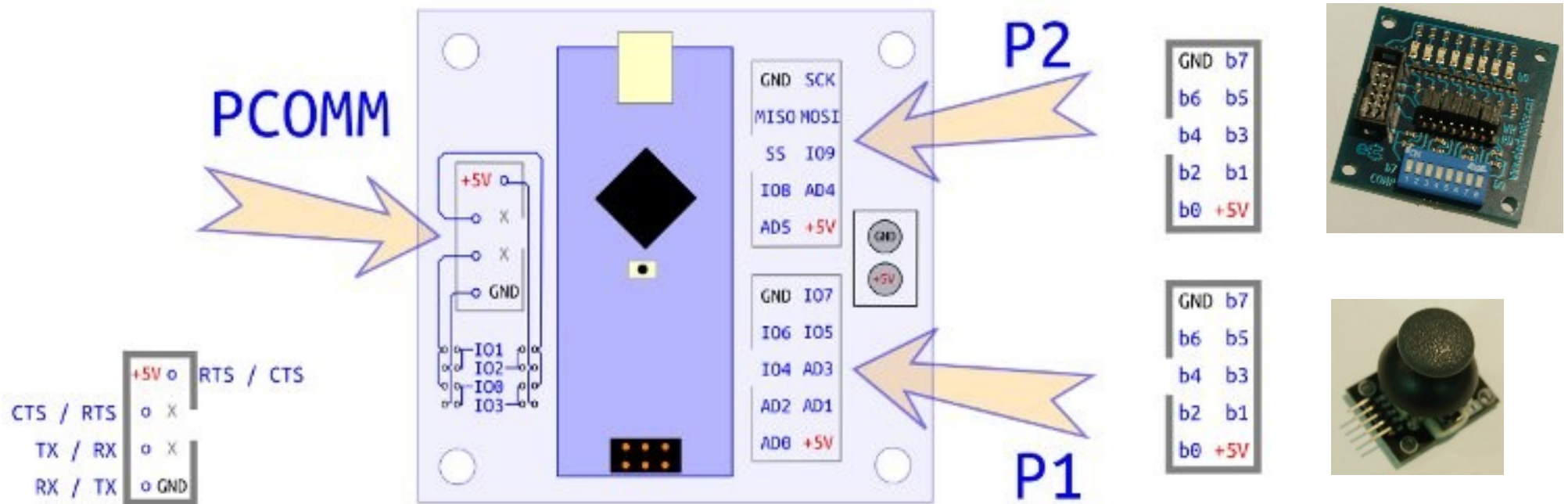
<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter3bits.abp>

<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter8bits.abp>



Tecnologies creatives a l'aula

pr03vuMeter.abp - Exercici



El valor analògic llegit màxim és 1023 i el mínim és 0

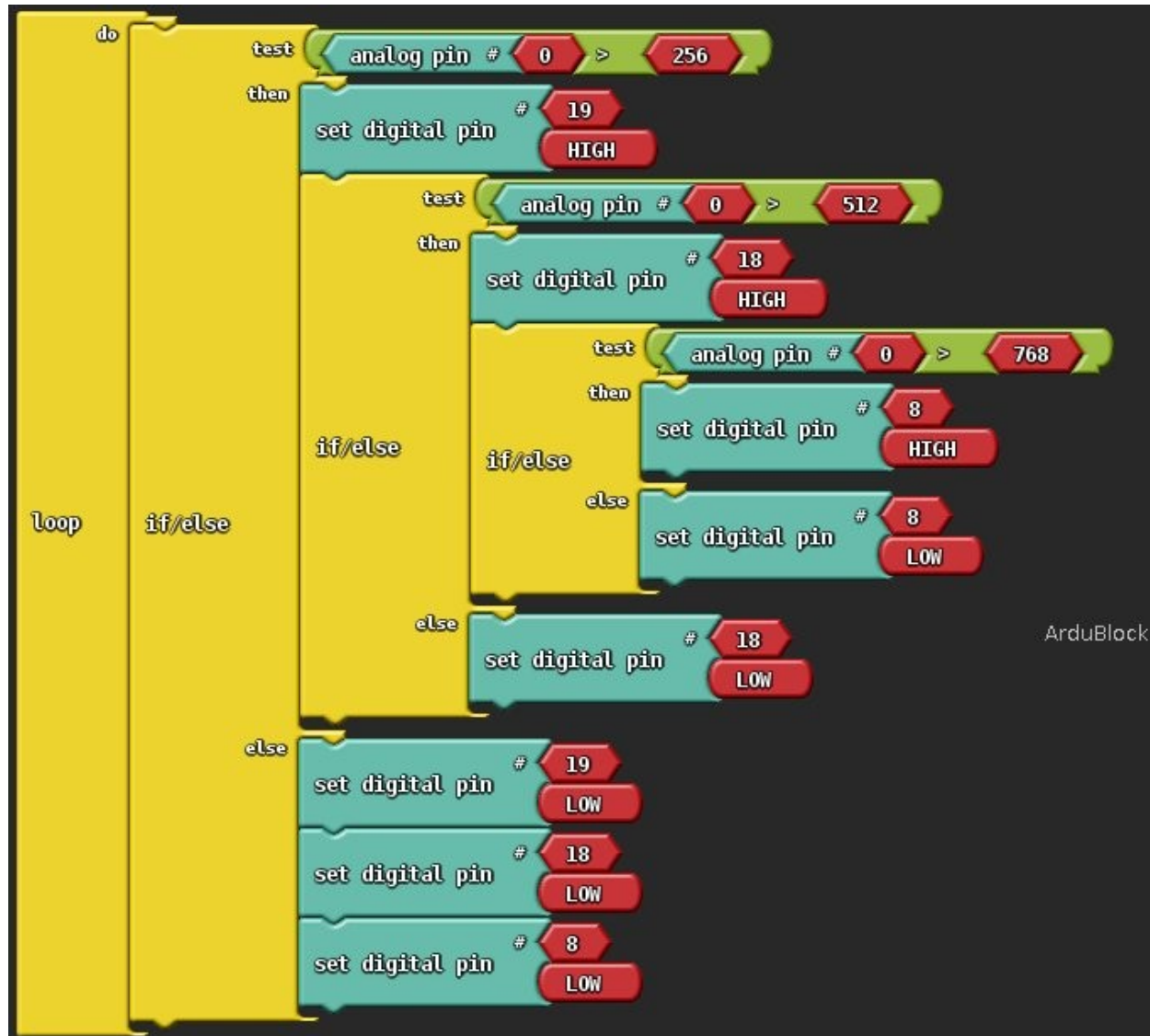
<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter3bits.abp>

