



Co-funded by the
Erasmus+ Programme
of the European Union



STEP by STEP

ROBOTICS


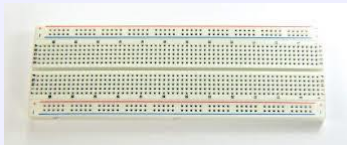


ServoMotor Flag



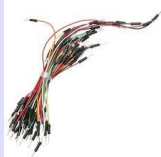
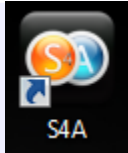


Lesson Objectives

- Know the servomotors or servos
- See how they differ from a normal engine
- Learn to handle them with a joystick
- Use analog input blocks with different pins
- Introduce the algorithm concept

Material and resources to use

Nome	Figura	Descrição
Arduino		Arduino Uno or compatible and with the firmware for S4A loaded.
Breadboard		Breadboard with 840 pins
Joystick		A joystick is composed of a pair of potentiometers (one for the X axis and one for the Y)
ServoMotor		A servomotor does not rotate continuously, but what we do is control its position.

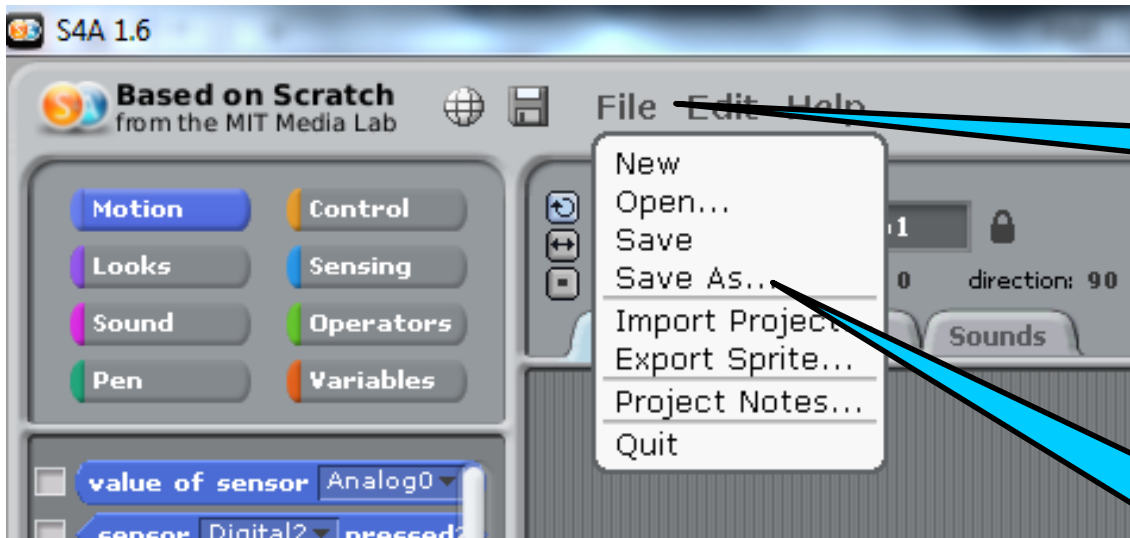
Material and resources to use

Nome	Figura	Descrição
Cables		Cables to connetions
Software S4A		Development Software
Tablet		Device build program
Computer		Device build program

