Circuit 2B: Digital Trumpet

Learn about digital inputs and buttons as you build your own digital trumpet! Buttons are all around us, from the keys on your keyboard to the buttons on your remote control.

YOU NEED


POTENTIOMETER

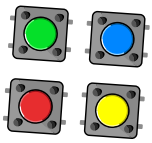

PIEZO BUZZER


10 JUMPER WIRES


3 PUSH BUTTONS

NEW COMPONENTS

BUTTONS: Also known as momentary switches, buttons only remain in their ON state as long as they're being actuated, or pressed. Most often momentary switches are best used for intermittent user-input cases: reset button and keypad buttons. These switches have a nice, tactile, "clicky" feedback when you press them.



Note that the different colors are just aesthetic. All of the buttons included behave the same, no matter their color.

NEW CONCEPTS

BINARY NUMBER SYSTEM: Number systems are the methods we use to represent numbers. We're most used to operating within the comfy confines of a base-10 number system, but there are many others. The base-2 system, otherwise known as binary, is common when dealing with computers and electronics. Computers, at their lowest level, really only have two ways to represent the state of anything: 1 or 0, which can also be thought of as ON or OFF, TRUE or FALSE, HIGH or LOW. Almost all electronics rely on a base-2 number system to store and manipulate numbers. The heavy reliance electronics places on binary numbers means it's important to know how the base-2 number system works.

DIGITAL INPUT: In circuit 1A, you worked with digital outputs. Each of the 14 digital pins can also be digital inputs. Digital inputs only care if something is in one of two states, 0 or 1. Digital inputs are great for determining if a button has been pressed or if a switch has been flipped.

PULL-UP RESISTORS: A pull-up resistor is a small circuit that holds the voltage HIGH (5V) on a pin until a button is pressed, pulling the voltage LOW (0V). The most common place you will see a pull-up resistor is when working with buttons. A pull-up resistor keeps the button in one state until it is pressed. The RedBoard has built-in pull-up resistors, but they can also be added to a circuit externally. This circuit uses the internal pull-up resistors, covered in more detail in the Code to Note section.