<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter8bits.abp>



Tecnologies creatives a l'aula

pr03vuMeter3bits.abp - Exercici

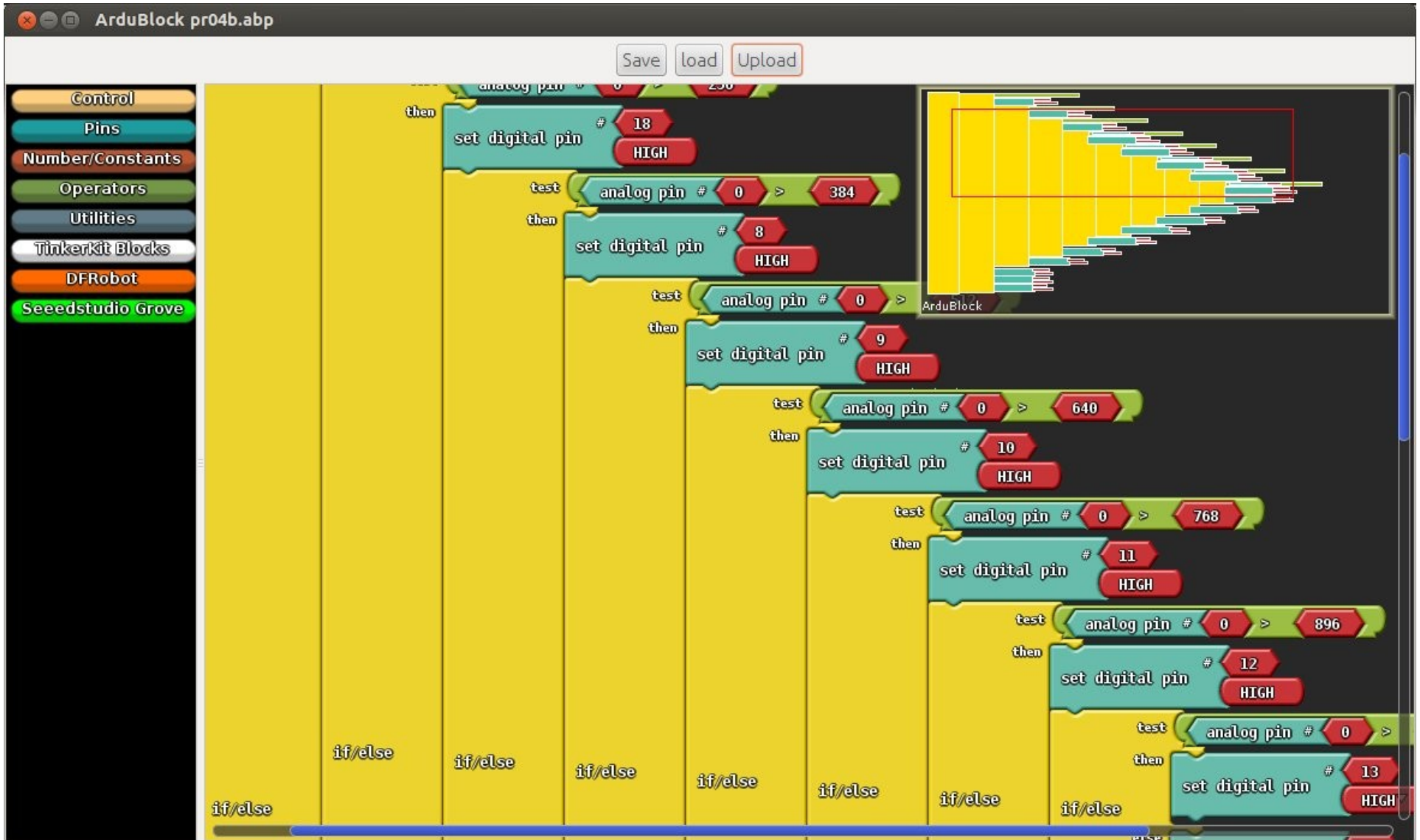


<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter3bits.abp>

<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter8bits.abp>

Tecnologies creatives a l'aula

pr03vuMeter8bits.abp - Exercici



<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter3bits.abp>

<http://www.binefa.cat/php/arduino/ardublock/pr03vuMeter8bits.abp>

e⚙️ Tecnologies creatives a l'aula

KIWIBOT



@_Leantec

@jo_pujol

<http://www.kiwibot.es>

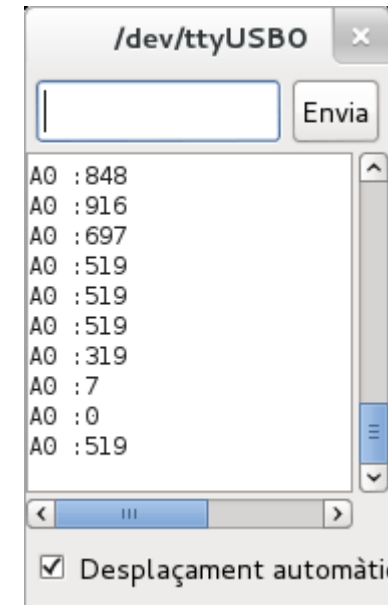


Tecnologies creatives a l'aula

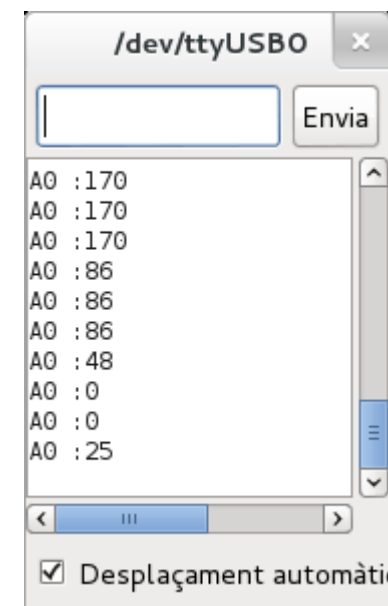
pr04joystick.abp - Exercici



<http://www.binefa.cat/php/arduino/ardublock/pr04joystick.abp>

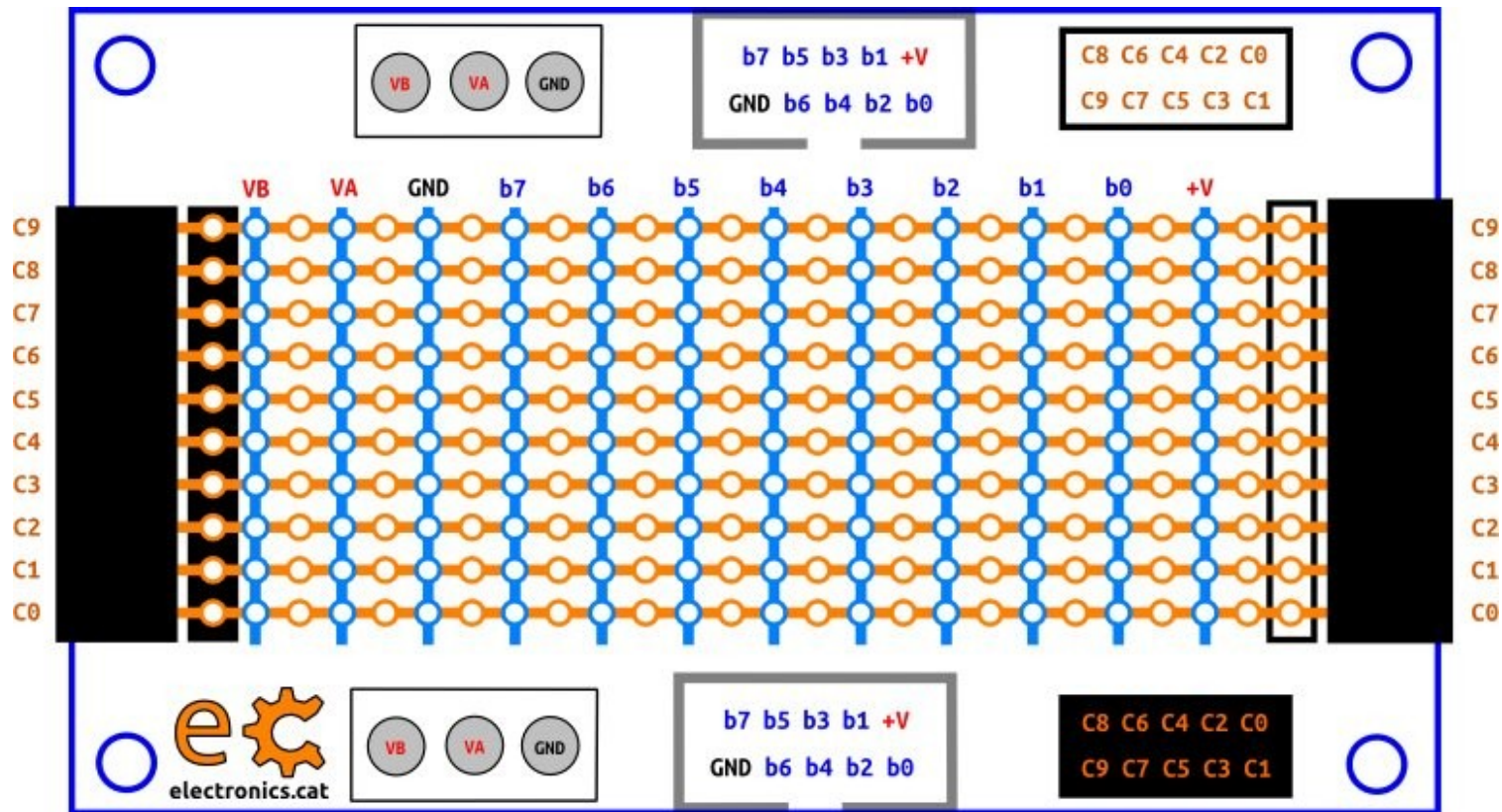


<http://www.binefa.cat/php/arduino/ardublock/pr04joystickB.abp>



Tecnologies creatives a l'aula

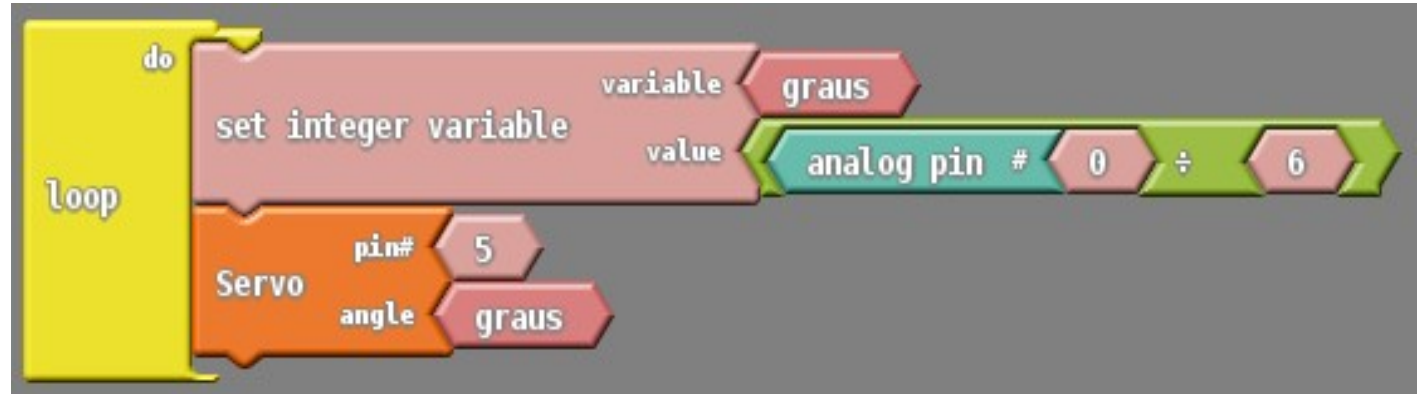
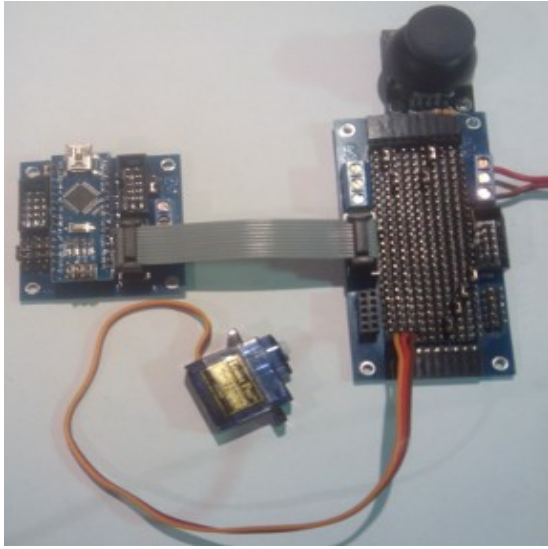
Matriu