ROBOTICS - ServoMotor Flag



ServoMotor Flag drawing

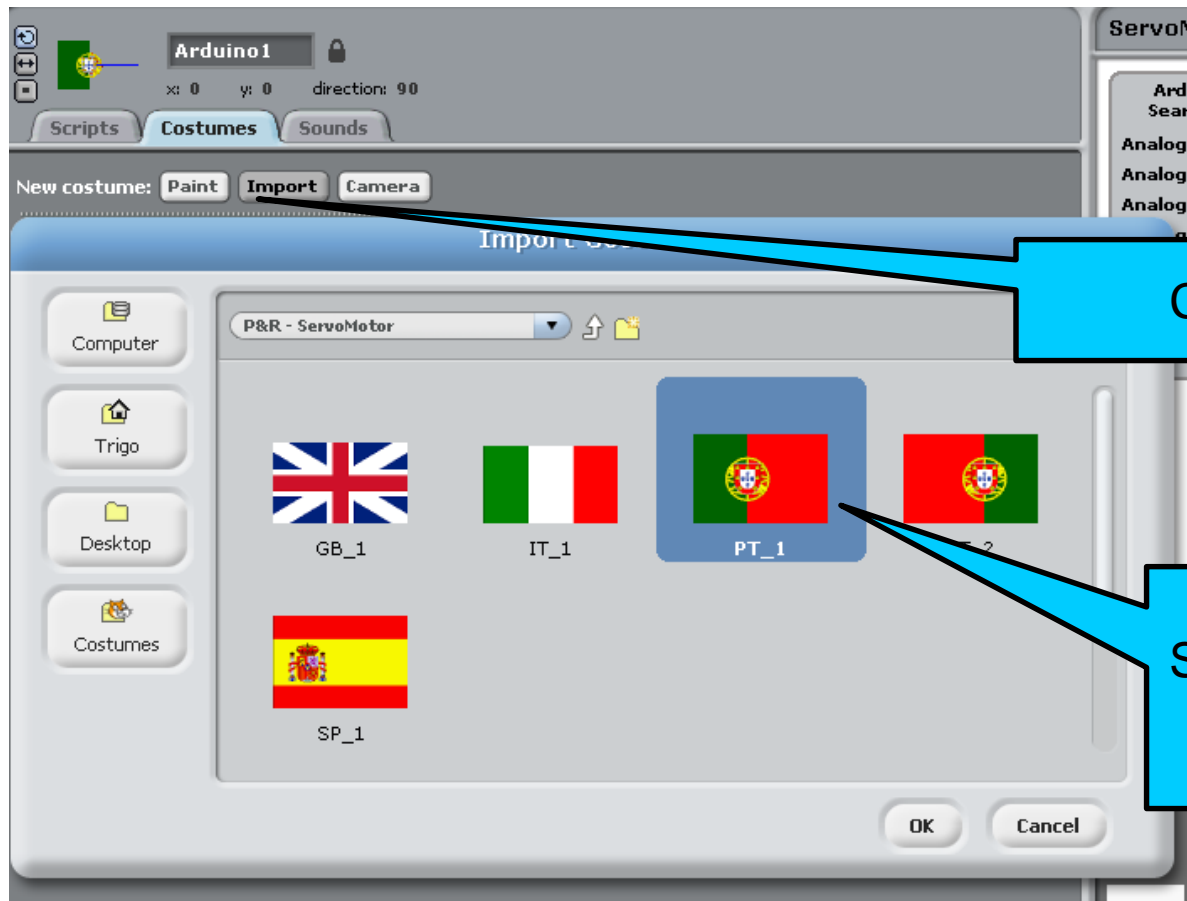


Click in "File"

Click in "Save As"
with name
ServoMotor_Flag



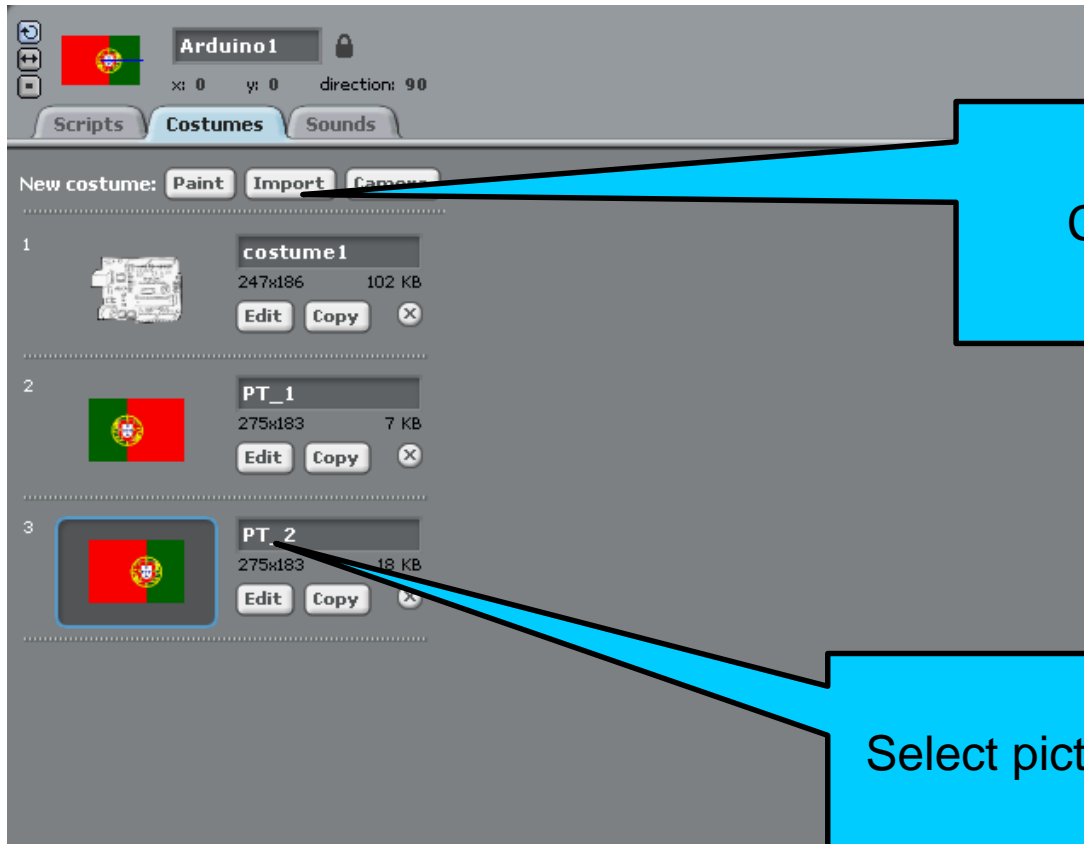
ServoMotor Flag drawing



Click in "Import"

