

Maquinari lliure

Exemples pràctics

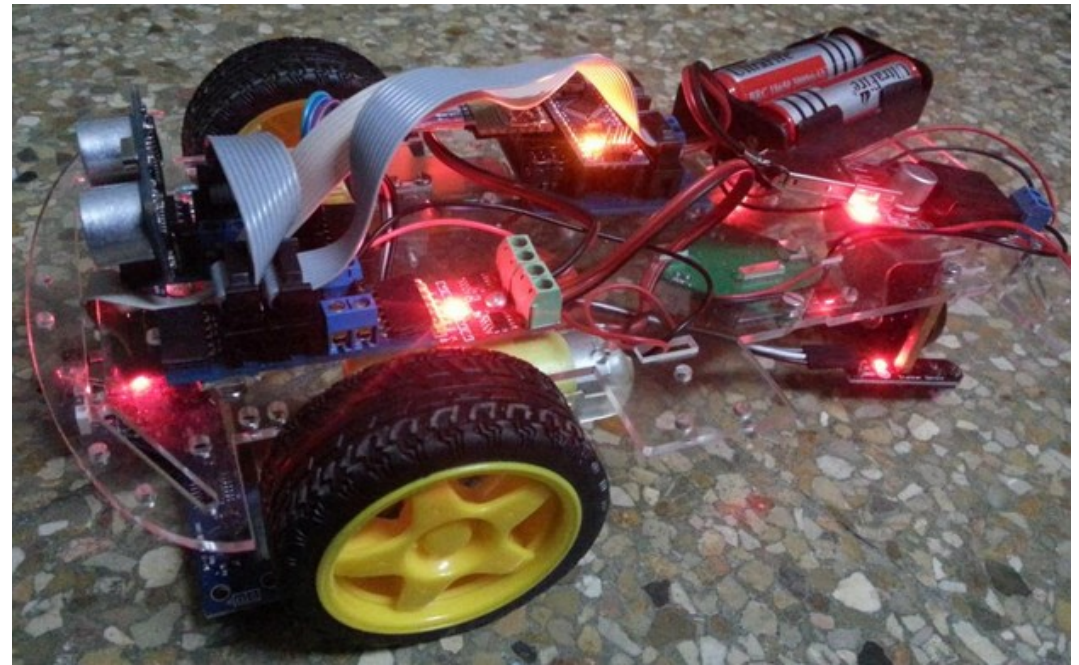
Com construir-te el teu propi robot



23-24-27 Febrer / 4-5 Març 2015



Institut Escola del Treball de Barcelona



Jordi Binefa i Martínez

Responsable d'R+D+i a

Professor de cicles formatius a



23 / febrer / 2015

Maquinari lliure

Definició de maquinari lliure :

És un maquinari en que el disseny està a disposició del públic per a que qualsevol ho pugui estudiar, modificar, distribuir, fabricar i vendre.

open hardware

Font : <http://freedomdefined.org/OSHW>



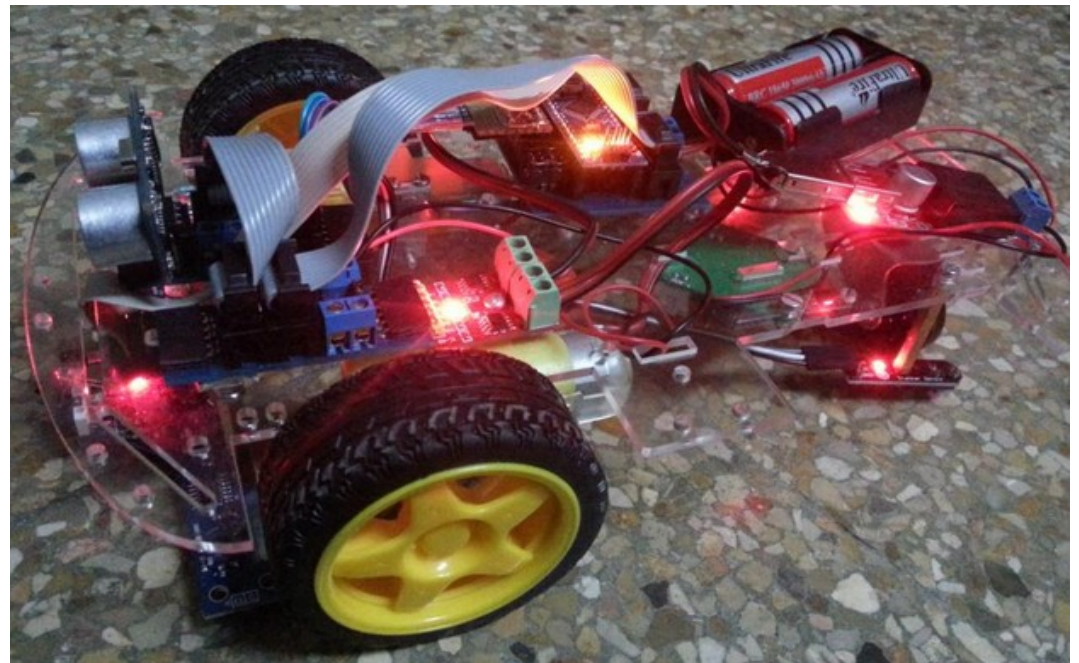
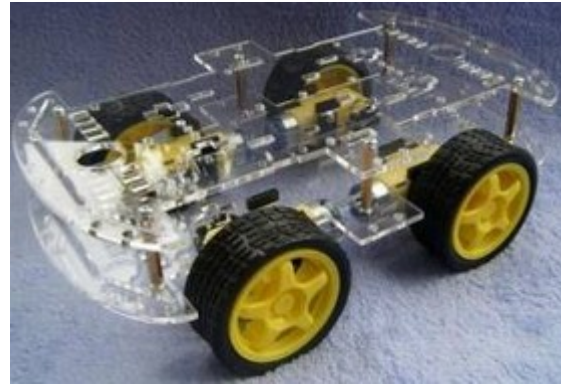
A on aconseguir el material ?



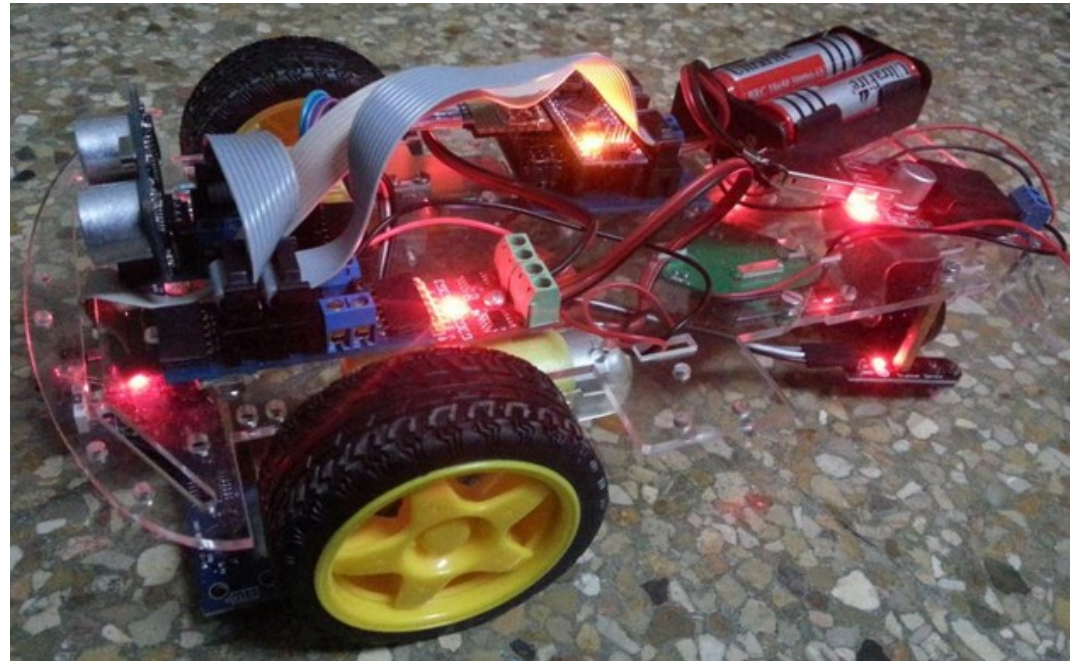
onda radio, s.a.



Xassís del cotxe / robot

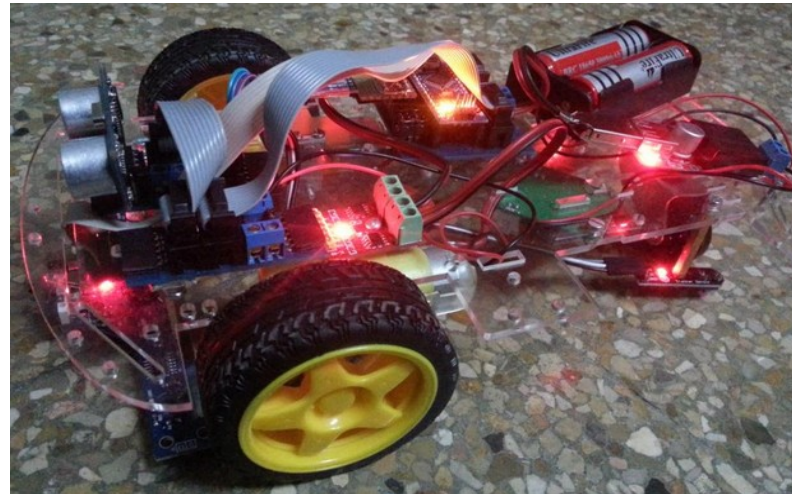
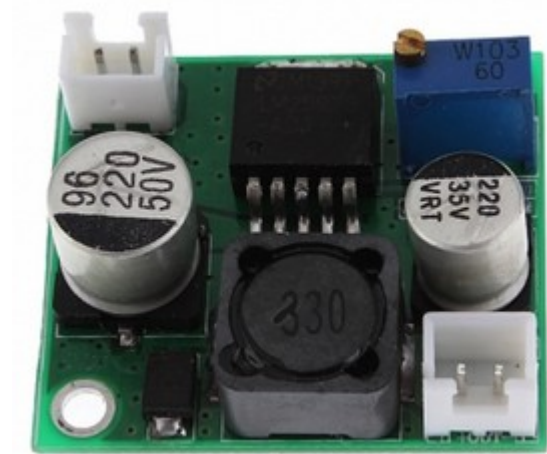


Energia





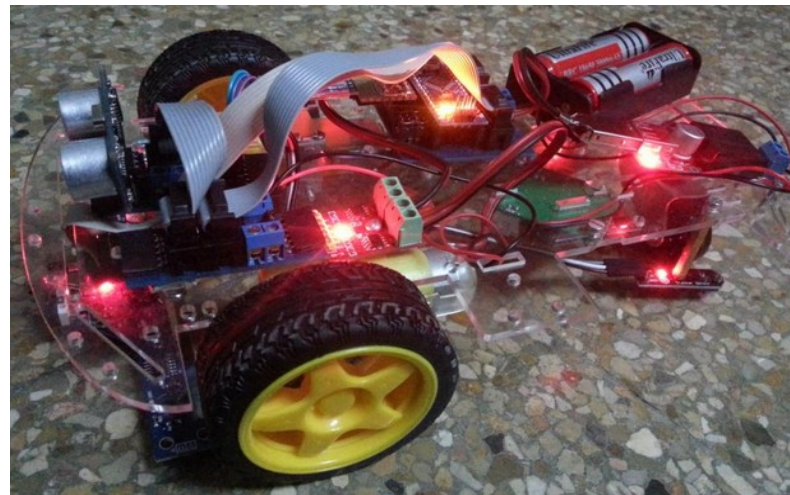
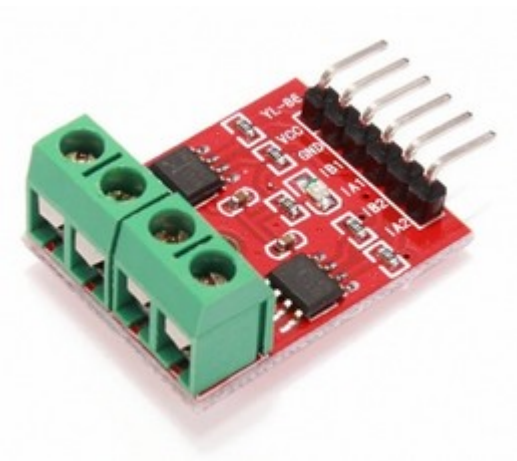
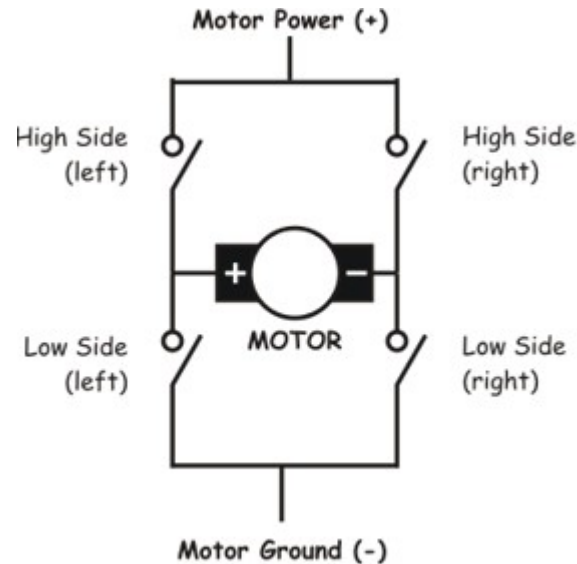
Fonts d'alimentació commutades





