

TANGIBLE DIGITAL ENVIRONMENT SHARED GEOMETRY

Joan Gelabert & Jesús Arbués

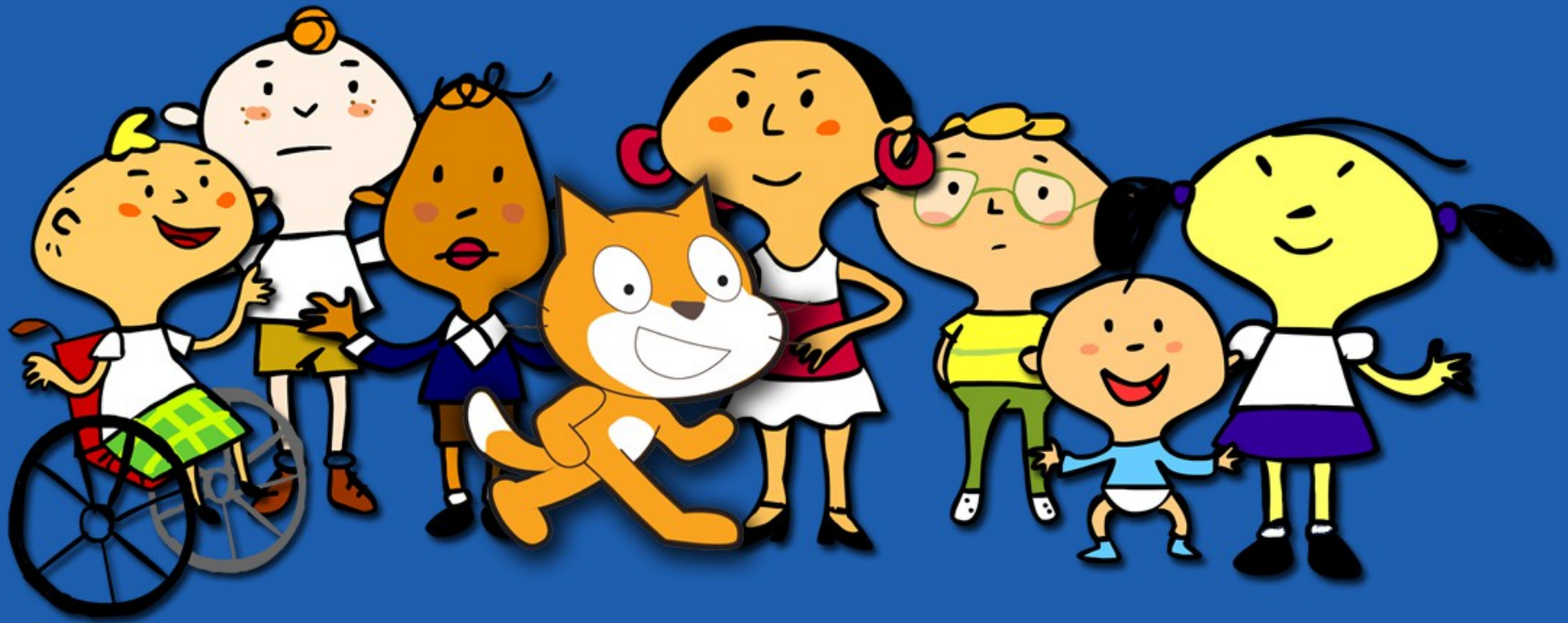


INDEX

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 1. ARDUINO
 2. DRIVERS
 3. FIRMWARE
 4. RFID
 5. PHYSICAL OBJECTS
 6. SCRATCH
- CONFIGURATION
CUSTOMIZATION
DEMONSTRATION

0. INTRODUCTION

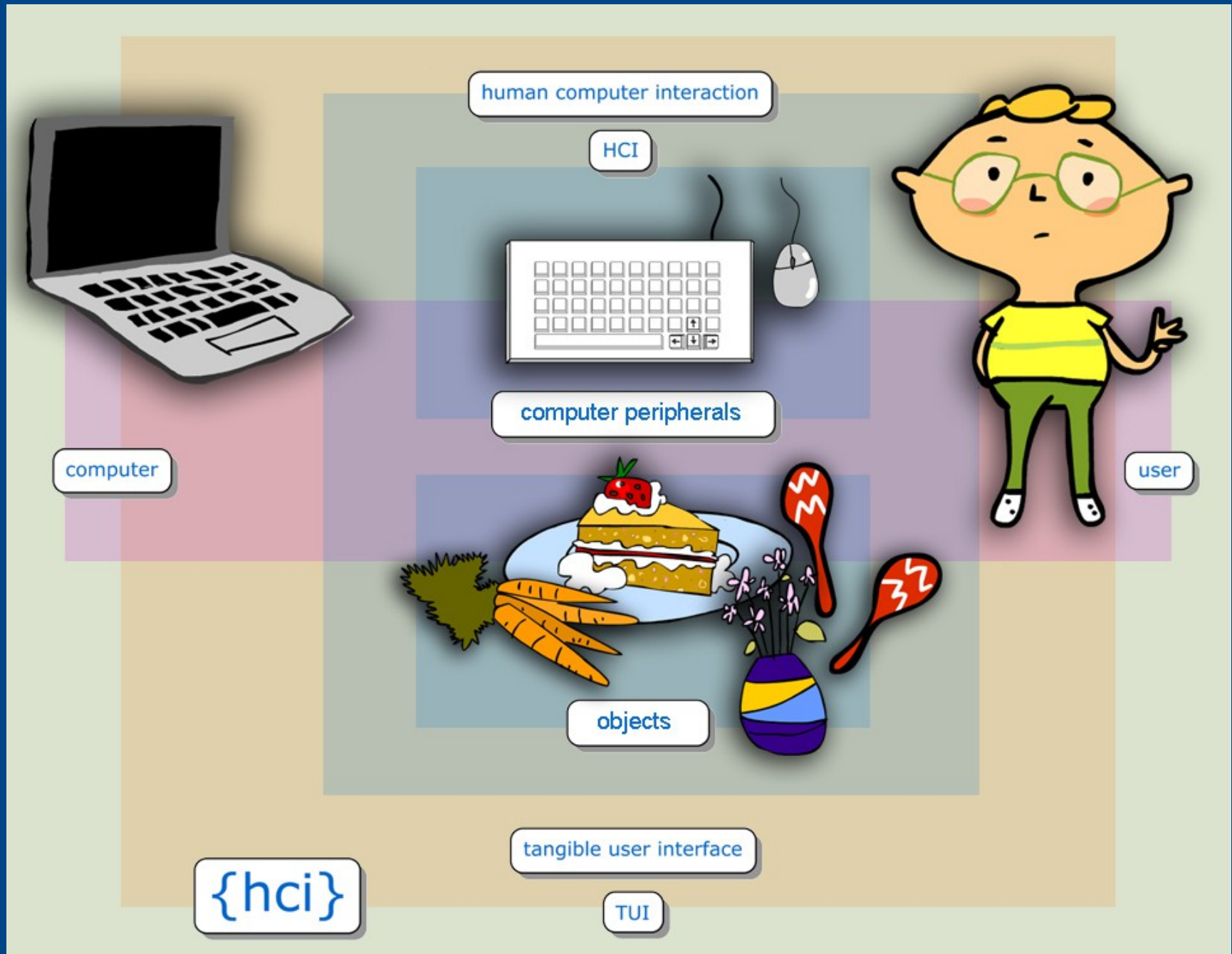
OBJECTIVES:
DIGITAL INCLUSION



INCLUSIÓN
DIGITAL

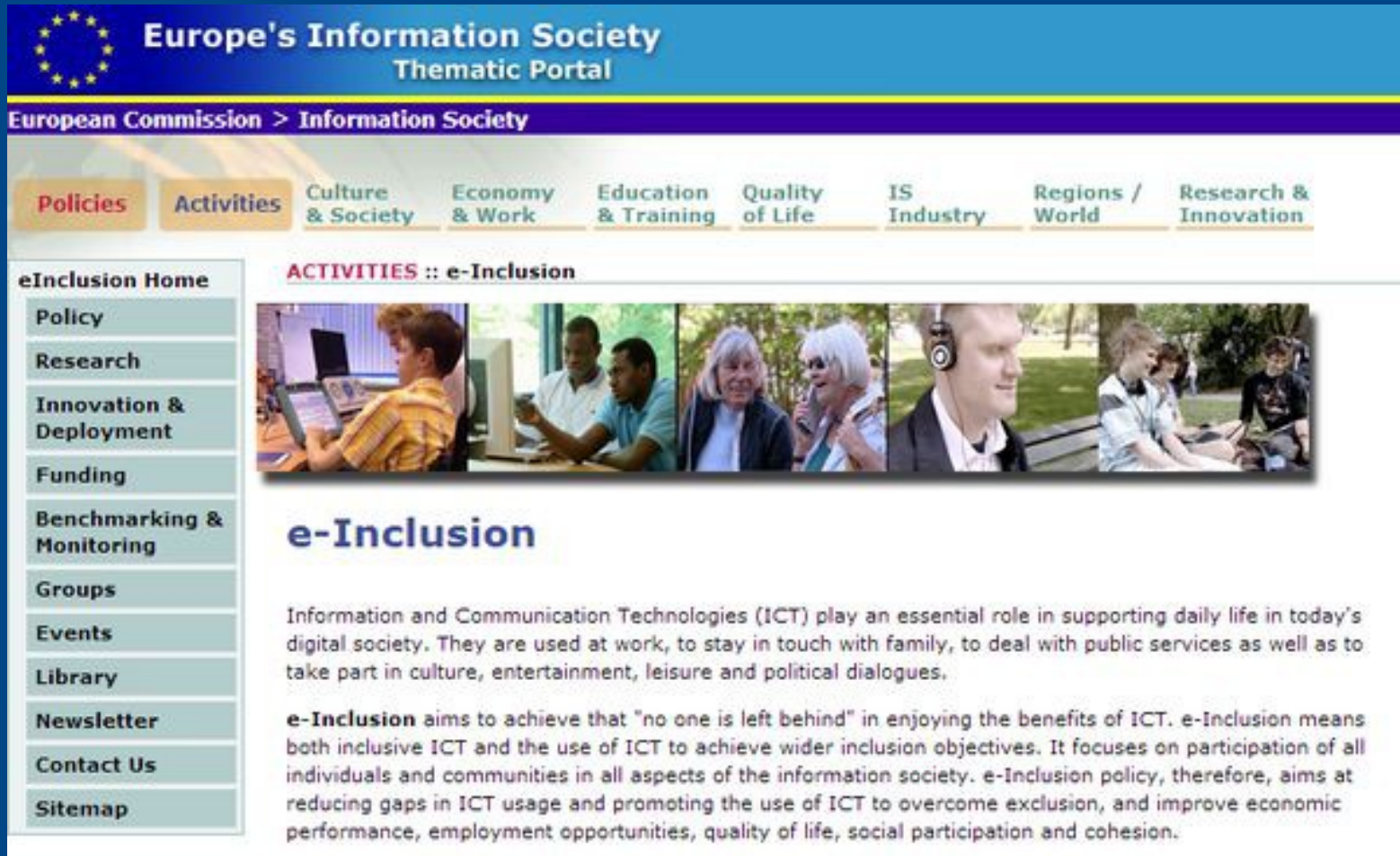
DIGITAL
INCLUSION

INCLUSIÓN DIGITAL



APLICACIÓN MULTIMÉDIA ACCESIBLE ACCESSIBLE MULTIMEDIA APPLICATION

e-Inclusion



The screenshot shows the 'Europe's Information Society Thematic Portal' website. The header includes the European Commission logo and the text 'European Commission > Information Society'. A navigation menu lists various categories: Policies, Activities, Culture & Society, Economy & Work, Education & Training, Quality of Life, IS Industry, Regions / World, and Research & Innovation. The 'Activities' section is highlighted, and the 'e-Inclusion Home' sidebar is visible on the left. The main content area features a banner with the title 'ACTIVITIES :: e-Inclusion' and a collage of images showing people using technology. Below the banner, the heading 'e-Inclusion' is followed by a paragraph explaining the role of ICT in daily life and a definition of e-Inclusion.

Europe's Information Society
Thematic Portal


European Commission > Information Society

Policies Activities Culture & Society Economy & Work Education & Training Quality of Life IS Industry Regions / World Research & Innovation

eInclusion Home

- Policy
- Research
- Innovation & Deployment
- Funding
- Benchmarking & Monitoring
- Groups
- Events
- Library
- Newsletter
- Contact Us
- Sitemap

ACTIVITIES :: e-Inclusion



e-Inclusion

Information and Communication Technologies (ICT) play an essential role in supporting daily life in today's digital society. They are used at work, to stay in touch with family, to deal with public services as well as to take part in culture, entertainment, leisure and political dialogues.

e-Inclusion aims to achieve that "no one is left behind" in enjoying the benefits of ICT. e-Inclusion means both inclusive ICT and the use of ICT to achieve wider inclusion objectives. It focuses on participation of all individuals and communities in all aspects of the information society. e-Inclusion policy, therefore, aims at reducing gaps in ICT usage and promoting the use of ICT to overcome exclusion, and improve economic performance, employment opportunities, quality of life, social participation and cohesion.

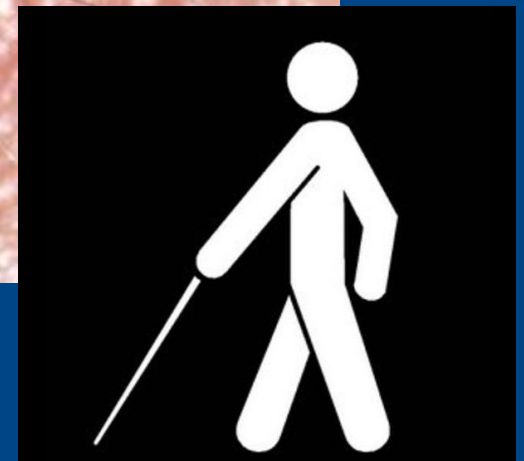
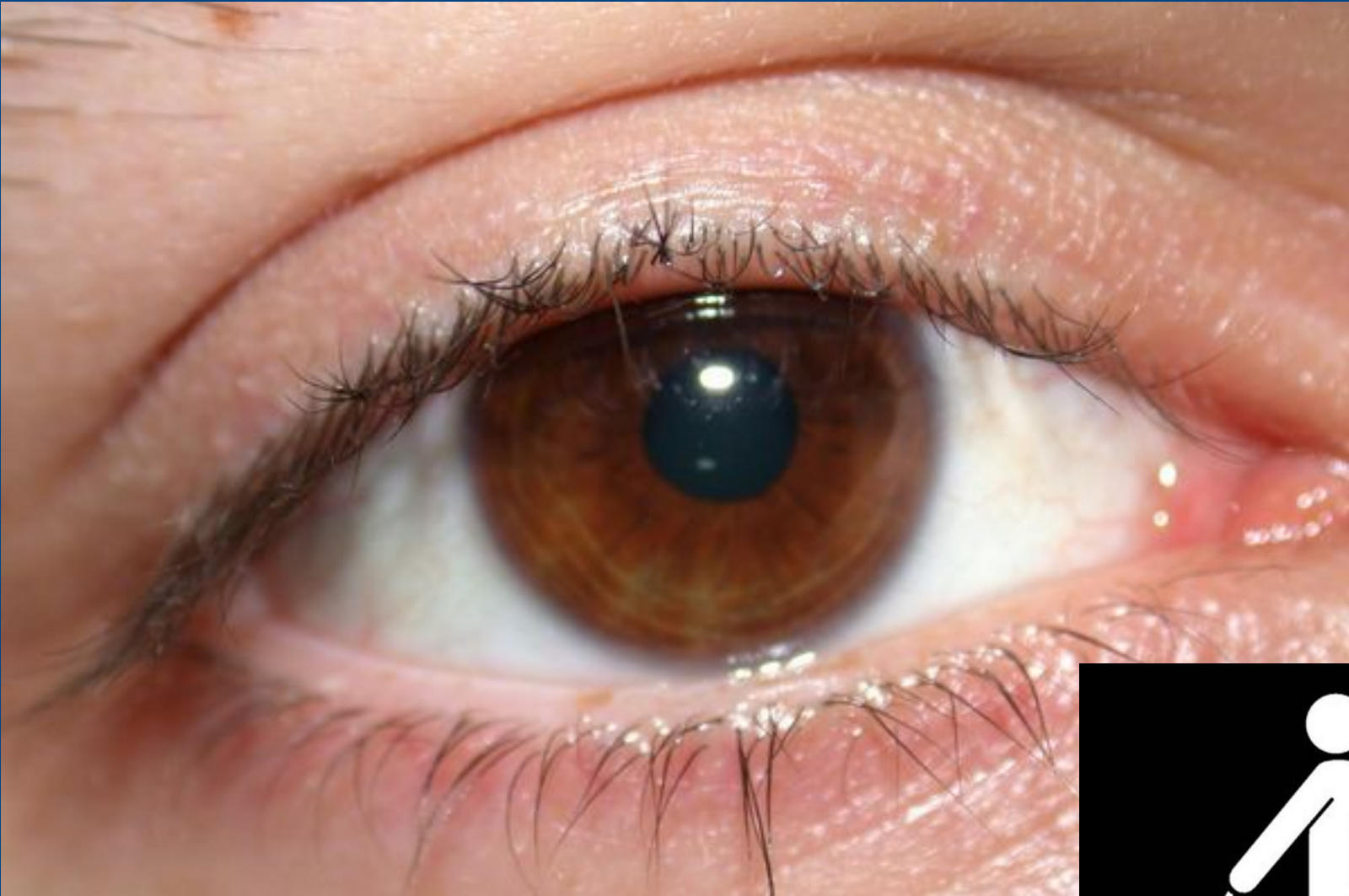
LINK