Select picture "PT_1"
and click OK

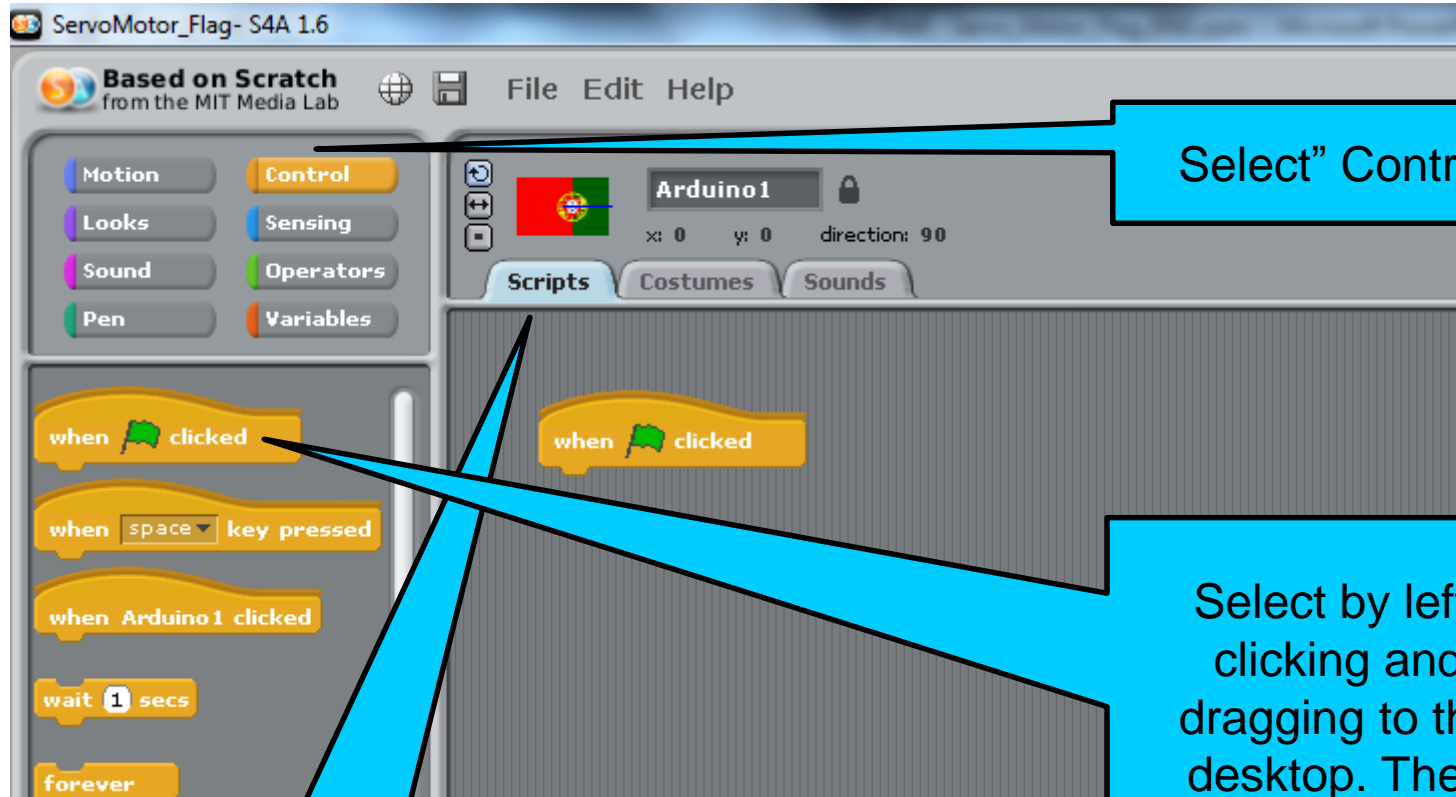
ServoMotor Flag drawing



Click in "Import" again

Select picture "PT_2" and click OK

Programming

