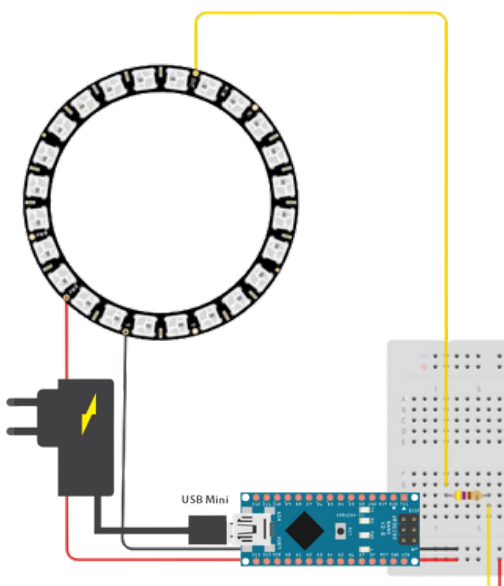
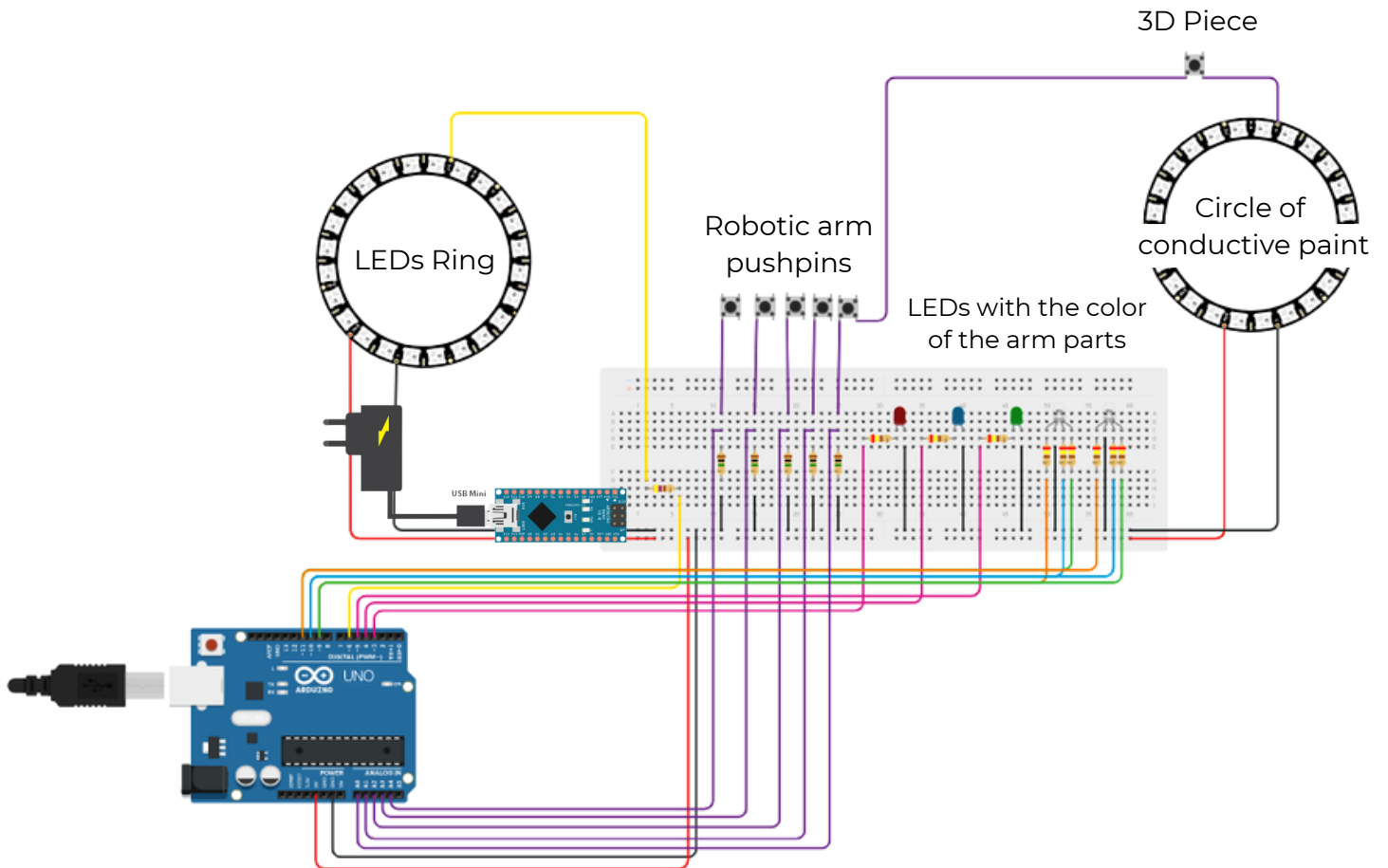


STEP 2 - SCHEME OF ELECTRICAL CONNECTORS

In this section, you can see how the different components are connected to the Arduino UNO. To make it easier to read, it has been explained element by element according to the function they play in the code and in the prototype.