INTRODUCTION
O

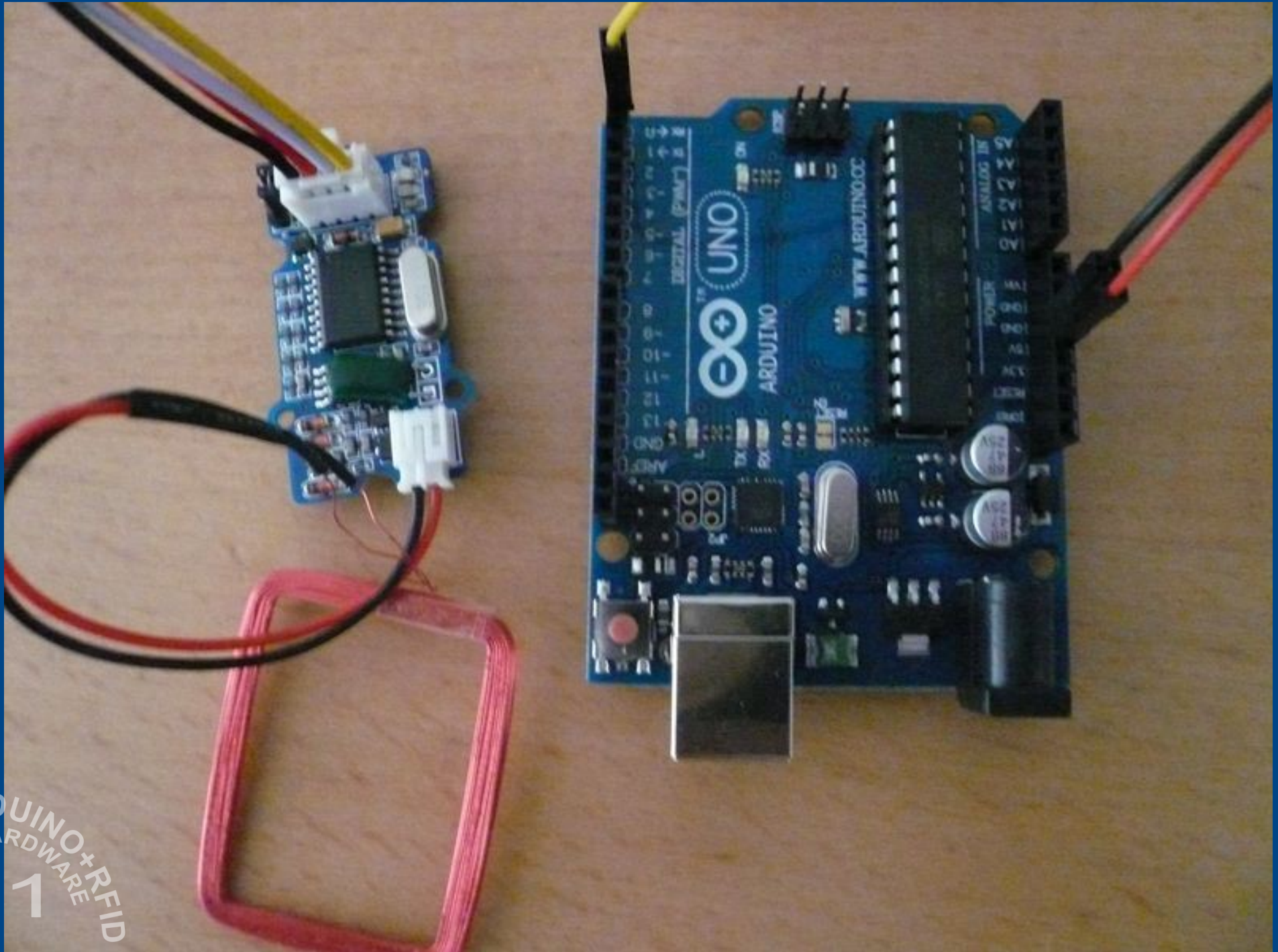
WE ATTEMPT TO INTEGRATE BLIND AND VISUALLY IMPAIRED PEOPLE IN ...



...HOBBIES AND LEISURE ACTIVITIES SO THEY CAN PARTICIPATE ON EQUAL TERMS WITH THE COMMUNITY MEMBERS



1. HARDWARE: ARDUINO + RFID



PLACA/BOARD ARDUINO UNO



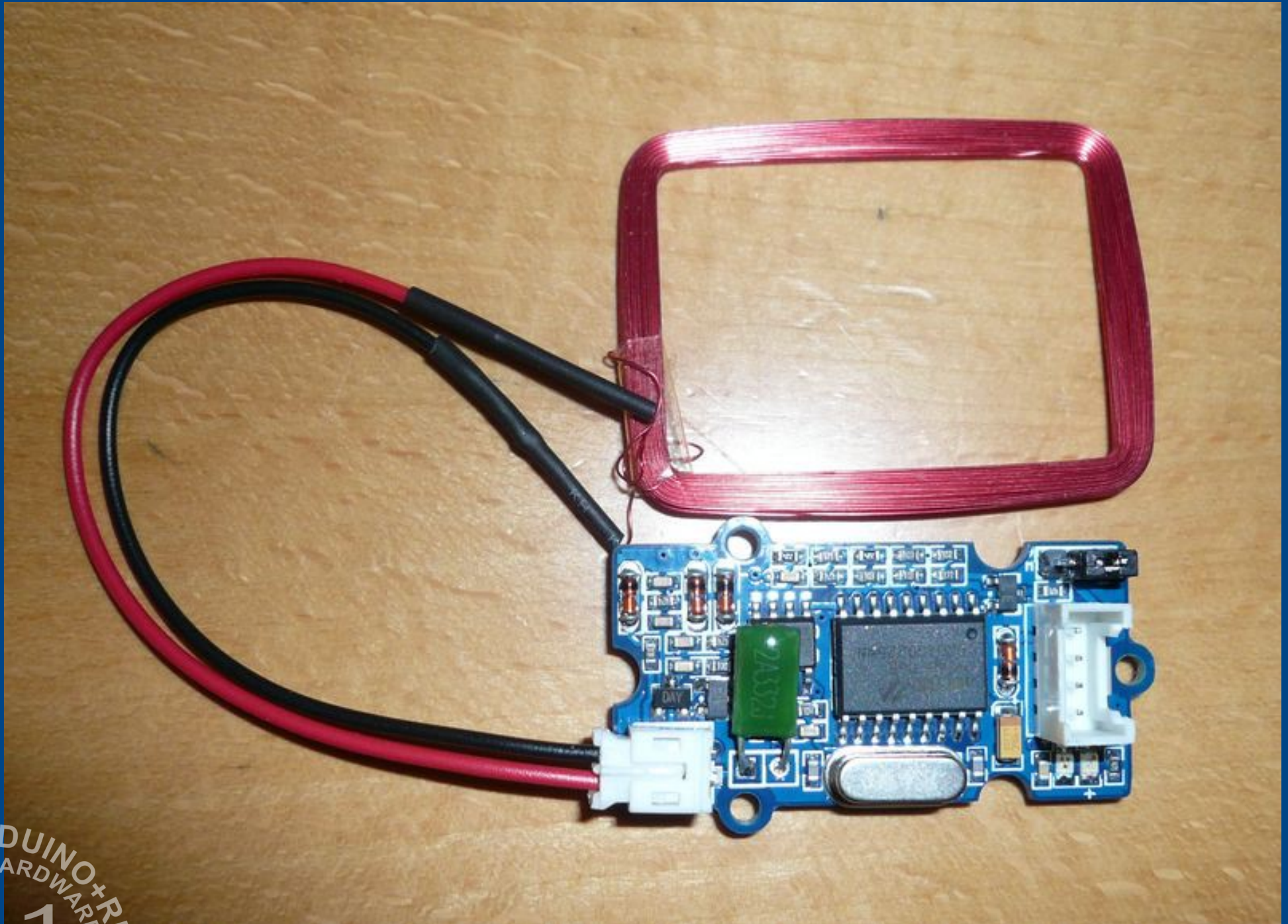
SONADOR/BUZZER

Necesario para personas con ceguera o baja visión.
Confirma que el lector RFID ha recibido información

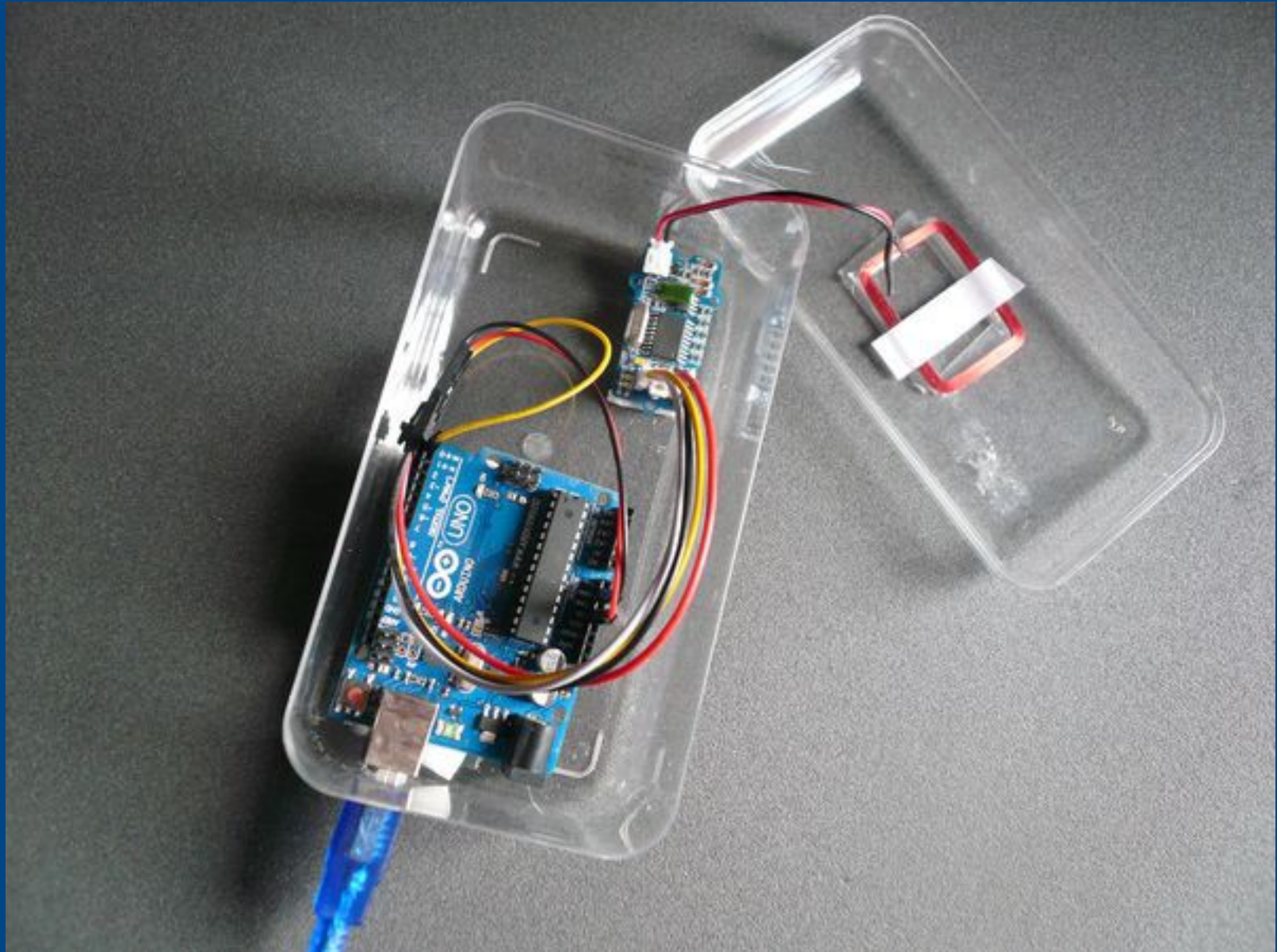
Required for people with blindness or low vision.
Confirms that the RFID reader has received information