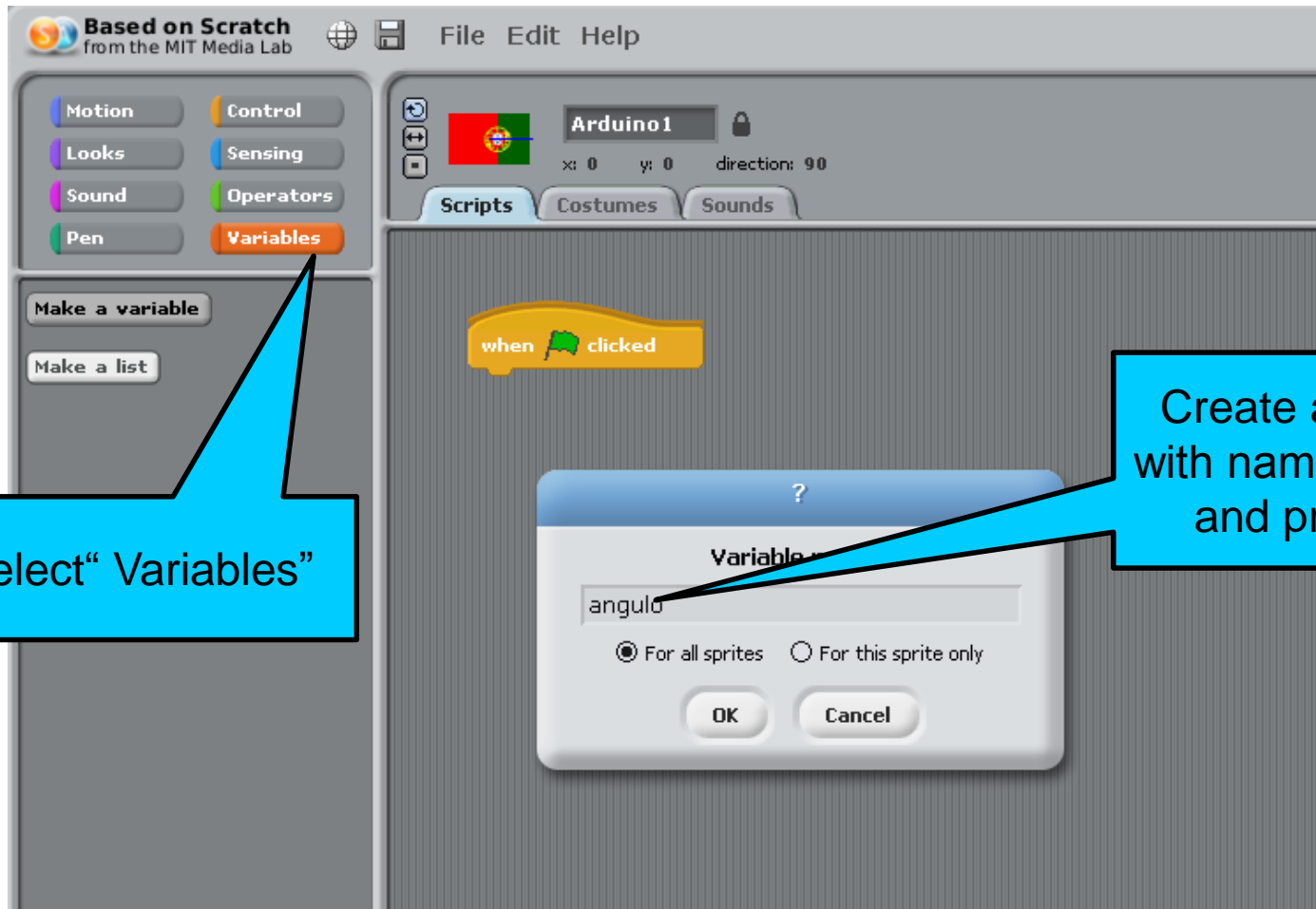


Select "Control"

Select "Scripts"

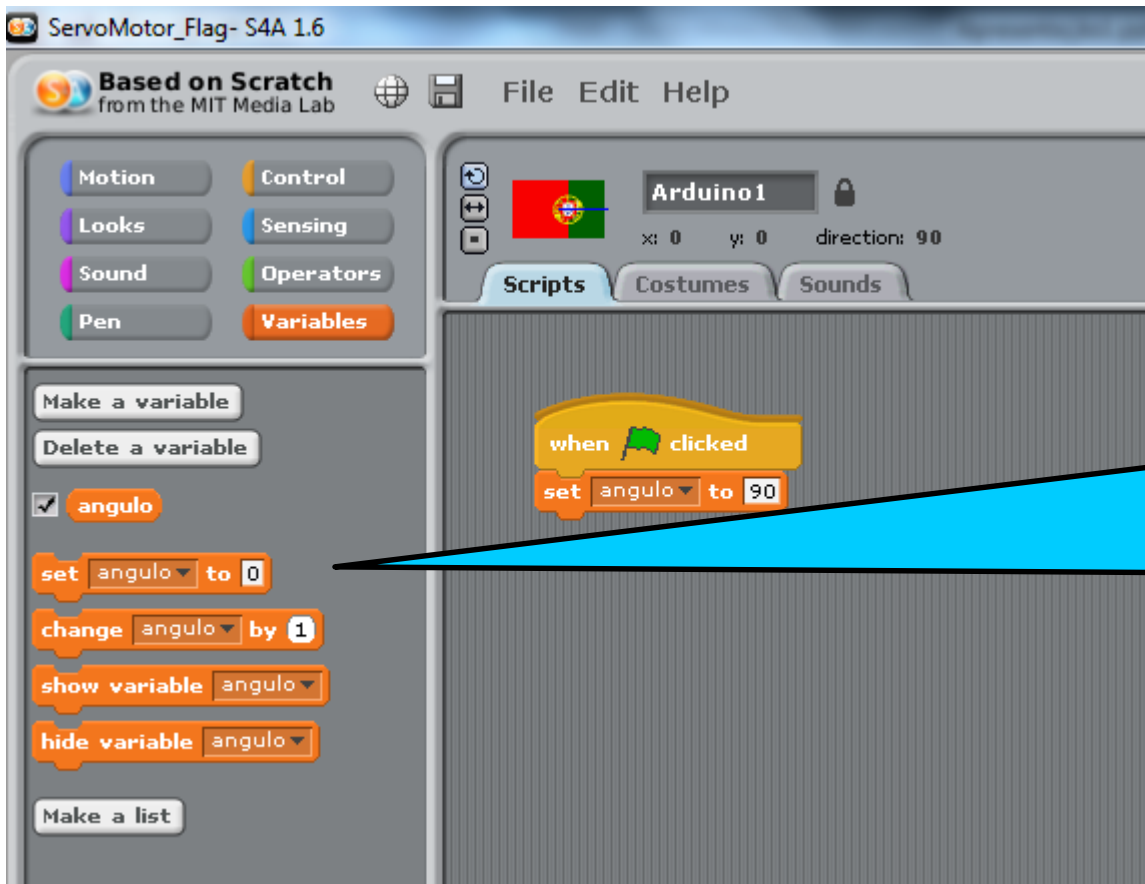
Select by left-clicking and dragging to the desktop. Then release the mouse button