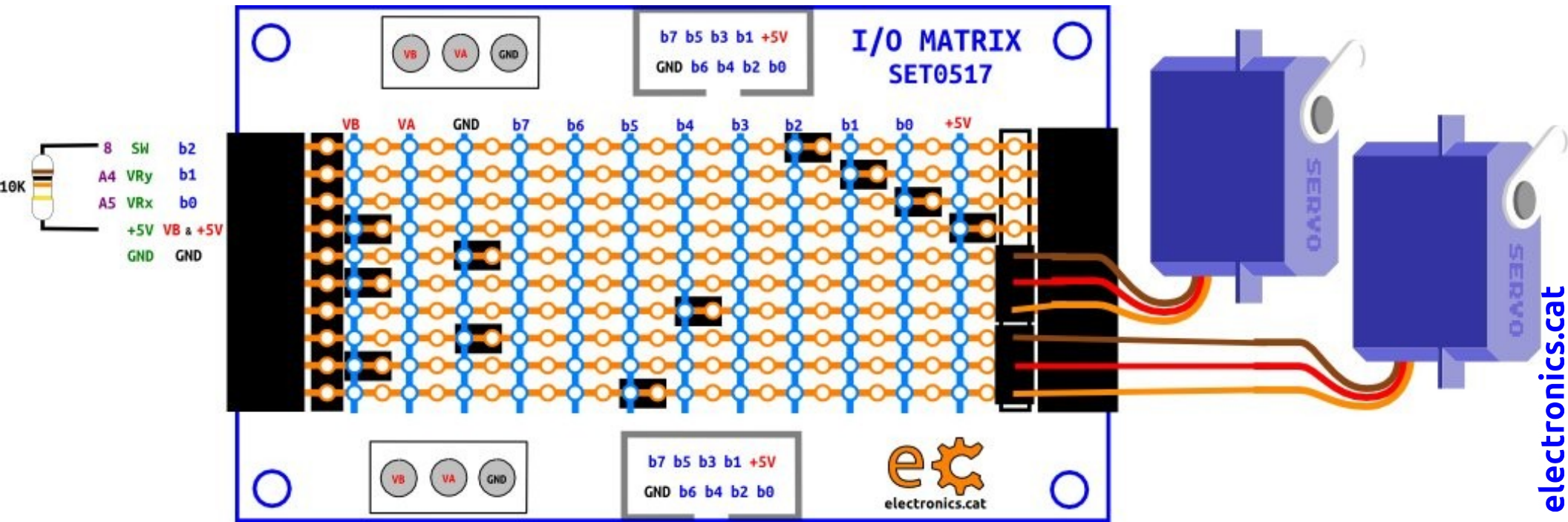
<http://electronics.cat/php/common/index.php?lang=ca&page=517>

Tecnologies creatives a l'aula

pr04joystickServo.abp - Exercici

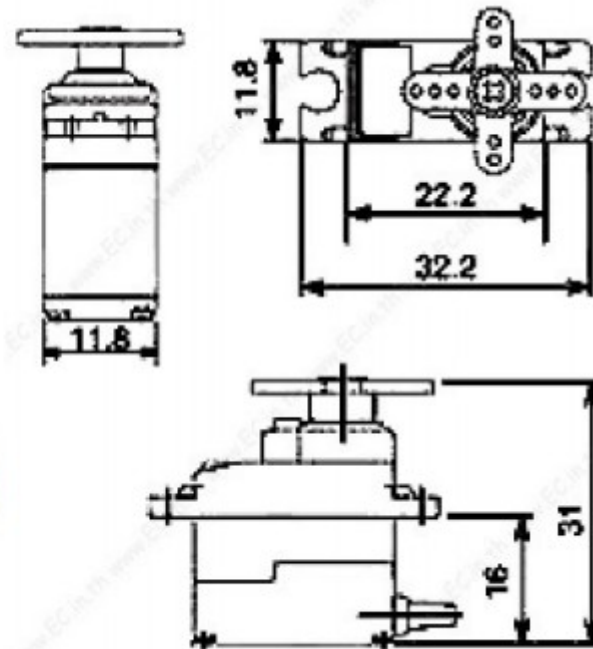


<http://www.binefa.cat/php/arduino/ardublock/pr04joystickServo.abp>



e⚙️ Tecnologias creatives a l'aula

Servo



Specifications

- Weight: 9 g
- Dimension: 22.2 x 11.8 x 31 mm approx.
- Stall torque: 1.8 kgf·cm
- Operating speed: 0.1 s/60 degree
- Operating voltage: 4.8 V (~5V)
- Dead band width: 10 μ s
- Temperature range: 0 °C – 55 °C

<http://datasheet.sparkgo.com.br/SG90Servo.pdf>

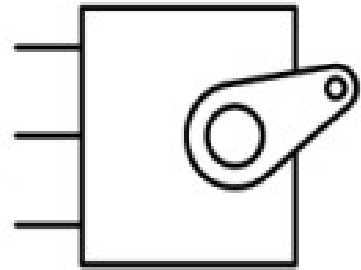
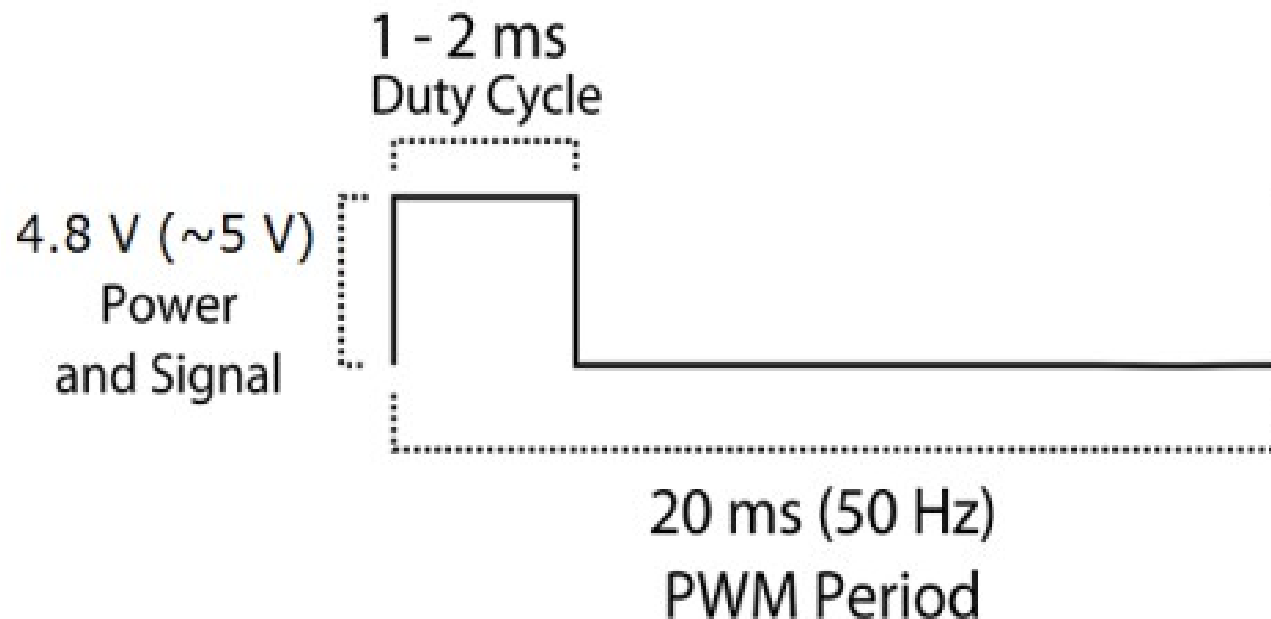
e⚙️ Tecnologias creatives a l'aula

Servo

PWM=Orange (⏏)

Vcc = Red (+)

Ground=Brown (-)