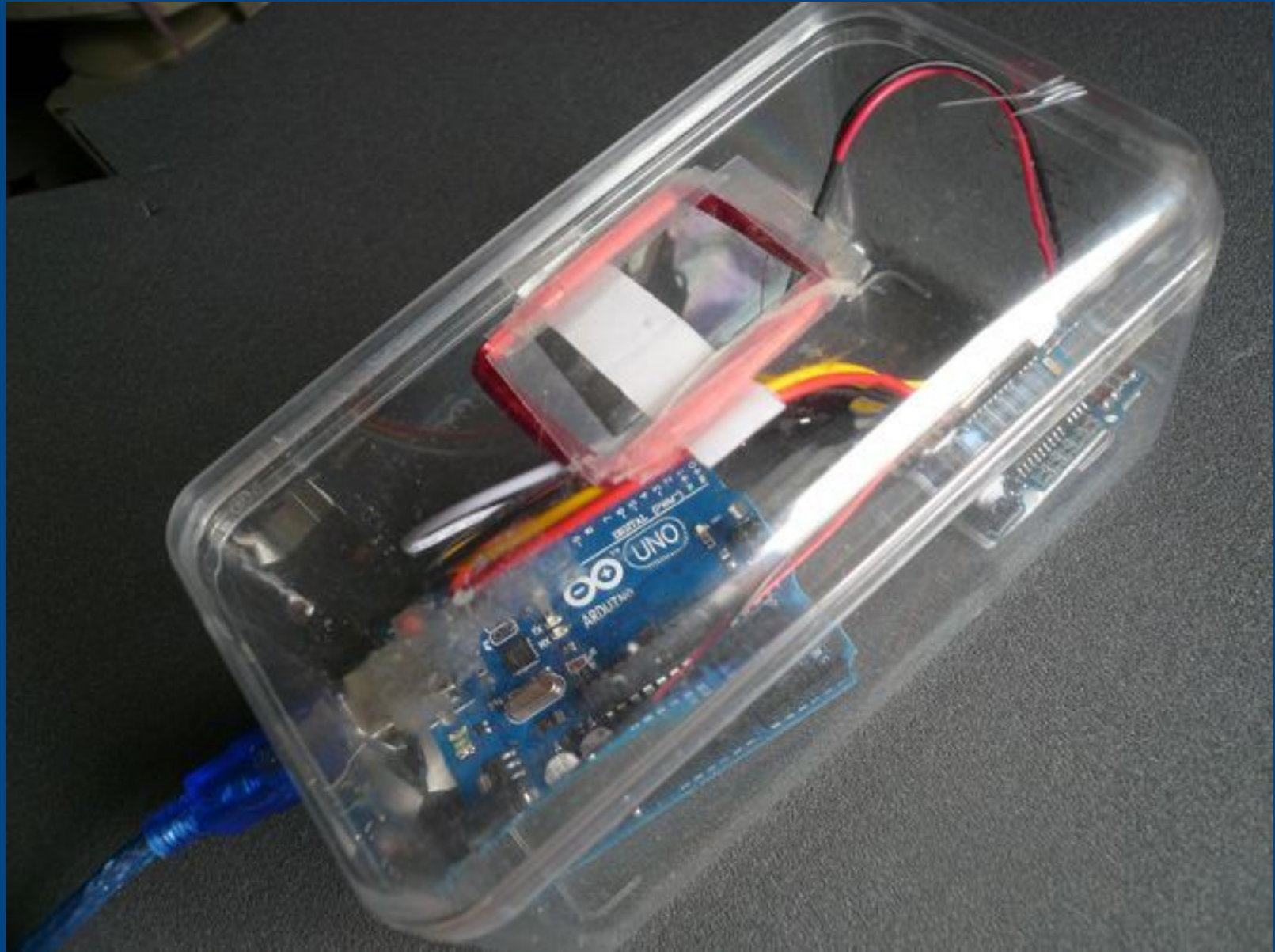
LECTOR/READER RDIF



PACK

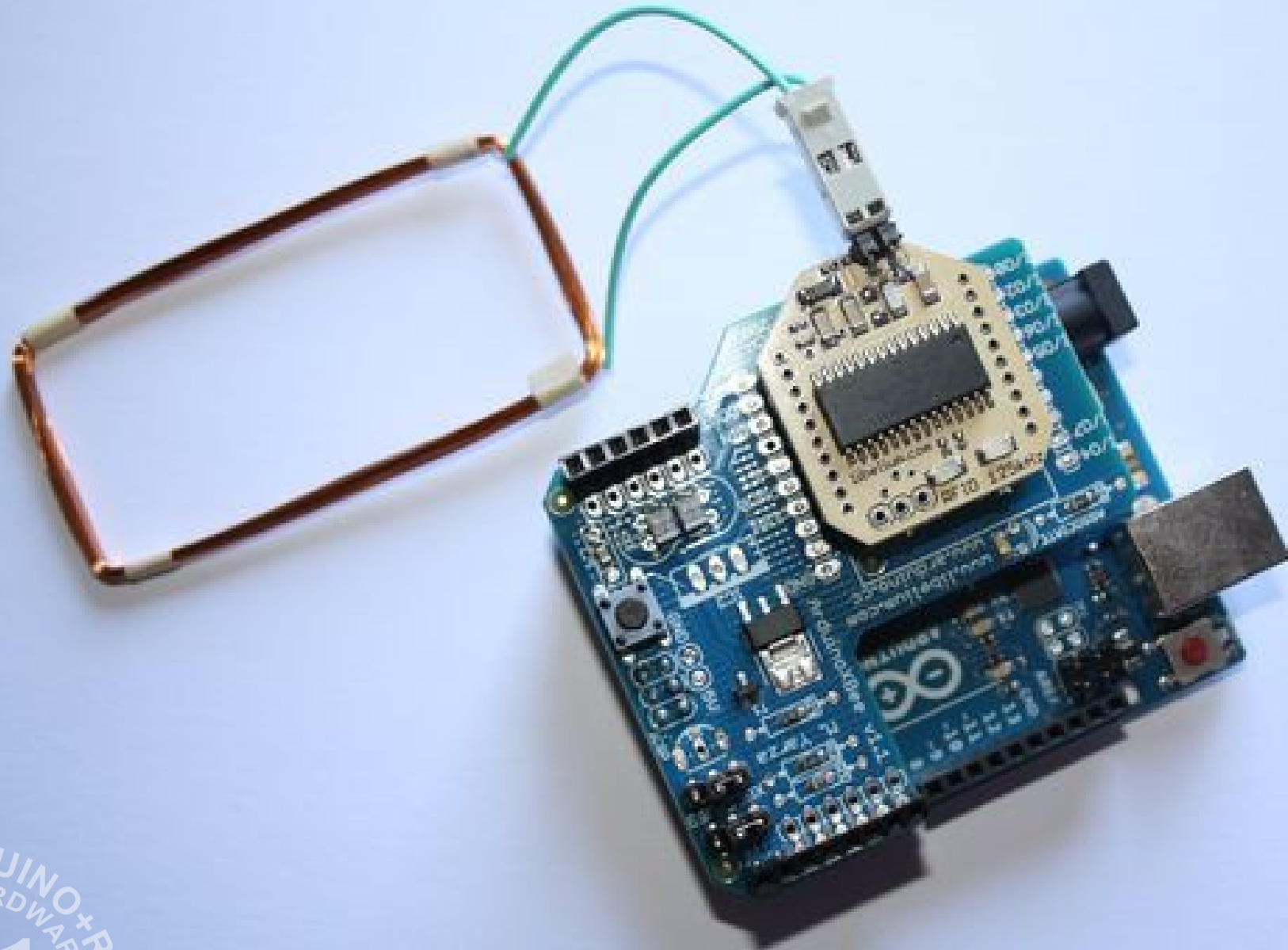


PACK



ARDUINO+RFID
HARDWARE
1

Otras versiones de Hardware/Other versions of Hardware
Arduino + Xbee + RFID reader



2. ARDUINO + COMPUTER (DRIVERS) ARDUINO ENVIRONMENT





[Compra](#) [Descarga](#) [Primeros Pasos](#) [Aprende](#) [Referencia](#) [Hardware](#) [FAQ](#) [Blog »](#) [Forum »](#) [Playground »](#)



IMPORTANTE: EL 26 DE SEPTIEMBRE DE 2010, EL SITIO WEB OFICIAL EN INGLÉS DE ARDUINO FUE ACTUALIZADO CON NUEVO CONTENIDO SOBRE LAS PLACAS UNO Y MEGA, ASÍ COMO CON TODA UNA SERIE DE TUTORIALES. ¡LA MAYORÍA DE ESTOS MATERIALES NECESITAN SER TRADUCIDOS AL ESPAÑOL, TODAVÍA!

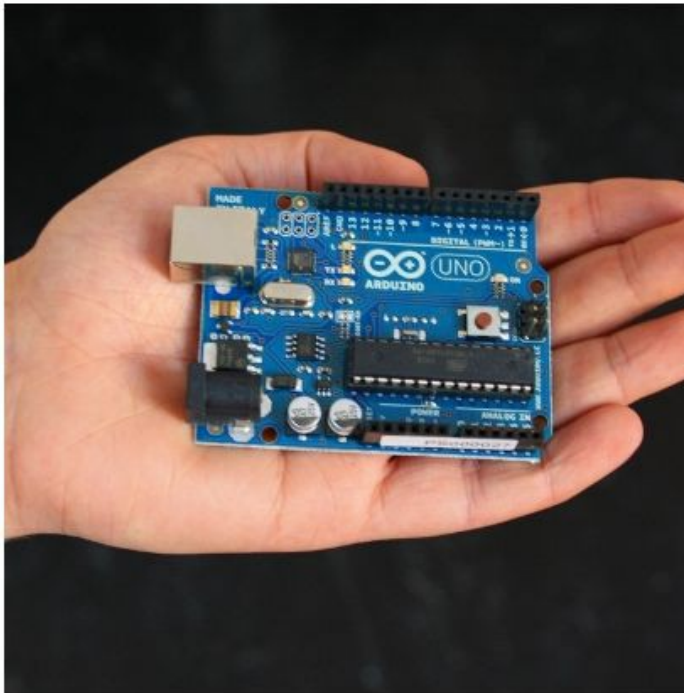


Foto por el A-Team

Arduino es una plataforma de electrónica abierta para la creación de prototipos basada en software y hardware flexibles y fáciles de usar. Se creó para artistas, diseñadores, aficionados y cualquiera interesado en crear entornos u objetos interactivos.

Arduino puede tomar información del entorno a través de sus pines de entrada de toda una gama de sensores y puede afectar aquello que le rodea controlando luces, motores y otros actuadores. El microcontrolador en la placa Arduino se programa mediante el [lenguaje de programación Arduino](#) (basado en [Wiring](#)) y el entorno de desarrollo Arduino (basado en [Processing](#)). Los proyectos hechos con Arduino pueden ejecutarse sin necesidad de conectar a un ordenador, si bien tienen la posibilidad de hacerlo y comunicar con diferentes tipos de software (p.ej. Flash, Processing, MaxMSP).

Descarga el Software de Arduino

El entorno de código abierto Arduino hace fácil escribir código y cargarlo a la placa E/S. Funciona en Windows, Mac OS X y Linux. El entorno está escrito en Java y basado en Processing, avr-gcc y otros programas también de código abierto.

EL SOFTWARE Arduino SE PROPORCIONA "COMO ES" Y NOSOTROS NO MANIFESTAMOS NI IMPLICA NINGUNA GARANTÍA CON RESPECTO A SU FUNCIONALIDAD, OPERATIVA O USO, INCLUYENDO, NINGUNA LIMITACIÓN NI IMPLICACIÓN RESPECTO GARANTÍAS DE COMERCIALIZACIÓN, ADECUACIÓN PARA PROPÓSITOS PARTICULARES O INFRINGIMIENTO. EXPRESAMENTE NOS DESVINCULAMOS DE CUALQUIER CONSECUENCIA, INCIDENTE O DAÑO DIRECTO O INDIRECTO INCLUYENDO, SIN LIMITE, PERDIDA DE BENEFICIOS, INTERRUPCIONES DE SERVICIO O PERDIDA DE DATOS, INDEPENDIEMENTE DEL FORMATO DE ACCIÓN O TEORÍA LEGAL EN QUE SE REALICE DICHA DEMANDA, INCLUSO SI HUBIERA ADVERTENCIA DE LA POSIBILIDAD O SIMILITUD DE DICHOS DAÑOS.

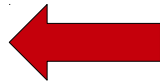


Descargando el software desde esta página se aceptan los términos anteriormente citados.

Descarga

Arduino 0019 ([notas de la versión](#)), hospedado en [Google Code](#):

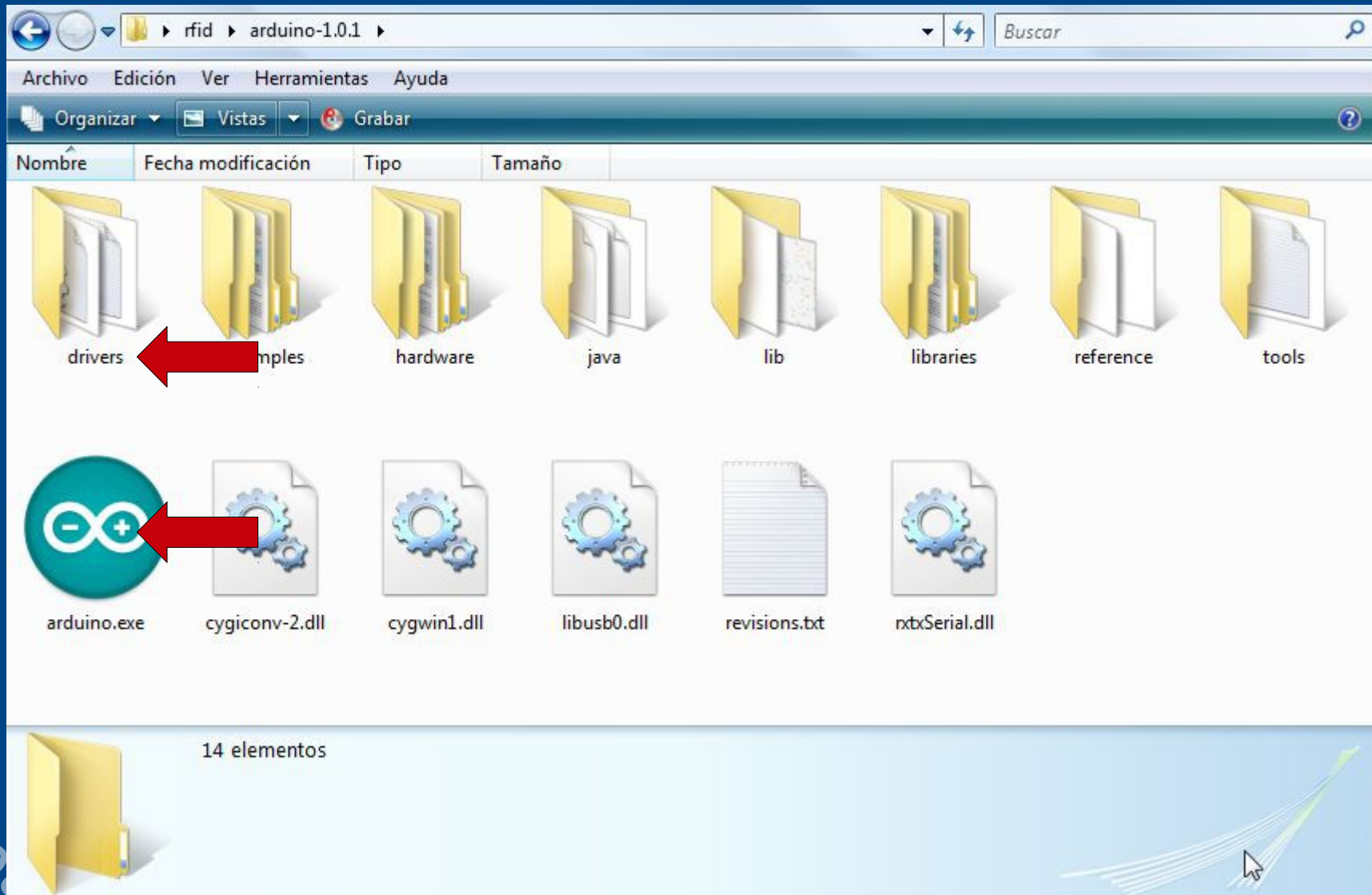
- + [Windows](#)
- + [Mac OS X](#)
- + [Linux: 32 bit](#) - [comprueba aquí](#) las compatibilidades.



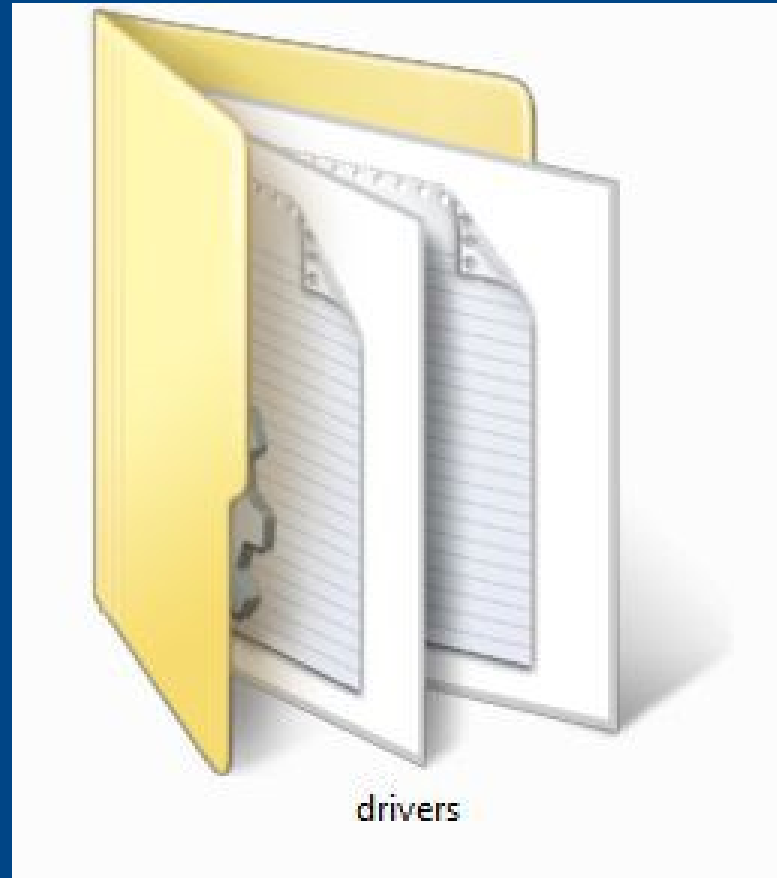
Siguientes pasos

- [Empezando](#)
- [Referencias](#)
- [Entorno](#)
- [Ejemplos](#)
- [Fundamentos](#)