Control de sentit dels motors

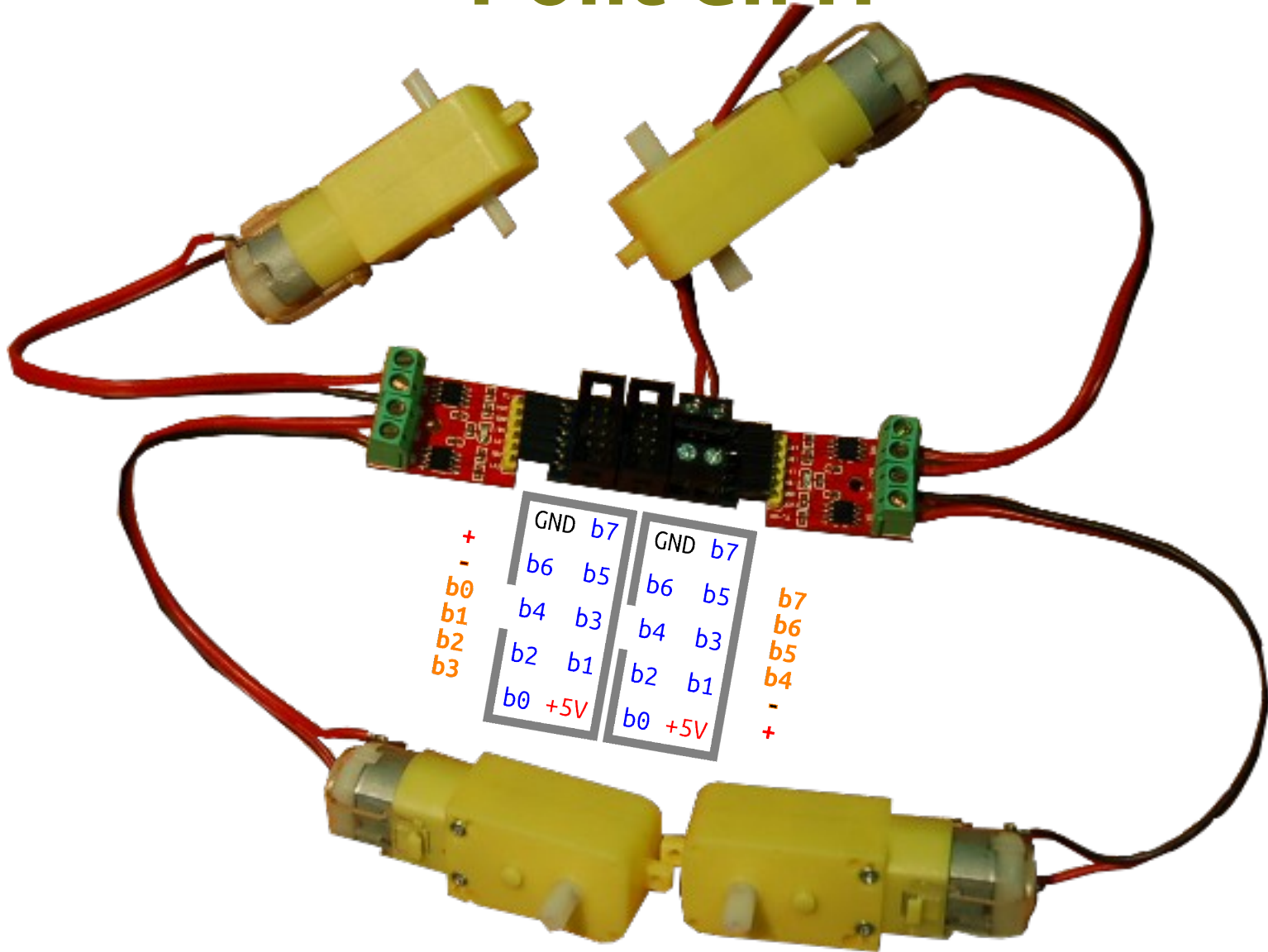
Pont en H





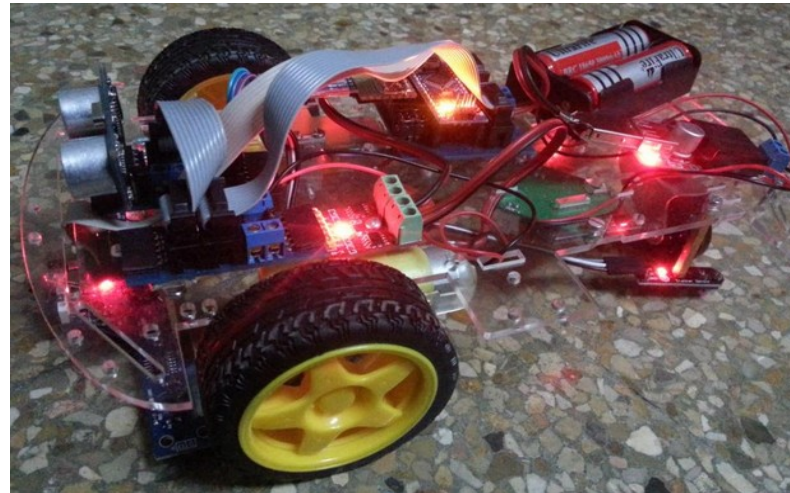
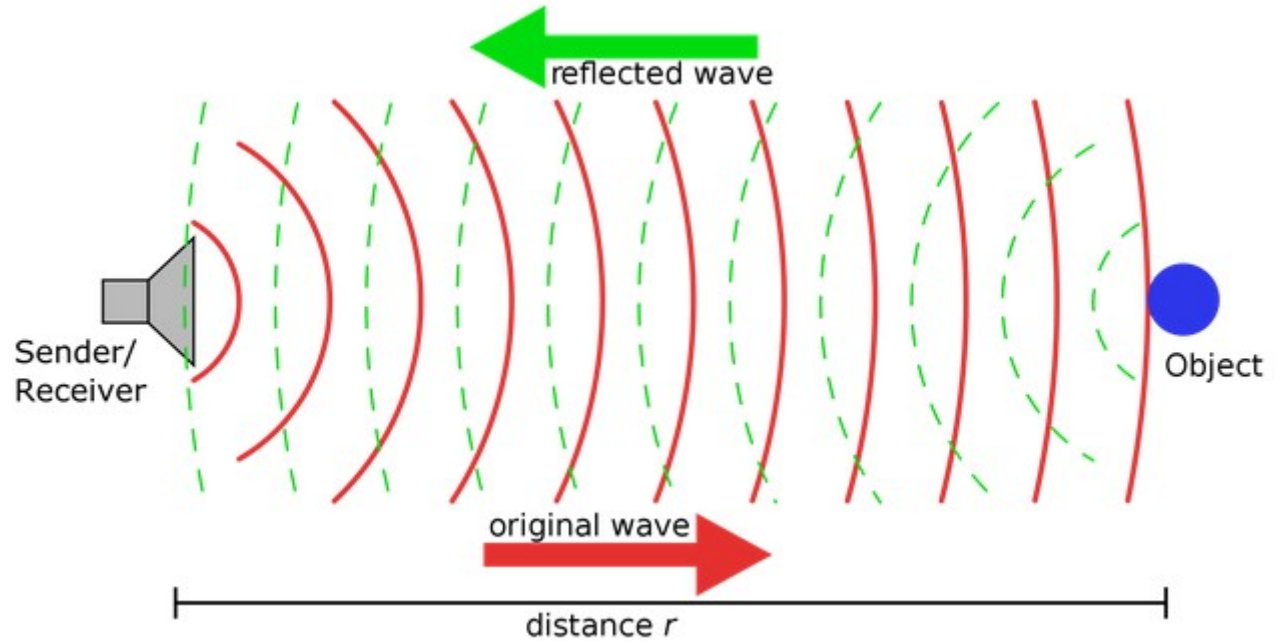
Control de sentit dels motors

Pont en H

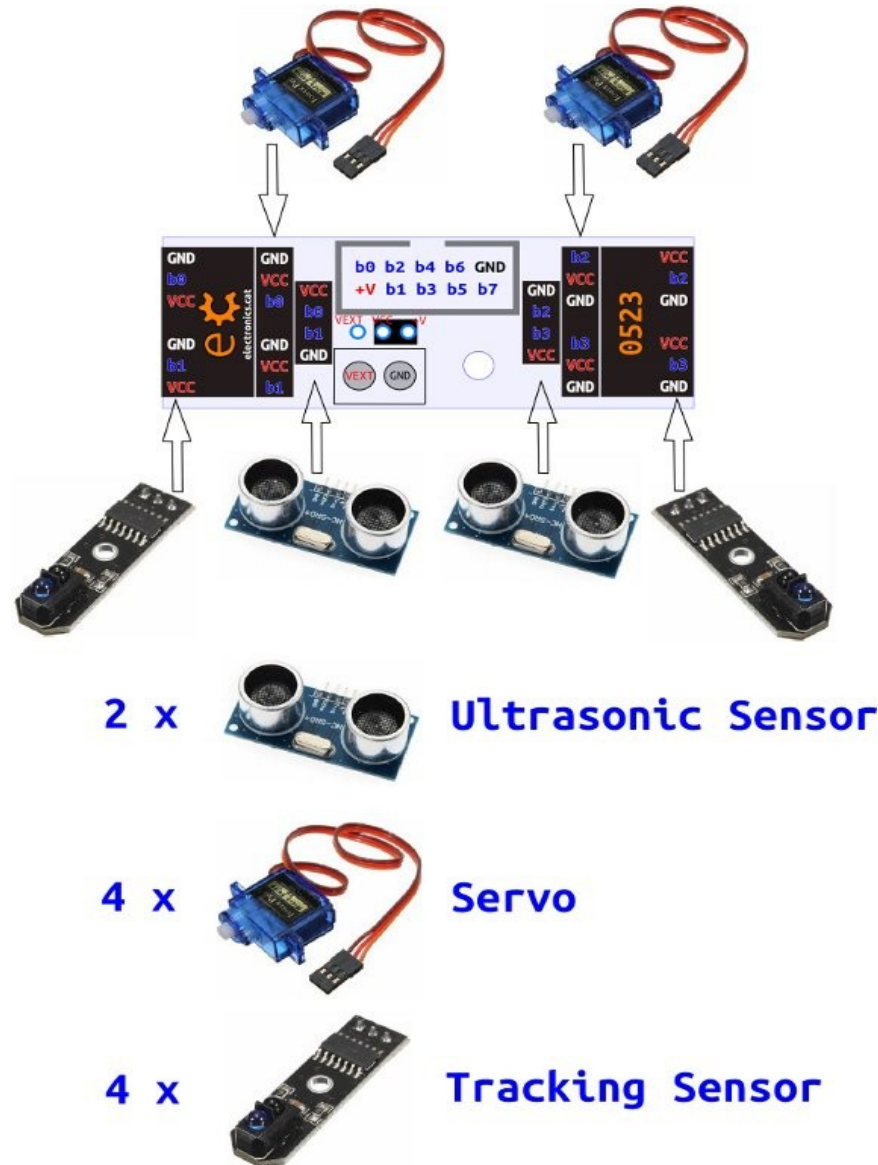




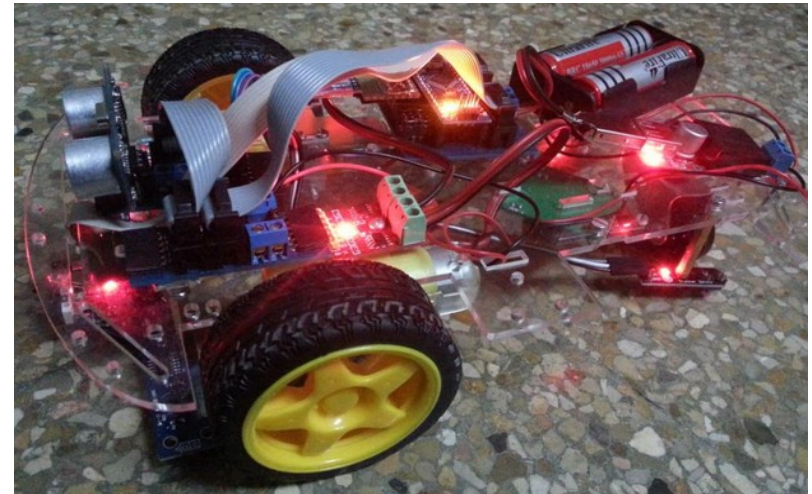
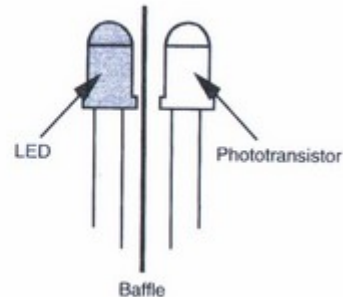
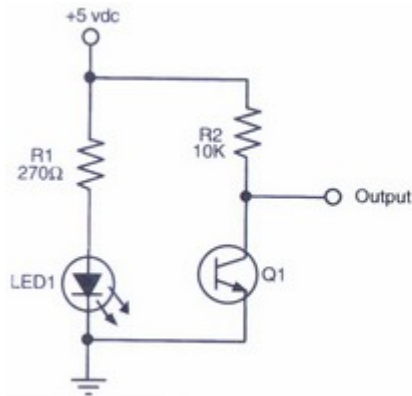
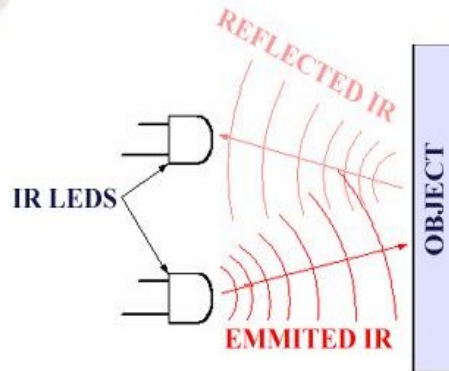
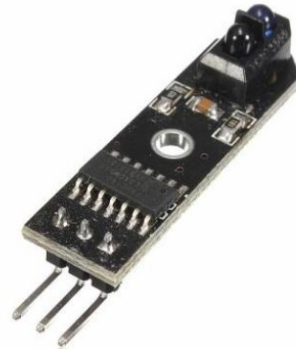
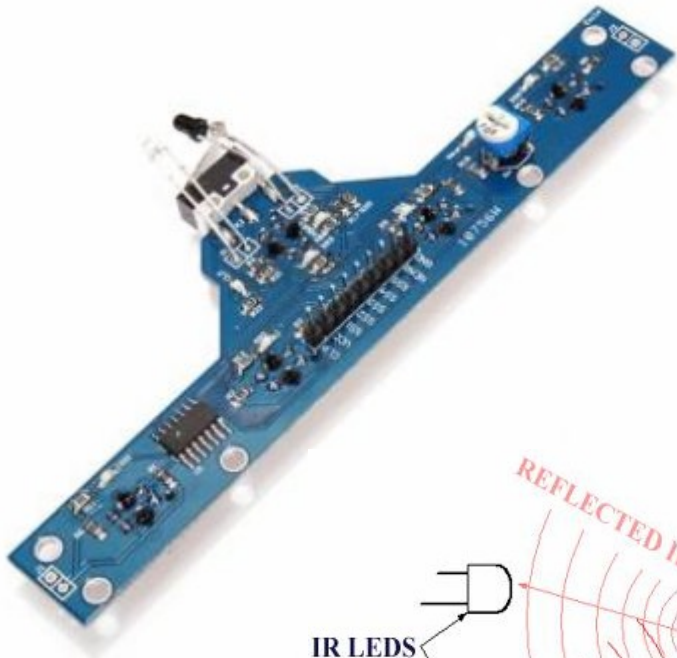
Sensor ultrasònic de distància



electronics.cat

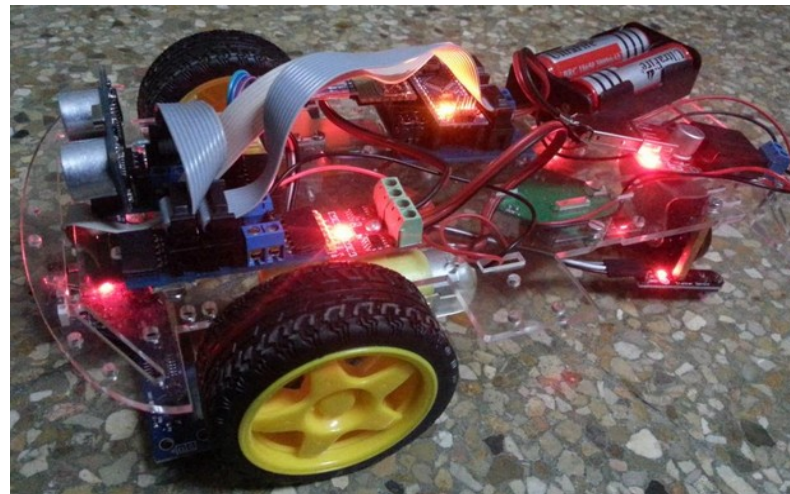


Sensors d'infrarojos

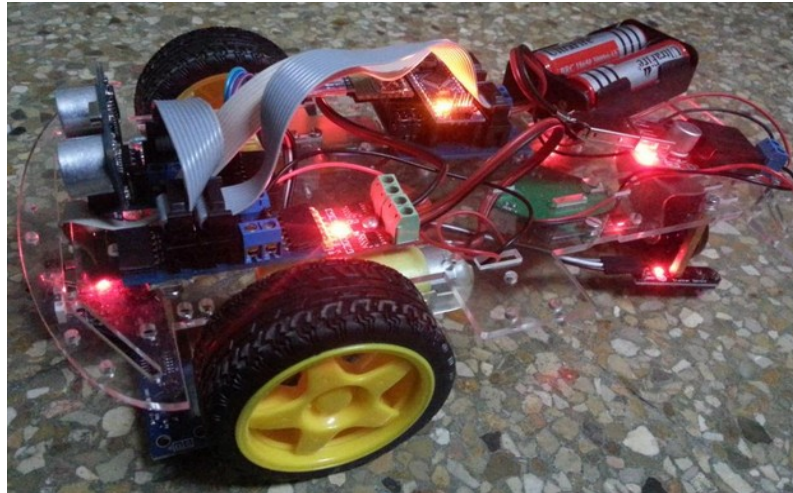




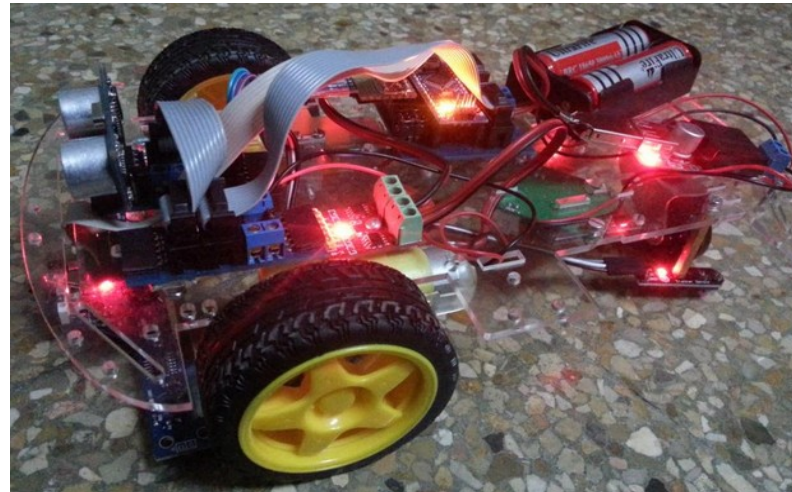
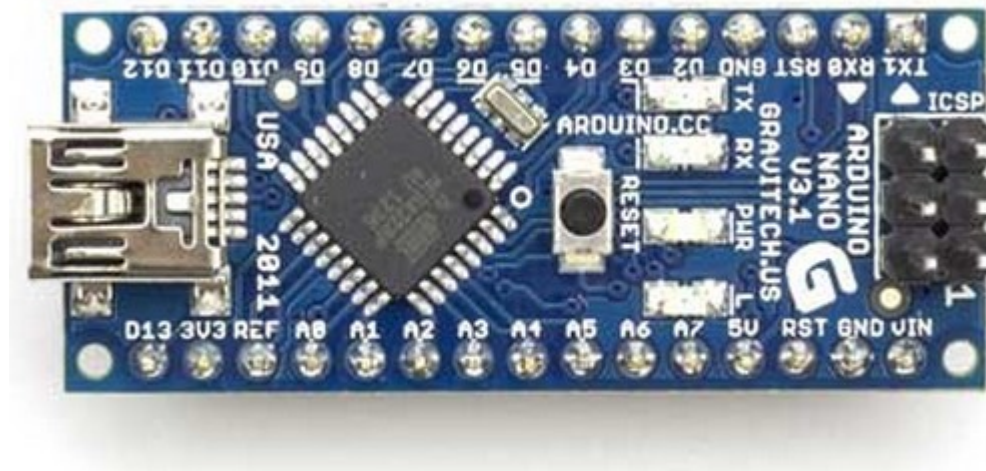
Mòdul Bluetooth