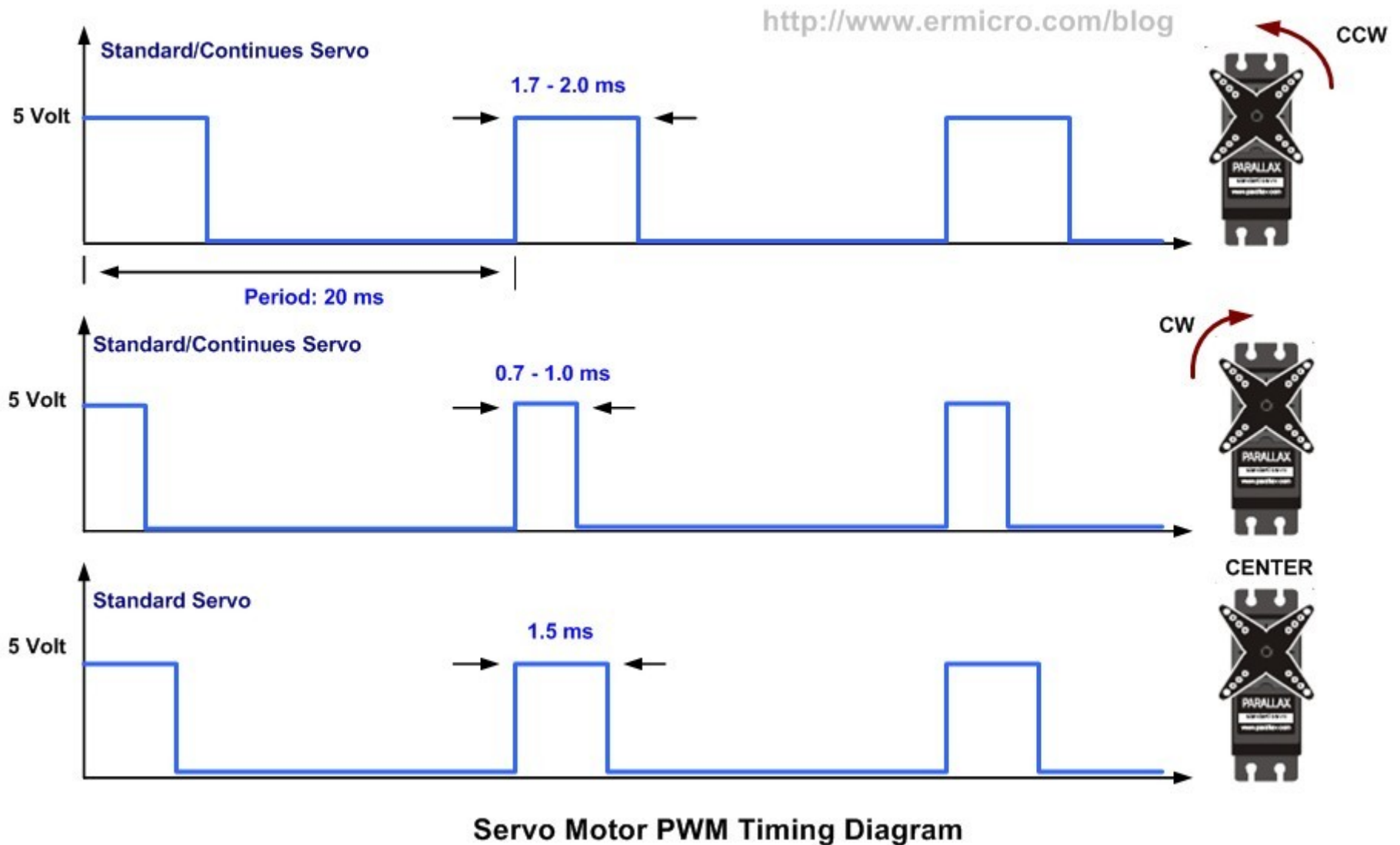



Position "0" (1.5 ms pulse) is middle, "90" (~2 ms pulse) is all the way to the right, "-90" (~1 ms pulse) is all the way to the left.

<http://datasheet.sparkgo.com.br/SG90Servo.pdf>

Tecnologies creatives a l'aula

Servo

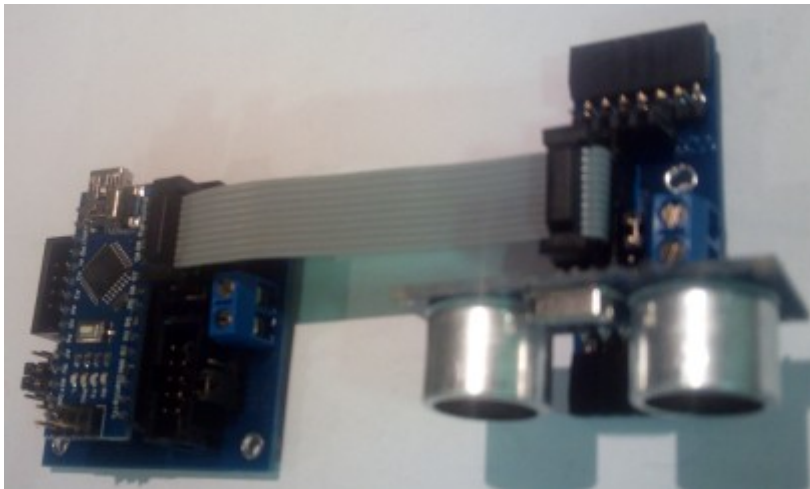
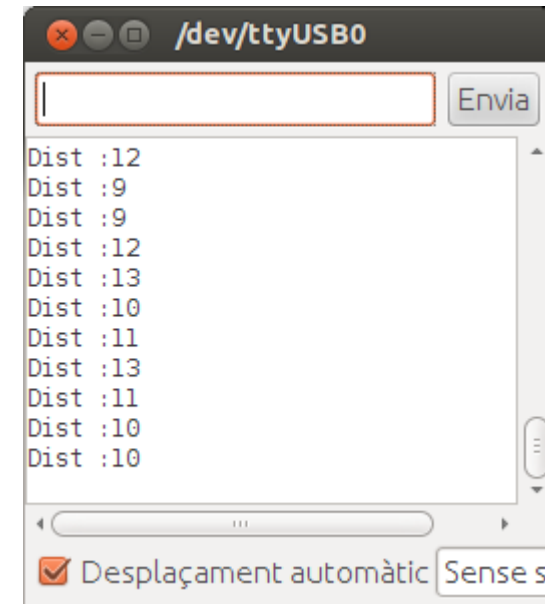


http://www.ermicro.com/blog/wp-content/uploads/2009/02/servo_01.jpg



Tecnologies creatives a l'aula

pr05ultrasons.abp Mesura ultrasònica



<http://www.binefa.cat/php/arduino/ardublock/pr05ultrasons.abp>

<http://www.binefa.cat/php/doc/pr002/>



Tecnologies creatives a l'aula

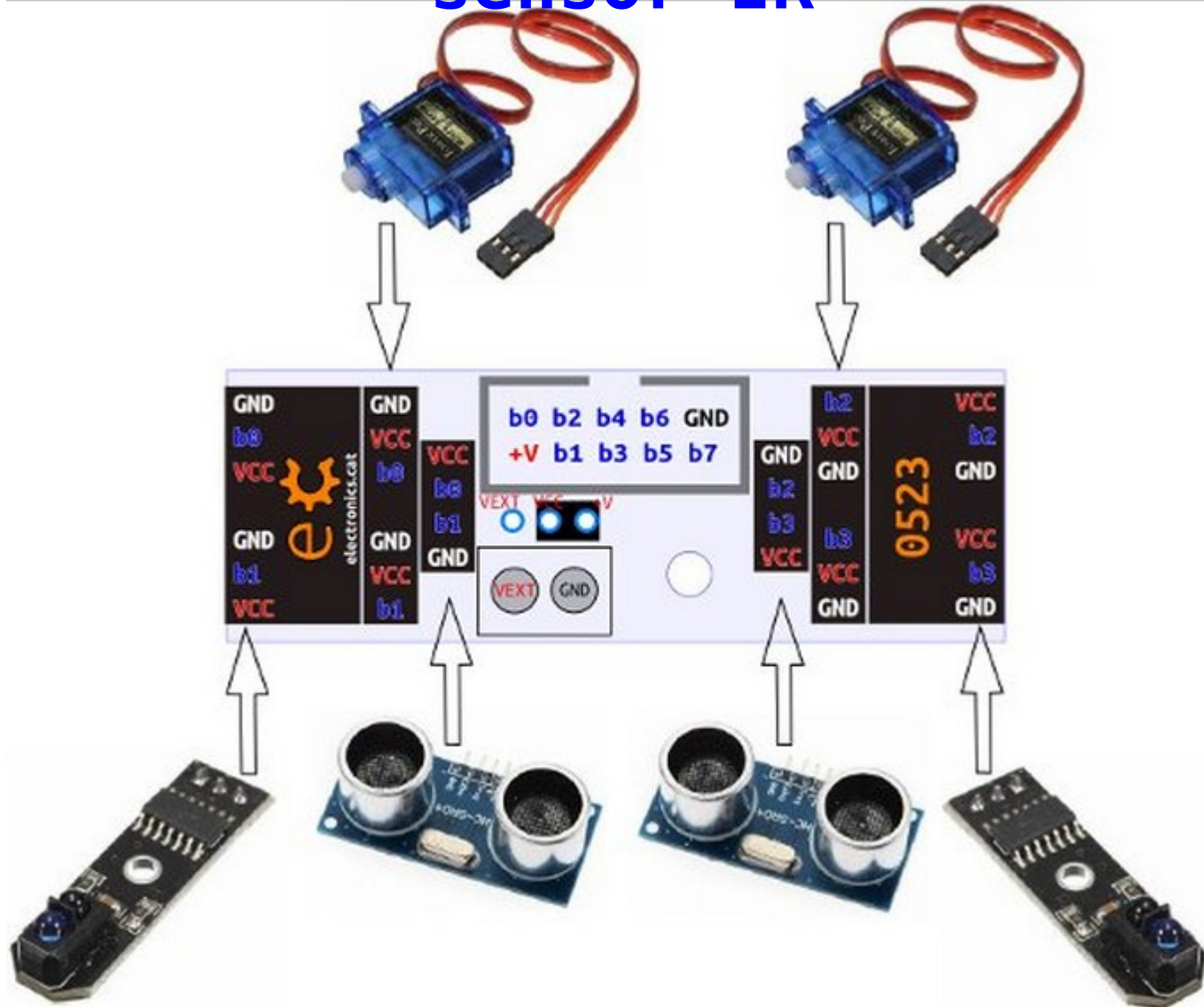
Exercici Ultrasons + Servo

Emprant l'ArduBlock feu que el servo es mogui en funció de la distància llegida pels ultrasons.

Haureu de tenir en compte que el servo accepta un valor mínim i un màxim.

Tecnologies creatives a l'aula

Connexions a la placa 0523 – Connexió sensor IR





Tecnologies creatives a l'aula

Exercici Ultrasons + Servo + sensor IR

Emprant l'ArduBlock feu que el servo es mogui en funció de la distància llegida pels ultrasons, en cas de que el sensor d'infrarojos detecti presència.

Haureu de tenir en compte que el servo accepta un valor mínim i un màxim.