ARDUINO ENVIRONMENT



ARBUINO BOARD + DRIVERS



3. ARDUINO + SCRATCH (FIRMWARE)

LINK FIRMWARE ARDUINO



CITILAB HA DESARROLLADO S4A
NOSOTROS HEMOS MODIFICADO SU FIRWARE

S4A DEVELOPED BY CITILAB
WE HAVE MODIFIED YOUR FIRWARE



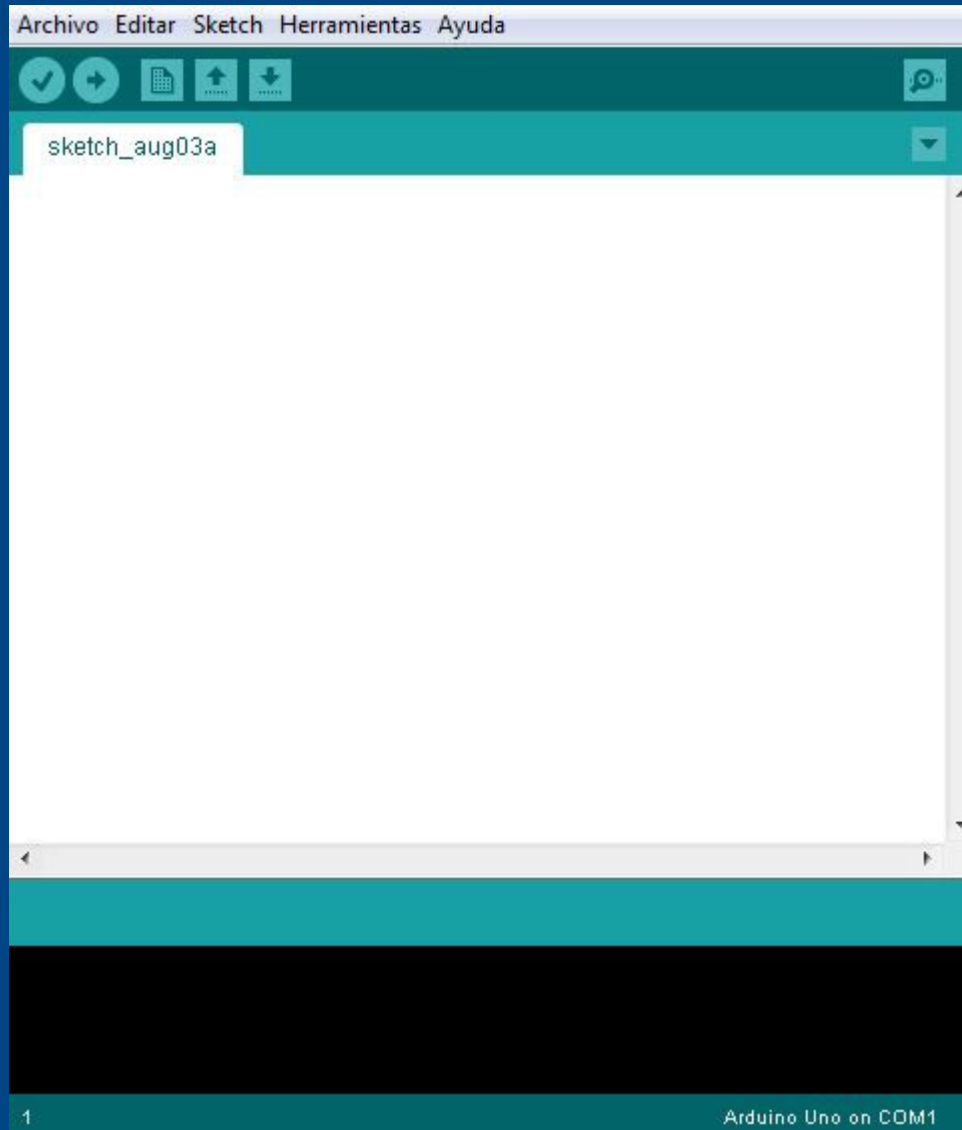
ARDUINO+
SCRATCH
FIRMWARE
3

LINK FIRMWARE ARDUINO SACOSTA.ORG

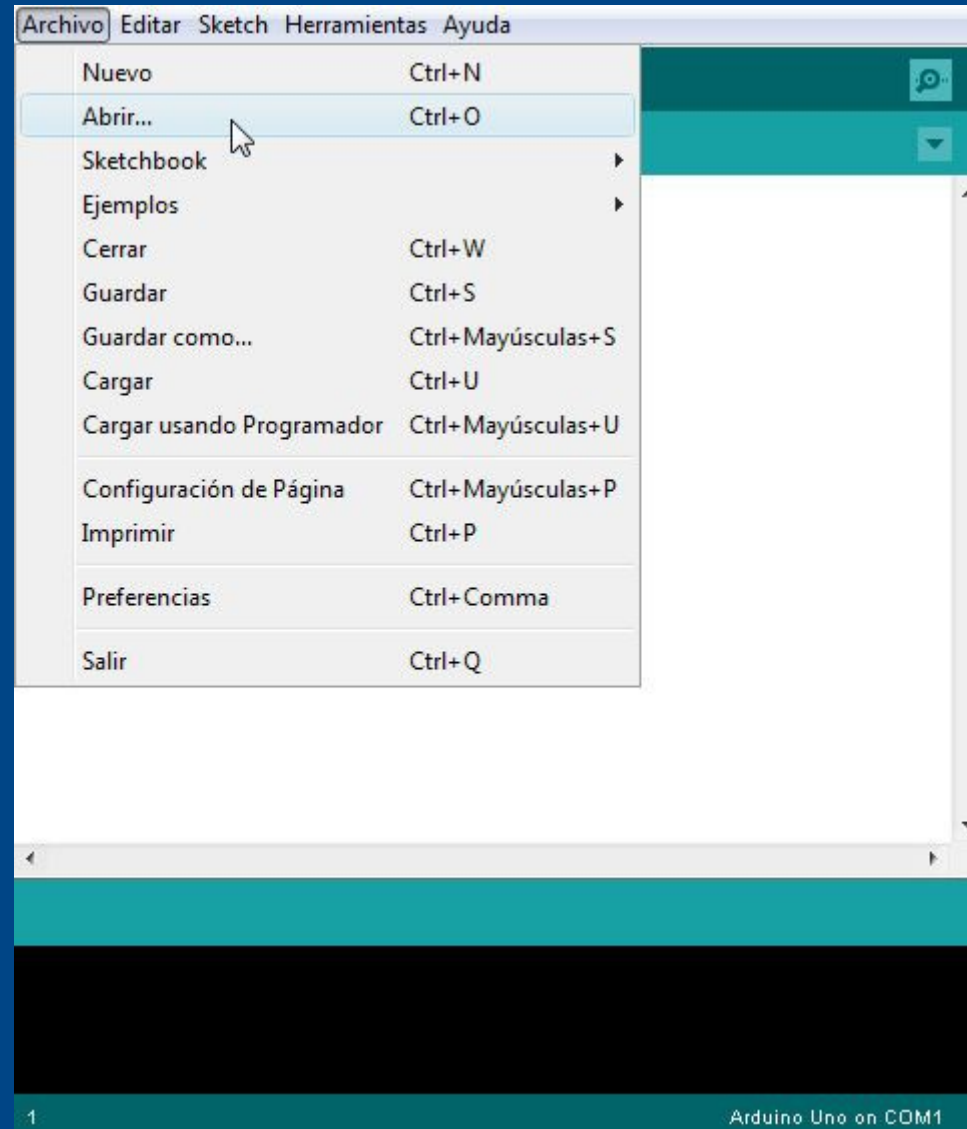




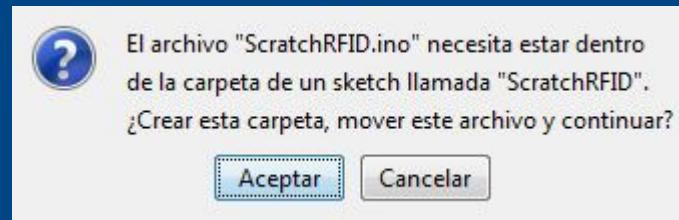
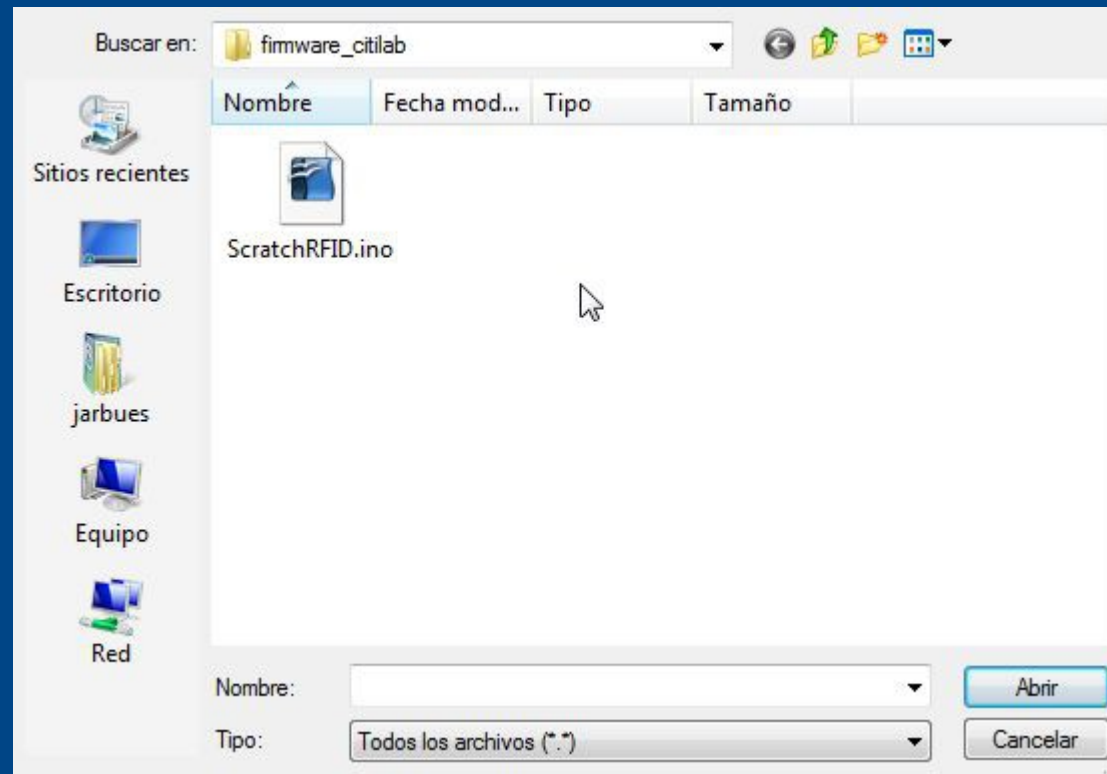
ARDUINO.EXE



OPEN FIRMWARE



OPEN FIRMWARE



```

// Basado en ArduinoBoard de Rai and Mike McKenzie modificado por Francesc Galbany
//=====

#include <Wire.h>
char rfid[12];
int pos=0;
void ScratchBoardSensorReport(int sensor, int value)
{
  Serial.write( B10000000
    | ((sensor & B1111)<<3)
    | ((value>>7) & B111));
  Serial.write( value & B1111111);
}

void setup()
{
  Serial.begin(9600);
  pinMode(4, INPUT);
}

int map3a1(char a, char b, char c){
  int val = 255*hexVal(a) + hexVal(b)*16 + hexVal(c);
  return map(val, 0, 4095, 0, 1023); // Passem de 4k a 1k perdent precisi`
}

int hexVal(char c){
  char ret = 0;
  if((c >= '0') && (c <= '9')){
    ret = c - '0';
  }else if((c >= 'A') && (c <= 'F')){
    ret = c - 'A' + 10;
  }
  return ret;
}

```



```

void loop()
{
  //Si hi ha dades RFID...
  if(Serial.available())
  {
    while(Serial.available()){
      delay(10);
      char c = (char)Serial.read();
      if( ((int)c >= 48) && ((int)c <=70)){
        rfid[pos]=c;
        pos++;
      }
      if(pos == 12){
        break;
      }
    }
    //Cal comprovar que i==12
    if(pos == 12){
      pos = 0;
      Serial.end();
      Serial.begin(38400);
      ScratchBoardSensorReport(0, map3a1(rfid[0],rfid[1],rfid[2]));
      ScratchBoardSensorReport(1, map3a1(rfid[3],rfid[4],rfid[5]));
      ScratchBoardSensorReport(2, map3a1(rfid[6],rfid[7],rfid[8]));
      ScratchBoardSensorReport(3, map3a1(rfid[9],rfid[10],rfid[11]));
      ScratchBoardSensorReport(4, 0);
      ScratchBoardSensorReport(5, 0);
      ScratchBoardSensorReport(6, 0);
      ScratchBoardSensorReport(7, digitalRead(4)?1023:0);
      tone(11,4000,200);
      delay(1000);
      ScratchBoardSensorReport(0, 0);
      ScratchBoardSensorReport(1, 0);
      ScratchBoardSensorReport(2, 0);
      ScratchBoardSensorReport(3, 0);
      delay(30);
      Serial.end();
      Serial.begin(9600);
    }
  }
  // Let Scratch catch up with us
  delay(30);
}

```

```
Archivo  Editor  Sketch  Herramientas  Ayuda
[Checkmark] [Refresh] [File] [Upload] [Download] Cargar [Settings]
sketch_aug12a $
//char val = 0; // variable to store the data from the serial port
byte val;
byte code[6];
byte checksum;
byte bytesread;

void setup() {
  Serial.begin(19200); // connect to the serial port
}

// Format output for ScratchBoard emulation
// sensor=0-7, value=0-1023 (rescaled by Scratch to 0-100)
// 0="A", 1="B", 2="C", 3="D",
// 4="Slider", 5="Light", 6="Sound", 7="Button"

void ScratchBoardSensorReport(int sensor, int value)
{
  Serial.write( B10000000
               | ((sensor & B1111)<<3)
               | ((value&&7) < B1111) );
}
```

97 Arduino Uno on COM1

4. RFID



Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects.