Accessoris

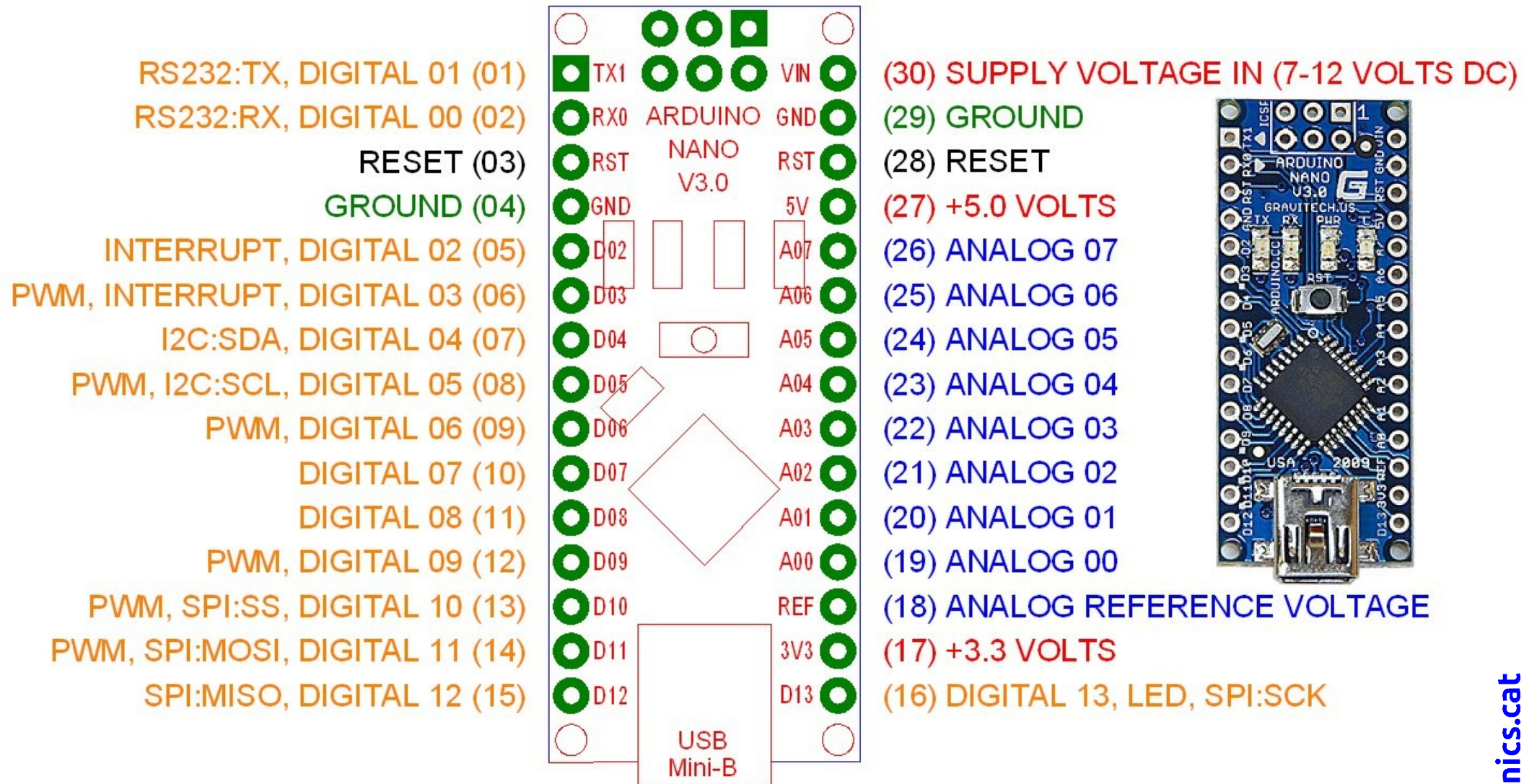


Arduino Nano



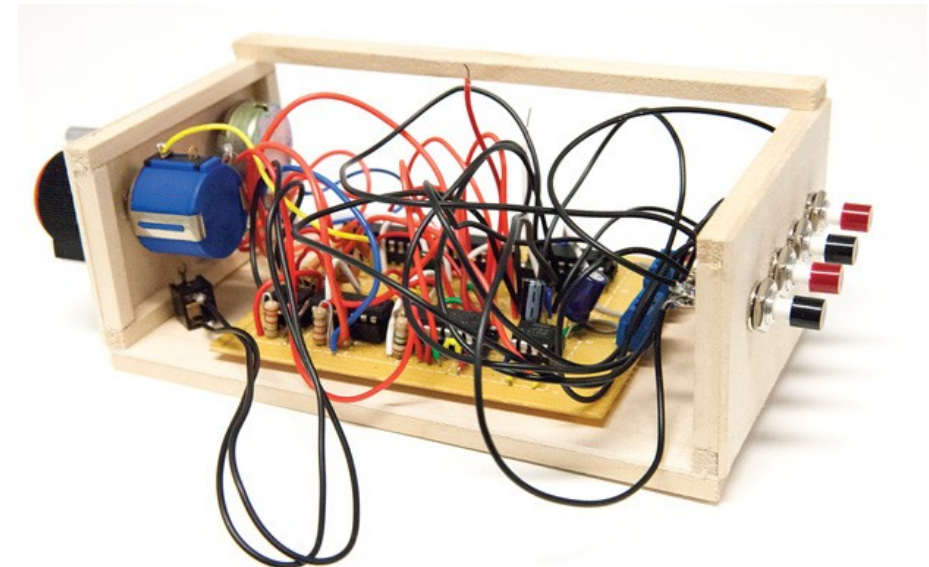
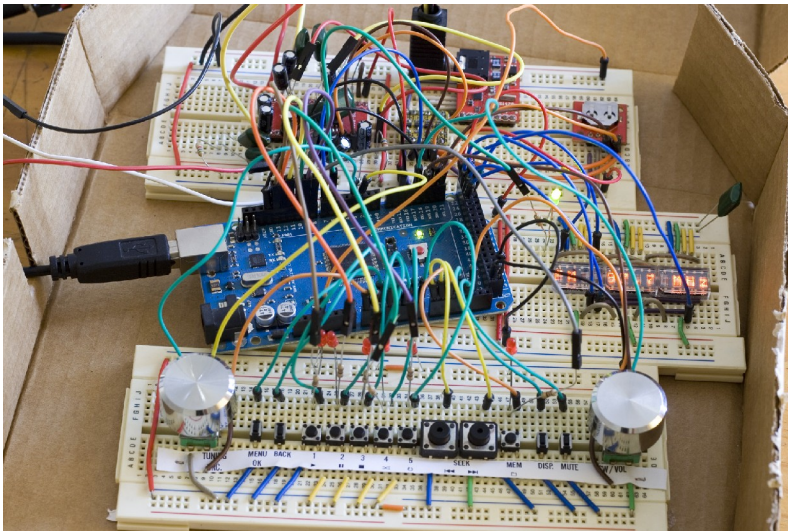
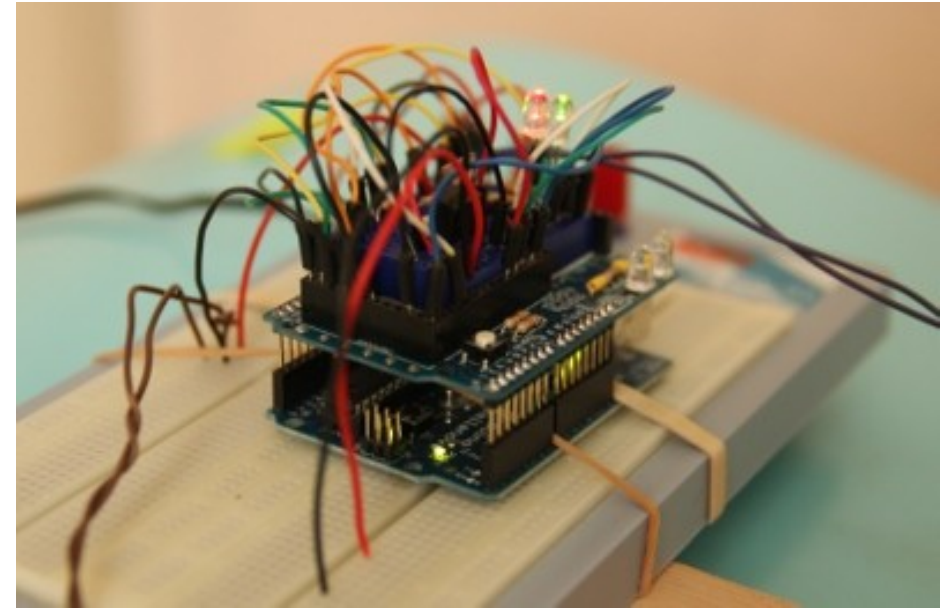
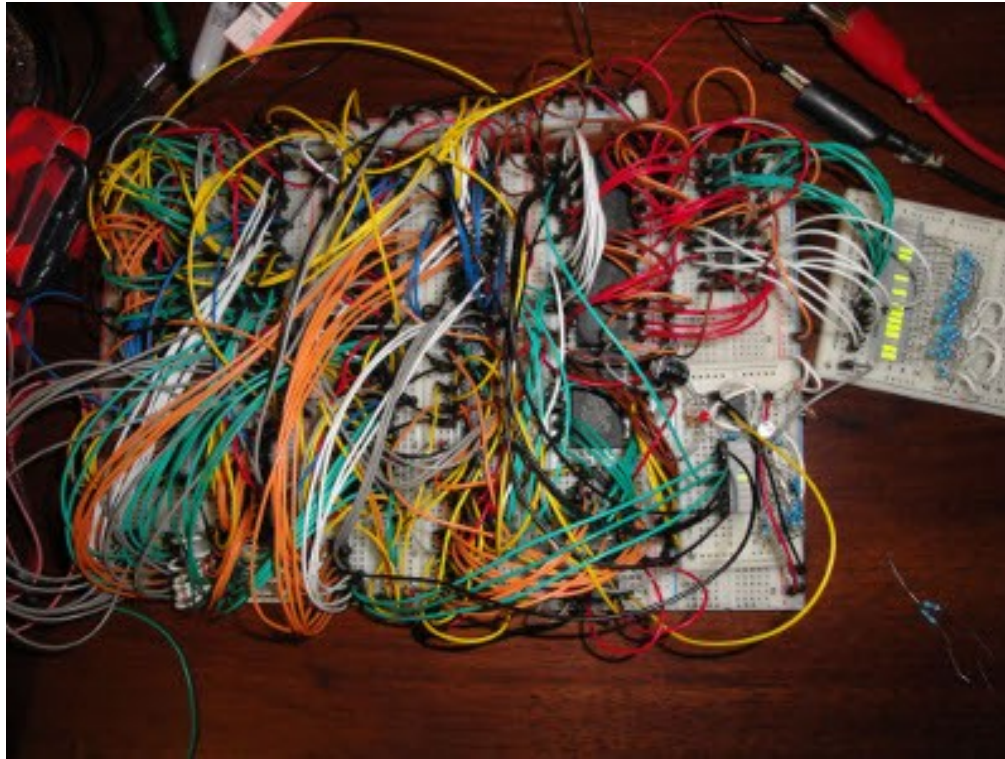


Arduino Nano

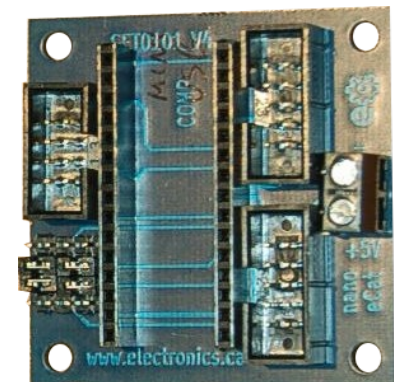
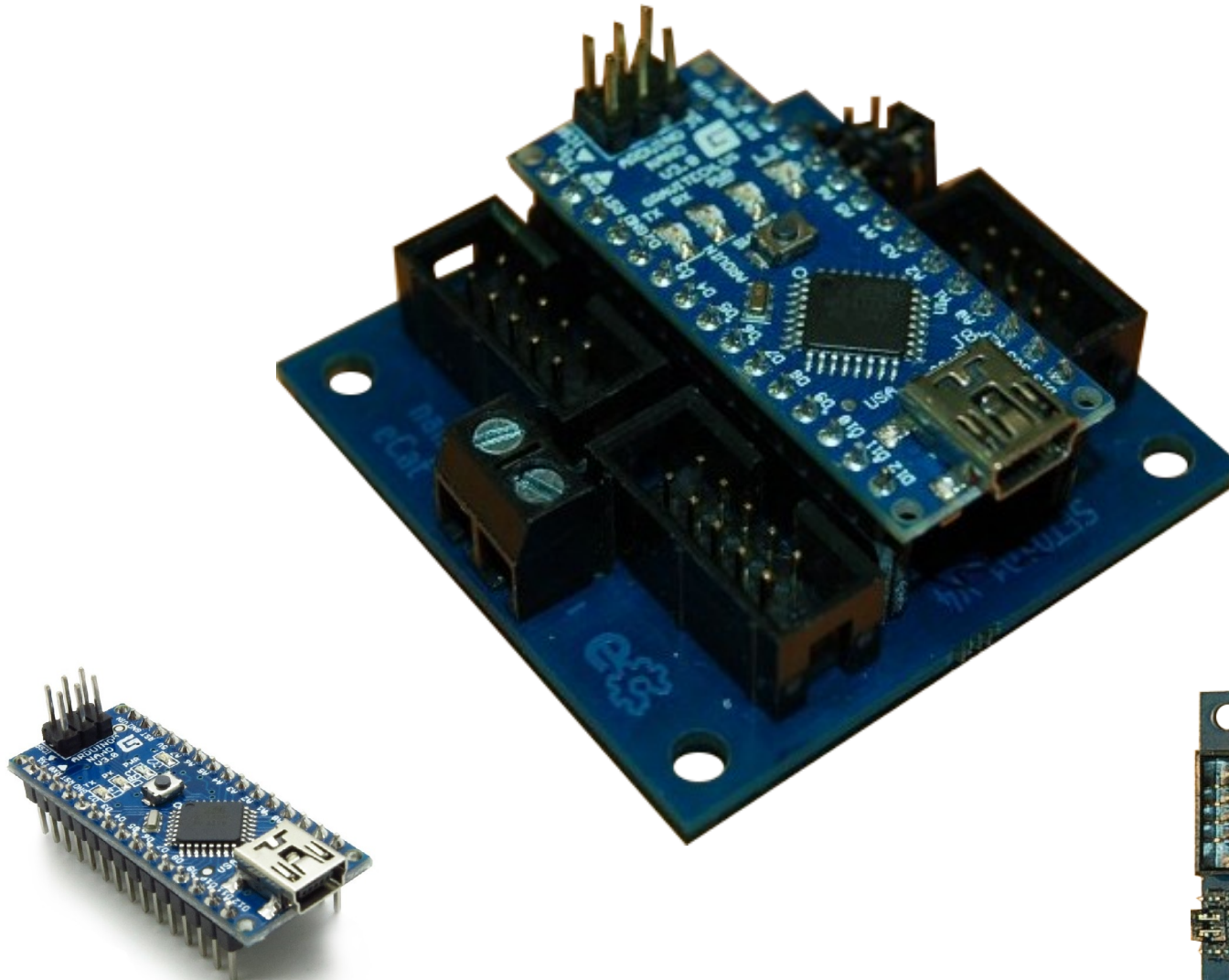