Programming



The screenshot shows the Scratch IDE interface. On the left sidebar, the 'Variables' category is selected. A blue callout box points to the 'Variables' button with the text 'Select "Variables"'. In the main workspace, a 'when clicked' event block is visible. A 'Variable' dialog box is open, showing the name 'angulo' in the text field. A blue callout box points to the text field with the text 'Create a variable with name "angulo" and press OK'. The dialog box also has radio buttons for 'For all sprites' (selected) and 'For this sprite only', and 'OK' and 'Cancel' buttons.

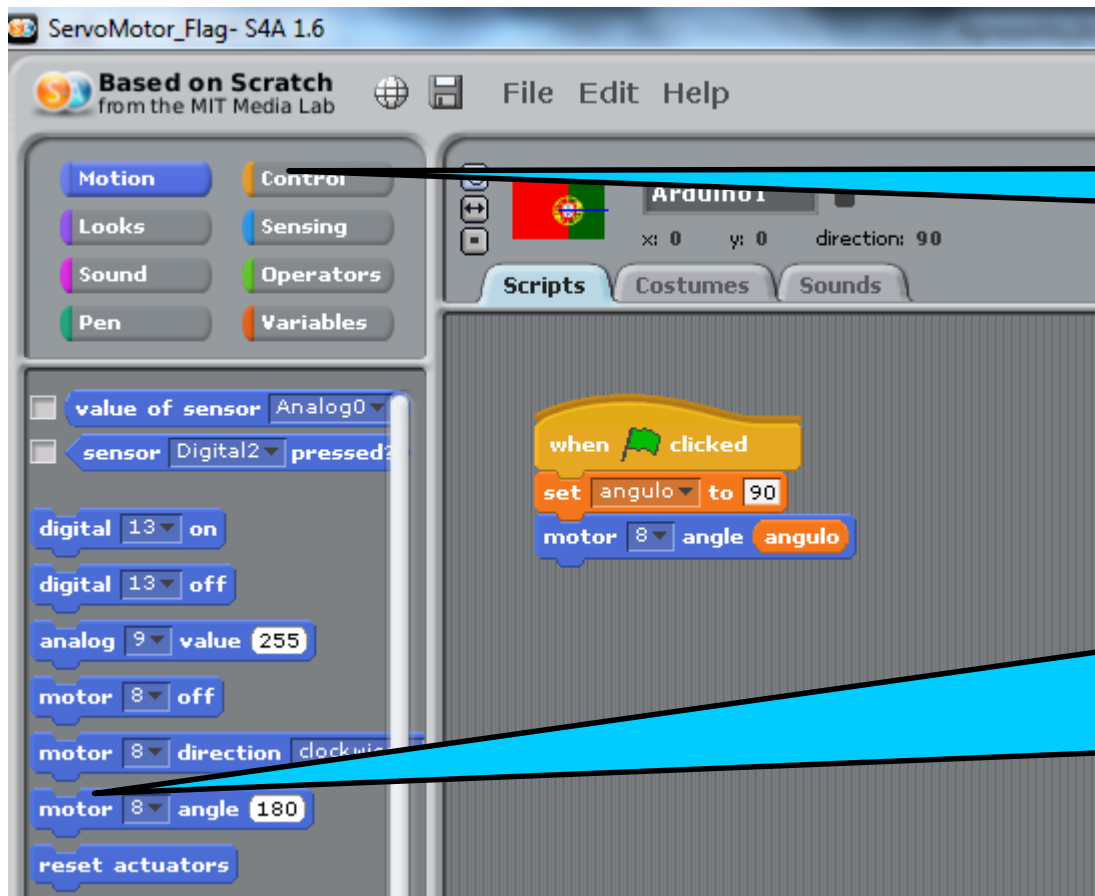
Programming



The screenshot shows the Scratch IDE interface for a project titled "ServoMotor_Flag - S4A 1.6". The interface includes a menu bar (File, Edit, Help), a toolbar, and a sidebar with categories like Motion, Control, Looks, Sensing, Sound, Operators, Pen, and Variables. The "Variables" category is selected, showing a variable named "angulo" with a checkmark. Below the variable name are several blocks: "set angulo to 0", "change angulo by 1", "show variable angulo", and "hide variable angulo". The main stage area shows a "Scripts" tab with a "when clicked" event block and a "set angulo to 90" block. A blue callout box points to the "set angulo to 90" block.

Select by left-clicking and dragging to the desktop. Then release the mouse button. Put the value 90

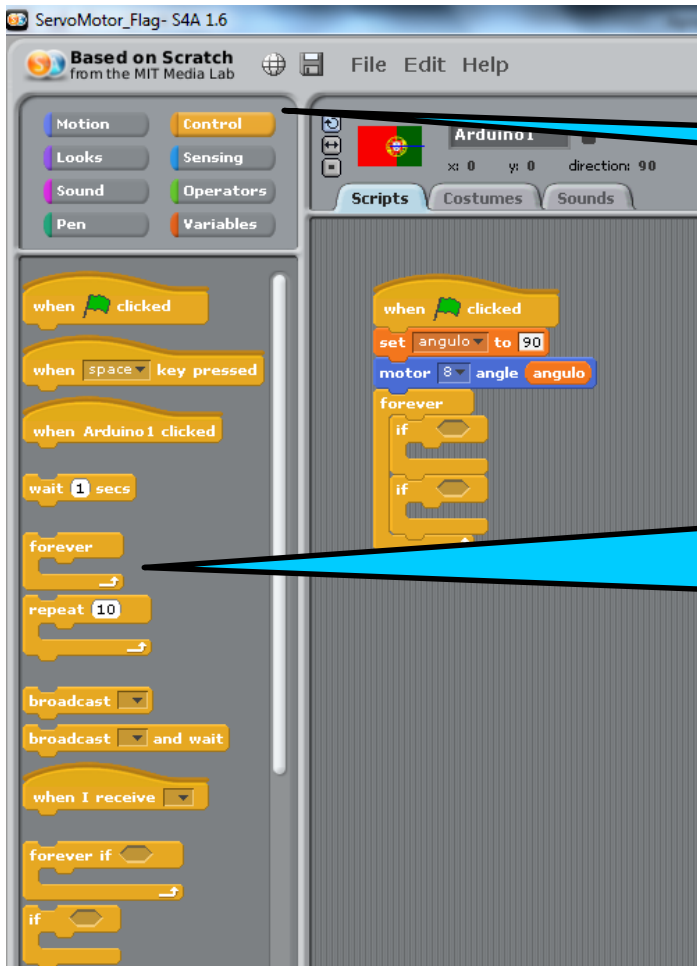
Programming



Select "Control"

Select by left-clicking and dragging to the desktop. Then release the mouse button. Change de value to variable "angulo"