Technologies creatives a l'aula

Arduino Nano + LCD + Joystick + Servo

```
#include <LiquidCrystal.h>
#include <Servo.h>

LiquidCrystal lcd(16, 17, 4, 5, 6, 7); // P1
//LiquidCrystal lcd(8,9,10,11,12,13); // P2
Servo servo1; Servo servo2;

const int buttonPin = 8;
//const int buttonPin = 16;
int analogPinX = 5, analogPinY = 4;
//int analogPinX = 0, analogPinY = 1;
int buttonState = 0;

void setup() {
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
  lcd.print("electronics.cat");
  pinMode(buttonPin, INPUT);
  servo1.attach(10);
  servo2.attach(11);
  servo1.write(90);
  servo2.write(90);
}
```

```
unsigned long int nAnalogValue2Degrees(unsigned long int nAnalogValue){
  return (nAnalogValue * 180) / 1023;
}

void loop() {
  buttonState = digitalRead(buttonPin);
  unsigned long int degX = nAnalogValue2Degrees(analogRead(analogPinX));
  unsigned long int degY = nAnalogValue2Degrees(analogRead(analogPinY));
  // set the cursor to column 0, line 1 (note: line 1 is the second row, since counting begins from 0)
  lcd.setCursor(0, 1);
  if (buttonState == HIGH) {
    lcd.print("F ");
  } else {
    lcd.print("N ");
  }
  lcd.print("X:"); lcd.print(degX); lcd.print("d Y:"); lcd.print(degY); lcd.print("d ");
  servo1.write(degX);
  servo2.write(degY);
}
```



<http://www.binefa.cat/php/doc/lcdJsServo/>

<http://www.binefa.cat/php/arduino/ardublock/lcdJsServo/lcdJsServo.ino>

e* Technologies creatives a l'aula

Arduino Nano + LCD + Joystick + Servo

```
#include <LiquidCrystal.h>
#include <Servo.h>

LiquidCrystal lcd(16, 17, 4,5, 6, 7); // P1
//LiquidCrystal lcd(8,9,10,11,12,13); // P2
Servo servol; Servo servo2;

const int buttonPin = 8;
//const int buttonPin = 16;
int analogPinX = 5,analogPinY = 4;
//int analogPinX = 0,analogPinY = 1;
int buttonState = 0;

void setup() {
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
  lcd.print("electronics.cat");
  pinMode(buttonPin, INPUT);
  servol.attach(10);
  servo2.attach(11);
  servol.write(90);
  servo2.write(90);
}
```

<http://www.binefa.cat/php/doc/lcdJsServo/>

<http://www.binefa.cat/php/arduino/ardublock/lcdJsServo/lcdJsServo.ino>

e* Technologies creatives a l'aula

Arduino Nano + LCD + Joystick + Servo

```

unsigned long int nAnalogValue2Degrees(unsigned long int nAnalogValue){
    return (nAnalogValue * 180) / 1023;
}

void loop() {
    buttonState = digitalRead(buttonPin);
    unsigned long int degX = nAnalogValue2Degrees(analogRead(analogPinX));
    unsigned long int degY = nAnalogValue2Degrees(analogRead(analogPinY));
    // set the cursor to column 0, line 1 (note: line 1 is the second row, since counting begins with 0):
    lcd.setCursor(0, 1);
    if (buttonState == HIGH) {
        lcd.print("F ");
    }else{
        lcd.print("N ");
    }
    lcd.print("X:");lcd.print(degX); lcd.print("d  Y:");lcd.print(degY);lcd.print("d      ");
    servo1.write(degX);
    servo2.write(degY);
}

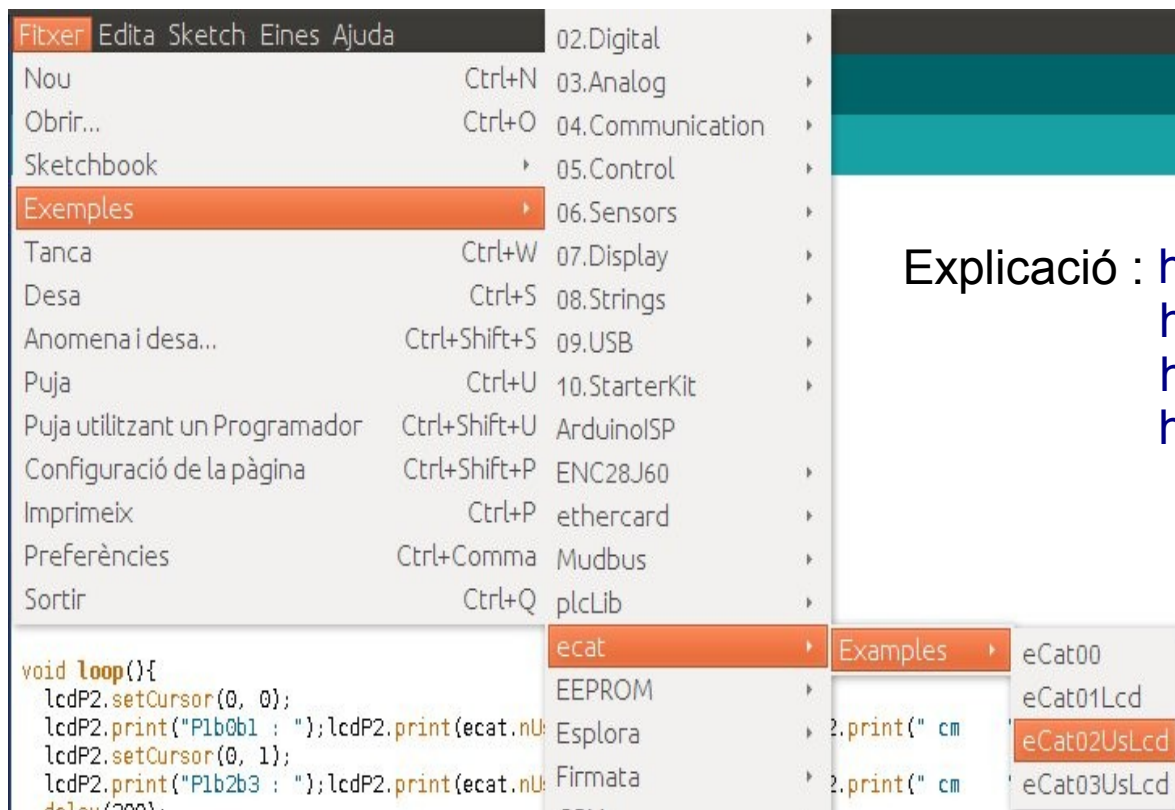
```



Tecnologies creatives a l'aula

Biblioteca **ecat.h** per a l'IDE d'Arduino

<http://www.electronics.cat/doc/arduinoLib/ecat.zip>



Explicació : <http://www.binefa.cat/php/doc/lib-eCat01/>
<http://www.binefa.cat/php/doc/lib-eCat02/>
<http://www.binefa.cat/php/doc/lib-eCat03/>
<http://binefa.cat/blog/?p=140>



Tecnologies creatives a l'aula

Biblioteca **ecat.h** per a l'IDE d'Arduino

<http://www.electronics.cat/doc/arduinoLib/ecat.zip>

Explicació : <http://www.binefa.cat/php/doc/lib-eCat01/>
<http://www.binefa.cat/php/doc/lib-eCat02/>
<http://www.binefa.cat/php/doc/lib-eCat03/>
<http://binefa.cat/blog/?p=140>

```

1  #include <ecat.h>
2
3  #define ROBOT_ATURAT      0
4  #define ROBOT_ENDAVANT    1
5  #define ROBOT_ENDARRERA   2
6  #define ROBOT_DRETA       3
7  #define ROBOT_ESQUERRA    4
8
9  String szMissatge;
10 Ecat ecat;
11 boolean bConnectat;
12 int nG,nA,nB,nEstatActual;
13
14 void setup(){
15     ecat.setupNibbleMode(NIBBLE_H_P1,OUTPUT);
16     ecat.vUltrasonicSensorP1b0b1_init();
17     pinMode(ecat.nPinP1B2,INPUT);
18     pinMode(ecat.nPinP1B3,INPUT);
19     pinMode(ecat.nPinP2B7,OUTPUT);
20     pinMode(ecat.nPinP2B6,INPUT);
21     pinMode(ecat.nPinP2B5,INPUT);
22     pinMode(ecat.nPinP2B4,INPUT);
23     ecat.setupNibbleMode(NIBBLE_L_P2,INPUT);
24     Serial.begin(9600);
25     nG = 150;
26     nA = nB = 30;
27     bConnectat = false;
28     nEstatActual = ROBOT_ATURAT;
29 }
30

```

<http://electronics.cat/downloads/code/robot08.ino>



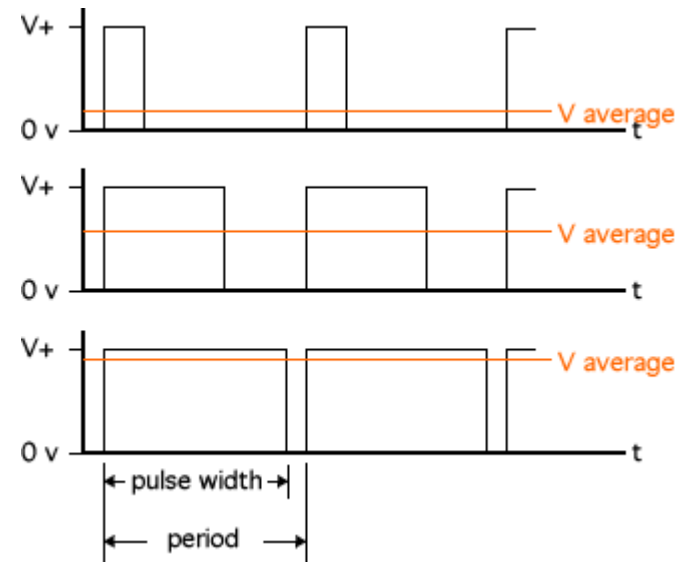
Tecnologies creatives a l'aula

Modulació per amplada de pols PWM

```

31 int nPwmA(){
32     int nAux = nG + nA;
33     if(nAux > 255)
34         nAux = 255;
35     return nAux;
36 }
37
38 int nPwmB(){
39     int nAux = nG + nB;
40     if(nAux > 255)
41         nAux = 255;
42     return nAux;
43 }
44
45 void vRobotAturat(){
46     nEstatActual = ROBOT_ATURAT;
47     ecat.vWriteHighNibbleP1(0x00);
48 }
49
50 void vRobotEndavant(){
51     //ecat.vWriteHighNibbleP1(B00000110);
52     nEstatActual = ROBOT_ENDAVANT;
53     digitalWrite(ecat.nPinP1B4, LOW);
54     analogWrite(ecat.nPinP1B5, nPwmA());
55     analogWrite(ecat.nPinP1B6, nPwmB());
56     digitalWrite(ecat.nPinP1B7, LOW);
57 }