Maquinari lliure amb Arduino Nano Inconvenients per a novells, ... i experts



nano-eCat



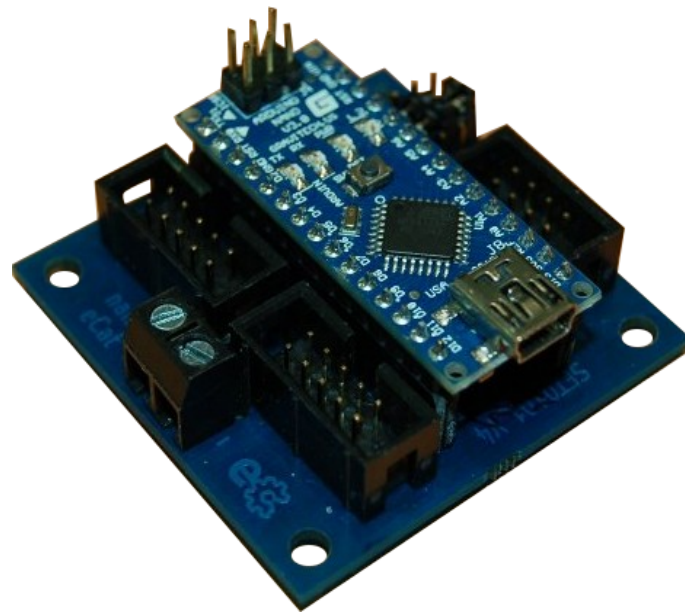


Maquinari lliure amb Arduino Nano

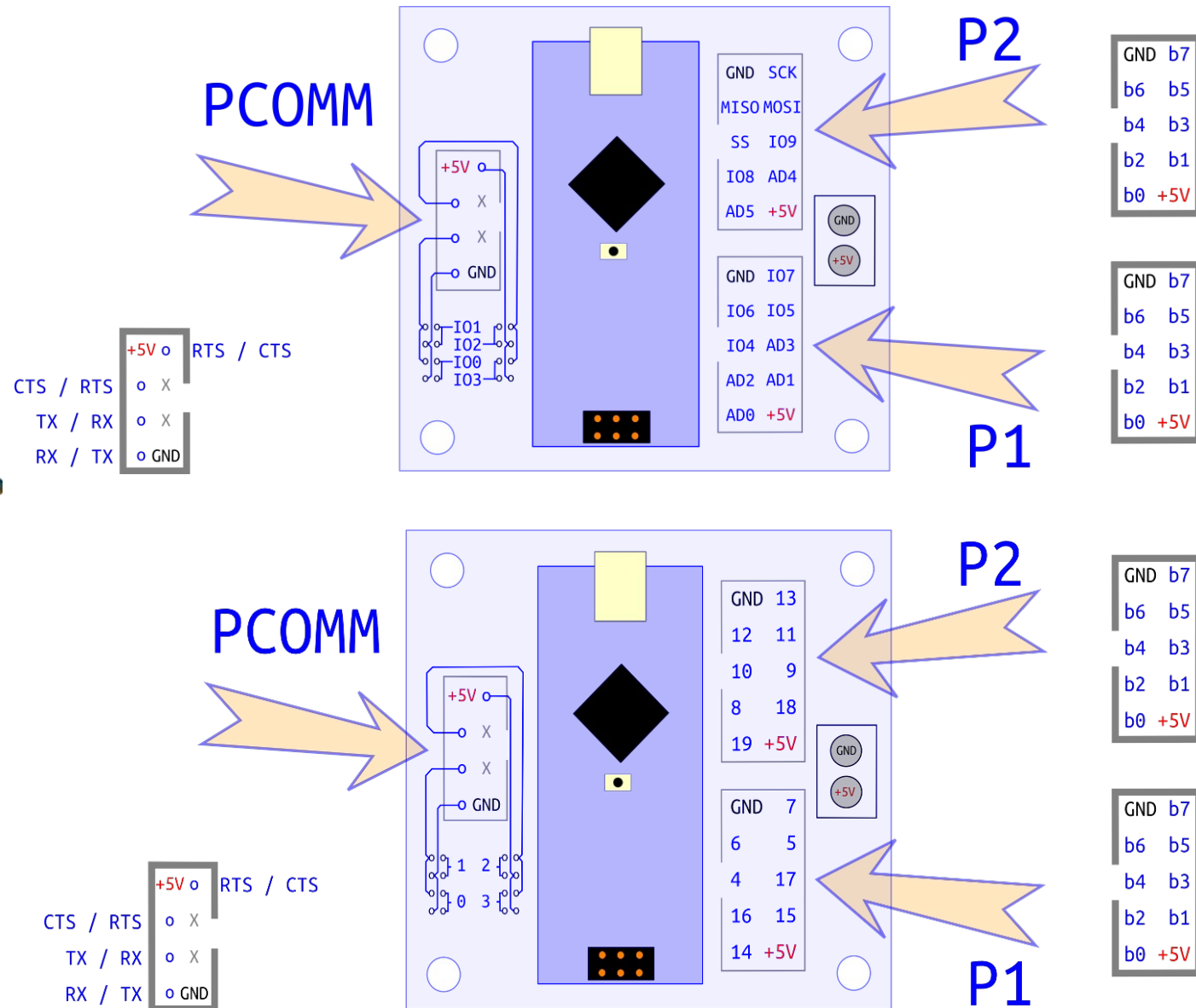
Plaques amb sistema de bus lliure eCat

nano-eCat

Placa 0101 v4



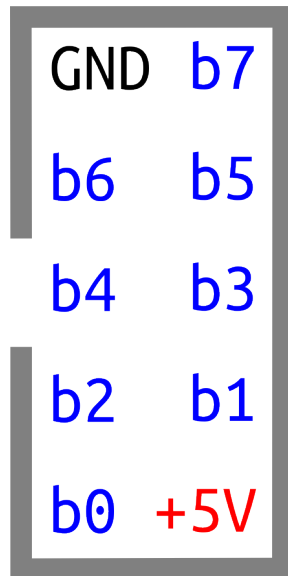
Placa convertidora de
l'Arduino Nano al
sistema de bus lliure
eCat System





Maquinari

BUS : Sistema digital que transfereix dades entre dispositius electrònics



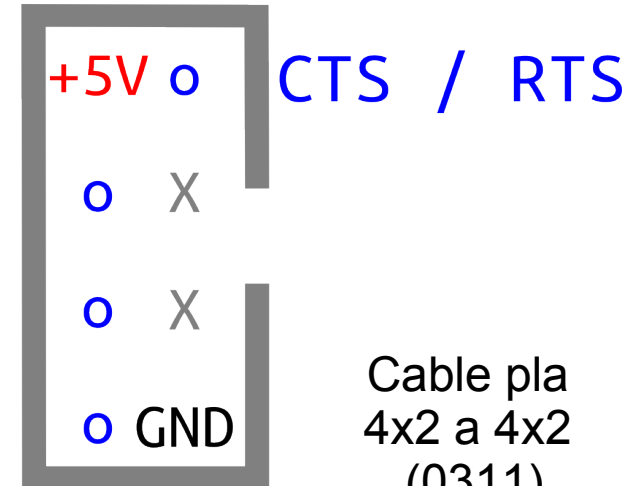
Cable pla
5x2 a 5x2
(0104A)



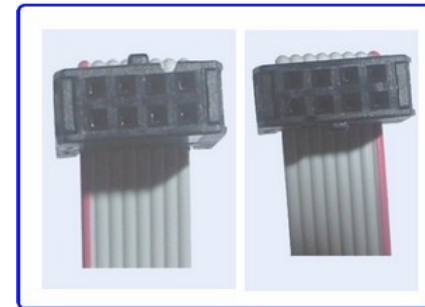
CTS / RTS

TX / RX

RX / TX



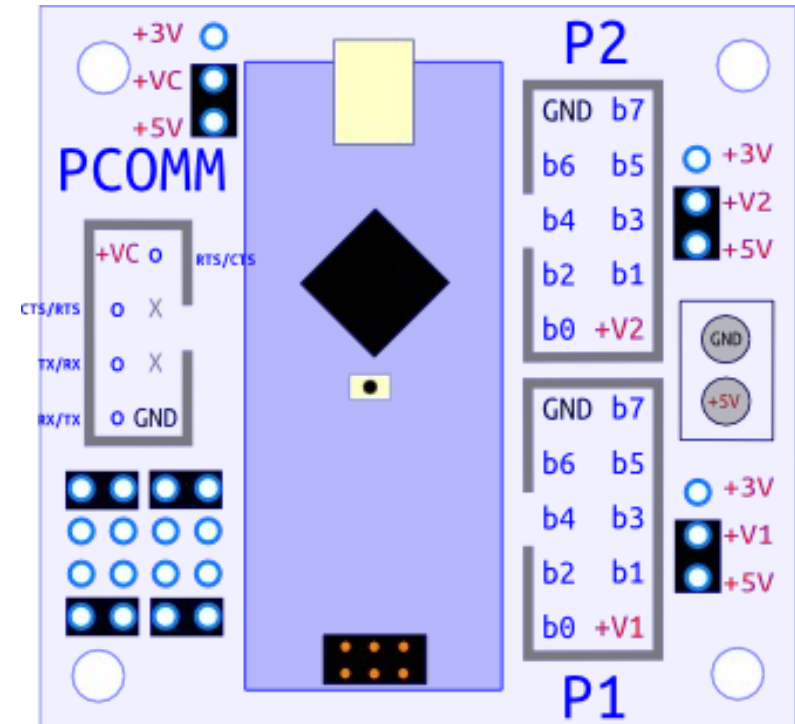
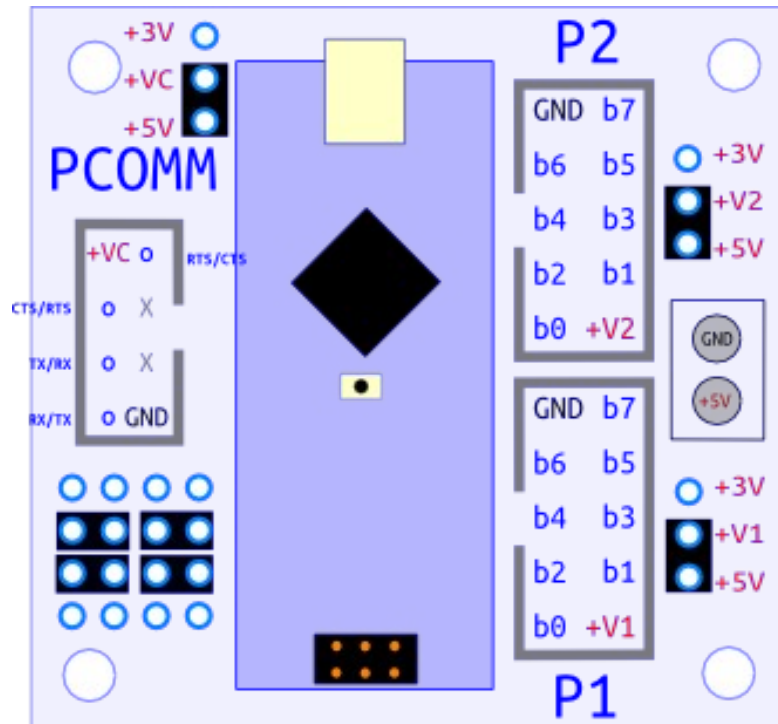
Cable pla
4x2 a 4x2
(0311)