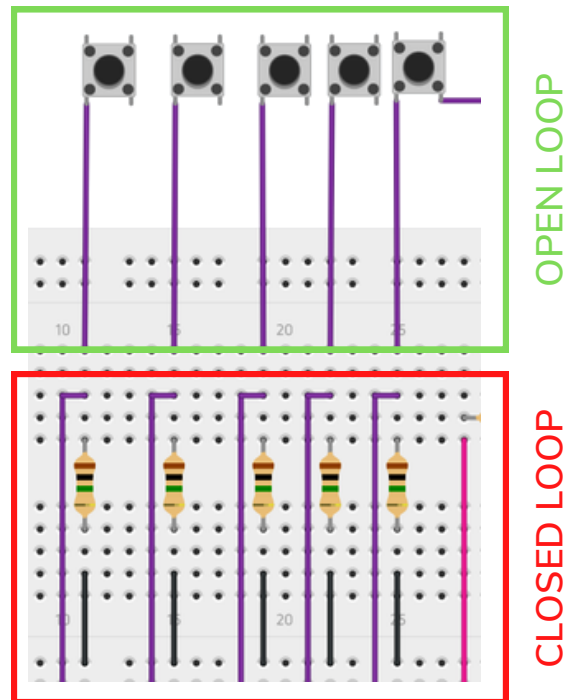
1 LED RING

It is a Neopixel ring with 32 RGB LEDs. Its function in the prototype is to indicate the angle that we are marking by the 3D piece, in the painting. For this, it is necessary: a cable that connects the ring to Ground, another one that is connected to a pin of the arduino to send the signal (in this case it would be the 6) and, finally, a last cable that connects it to a power supply. In this case, it has to be external (9V), since, otherwise, the ring does not have enough power to illuminate all the LEDs. Also, it needs a 470Ω resistor to work properly.

2

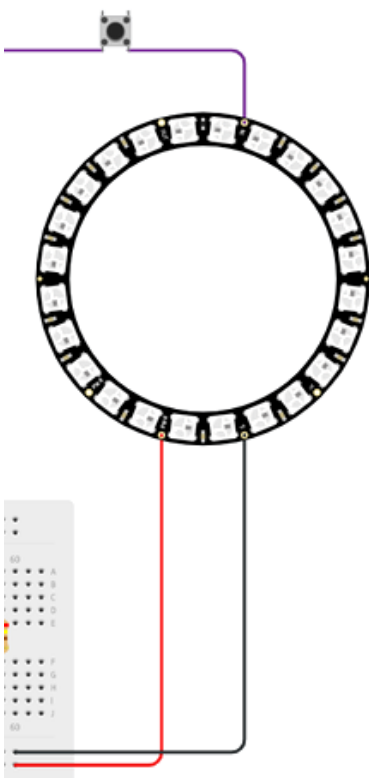
ROBOTIC ARM TACKS

This is the section of the code that controls which piece of the robotic arm we are actuating. This consists of two parts, the one we will call the closed loop and the other which will be the open loop. In order to represent the pushpins that are embedded in the drawing of the arm, we have used buttons. The process is as follows: when an arm is not selected, which means that we have not put in contact the pushpin of the mobile arm with the one in the drawing, the current flows from one of the analog pins of the arduino (in this case those from A0 to A4), passes through the 1M Ω resistor and goes directly to the Ground.



Meanwhile, the wire that is connected to the pushpin, as it is not in contact with anything, the circuit is open on that side and the current does not flow through it. However, when one of the arms is selected, since passing through the pushpin involves less resistance than going through the 1M arm, the current flows through there and goes directly to the pushpin containing the 3D part.

The reason why these components have been connected to the analog pins is because their purpose is to read the potential values received from the conductive paint, so that the arduino processes them and activates the other elements to rotate the pieces of the robot arm.



3

3D PART AND CONDUCTIVE PAINT

This part of the schematic represents the conductive paint circle and the 3D part running on it. This piece is the one that contains a thumbtack inside, as mentioned above, and is the one that acts as a potentiometer, which sends the different potential values to the arduino board, specifically to the pin of the piece that we have selected with the movable arm. This is the one that we have represented in the schematic as another button.

As for the conductive paint (represented as a ring of LEDs although it is not), the circle it creates is open, and one of its ends is connected to 5V and the other to Ground. The objective is to relate potential values with angles, making that when it receives 5V the angle that corresponds is 360 degrees and the 0V is 0 degrees.

4

ARM PARTS INDICATORS

This part of the schematic represents the LEDs that will indicate which part of the robotic arm is being selected. The color you mark will be the same color that will be shown on the LED ring and on the program of the arm itself. The first piece is red, the second one is blue, the third one is green, the fourth one is yellow and the fifth one is magenta. For this, four normal LEDs and one RGB LED have been used. Initially, we wanted to use two of RGB (as shown in the schematic) to give more color versatility, but since we are using an Arduino Uno, it does not have enough analog pins to do so. That's why, we decided to make the yellow color with a regular LED. However, in case you have an Arduino with more analog inputs, you can use more RGB LEDs.

In the first case, we connected a pin (specifically 3 for the red, 4 for the blue, 5 for the green and 7 for the yellow) to a 240Ω resistor. This was connected to the cathode of the LED and finally the anode to the ground.

In the second case, the red pin of the RGB LED has been connected to pin 9, the green to pin 10 and the blue to pin 11. The rest has been connected in the same way as in the first case with 240Ω resistors as well.