```





Tecnologies creatives a l'aula

Preparant la comunicació Bluetooth

```
#include <ecat.h>

Ecat ecat;
boolean bP2B0;

void setup(){
  pinMode(ecat.nPinP2B7, OUTPUT);
  pinMode(ecat.nPinP2B0, INPUT);
  Serial.begin(9600);
  bP2B0 = digitalRead(ecat.nPinP2B0);
}

void loop(){
  String szMsg;

  while(Serial.available()){
    delay(3);
    char c = Serial.read();
    szMsg += c;
  }
  if(szMsg == "n"){
    digitalWrite(ecat.nPinP2B7, HIGH);
  }
  if(szMsg == "f"){
    digitalWrite(ecat.nPinP2B7, LOW);
  }
  if(bP2B0 != digitalRead(ecat.nPinP2B0)){
    bP2B0 = digitalRead(ecat.nPinP2B0);
    if(bP2B0){
      Serial.println("P2B0 HIGH");
    }else{
      Serial.println("P2B0 LOW");
    }
  }
  szMsg = "";
}
```



<http://electronics.cat/doc/hc06/bluetooth04.ino>



Tecnologies creatives a l'aula

Preparant la comunicació Bluetooth

```
#include <ecat.h>

Ecat ecat;
boolean bP2B0;

void setup(){
  pinMode(ecat.nPinP2B7, OUTPUT);
  pinMode(ecat.nPinP2B0, INPUT);
  Serial.begin(9600);
  bP2B0 = digitalRead(ecat.nPinP2B0);
}
```



Tecnologies creatives a l'aula

Preparant la comunicació Bluetooth

```
void loop(){
  String szMsg;

  while(Serial.available()){
    delay(3);
    char c = Serial.read();
    szMsg += c;
  }
  if(szMsg == "n"){
    digitalWrite(ecat.nPinP2B7,HIGH);
  }
  if(szMsg == "f"){
    digitalWrite(ecat.nPinP2B7,LOW);
  }
  if(bP2B0 != digitalRead(ecat.nPinP2B0)){
    bP2B0 = digitalRead(ecat.nPinP2B0);
    if(bP2B0){
      Serial.println("P2B0 HIGH");
    }else{
      Serial.println("P2B0 LOW");
    }
  }
  szMsg = "";
}
```

<http://electronics.cat/doc/hc06/bluetooth04.ino>



Tecnologies creatives a l'aula

Preparant la comunicació Bluetooth

Verifiquen el funcionament del programa bluetooth04.ino interactuant amb qualsevol dels programes de comunicacions que coneixeu



<http://electronics.cat/doc/hc06/bluetooth04.ino>



Tecnologies creatives a l'aula

App Inventor

MIT App Inventor | Explore MIT App Inventor - Mozilla Firefox

MIT App Inventor | E... x

appinventor.mit.edu/explore/

MIT App Inventor

About ▾ News & Stories ▾ Resources ▾

Create!

f g+ t y d w

Check out the new App Inventor Gallery!

Google™ Custom Search

MIT App Inventor noted in US News & World Report.

MIT students use App Inventor to create UMATI, a crowdsourced app to track bus routes in Nairobi

Recent News

- MIT App Inventor at ISTE 2015
- College Board Announces Endorsement of Advanced Placement Mobile CSP Course
- MIT App Inventor Classic to MIT App Inventor 2 Converter Released
- MIT App Inventor usage triples over the 2014-2015 academic year

More...

edX

Register for a free online edX App Inventor course!

Tweets

Follow

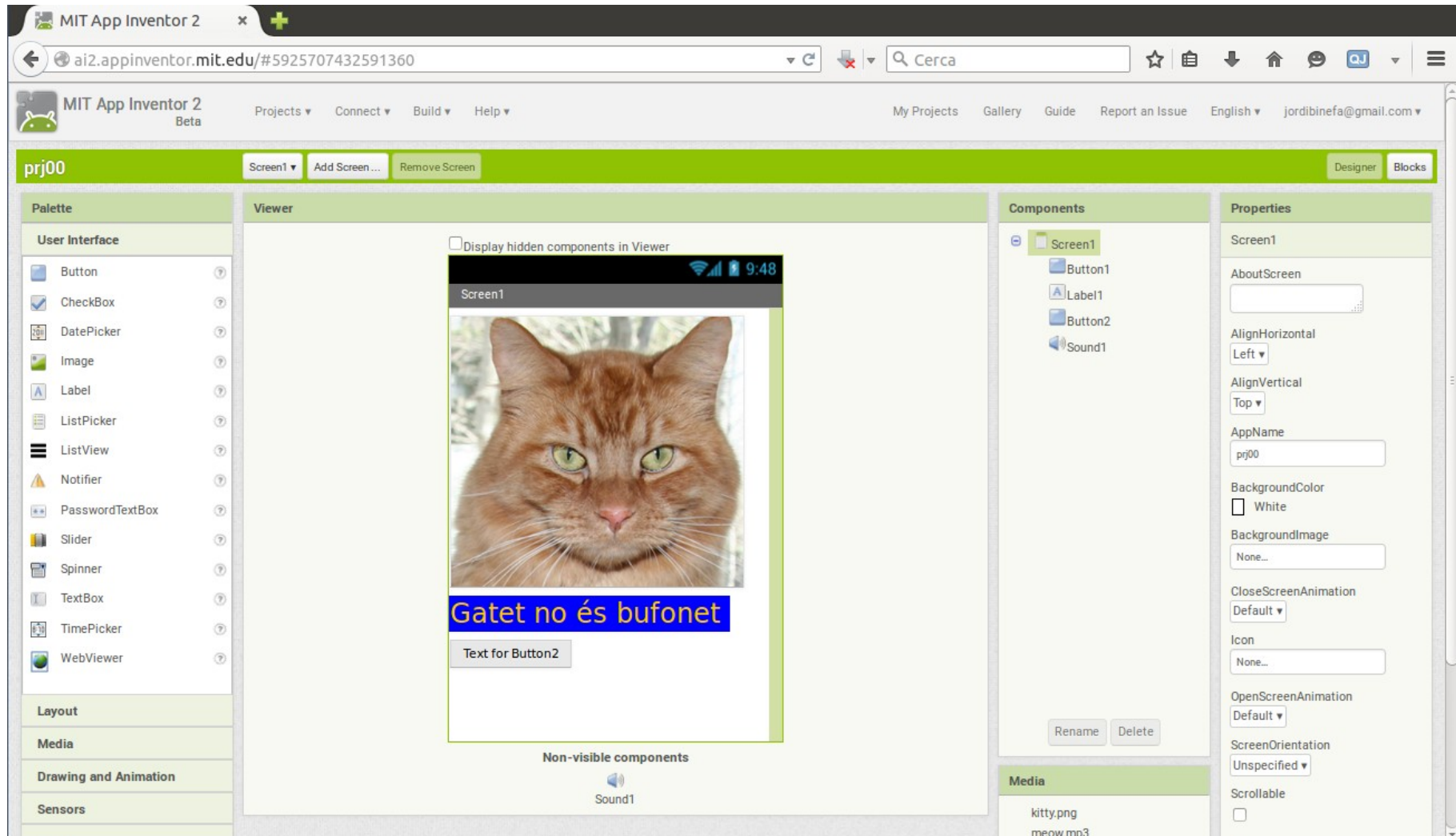
MIT App Inventor @MITAppInventor 6h

<http://appinventor.mit.edu/>



Tecnologies creatives a l'aula

App Inventor

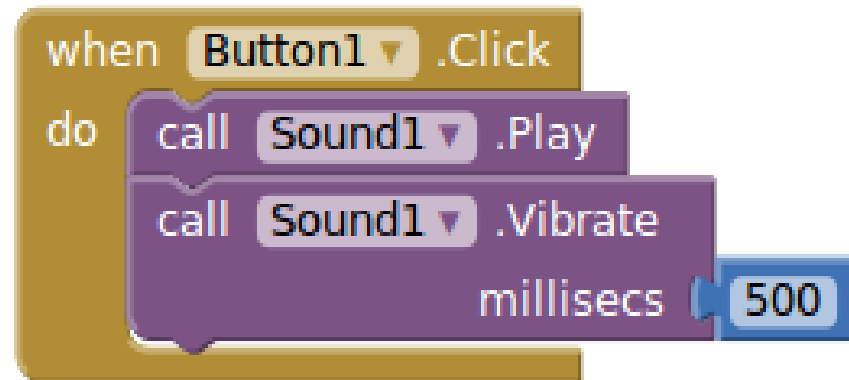


<http://binefa.cat/php/appinventor/prj00.aia>



Tecnologies creatives a l'aula

App Inventor



<http://binefa.cat/php/appinventor/prj00.aia>



Tecnologies creatives a l'aula

App Inventor

Un cop us heu validat a l'App Inventor, importeu l'arxiu prj00.aia -Projects / Import projects (.aia) from my computer- i genereu l'arxiu prj00.apk -Build / App (save .apk to my computer)-.