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

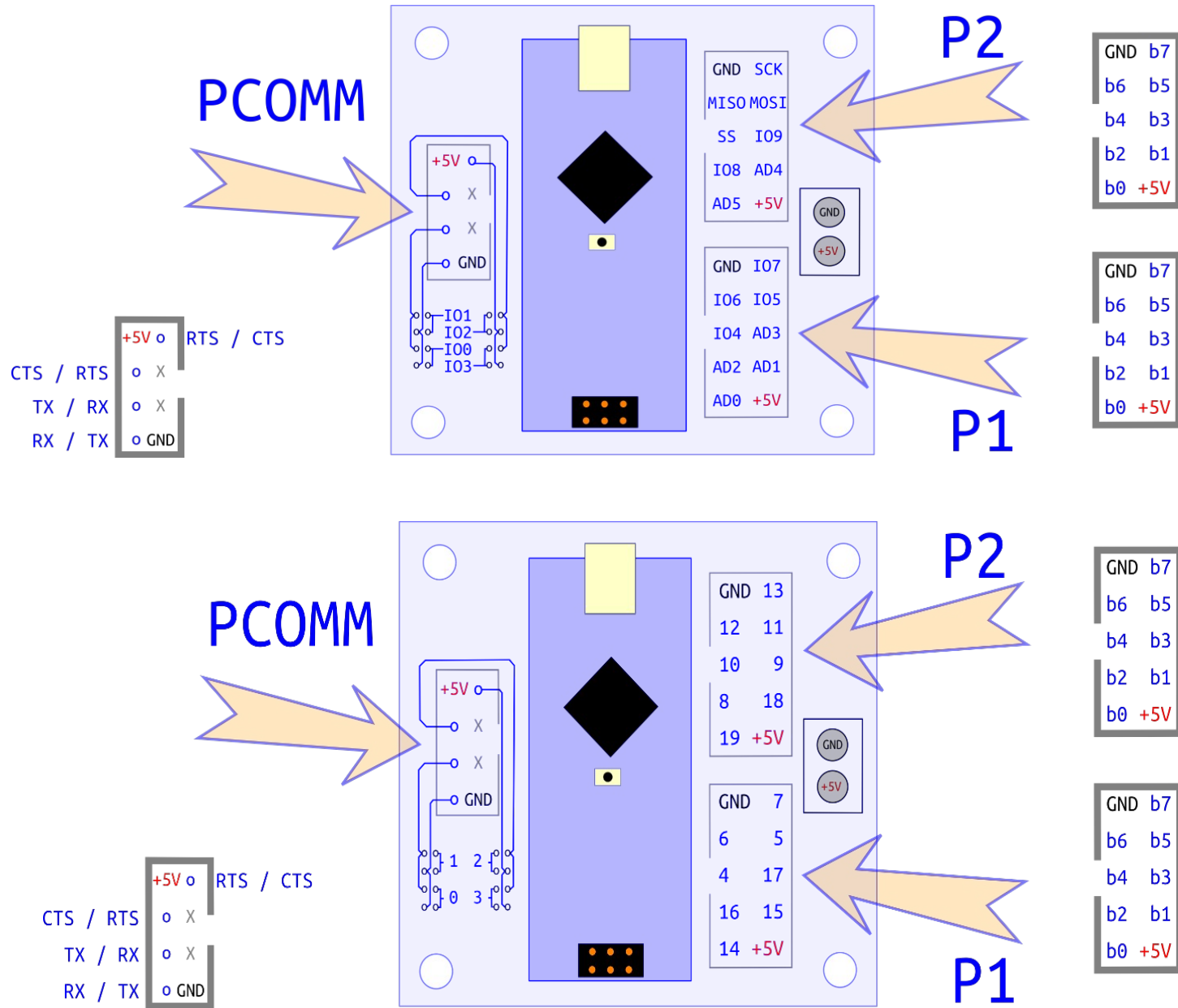


nano-eCat



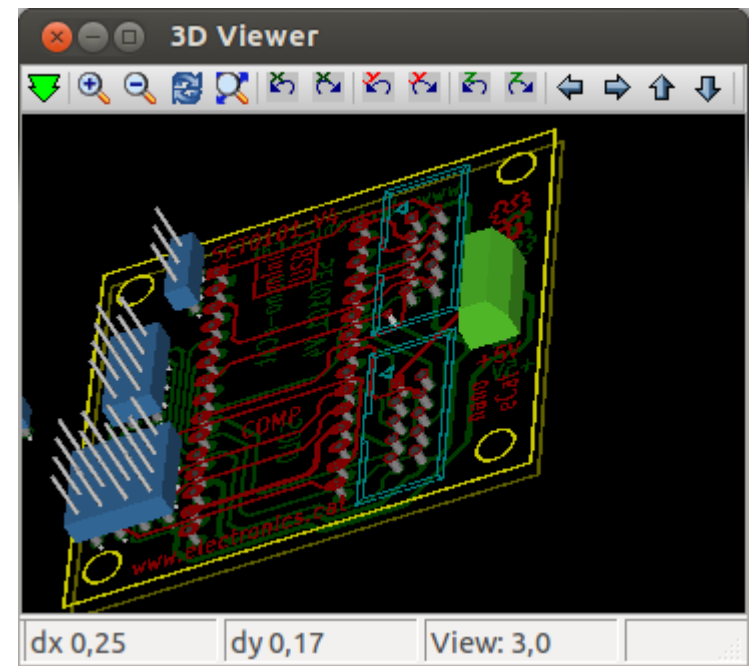
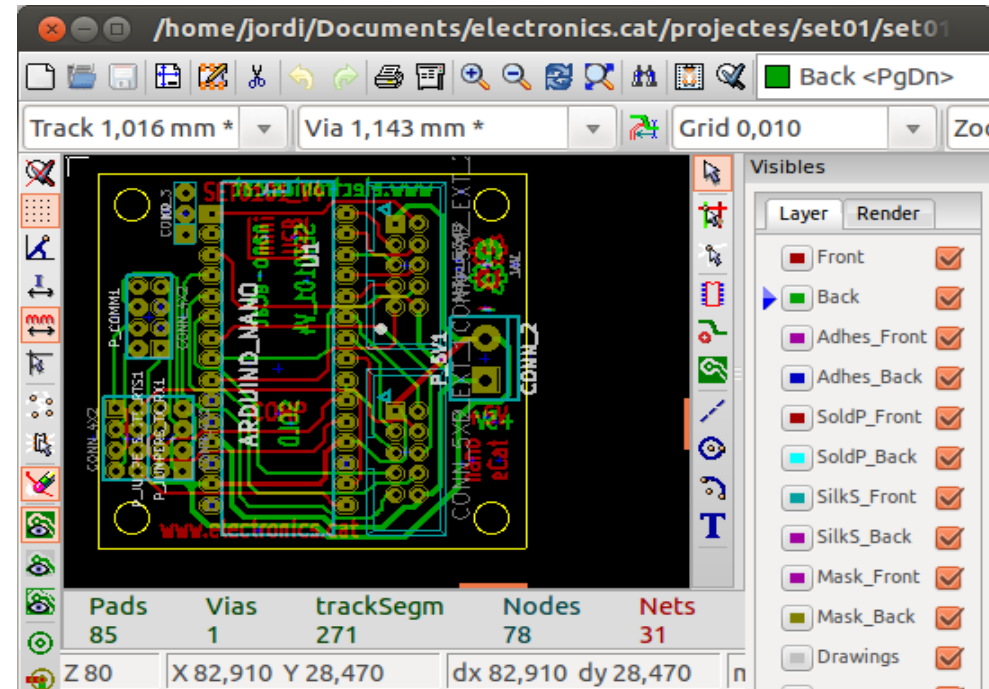
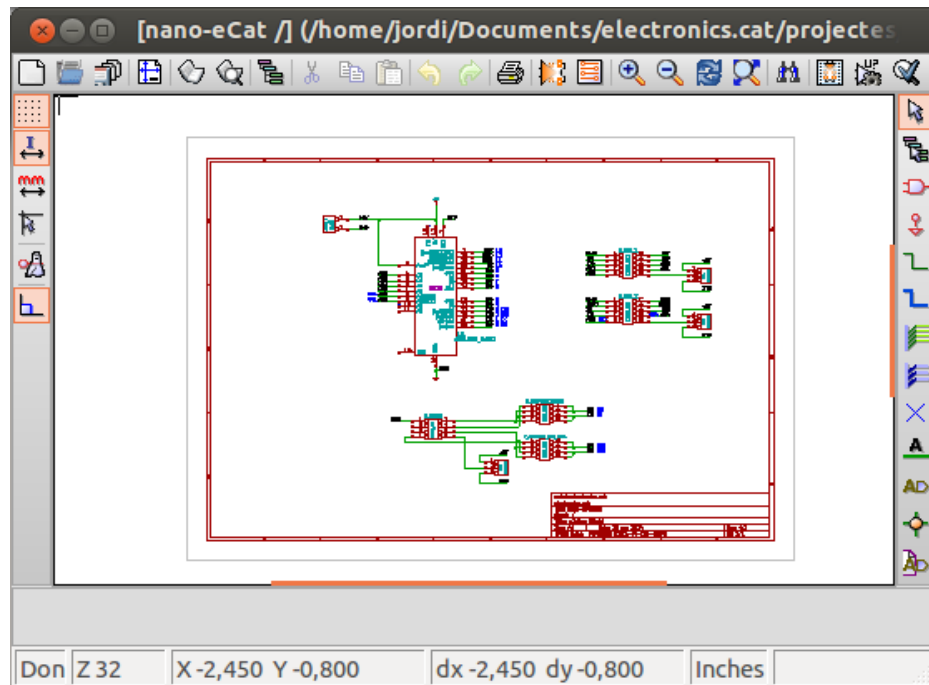


nano-eCat



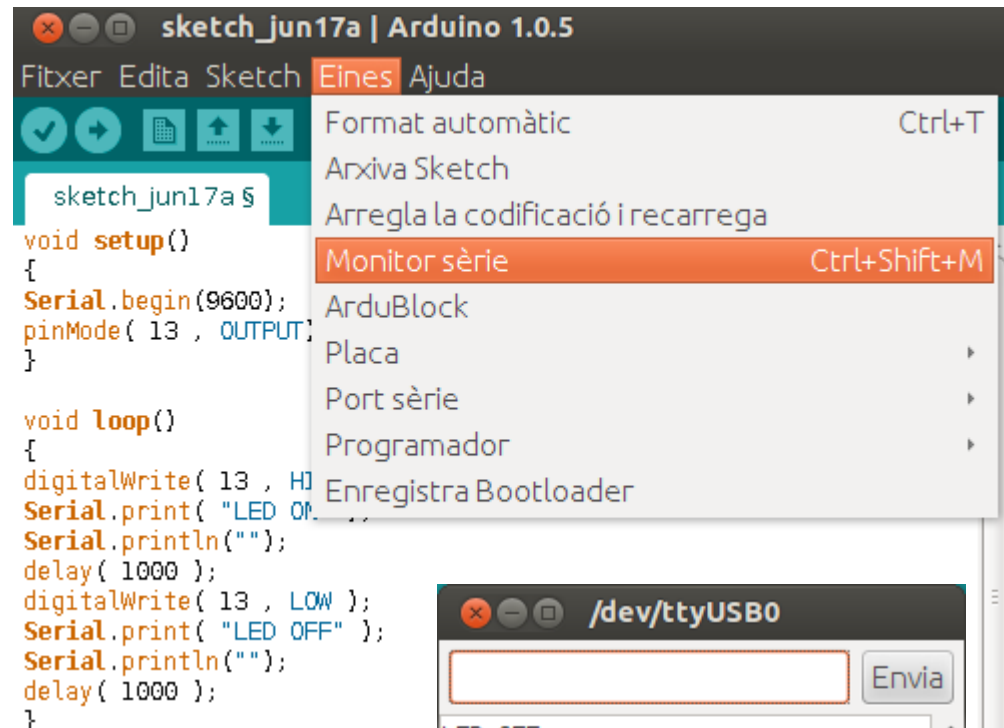
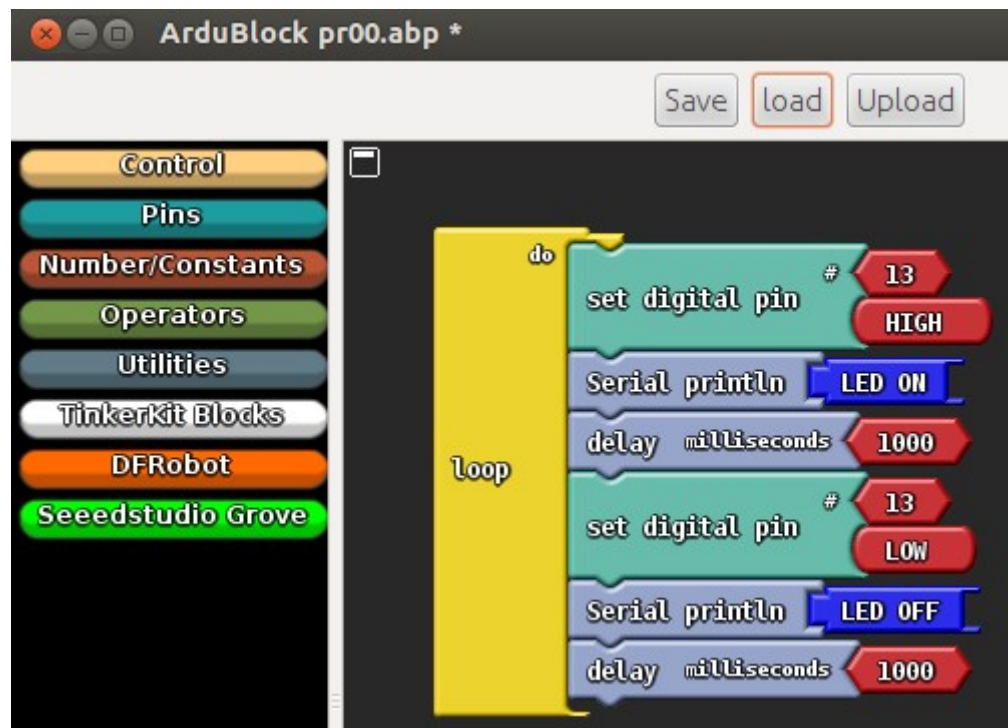


Dissenyat en KiCad

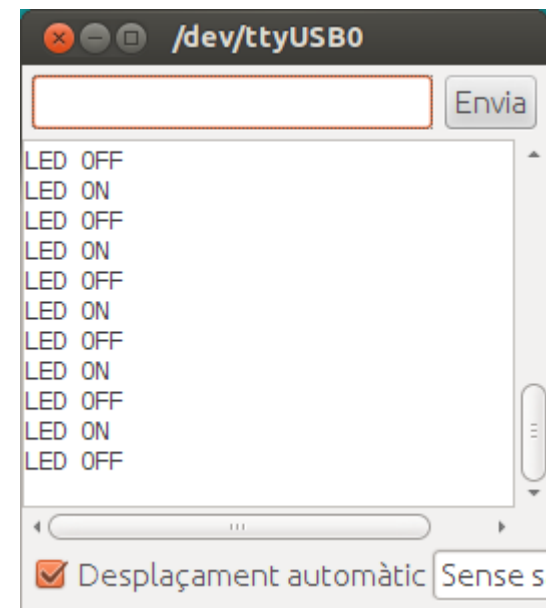
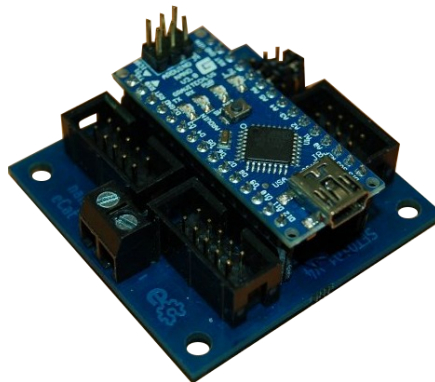




Eines per a programar



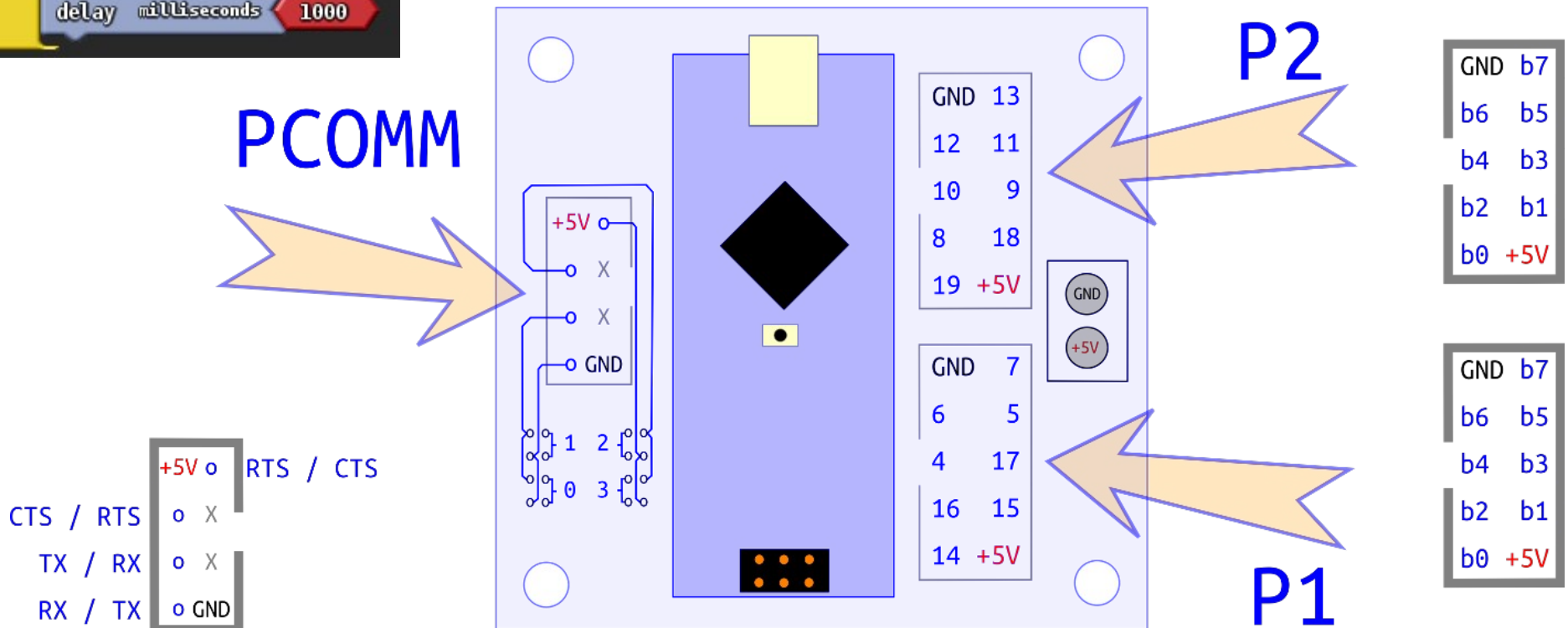
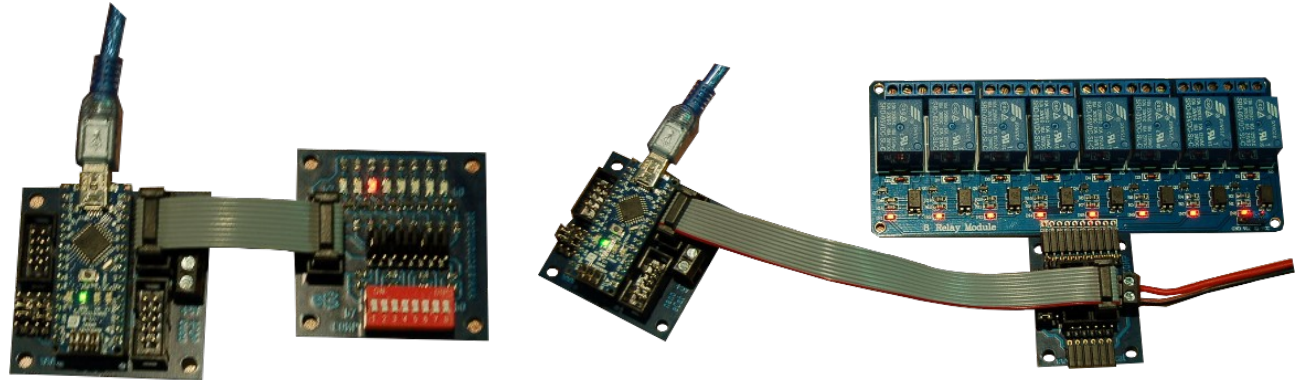
ArduBlock