RFID



RFID Tags RFID



RFID
Tags RFID



=EFA788EE12



=A154FFG245

ÚNICA / UNIQUE

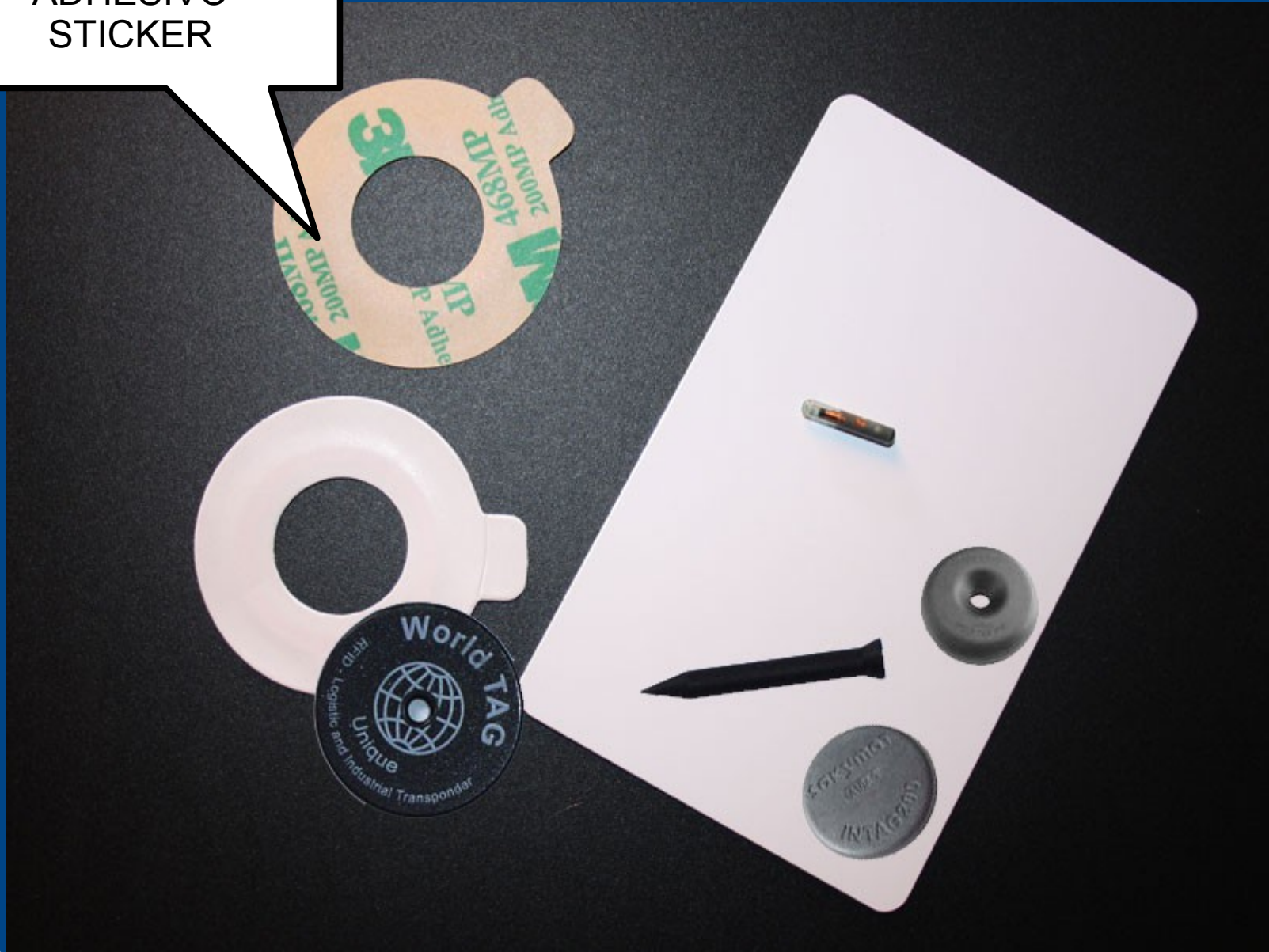


RFID Tags RFID



RFID Tags RFID

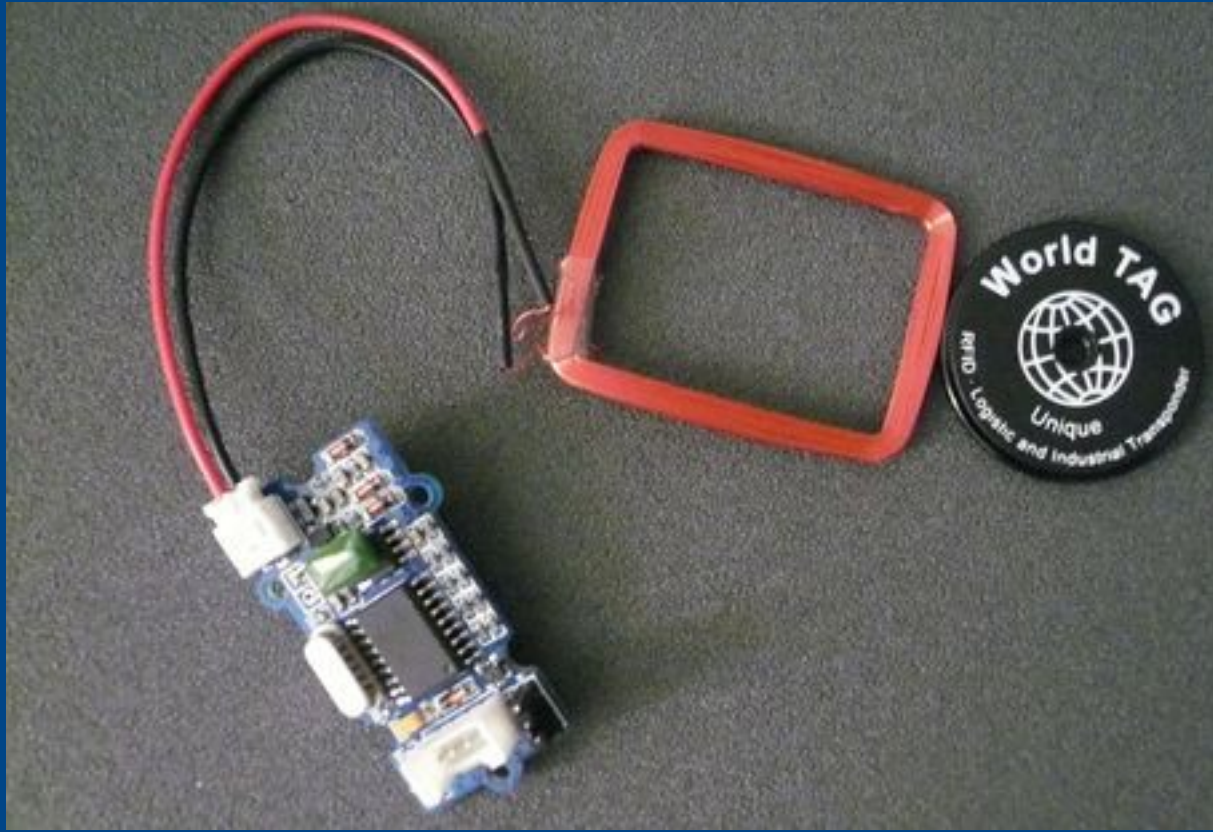
ADHESIVO
STICKER



RFID Tags RFID



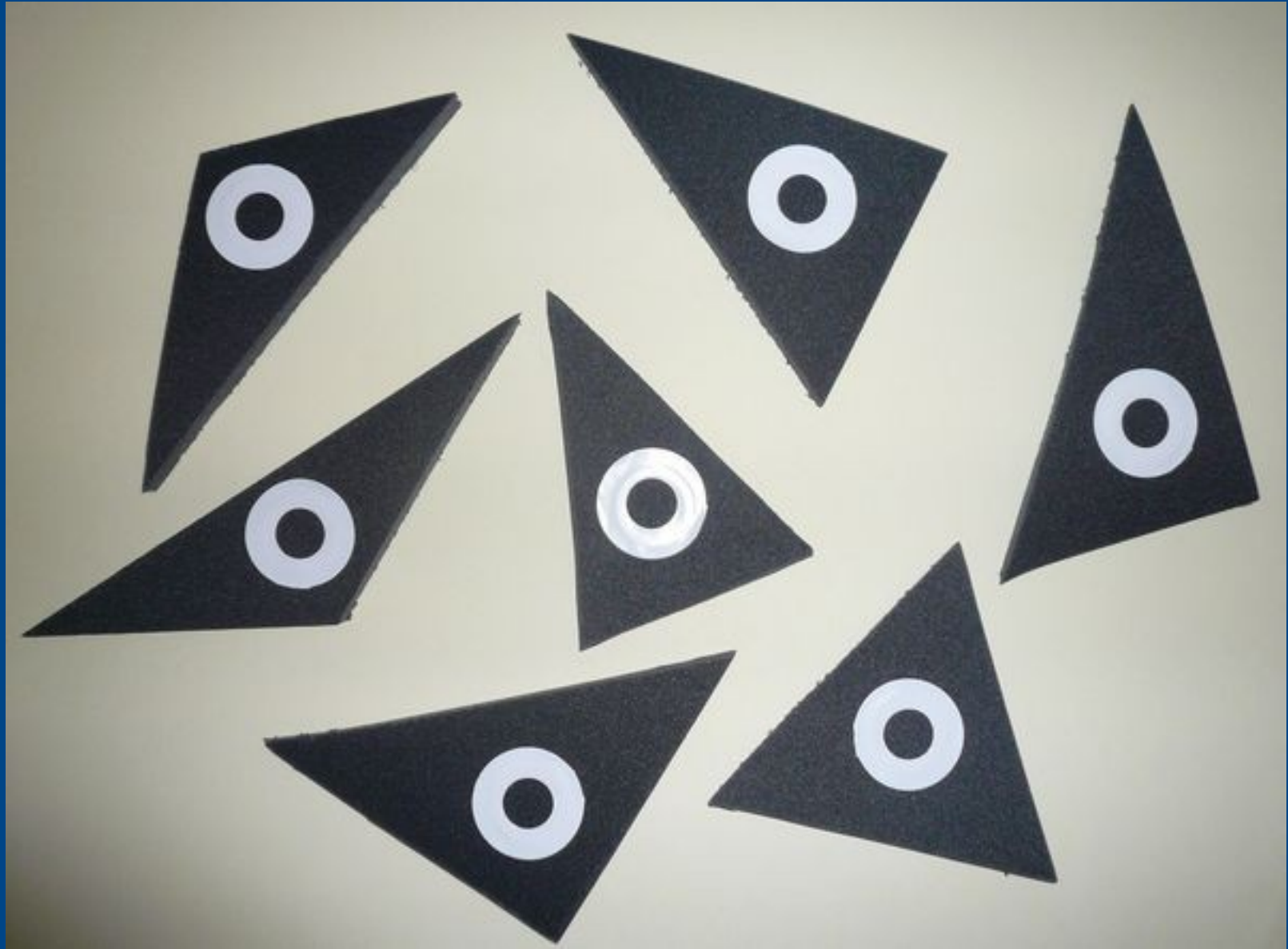
ROPA
CLOTHING



5. PHISYCAL OBJECTS



MATERIALES/MATERIALS



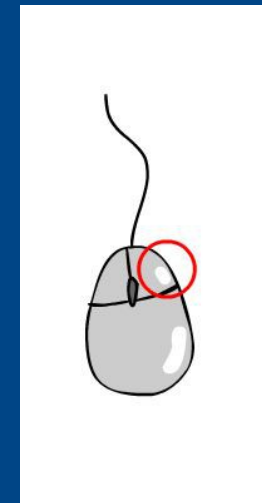
TACTO, TEXTURA, SEGURIDAD, MEDIDA/FEEL, TEXTURE, SIZE, SAFETY



6. SCRATCH PORT COM SCRATCH BOARD



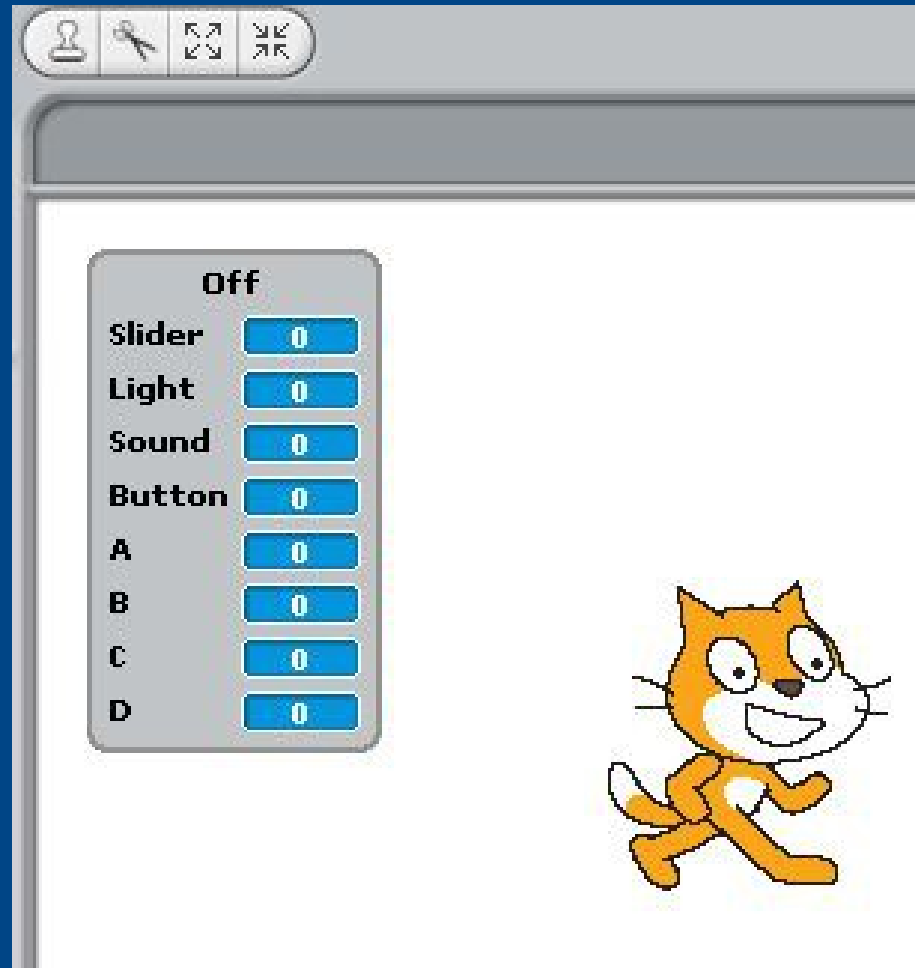
SENSING > SENSOR VALUE



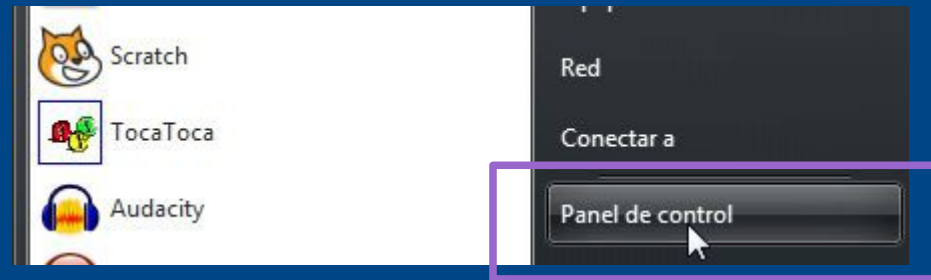
SCRATCHBOARD



SCRATCHBOARD WATCHER







SEARCH PORT COM CONTROL PANEL SYSTEM



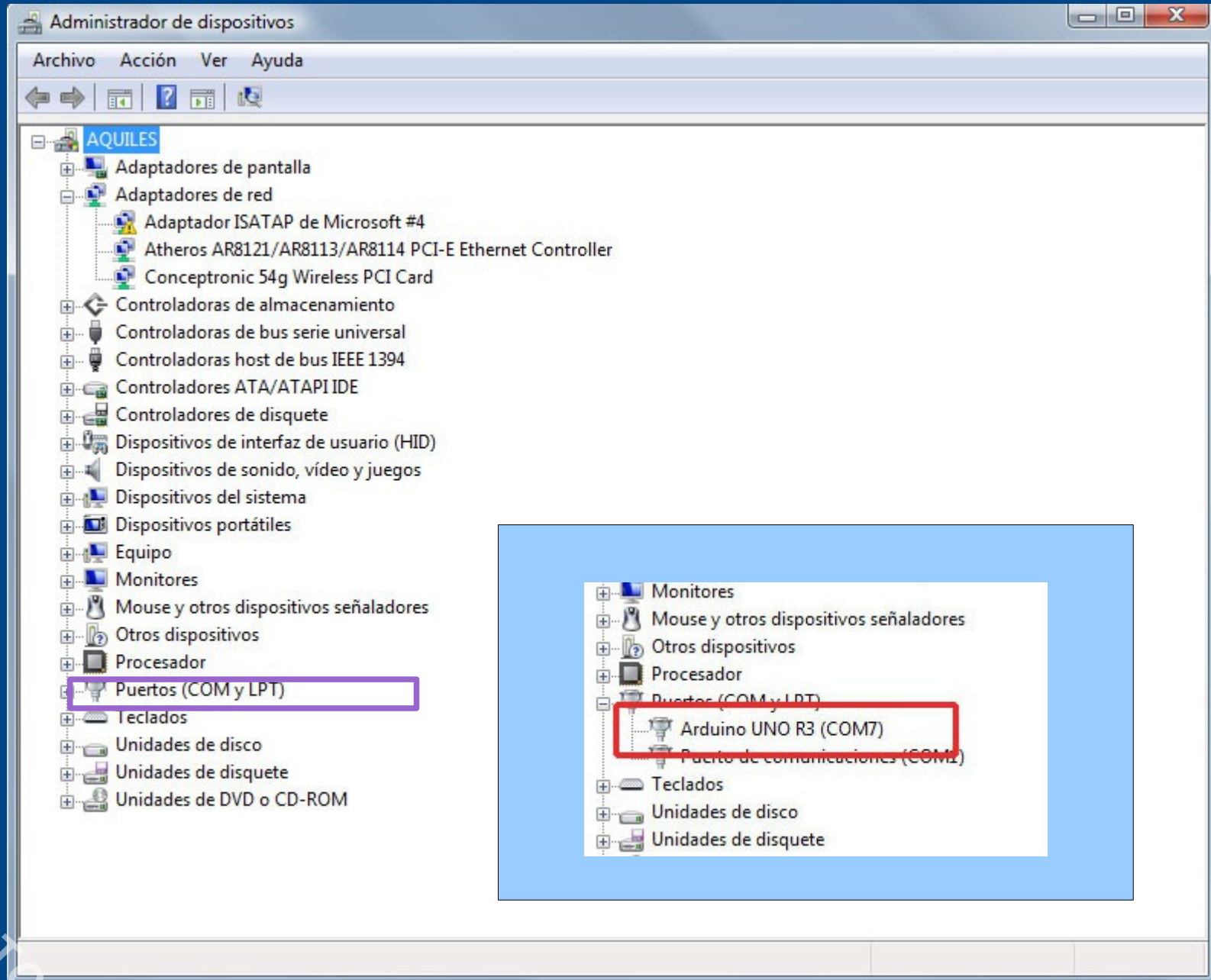
DECIVE MANAGER

Tareas

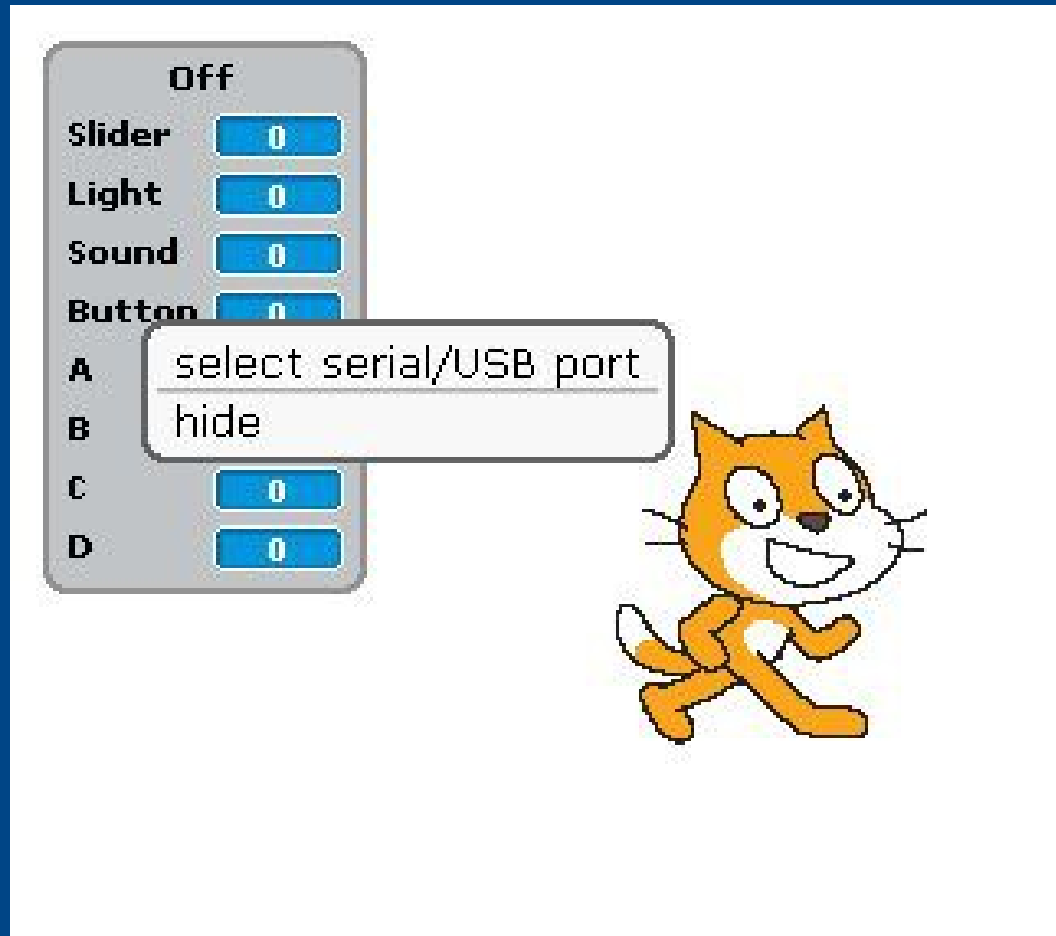
-  Administrador de dispositivos
-  Configuración de Acceso remoto
-  Protección del sistema
-  Configuración avanzada del sistema