Un cop generat l'arxiu .apk el passeu al vostre mòbil Android fent servir el cable USB, trametent-lo mitjançant correu electrònic o anant a l'adreça de sota mitjançant el vostre navegador.

A l'hora de fer la instal·lació el telèfon us avisarà de que la font del programa no és l'estàndard. Temporalment, doneu al vostre mòbil permisos per a fer una instal·lació des de font desconeguda.

Verifiqueu el seu funcionament.

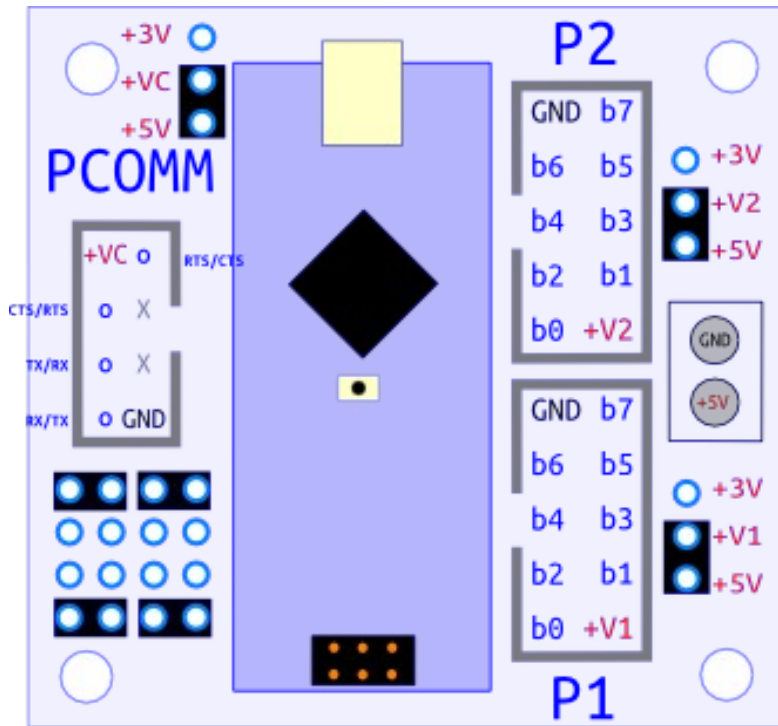
<http://binefa.cat/php/appinventor/prj00.aia>

<http://binefa.cat/php/appinventor/prj00.apk>



Tecnologies creatives a l'aula

Comunicació mitjançant Bluetooth



- Carregueu bluetooth04.ino a l'Arduino Nano
- Desconnecteu cable mini-USB de l'Arduino Nano
- Alimenteu separatament la placa nano-eCat (cal tornavís)
- Assegureu-vos de la posició dels ponts (jumpers) de comunicació
- Preneu nota del número identificador de Bluetooth
- Connecteu placa set0525 a la nano-eCat
- Vinculeu el dispositiu BlueTooth al vostre mòbil Android (contrasenya : 1234)
- Proveu el fi  direccional

<http://electronics.cat/doc/hc06/bluetooth04.ino>
http://electronics.cat/doc/hc06/HC06_04b.aia
http://electronics.cat/doc/hc06/HC06_04b.apk

Tecnologies creatives a l'aula

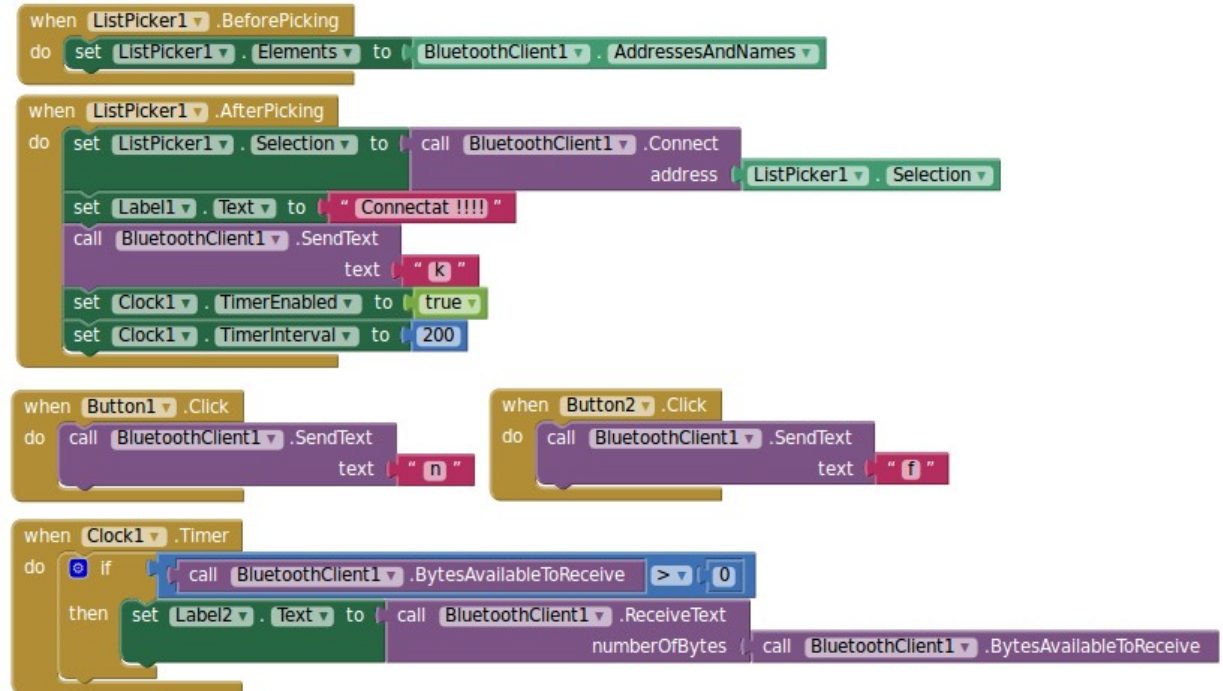
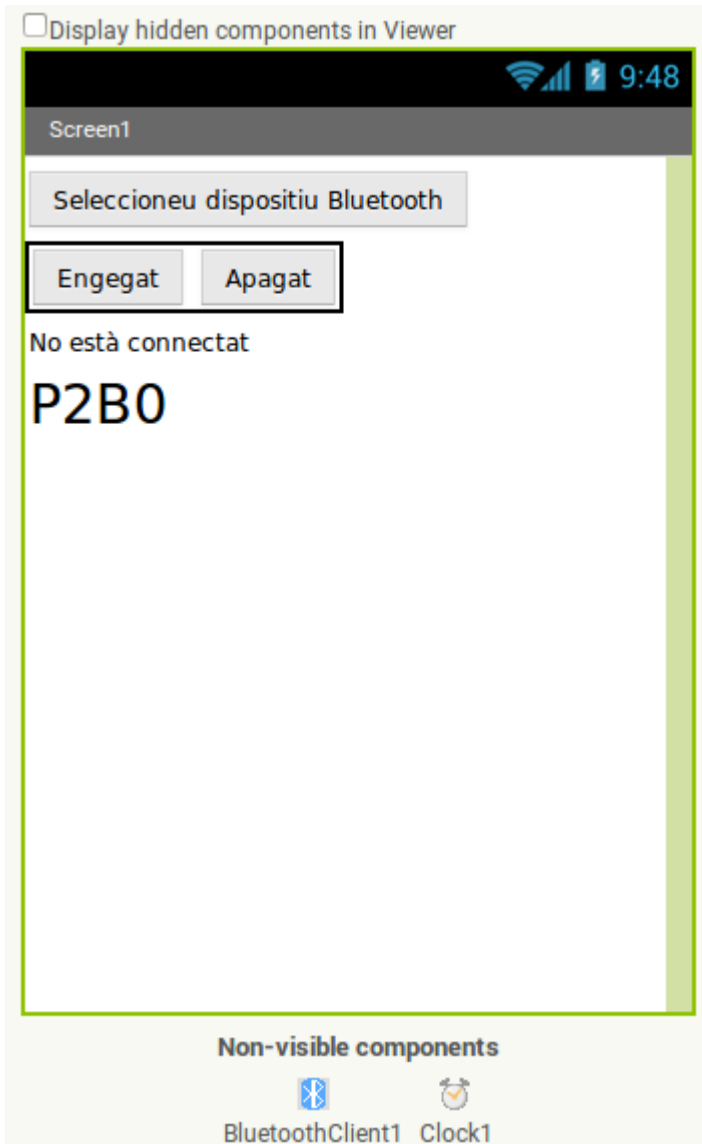
Com trobar pel terminal el número ID del Bluetooth

```
$ hcitool scan  
Scanning ...  
98:D3:31:30:2C:0D HC-06
```