ArduBlock

pr00.abp – Sortides digitals





ArduBlock

pr02.abp - Exercici

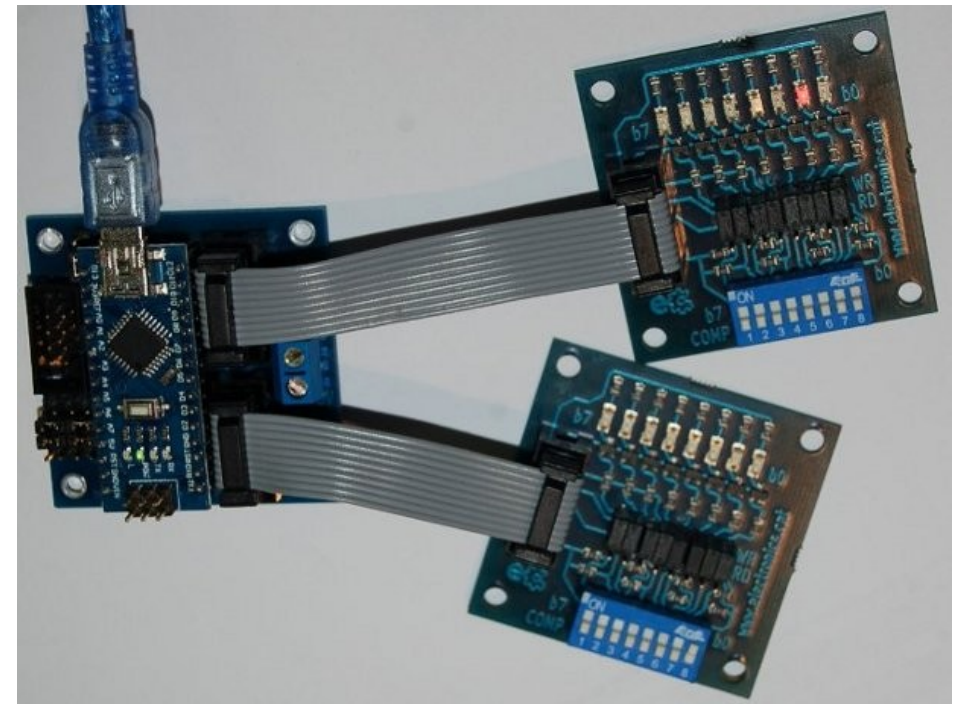
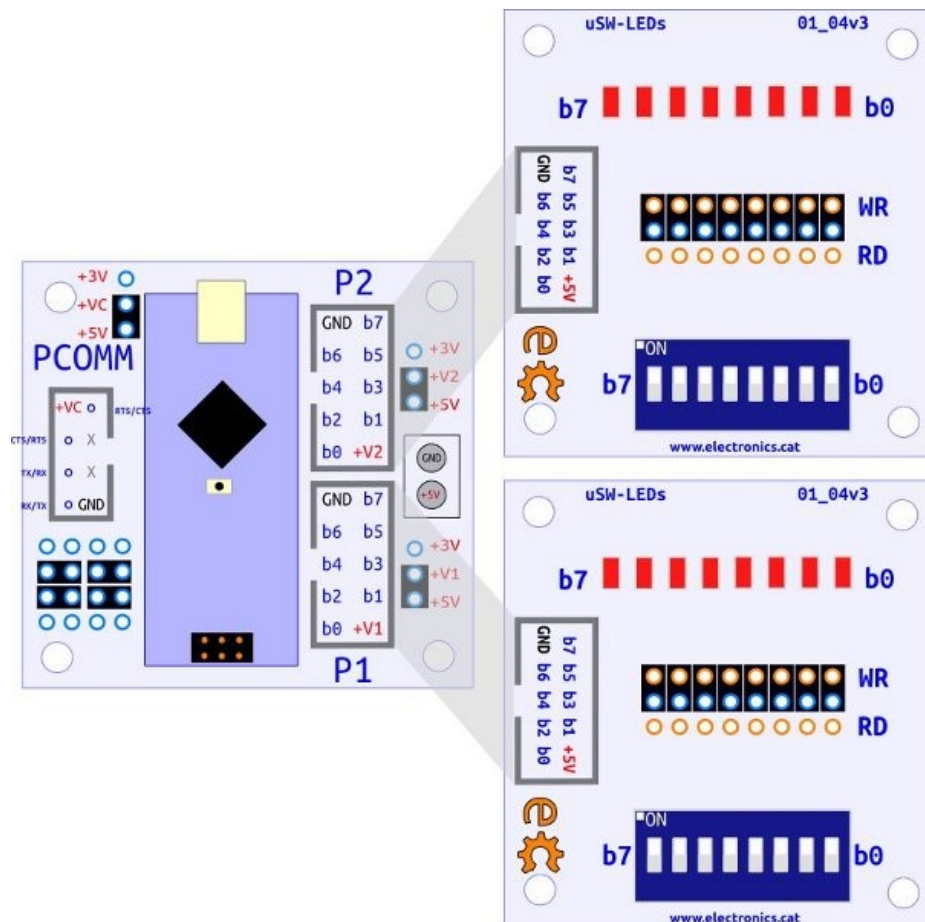


http://www.binefa.cat/php/arduino/ardublock/pr02_P2.abp
http://www.binefa.cat/php/arduino/ardublock/pr02_P1.abp



ArduBlock

pr02.abp - Exercici



Vídeo : <https://www.youtube.com/watch?v=efS0m-Zllq0>

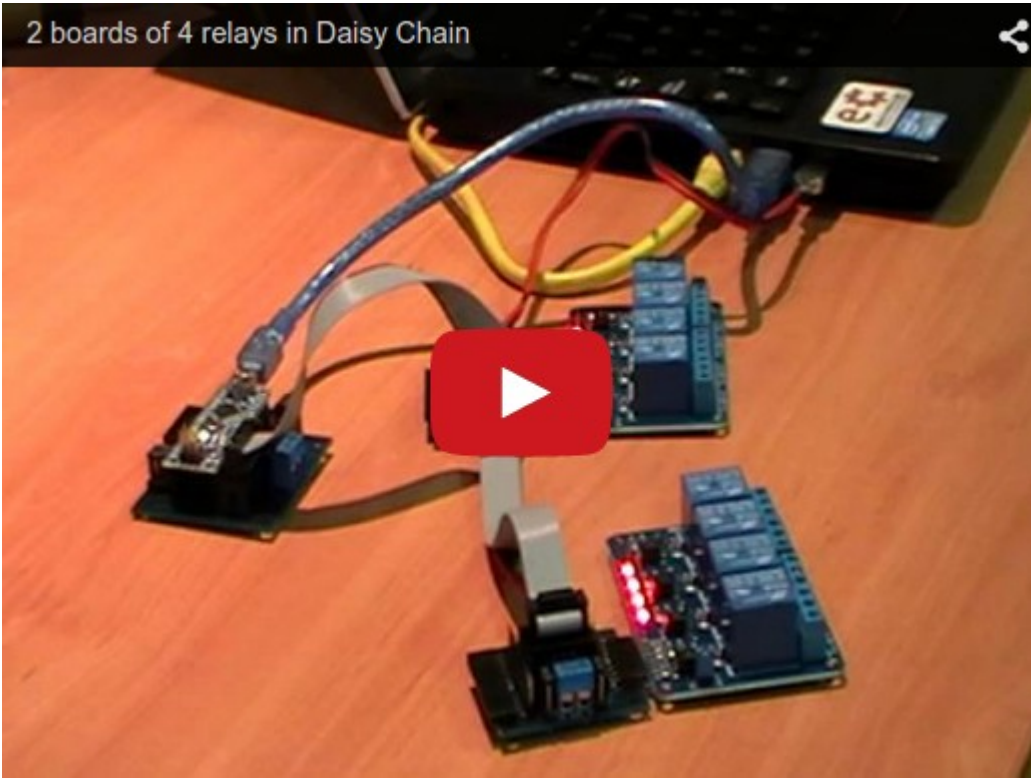
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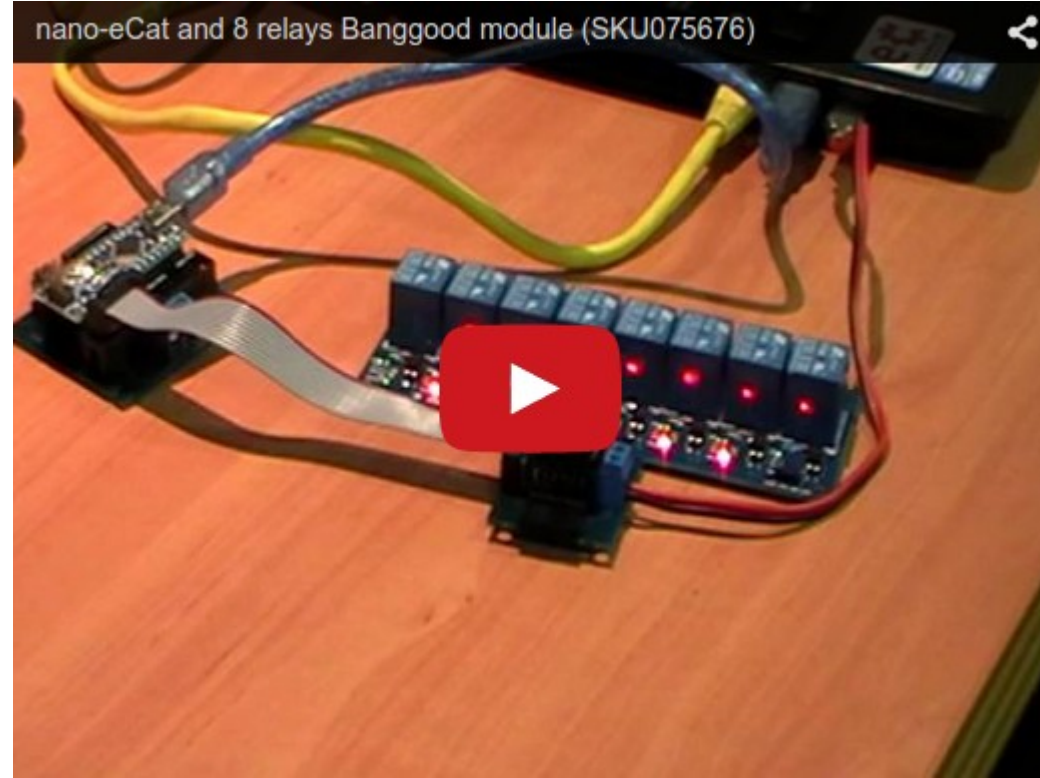
ArduBlock

pr02.abp - Exercici

2 boards of 4 relays in Daisy Chain



nano-eCat and 8 relays Banggood module (SKU075676)



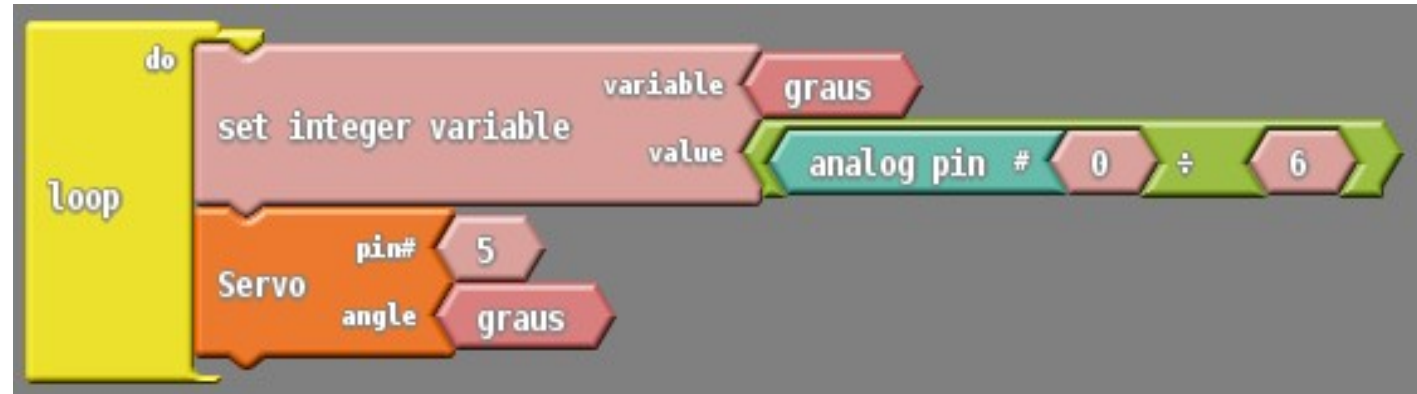
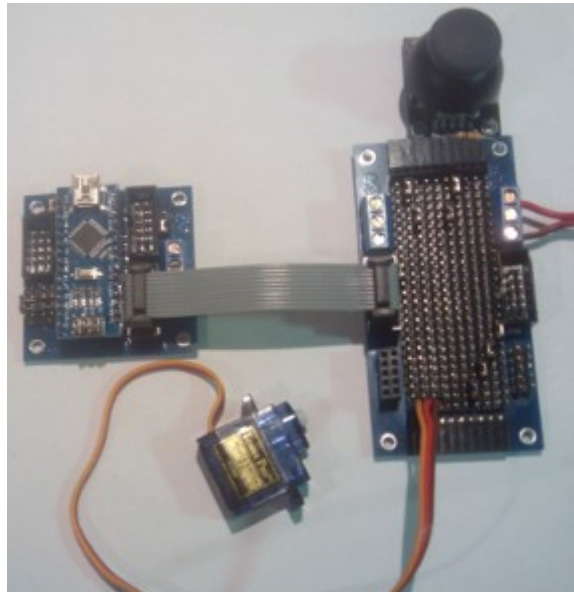
<http://binefa.cat/blog/>

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

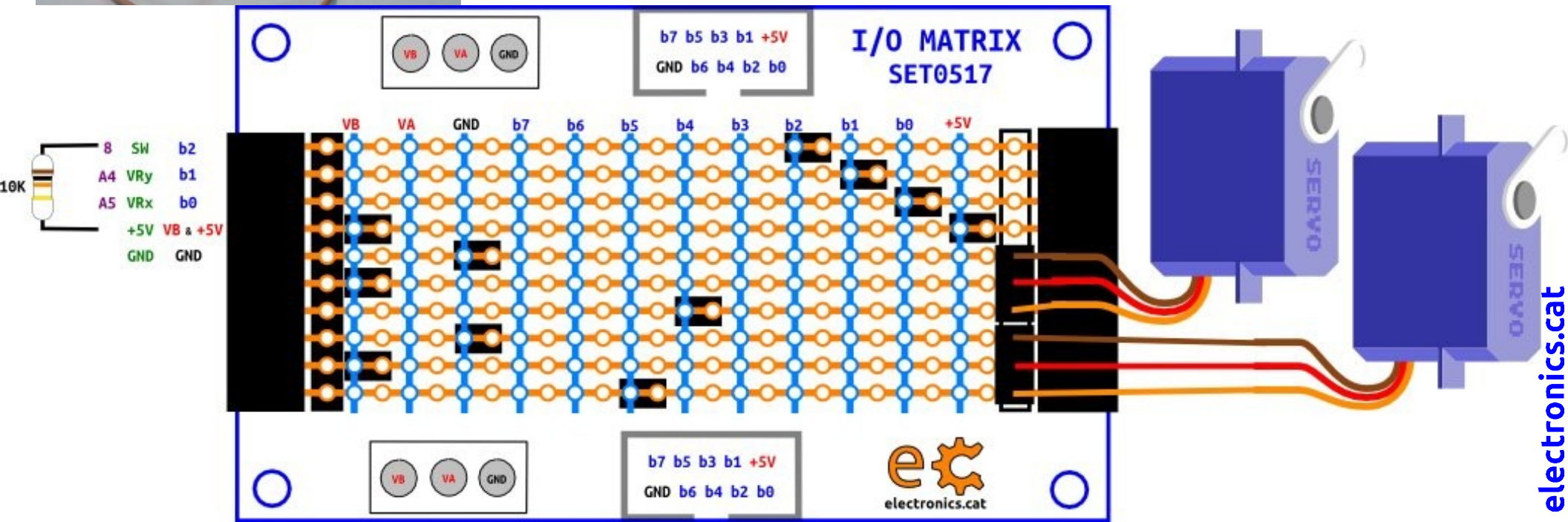


ArduBlock

pr04joystickServo.abp - Exercici



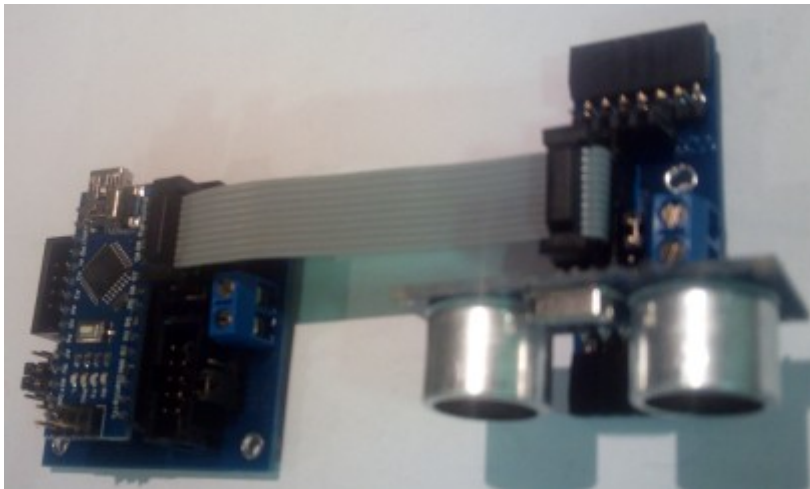
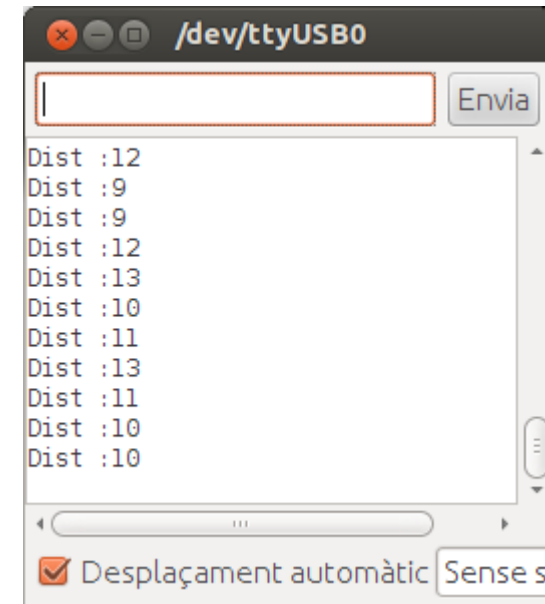
<http://www.binefa.cat/php/arduino/ardublock/pr04joystickServo.abp>