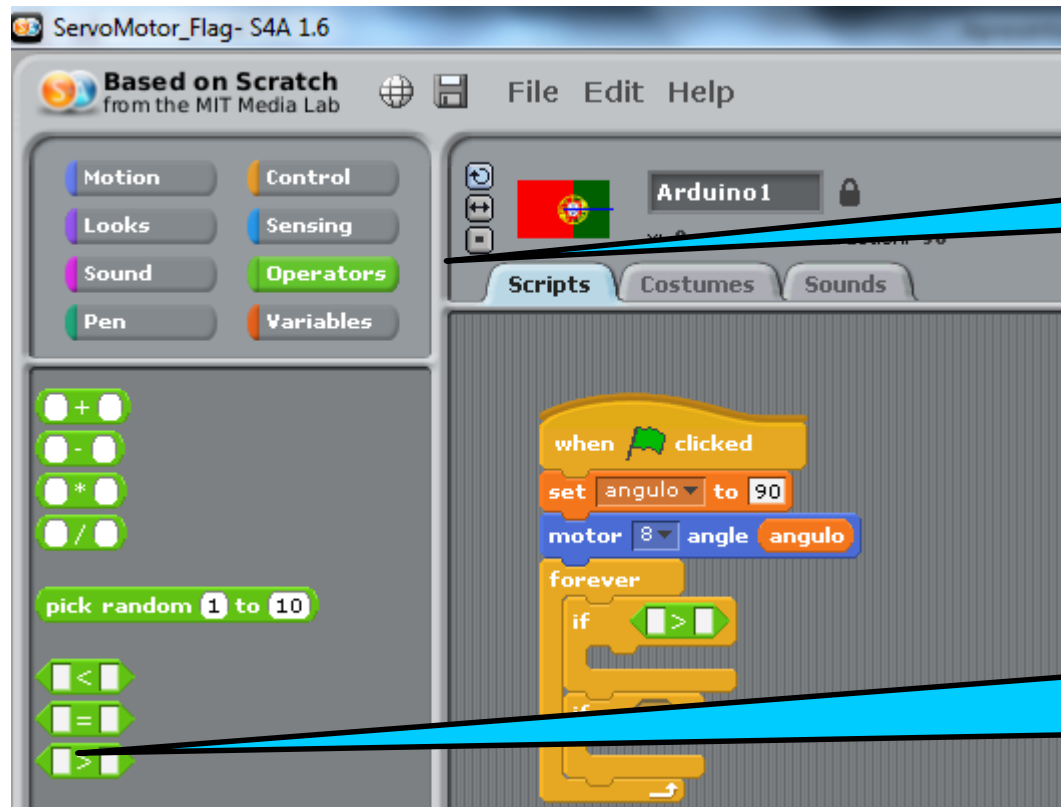
Programming



Select "Control"

Select by left-clicking and dragging to the desktop. Then release the mouse button

Programming



Select "Operators"

Select this block and drag it to the desktop.

ROBOTICS - ServoMotor Flag

Programming

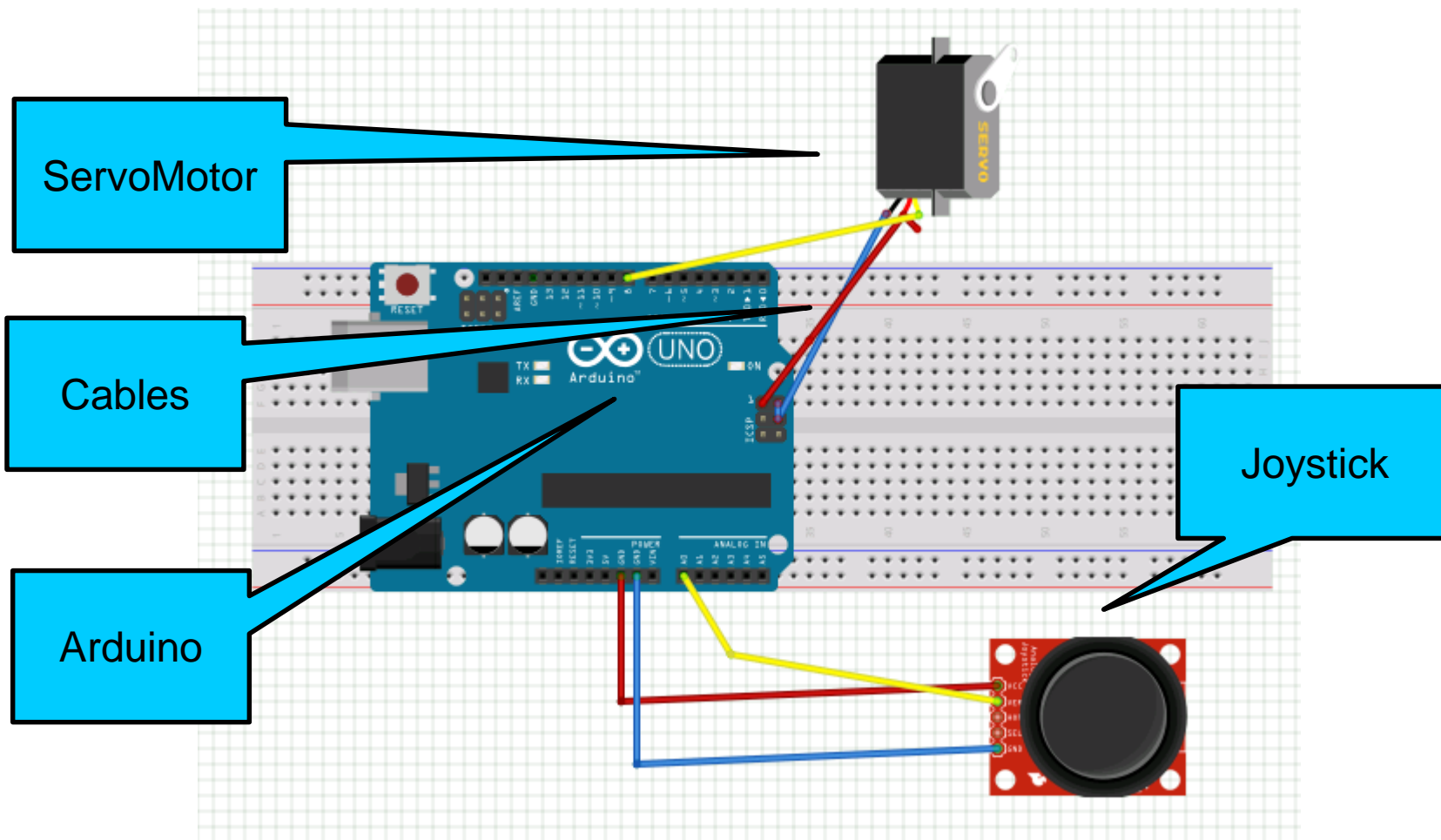
The screenshot shows the Scratch IDE interface. On the left, the 'Looks' category is selected in the palette. The main workspace contains a script for an Arduino servo motor. The script starts with a 'when clicked' event block, followed by a 'set servo angle to 90' block, and a 'motor 8 angle angulo' block. A 'forever' loop contains two conditional blocks: one for 'value of sensor Analog0 > 600' which changes the angle by 3 and switches to costume 'PT_1', and another for 'value of sensor Analog0 < 400' which changes the angle by -3 and switches to costume 'PT_2'. A 'switch to costume IT_2' block is also visible in the costume palette.

