

PHYSICAL COMPUTING WITH ARDUINO

THEME	Dojo of Arduino programming: Volume indicator
FORMAT	Group (students work collectively as a group)
PREPARATION TIME	30 hours
ACTIVITY LENGHT	40-45 minutes
DIFFICULTY LEVEL	Low-average

PEDAGOGICAL GOALS

This activity seeks to introduce students to output control by analyzing input values read from an analog input.

For this, they will develop a program collectively, in the Dojo style, which causes LEDs to light up gradually as we turn a potentiometer.

This activity has as specific objectives:

- To familiarize students with Arduino board programming
- To encourage collaboration when programming
- To use commands to turn digital outputs on and off
- To Use commands to read values from analog inputs
- To use conditionals to control outputs from the reading value of an input

NECESSARY MATERIALS

- 1 computer connected to a projector or a television
- 1 Arduino board
- 1 breadboard
- 3 LEDs
- 3 220 Ohms resistors
- 1 potentiometer
- 6 male-male jumper wires

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Preparation:

To perform this activity, it is necessary that the Arduino IDE is installed on the computer. To begin, assemble a circuit with three LEDs on a breadboard, connected to pins 11, 12 and 13 and a potentiometer connected to pin A0.

This circuit will be used in the classroom so that students collectively create a code that causes the LEDs to light up gradually as we turn the potentiometer.

While preparing the classroom, place two chairs in front of the computer that is connected to the projector.

Leading the activity:

- Showing your computer screen for the class, start by opening a new program on the Arduino IDE. Connect your Arduino board (with the circuit with LEDs and potentiometer properly assembled) to the computer's USB input and configure (under Tools) the type of board and the port to which your board is connected.
- Open the following Basics> ReadSensorValue sample program and upload it to your card. Then, open the serial monitor. Rotate the potentiometer and watch what happens as it changes its position.
- Go back to the code and discuss with the class what is happening in the code. You can delete the initial comments to make the program cleaner.
- Then, add a conditional structure to your program, which causes LED 13 to light up when the potentiometer value reaches a certain value.
- Then proceed to the Dojo stage. In this dynamic, two students at a time sit in the chairs in front of the computer: one is the pilot and the other is the co-pilot. The pilot controls the computer, while the co-pilot dictates the instructions to be followed by the pilot. Every 3 minutes the positions are changed: the pilot returns to his place, co-pilot sits in the pilot position, and a new student sits in the co-pilot position.
- Explain the dynamics to the class, and the ultimate goal of the activity. Start by asking two students to take the pilot and co-pilot positions: they must make some modifications to the program that will take them some step closer to achieving the goal.
- All steps must be tested by uploading to the board and commented with // in the code. When the 3 minutes are up, ask a new student to apply to take over as co-pilot. Repeat the dynamic until the objective has been achieved.
- If there is time, you can challenge them to include 2 more LEDs in the system, changing both the circuit and making the appropriate code changes.

Discussion and reflection:

- After completing the activity, discuss and formalize the concepts learned with the class. Some questions that can guide the discussion:
 - What command is used to turn on an LED? What command is used to read an entry?
 - How do we create a condition structure?

Credits:

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