ArduBlock

pr05ultrasons.abp Mesura ultrasònica



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

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



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





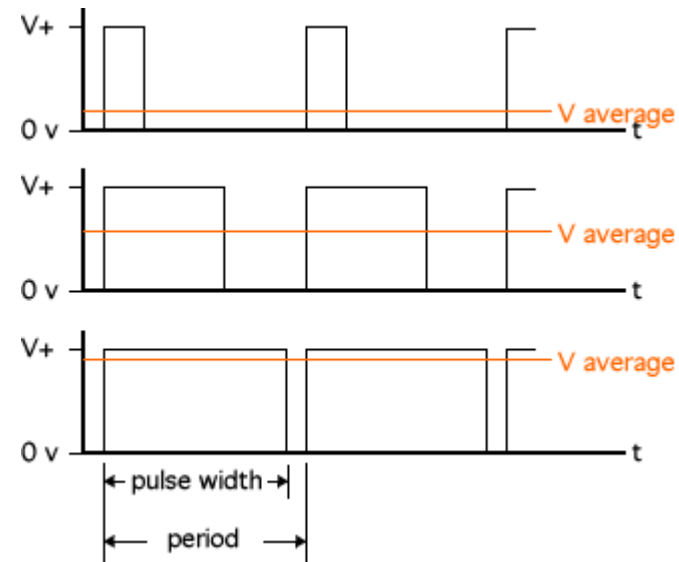
Biblioteca **ecat.h** per a l'IDE d'Arduino

```
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>

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 }
```





Eines per a simular

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Design and simulate circuit boards with our breadboard, schematic and PCB editor. Share your designs and collaborate as a team.

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Complete and compact simulation

```
// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output:
  pinMode(LED1, OUTPUT);
  pinMode(LED2, OUTPUT);
  pinMode(LED3, OUTPUT);
  pinMode(LED4, OUTPUT);
  pinMode(LED5, OUTPUT);
  pinMode(LED6, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(LED1, HIGH);
  delay(1000);
  digitalWrite(LED1, LOW);
  delay(1000);
}
```

POWER ANALOG IN

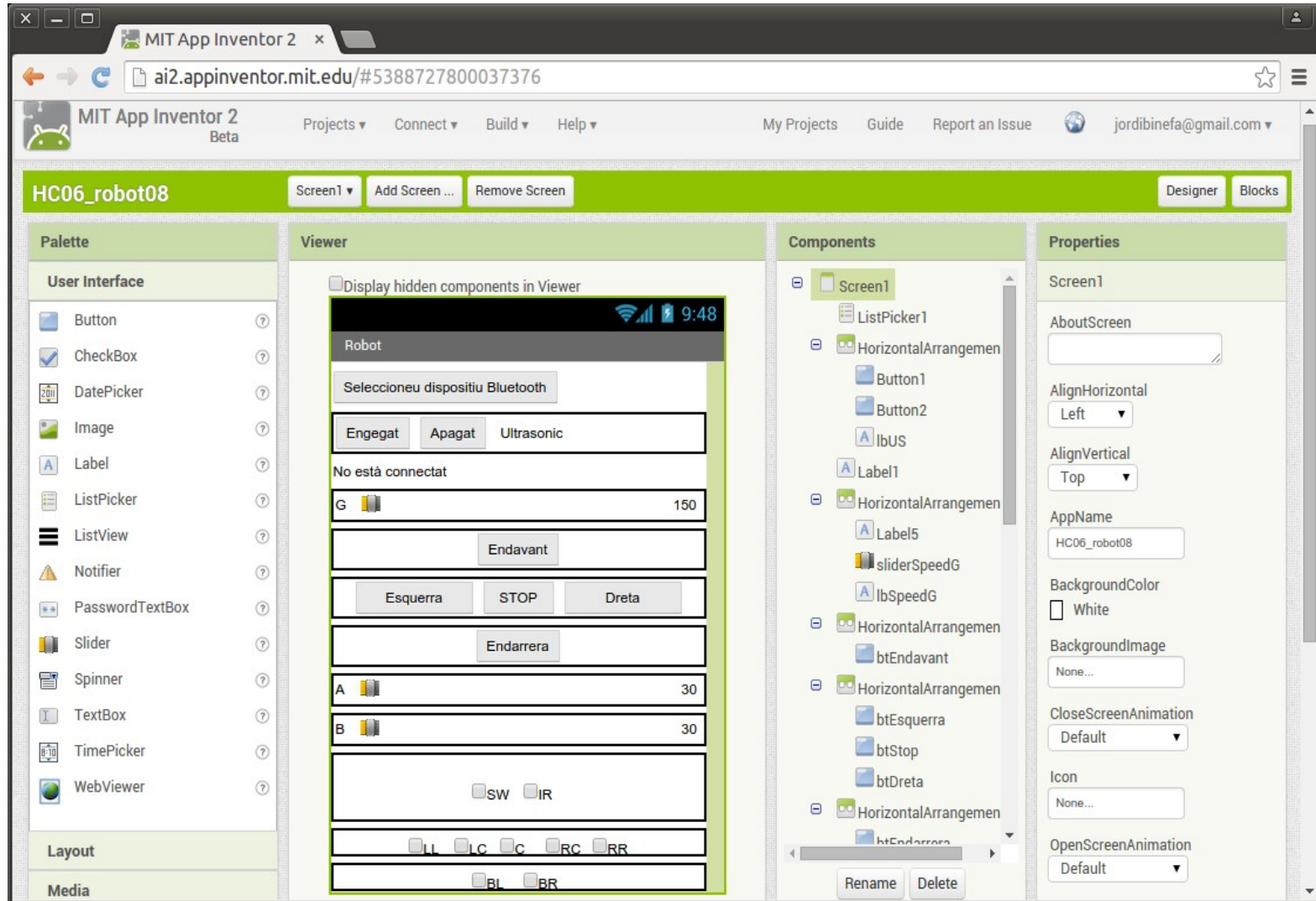
DRAW CONDUCTIVE TRACES

Easily create and simulate Circuit Scribe sketches online.