Select "Looks"

Select this block and drag it to the desktop. Select "PT_1" and "PT_2"



Circuit design



ROBOTICS - ServoMotor Flag



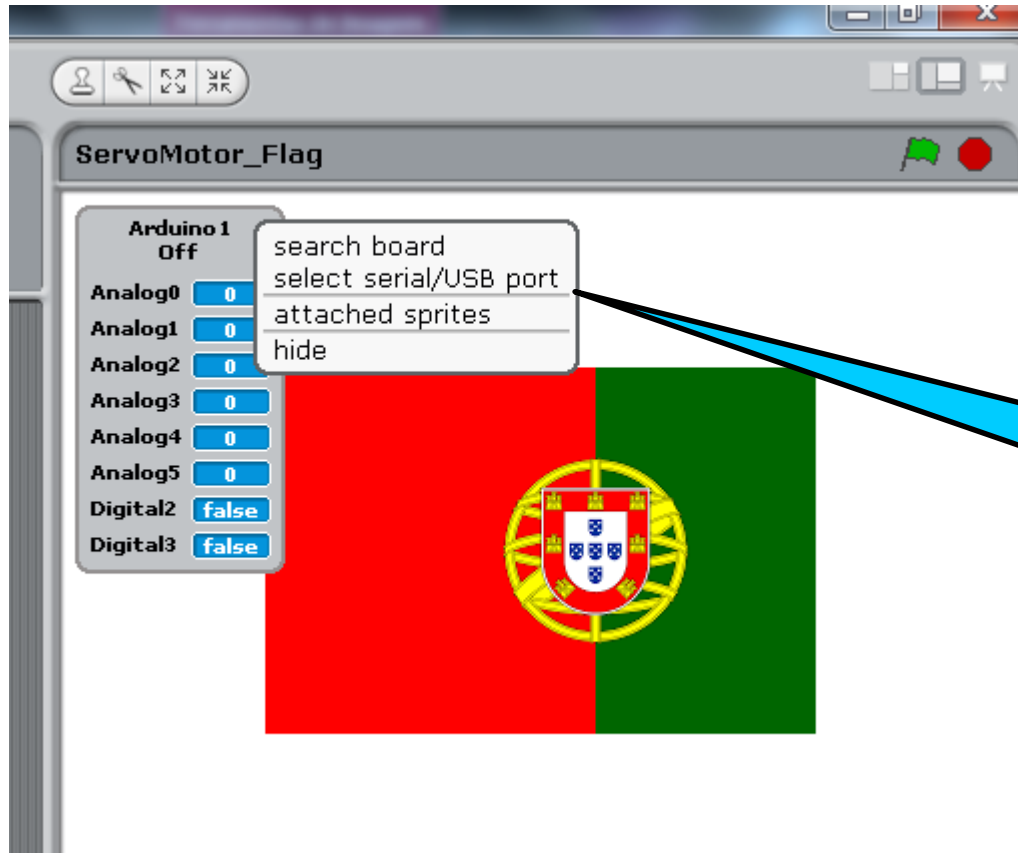
Upload the FirmeWare to Arduino

```
Firmware | Arduino 1.8.5
File Edit Sketch Tools Help
Firmware
37 // timer2 set to 20ms, to fix a glitch that made this period unstable in previous versions.
38 // readSerialport() function open
39 // pulse() modified so that it receives pulse width as a parameter instead using a global variable.
40 // updateServoMotors changes its name as a global variable to avoid the same name.
41 // Some minor fixes.
42
43
44
45
46
47
48 pinType type; //Type of pin
49 int state; //State of an output
50 //byte value; //Value of an input. Not used by now. TODO
51 };
52
53 pin arduinoPins[14]; //Array of struct holding 0-13 pins information
54
55 unsigned long lastDataReceivedTime = millis();
56
```

Open file "Firmware" and upload to arduino



Connection



Click "Select serial/USB port"

ROBOTICS - ServoMotor Flag