Tecnologies creatives a l'aula

App Inventor - Comunicació mitjançant Bluetooth



Tecnologies creatives a l'aula

App Inventor - Comunicació mitjançant Bluetooth

```

when ListPicker1.BeforePicking
do
  set ListPicker1.Elements to BluetoothClient1.AddressesAndNames

when ListPicker1.AfterPicking
do
  set ListPicker1.Selection to call BluetoothClient1.Connect
                                address ListPicker1.Selection
  set Label1.Text to "Connectat !!!! "
  call BluetoothClient1.SendText
                                text "k"
  set Clock1.TimerEnabled to true
  set Clock1.TimerInterval to 200

when Button1.Click
do
  call BluetoothClient1.SendText
                                text "n"

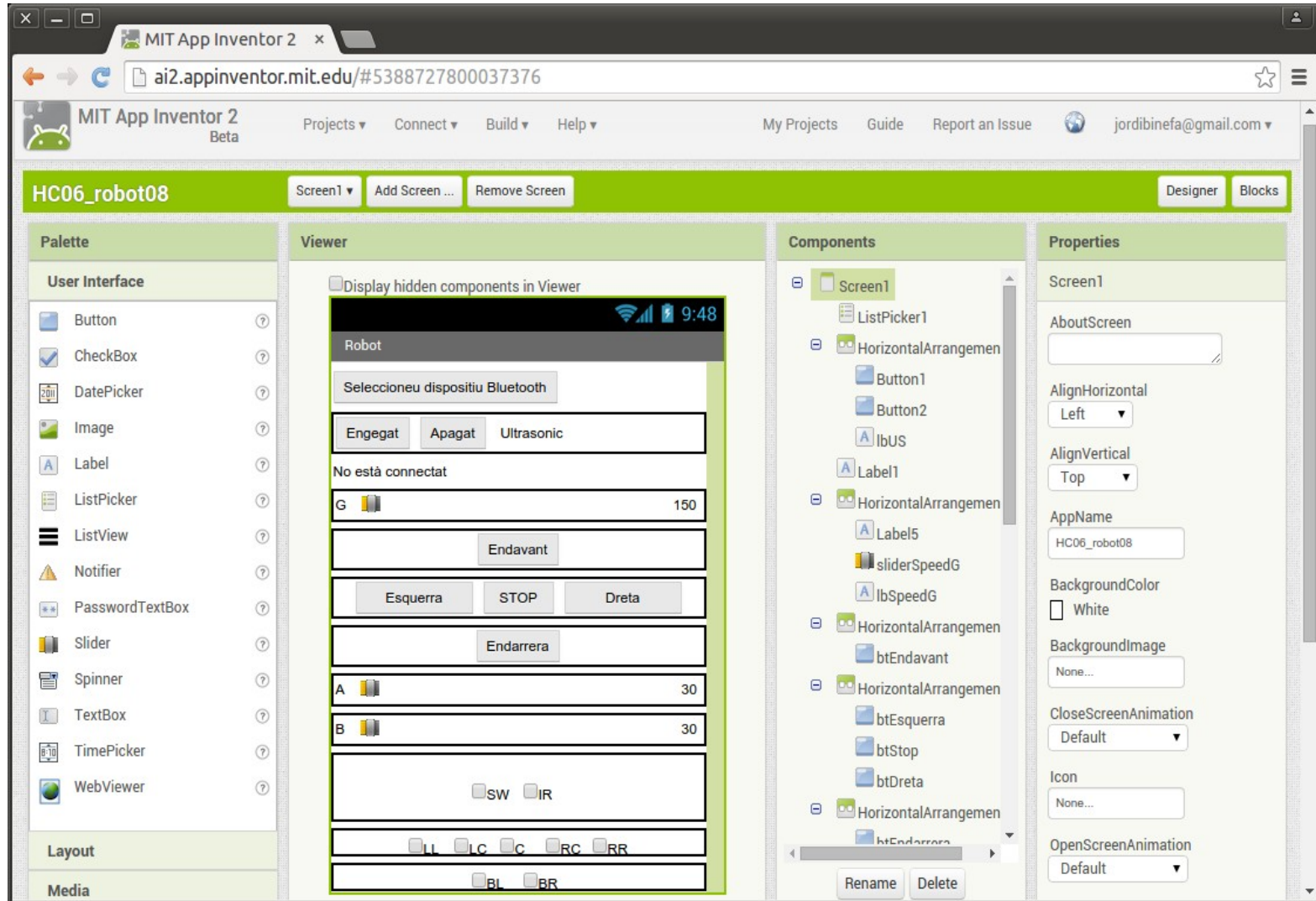
when Button2.Click
do
  call BluetoothClient1.SendText
                                text "f"

when Clock1.Timer
do
  if call BluetoothClient1.BytesAvailableToReceive > 0
  then
    set Label2.Text to call BluetoothClient1.ReceiveText
                                numberOfBytes call BluetoothClient1.BytesAvailableToReceive
  
```



Tecnologies creatives a l'aula

Programar al mòbil Android – App Inventor

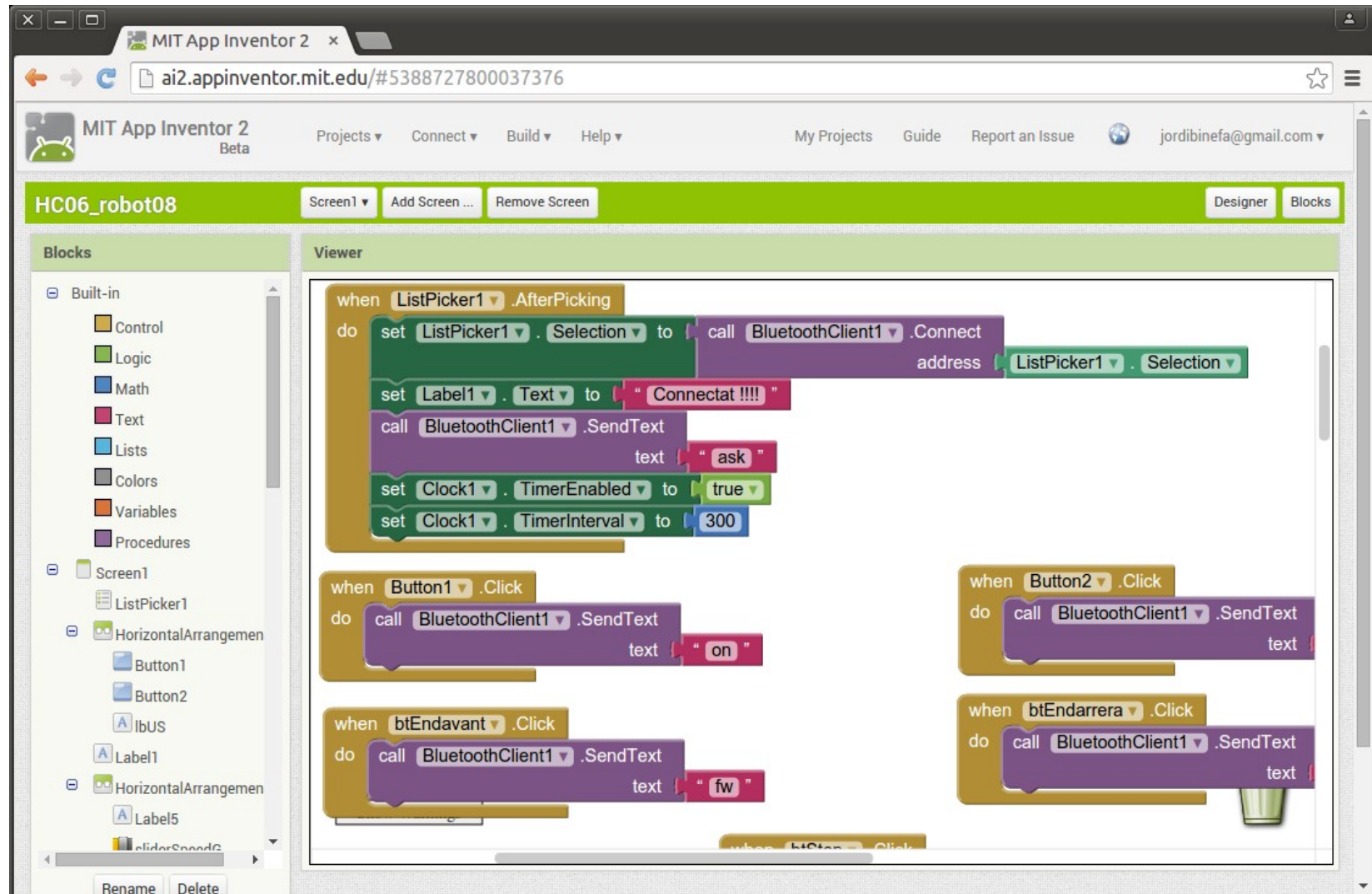


<http://appinventor.mit.edu/>



Tecnologies creatives a l'aula

Programar al mòbil Android – App Inventor



http://electronics.cat/downloads/code/HC06_robot08.aia

<http://appinventor.mit.edu/>



Tecnologies creatives a l'aula

Arduino i App Inventor - Comunicació

```
147 void vManageMsg(){
148     vSliders();
149     if(szMissatge == "on"){
150         //digitalWrite(ecat.nPinP2B7,HIGH);
151         analogWrite(ecat.nPinP2B7,nG);
152     }
153     if(szMissatge == "off"){
154         digitalWrite(ecat.nPinP2B7,LOW);
155     }
156     if(szMissatge == "ask"){
157         bConnectat = true;
158         vInformaSensors();
159     }
160     if(szMissatge == "fw"){
161         vRobotEndavant();
162     }
163     if(szMissatge == "bw"){
164         vRobotEndarrera();
165     }
166     if(szMissatge == "st"){
167         vRobotAturat();
168     }
169     if(szMissatge == "le"){
170         vRobotEsquerra();
171     }
172     if(szMissatge == "ri"){
173         vRobotDreta();
174     }
175 }
```

<http://electronics.cat/downloads/code/robot08.ino>

http://electronics.cat/downloads/code/HC06_robot08.aia

Torn de preguntes ...



... i sessió pràctica.



Tecnologies creatives a l'aula

Presentació descarregable a : <http://binefa.cat/blog>

Correu electrònic de contacte : jordibinefa@electronics.cat

twitter



<https://twitter.com/JordiBinefa>

<https://twitter.com/electronicscat>



<http://es.linkedin.com/pub/jordi-binefa/13/717/90b>

Plaques aviat disponibles a :

<http://www.electronics.cat>

<http://www.makeit.cat>

Moltes gràcies per la vostra atenció