COM



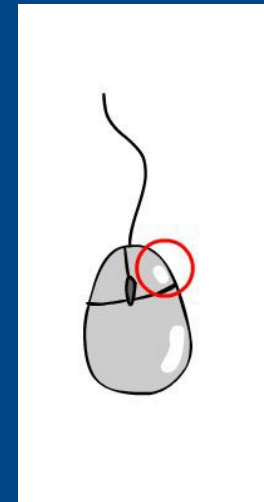
SELECT USB PORT



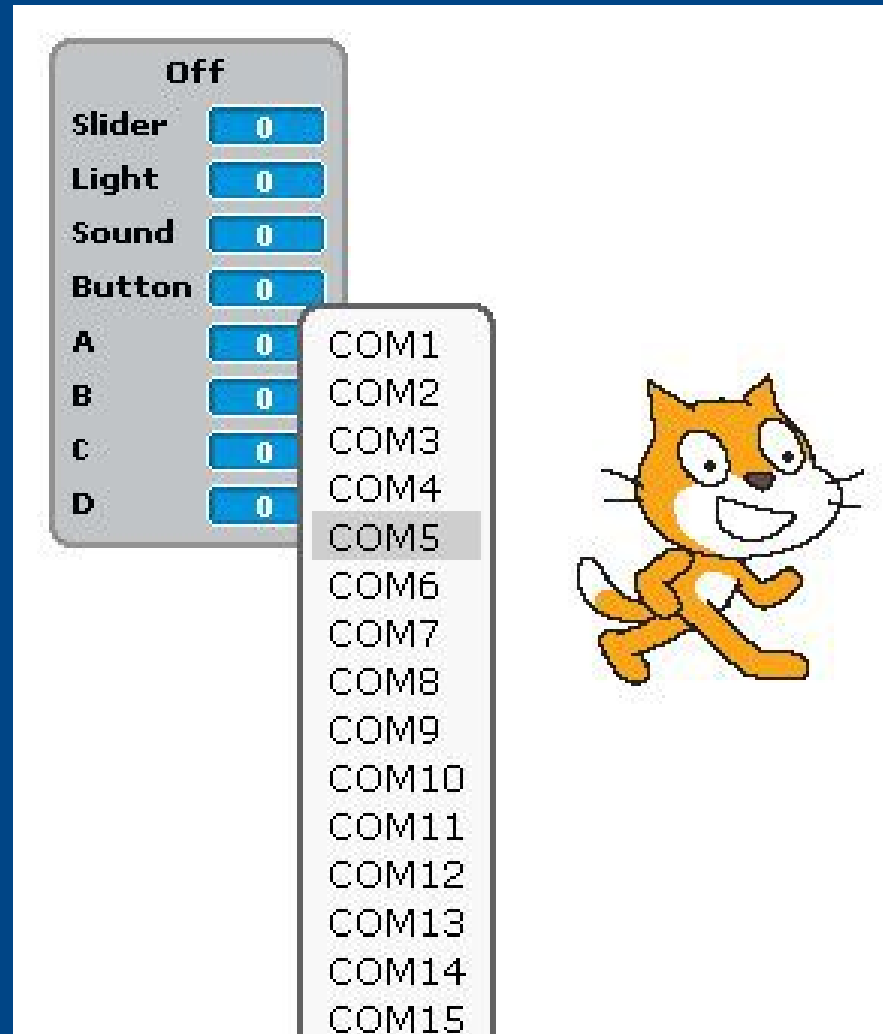
A Scratch configuration panel is shown with the following settings:

- Off
- Slider: 0
- Light: 0
- Sound: 0
- Button: 0
- A: select serial/USB port
- B: hide
- C: 0
- D: 0

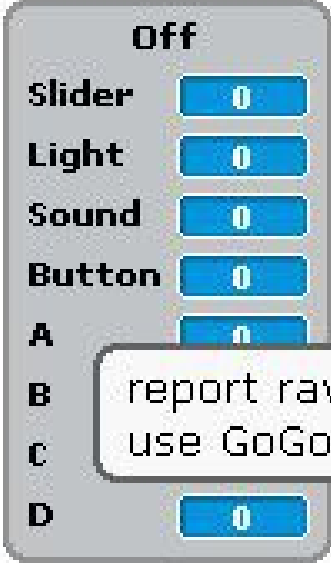
The Scratch cat character is positioned to the right of the configuration panel.



SELECT USB PORT



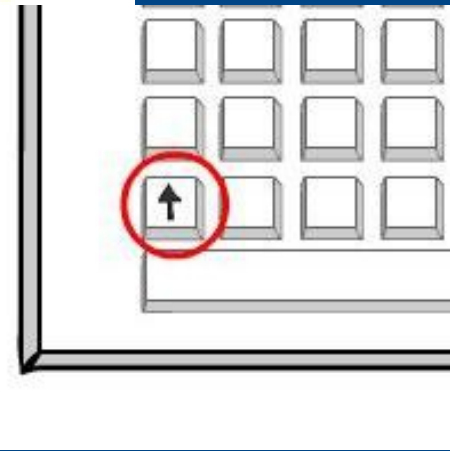
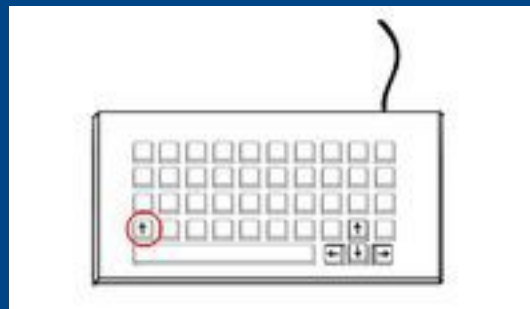
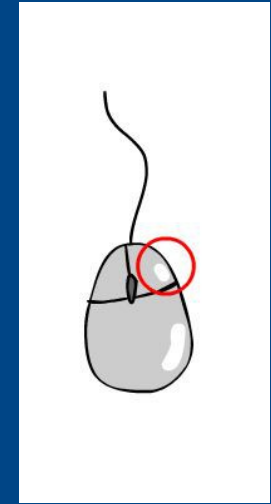

RIGHT BUTTON + SHIFT: REPORT RAW DATA



Off

Slider	0
Light	0
Sound	0
Button	0
A	0
B	0
C	0
D	0

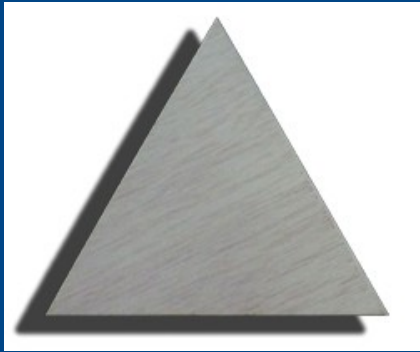
report raw data
use GoGo board



VARIABLES

EASY CUSTOMIZATION

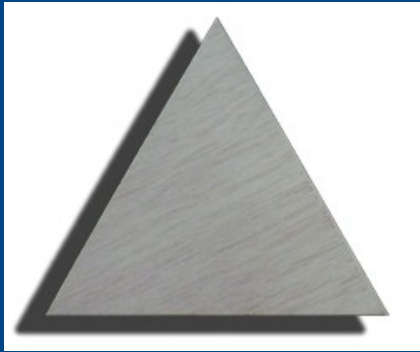




PHISYCAL OBJECT + TAG RFID

SCRATCHBOARD WATCHER

On	
Slider	0
Light	0
Sound	0
Button	0
A	3
B	837
C	244
D	278



PHISYCAL OBJECT + TAG RFID

SCRATCHBOARD WATCHER

On	
Slider	0
Light	0
Sound	0
Button	0
A	3
B	837
C	244
D	278

RELATIONSHIP BETWEEN OBJECTS AND VARIABLES

The image displays a Scratch script with the following blocks:

- when green flag clicked** (yellow block)
- forever if** (yellow block) with the condition: `resistance-D sensor value = valor_triangle and estat = 4`. A yellow label **triangle** is attached to the right side of this block.
- set solucio_4 to triangle** (orange block)
- wait 1 secs** (orange block)
- set solucio_4 to 0** (orange block)

RELATIONSHIP BETWEEN OBJECTS AND VARIABLES

The image displays a Scratch script starting with a 'when green flag clicked' block. This is followed by a 'forever if' loop. The loop's condition is 'resistance-D sensor value = valor_triangle and estat = 4'. The 'resistance-D' sensor is highlighted with a pink box. Inside the loop, there are three blocks: 'set solucio_4 to triangle', 'wait 1 secs', and 'set solucio_4 to 0'. The loop is connected to a 'triangle' object.

```
when green flag clicked
  forever if (resistance-D sensor value = valor_triangle and estat = 4)
    set solucio_4 to triangle
    wait 1 secs
    set solucio_4 to 0
```

SCRATCH.MIT.EDU

The screenshot shows the Scratch project page for "Basic Shapes. Shared Geometry" by user "arbues". The page features a blue header with navigation links: "Crear", "Explorar", "Charlar", "Ayuda", and a search bar labeled "Buscar". The user's profile "arbues" is visible in the top right. The project title "Basic Shapes. Shared Geometry" is displayed, along with the creator's name "por arbues". A "BORRADOR" (Draft) button is present. The main content area shows a preview of the project, which has a solid orange background with the text "DO YOU KNOW THE BASIC SHAPES?" and a green flag icon. To the right, the "Instrucciones" (Instructions) section contains text about the project's purpose and accessibility. Below the instructions, there are tags for "digital_inclusion", "inclusion", and "accessibility". The page also shows the date "Shared: 23 Jul 2013" and "Modified: 23 Jul 2013". At the bottom, there are icons for favorites (0), likes (0), sharing, adding, reporting, and view counts (2 views, 1 comment).

Scratch

Crear Explorar Charlar Ayuda Buscar

arbues

41 programas
9 objetos Ver dentro

BORRADOR

Basic Shapes. Shared Geometry

por arbues

DO YOU KNOW THE BASIC SHAPES?

Instrucciones

The project consists of an application on geometry that can be "shared" by any person, whether or not visual impairment and / or low vision.

This is a set of exercises created with Scratch, with the help of card / RF chips built-in physical pieces - to interact by touch and sound with your computer.

Cards / chips RFID (Radio Frequency Identification), can replace the mouse and even keyboard

Notas y créditos

Link video: goo.gl/YR1ZZ

Link web: www.sacosta.org/rfid (catalan version)

www.sacosta.org/rfid_castellano (spanish version)

This project was awarded first prize in the category "Science, Technology and Values" at the last congress "Science in Action" held at CosmoCaixa Alcobendas (Madrid) in October 2012

