

PHYSICAL COMPUTING WITH ARDUINO

THEME	Creating na interactive installation with LEDs
FORMAT	Group (students work in small groups)
PREPARATION TIME	2 hours
ACTIVITY LENGHT	30-45 minutes
DIFFICULTY LEVEL	average

PEDAGOGICAL GOALS

- To start programming an Arduino board or similar.
- To understand the coding and transfer procedure to the board.
- To learn how to modify a program and test it.

NECESSARY MATERIALS

- A projector

For each students group:

- 1 Computer
- 1 Arduino board or similar
- 1 breadboard
- LEDs

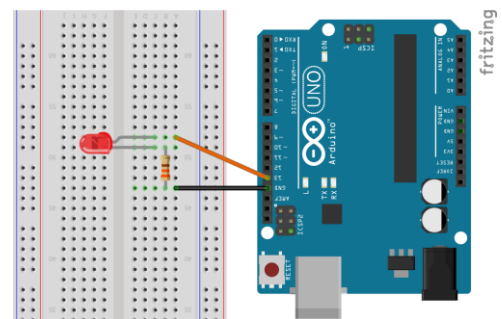
Preparation:

- To start working with Arduino boards or similar, you will need to install the Arduino IDE on the computers that will be used. Remember: the Arduino IDE is the software that allows you to program the board.
- In addition to installing the IDE, you must also install the driver that will allow your computer to communicate with the Arduino board. If you are using Mac or Linux, there is no need to install the driver. If you are using Windows, do the following: connect your Arduino board to your computer using the USB cable, a window will appear (Add New Hardware Wizard, or "Found New Hardware Wizard"), and Windows should automatically recognize and install the drivers.

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Leading the activity:

- If possible, divide the class into small groups. Each group must have access to a computer with an Arduino IDE installed, an Arduino board or similar and a cable to connect the board to the computer. If this is not possible, try to take turns to give all students access to the materials, or work in a collective format, projecting your screen.
- Start by presenting the Arduino board and examples of things that can be created with it.
- Then ask each group to connect their board to the computer and open the Arduino IDE.
- Show the steps to transfer the Blink example to the board (which makes the internal LED to blink):
- To find the example code, go to File> Examples> 01.Basics> Blink.
- In Tools> Port, select the port to which your Arduino is connected.
- In Tools> Board, check if your board is defined correctly (ex .: Arduino / Genuino Uno).
- Click Load (icon with the right arrow in the upper left corner).
- If all goes well, you will see the message “Done uploading” at the bottom of the screen.
- Then ask the groups to estimate how long (seconds) the LED is on and off. Then challenge them to find out where in the program this time is set, suggesting that they modify the interval using other values.
- You can also suggest that they create other patterns for the LED flashes (adding new lines of code, copying and pasting from the program itself).
- Finally, if there is time, you can ask them to connect an external LED to the protoboard, as in the example below. To do this, disconnect the Arduino from the computer and connect it again after completing the assembly. Then, you can suggest that they modify the program and the circuit to turn on the LED on other Arduino pins (as in pin 12 or 11, for example).
- If there are enough materials, students can continue connecting two LEDs to the board, modifying the initial program to make the two LEDs flash simultaneously, or in alternating patterns created by them.



Discussion and reflection:

- After completing the activity, discuss the concepts learned with the class, taking tests and designing the code, if possible. Some questions that can guide the discussion:
 - What is a computer program? How does this program work?
 - At which location in the code is the blink time interval set?
 - What does LOW and HIGH mean for Arduino? And pinMode (13, OUTPUT)?
 - What would happen if the code snippet inside the void loop function was switched to void setup?

Credits:

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