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



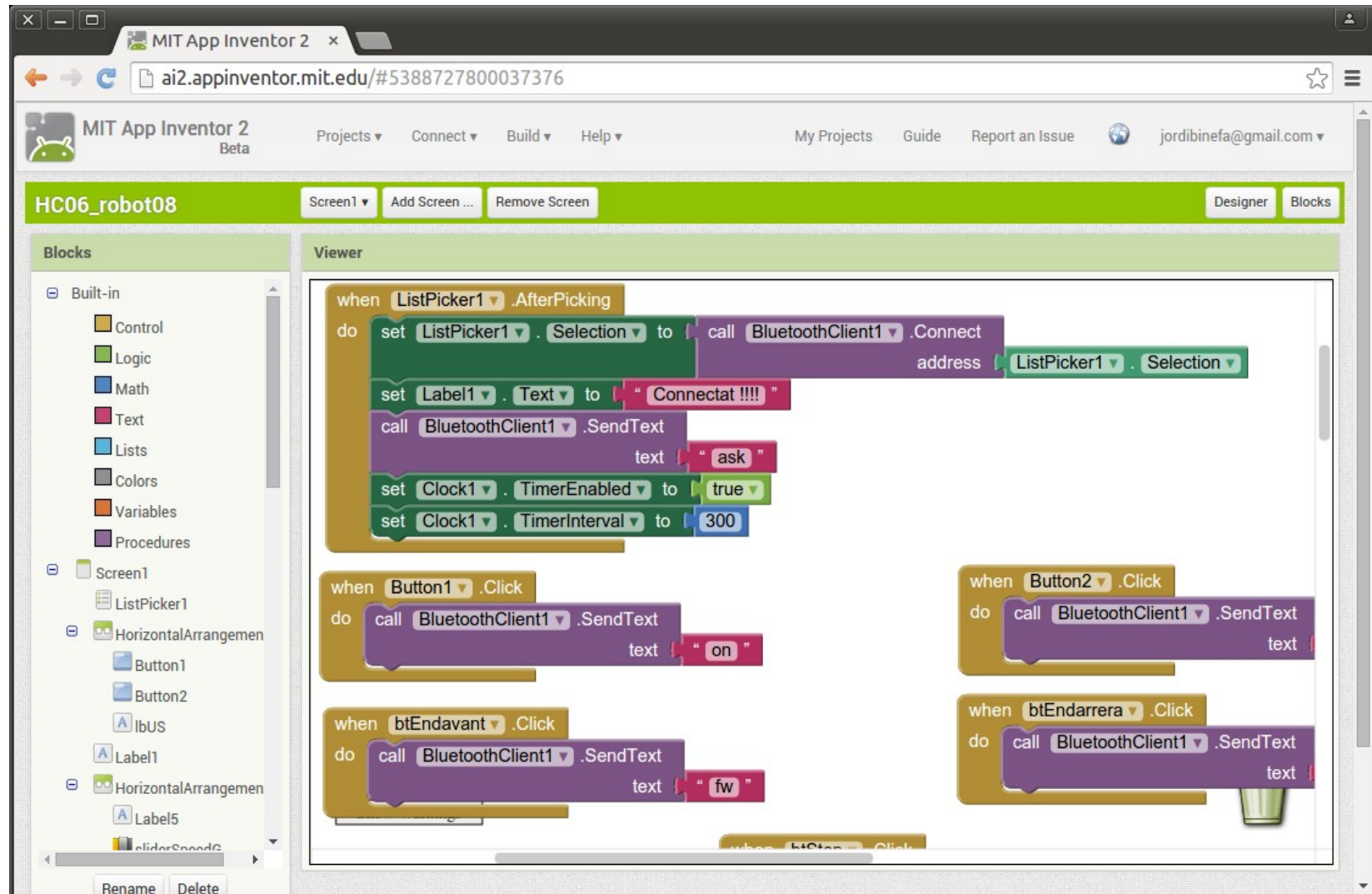
Programar al mòbil Android App Inventor



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



Programar al mòbil Android App Inventor



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

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



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 }
```

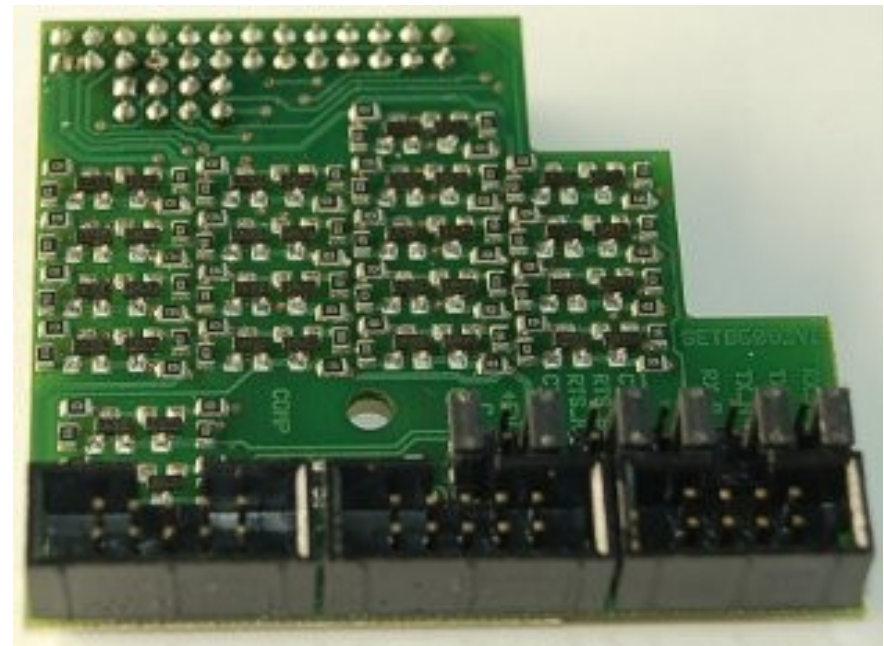
<http://electronics.cat/downloads/code/robot08.ino>

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

Maquinari

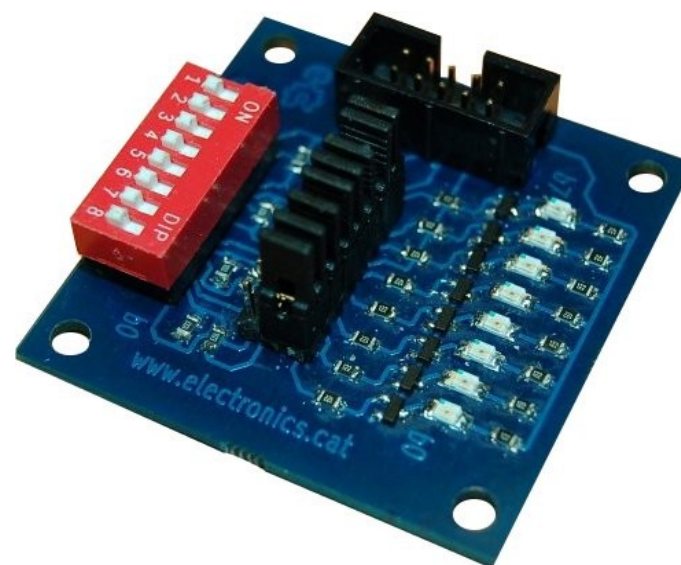
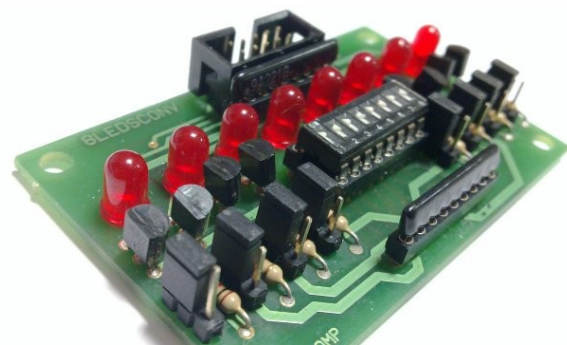
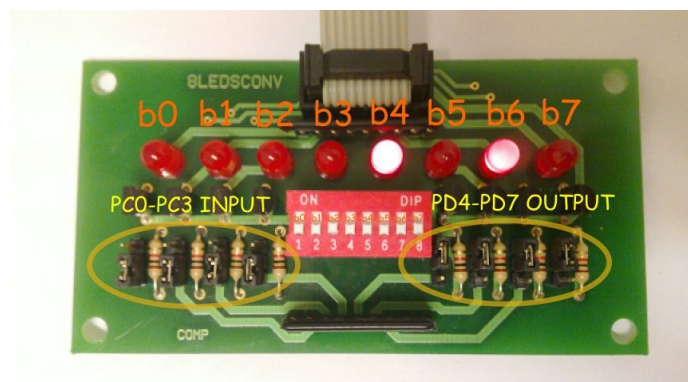
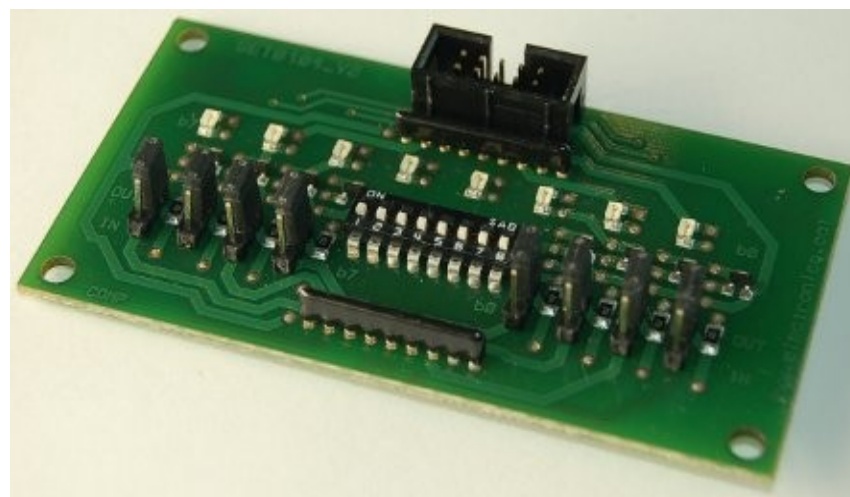
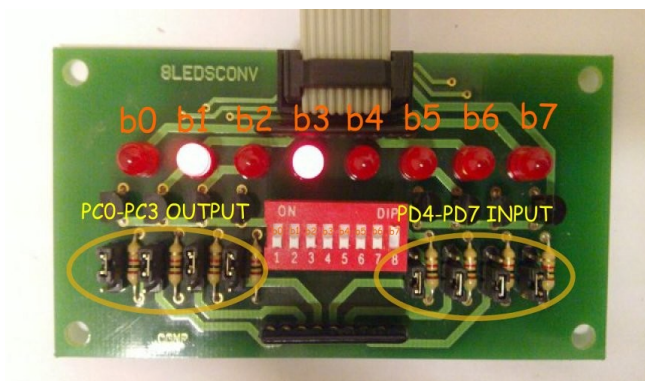
3Bpi - Pi de les Tres Branques

Placa traductora de nivells per a Raspberry Pi
Placa set05_08_v2



Maquinari

Leds i microrruptors - Placa set01_04

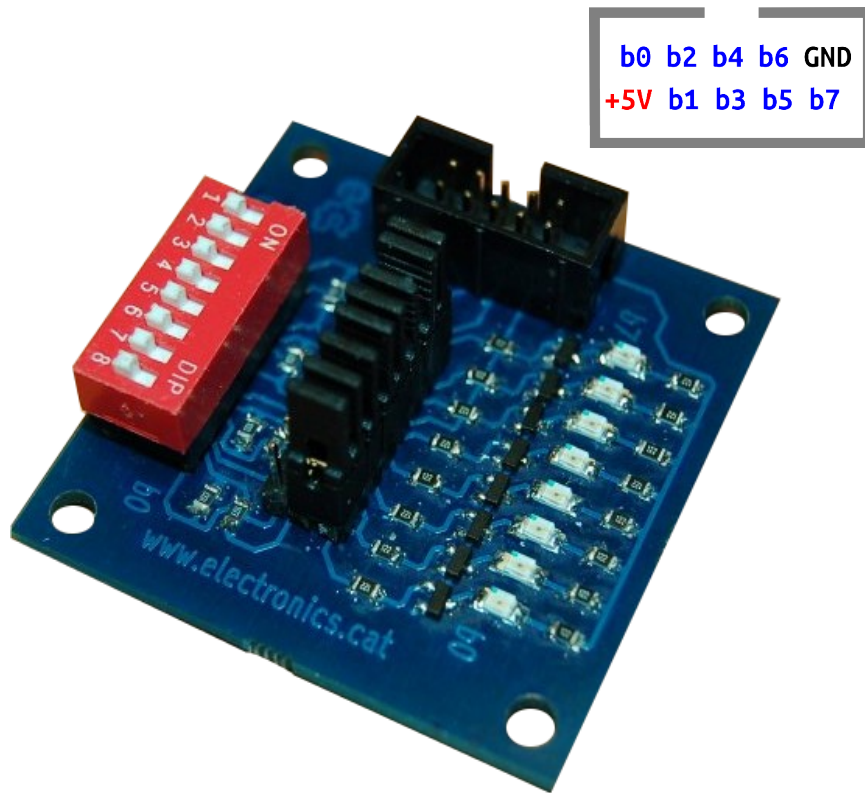




Maquinari lliure amb Arduino Nano Plaques amb sistema de bus lliure eCat

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
microrruptor (ON : zero lògic,
OFF : u lògic).**

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

Maquinari

Concepte de relé

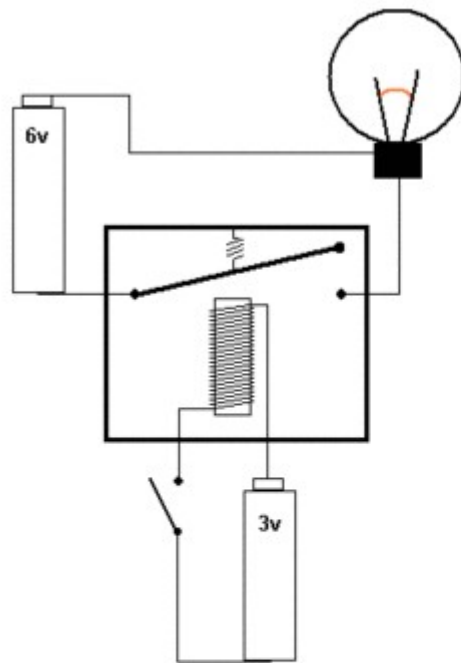


Figure 1: Relay off

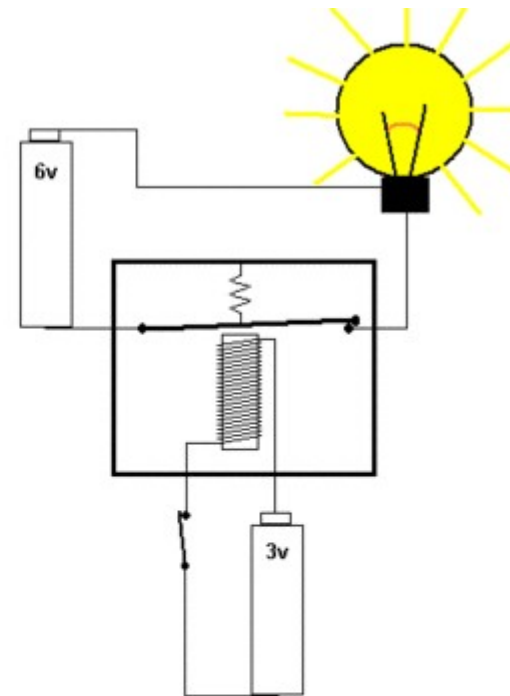
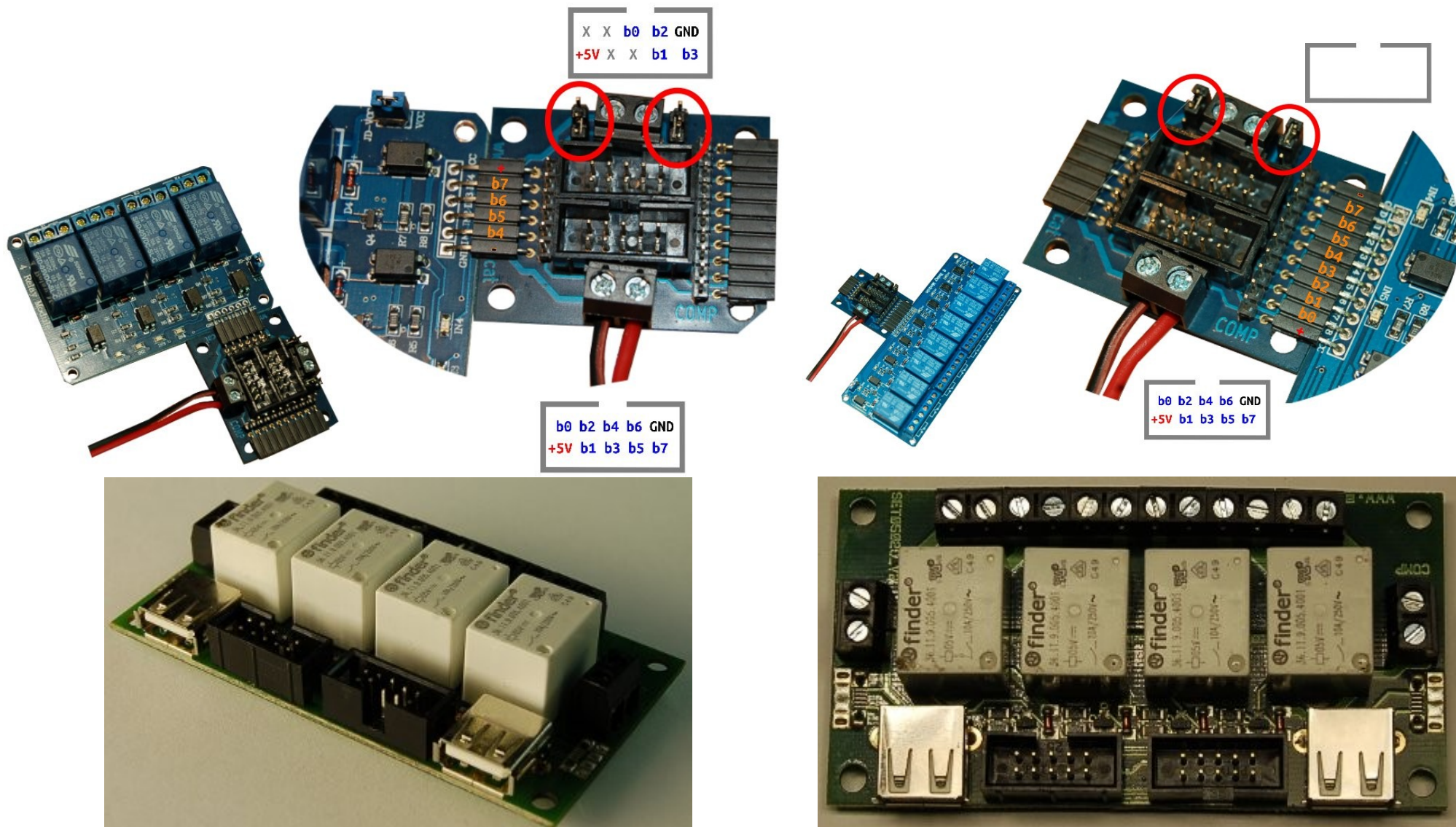


Figure 2: Relay on

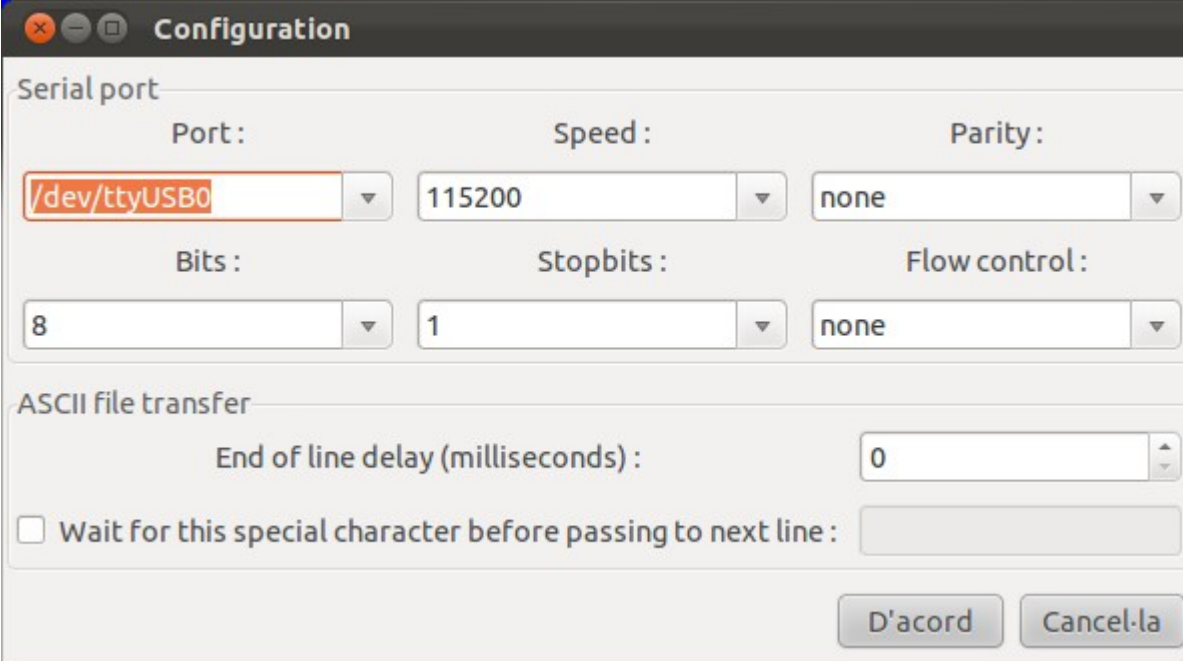
Maquinari

4 Relés - Placa set05_02



Comunicacions sèrie

GtkTerm



The image shows a 'Configuration' dialog box for the GtkTerm application. The dialog is titled 'Configuration' and has a standard window control bar. It is divided into two main sections: 'Serial port' and 'ASCII file transfer'.

Serial port section:

- Port:** A dropdown menu showing '/dev/ttyUSB0'.
- Speed:** A dropdown menu showing '115200'.
- Parity:** A dropdown menu showing 'none'.
- Bits:** A dropdown menu showing '8'.
- Stopbits:** A dropdown menu showing '1'.
- Flow control:** A dropdown menu showing 'none'.

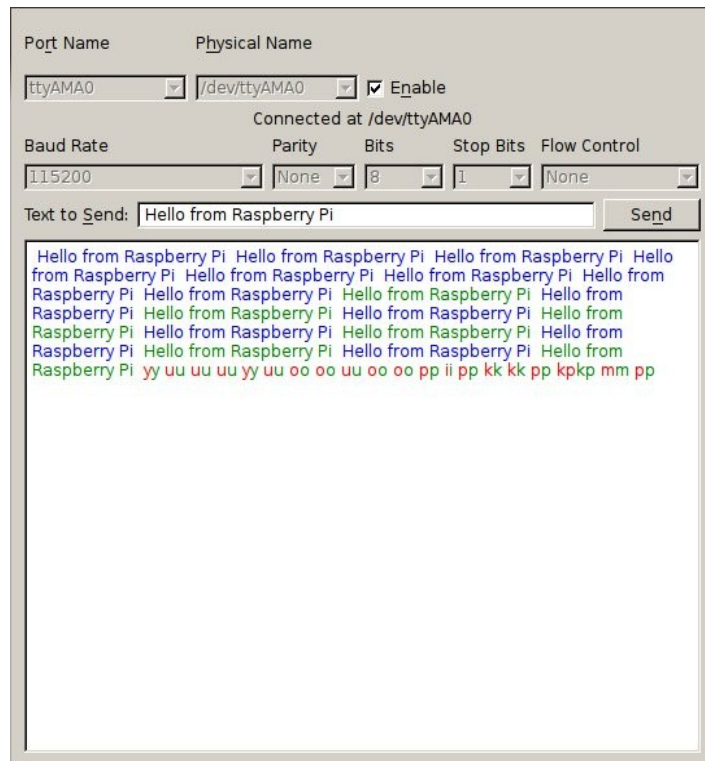
ASCII file transfer section:

- End of line delay (milliseconds):** A spin box showing '0'.
- Wait for this special character before passing to next line:** An unchecked checkbox followed by an empty text input field.

At the bottom right of the dialog, there are two buttons: 'D'acord' (Agree) and 'Cancel·la' (Cancel).

Comunicacions sèrie

qtTerm



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

Exemple de maquinari lliure emprant programari lliure

Trepant / fresadora - qtCnc

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

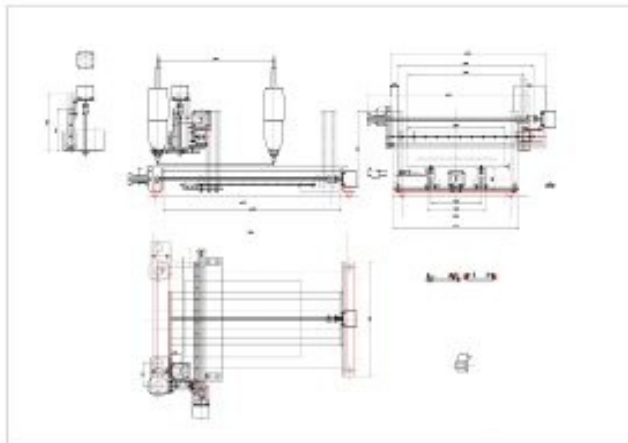


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Torn de preguntes ...



... i sessió pràctica.

COMIAT

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Correu electrònic de contacte : jordibinefa@electronics.cat

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