jgelabert@gmail.com

arbues@gmail.com

digital_inclusion x inclusion x accessibility x

Shared: 23 Jul 2013 Modified: 23 Jul 2013

★ 0 ♥ 0 Compartir a Añadir a Denunciar esto 👁 2 🌸 1

LINK

CUSTOMIZATION EXAMPLE



POINT TO A STAR

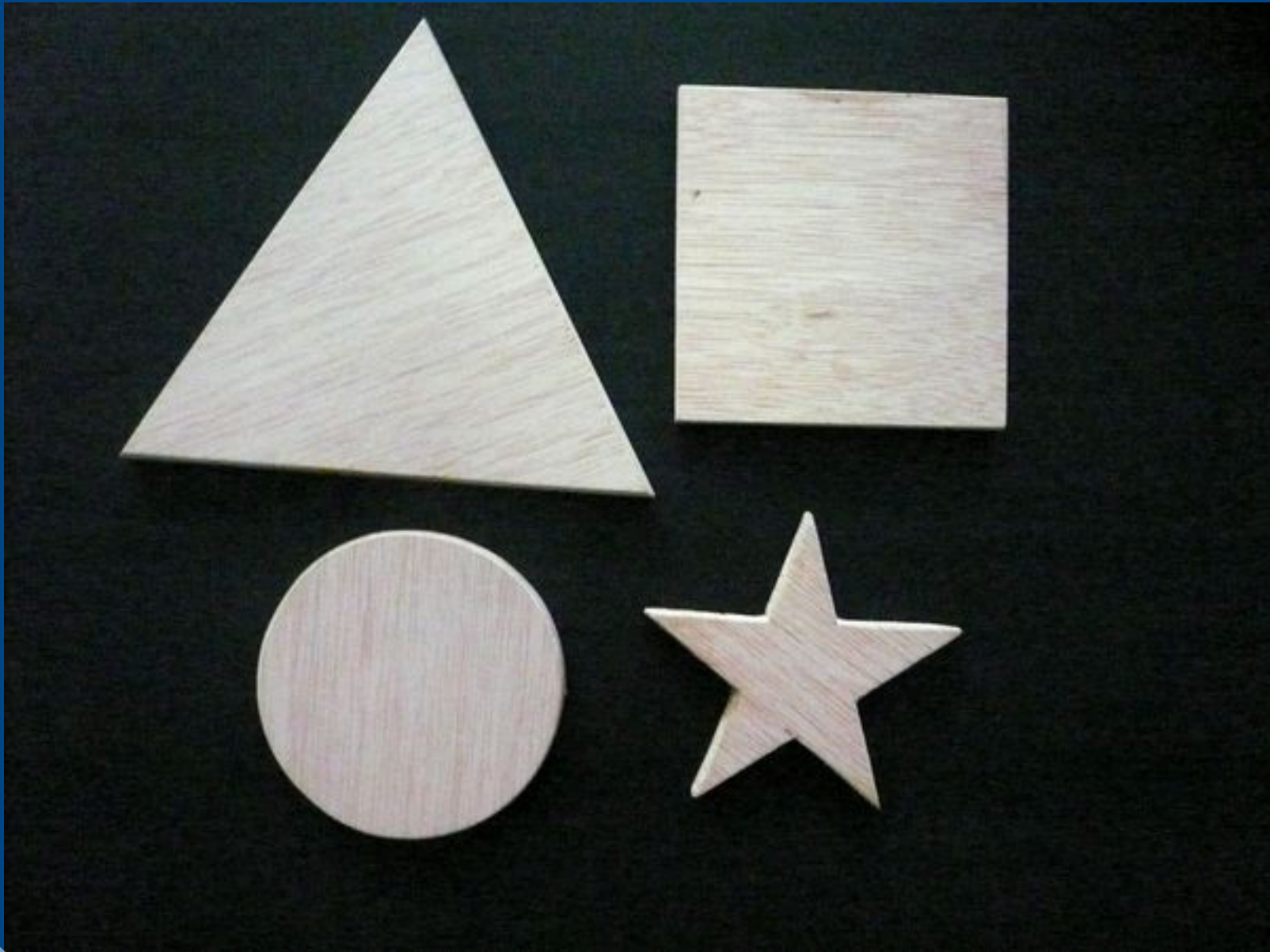


POINT TO A CAR

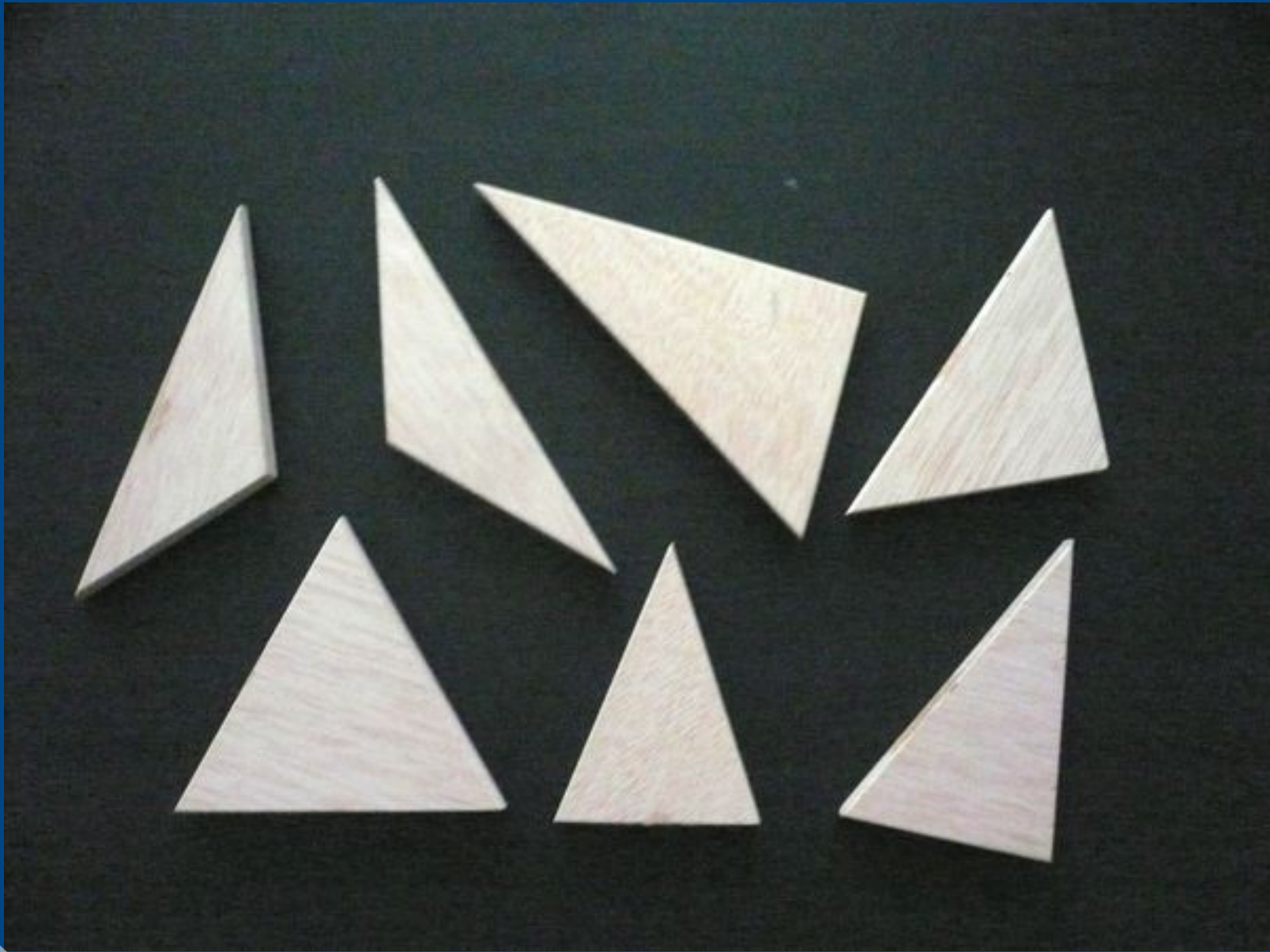


GEOMETRIA
COMPARTIDA
SHARED
GEOMETRY

ACTIVITIES: BASIC SHAPES



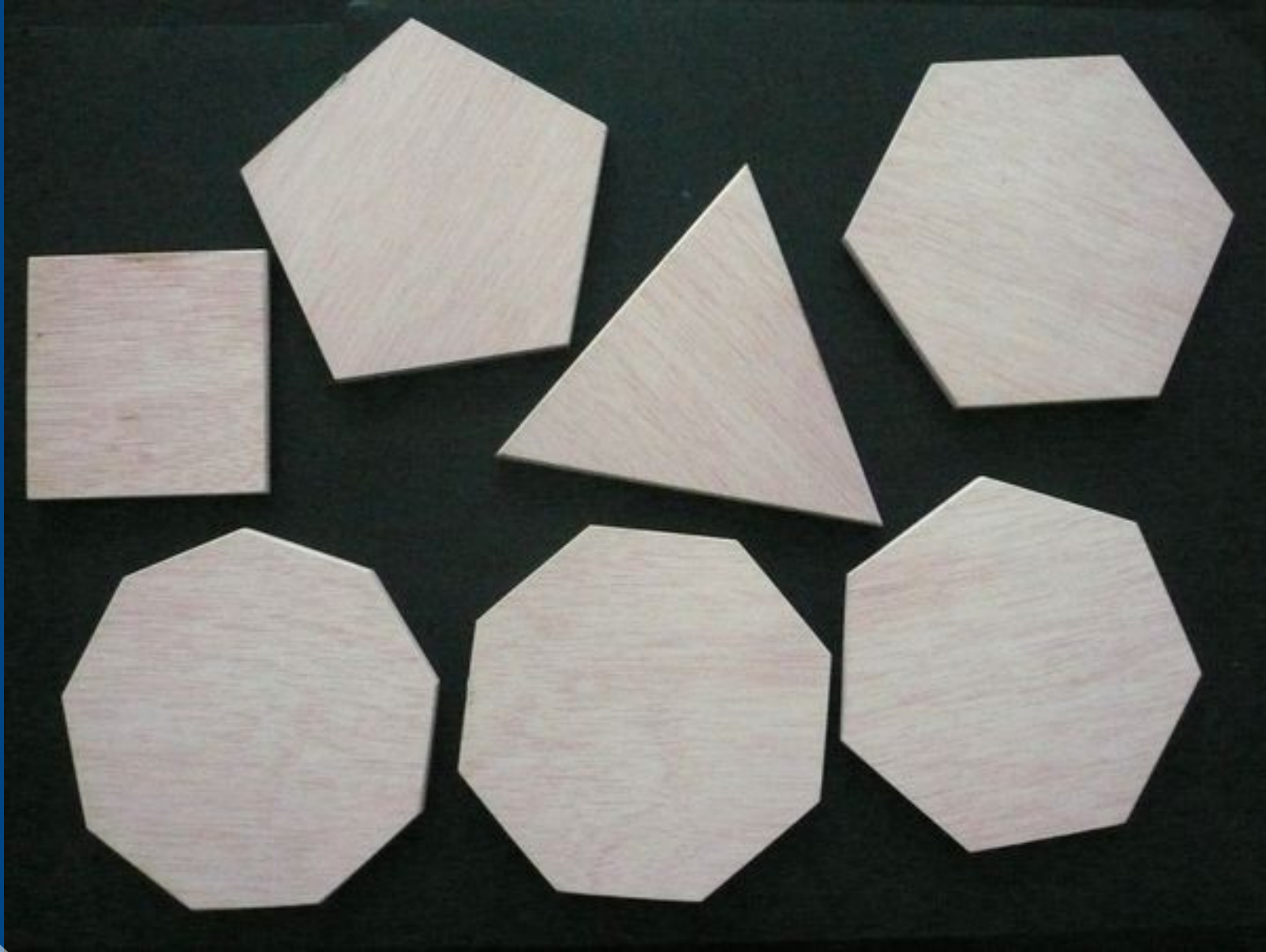
ACTIVITIES: TRIANGLES



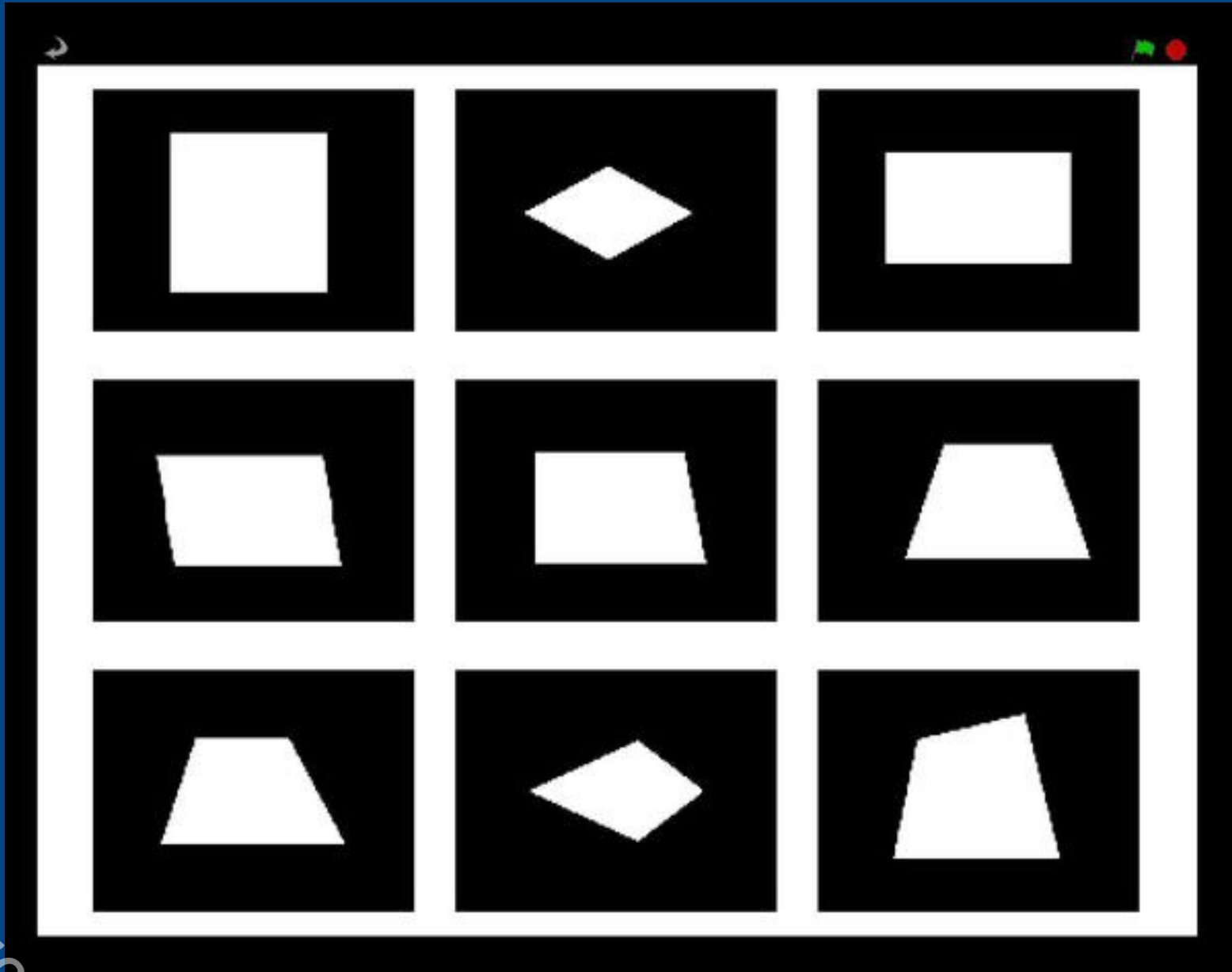
ACTIVITIES: QUADRILATERALS



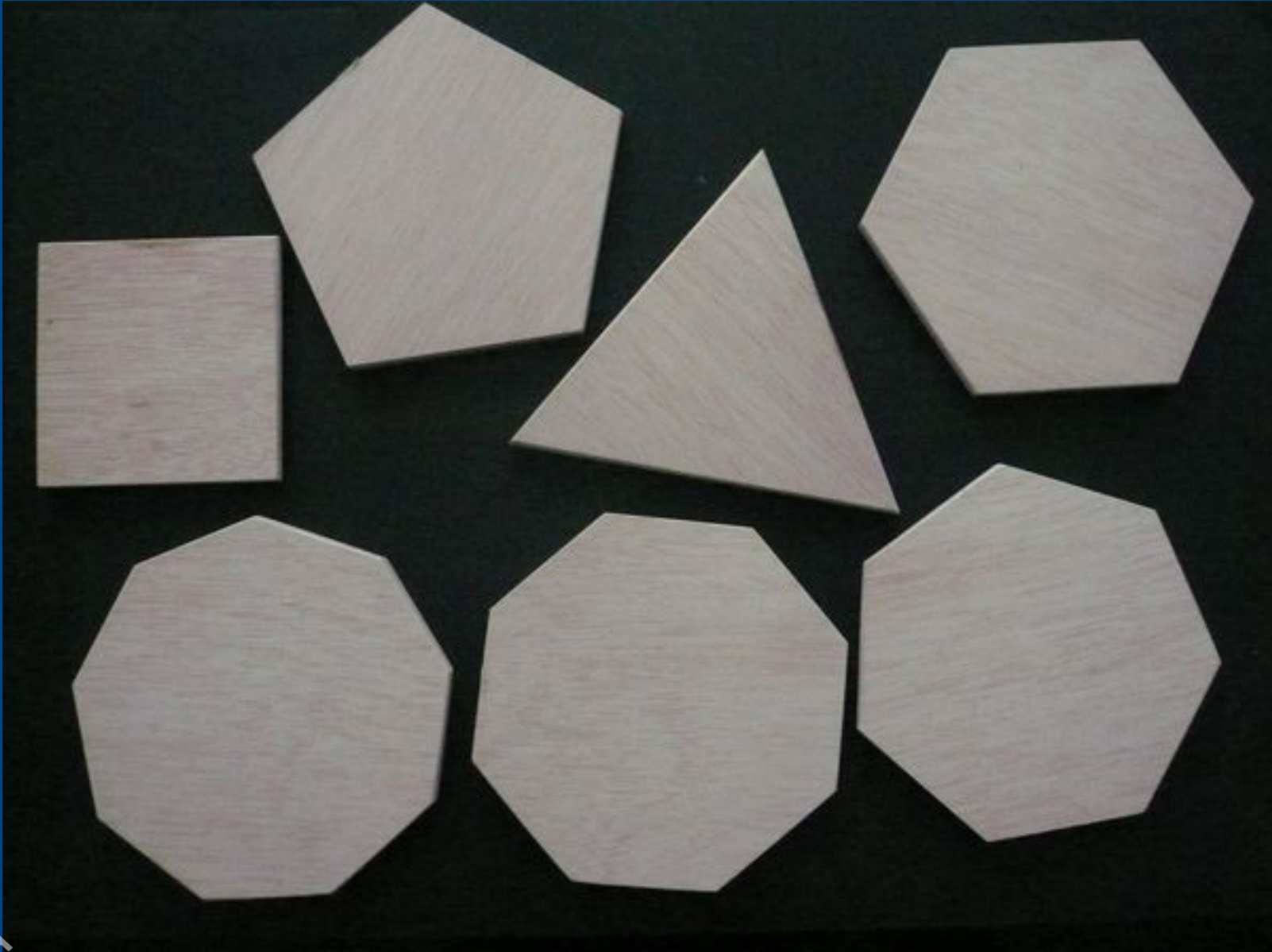
ACTIVITIES: REGULAR POLYGONS



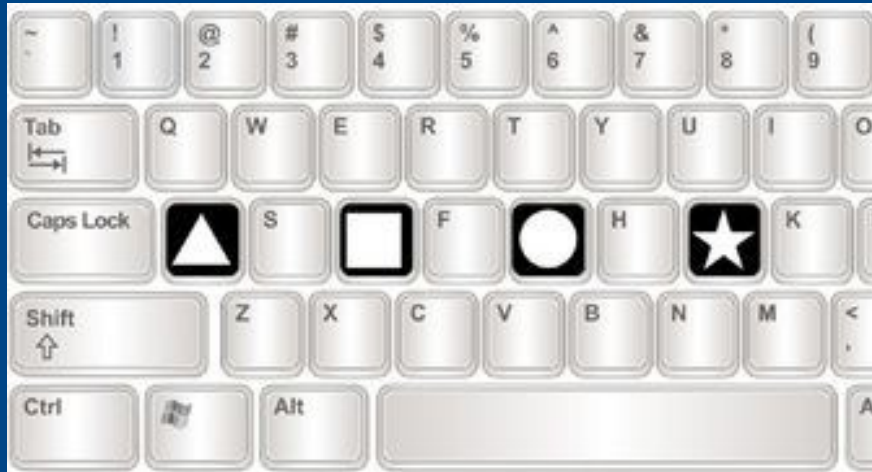
ACTIVITIES: DIFFICULTY LEVELS ISOSCELES TRAPEZOID?



ACTIVITIES: DIFFICULTY LEVELS HEPTAGON?



OTHERS KINDS OF INTERACTION STICKERS ON KEYBOARD



```
when clicked
  forever if key a pressed? and estat = 4
    set solucio_4 to triangle
    wait 1 secs
    set solucio_4 to 0

when clicked
  forever if key d pressed? and estat = 4
    set solucio_4 to quadrat
    wait 1 secs
    set solucio_4 to 0

when clicked
  forever if key g pressed? and estat = 4
    set solucio_4 to cerde
    wait 1 secs
    set solucio_4 to 0

when clicked
  forever if key j pressed? and estat = 4
    set solucio_4 to estrella
    wait 1 secs
    set solucio_4 to 0
```

KEY A TRIANGLE

KEY D SQUARE

KEY G CIRCLE

KEY J STAR

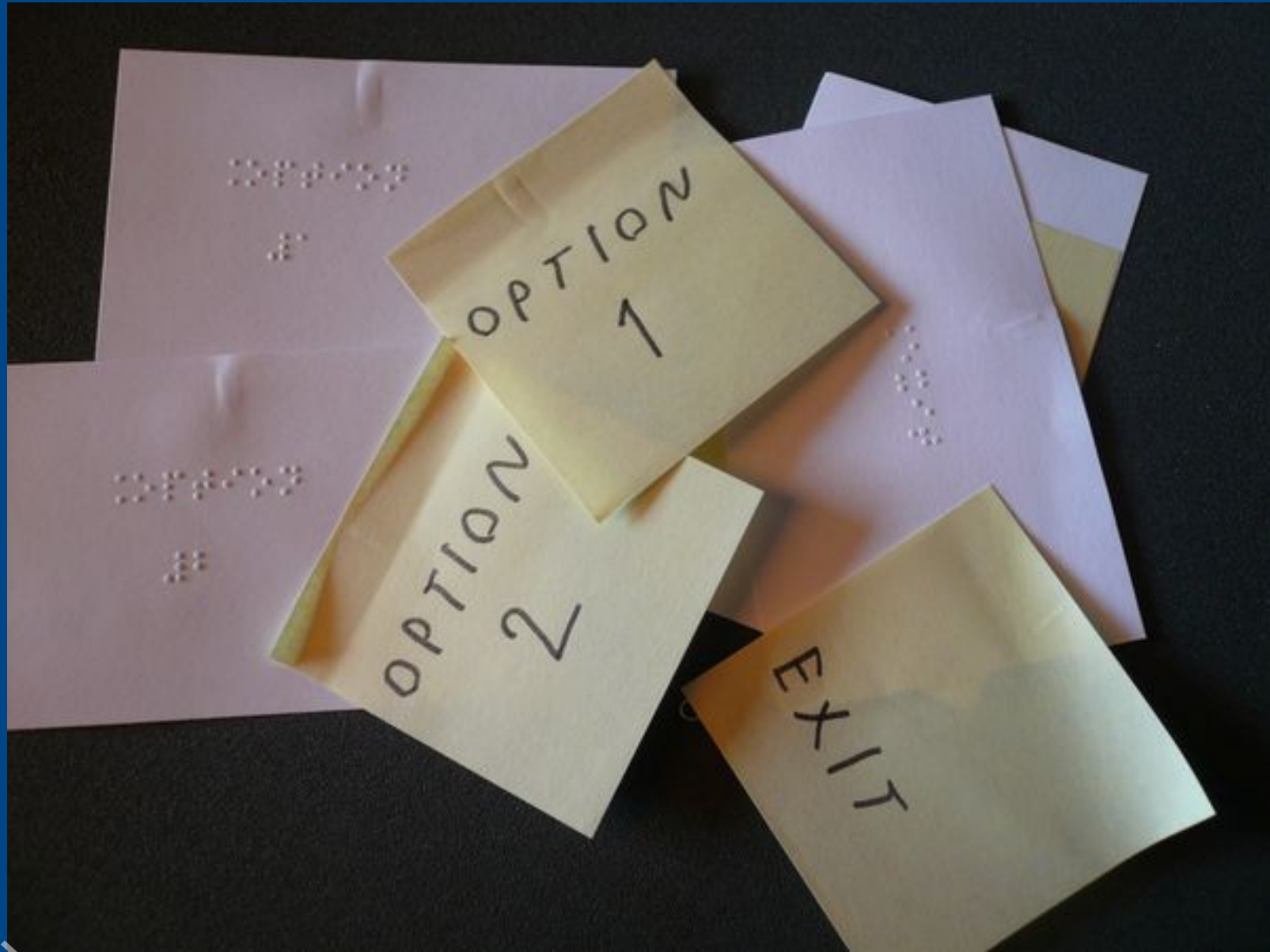
TAGS WITH BRAILLE CODE



TAGS CARD



BRAILLE CODE



TAGS + BRAILLE CODE



INFORMATION ALWAYS IN AUDIO



COLORS

3 COLORS

GREEN RIGHT

RED ERROR

ORANGE INFORMATION



OK



ERROR

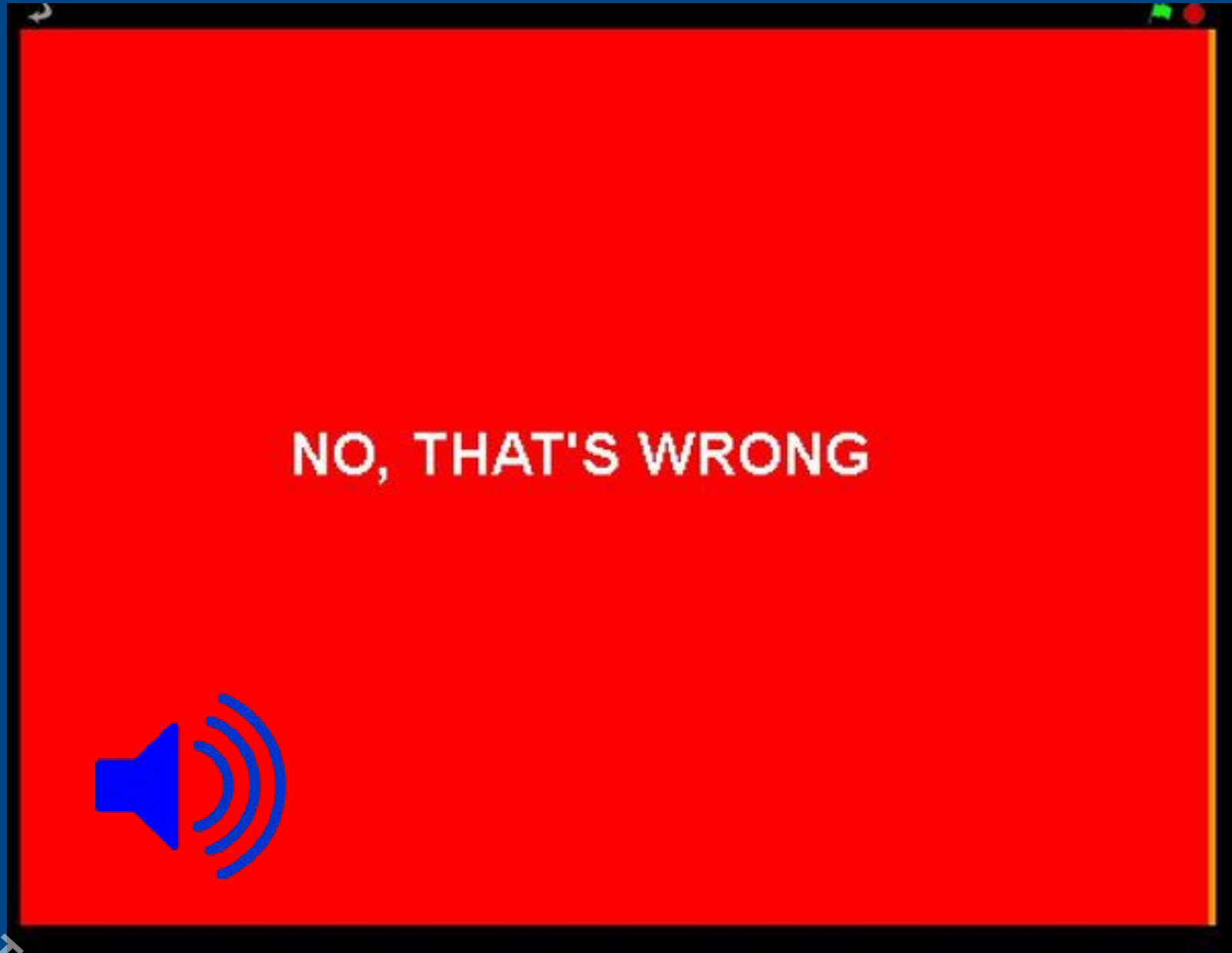


INFO

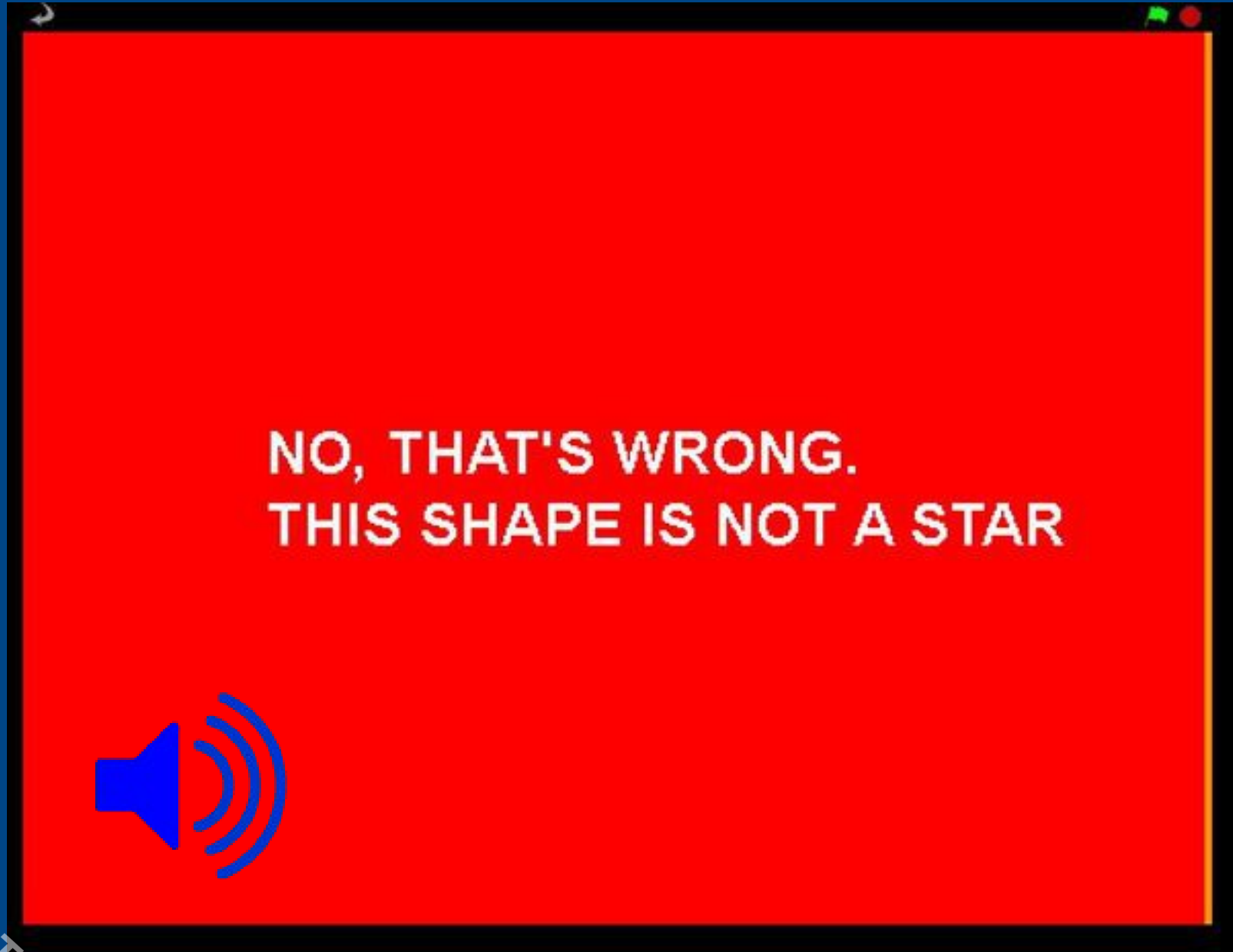
OK



ERROR MESSAGE



ERROR MESSAGE



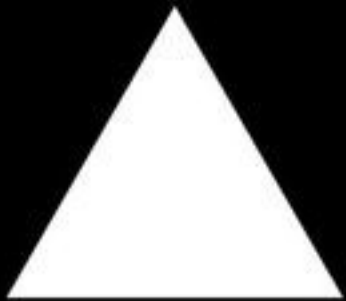
INFORMATION

DO YOU KNOW
THE BASIC SHAPES?



FORMAS GRANDES, COLORES CONTRASTADOS

LARGE SHAPES, CONTRASTING COLORS



WORDS / TEXTOS
TYPOGRAPHY ARIAL, SIZE LARGE, CAPITALS
TIPOGRAFIA ARIAL, MEDIDA GRANDE, MAYÚSCULAS

DO YOU KNOW
THE BASIC SHAPES?

MENÚ / MENU

OPTIONS: PRESENTATION, IDENTIFY AND POINT
OPCIONES: IDENTIFICAR, SEÑALAR Y RECONOCER

1. BASIC SHAPES PRESENTATION

2. IDENTIFY THE BASIC SHAPES

3. POINT TO THE BASIC SHAPES

MENÚ / MENU

OPTIONS: PRESENTATION, IDENTIFY AND POINT
OPCIONES: IDENTIFICAR, SEÑALAR Y RECONOCER

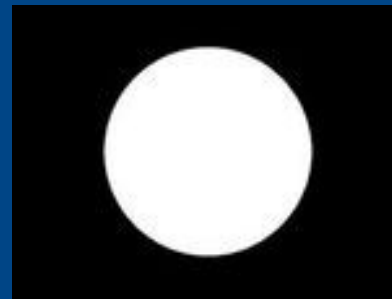
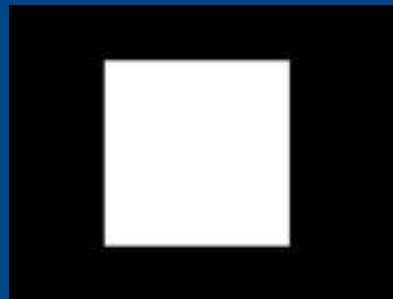
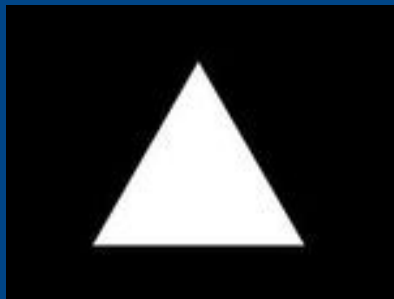
1. BASIC SHAPES PRESENTATION

2. IDENTIFY THE BASIC SHAPES

3. POINT TO THE BASIC SHAPES



1. BASIC SHAPES PRESENTATION



TRIANGLE



SQUARE



CIRCLE



STAR

2.IDENTIFY THE BASIC SHAPES



+



= TRIANGLE

3.POINT TO THE BASIC SHAPES

TRIANGLE ?



+



= OK



Primer premio "Ciencia en Acción 2012" Modalidad: Ciencia, Ingeniería y Valores

Proyecto

ENTORNO DIGITAL TANGIBLE:

GEOMETRÍA COMPARTIDA

Proyecto

Objetivo de investigación

Inclusión Digital

RFID

Video ilustrativo del proyecto

Material/Las piezas

Las actividades

Periféricos/Estructura

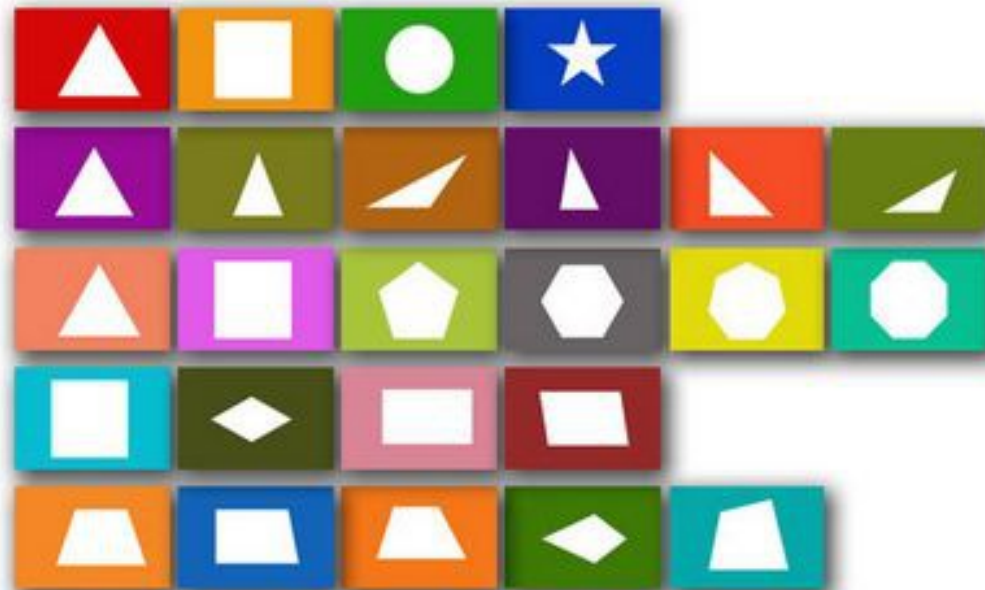
Difusión del proyecto

Agradecimientos

Documentación

Contacto/mails

Geometria compartida
Disseny d'un entorn digital tangible
Joan Gelabert/Jesús Arbués



Formes bàsiques - Triàngles - Polígons - Quadrilàters

www.sacosta.org/rfid (català)

www.rfid.org/rfid_castellano

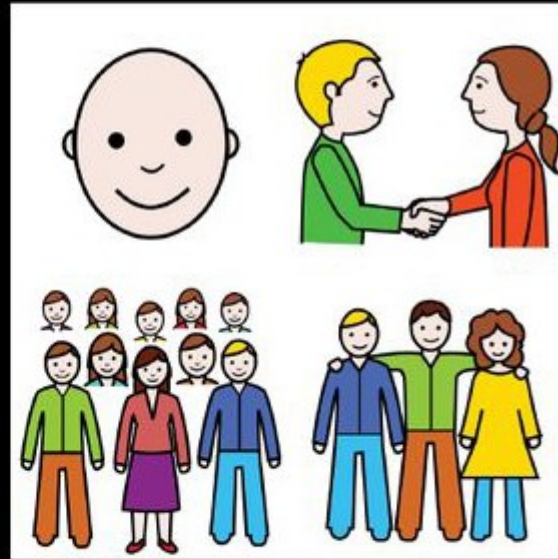
Imatges i fotos: Jesús Arbués, Bea Cascante,
Banco Imágenes y Sonidos del ITE





GRACIAS

THANK YOU



DEMO