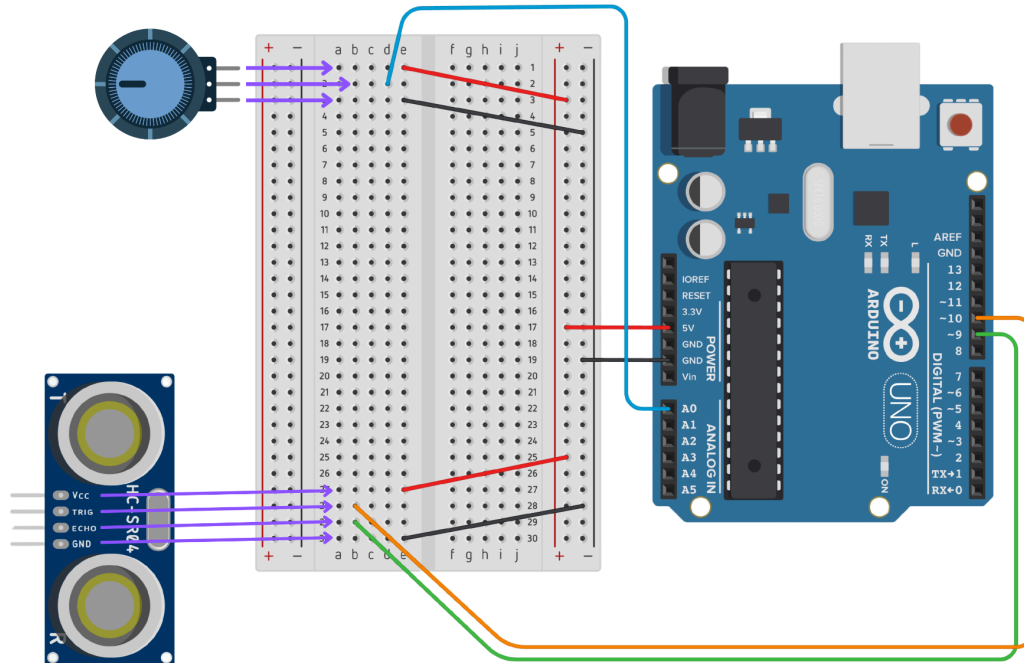


Ultrasonic Music

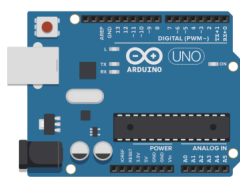
Instructions for building your circuit!



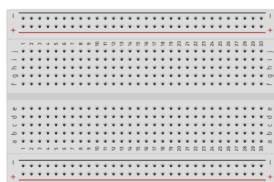
This is what your final circuit will look like!

Note: Follow the steps one-by-one and pay close attention to where each wire goes.

Step 1: Identify the components in your robotics kit.



1x Arduino UNO



1x Breadboard



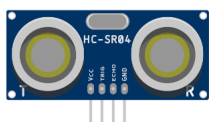
9x Jumper Wires



1x Potentiometer



2x Resistors



1x
Ultrasonic Sensor



1x
USB Cable



1x
USB-C Adapter



1x
Buzzer

**NOT TO
BE USED**

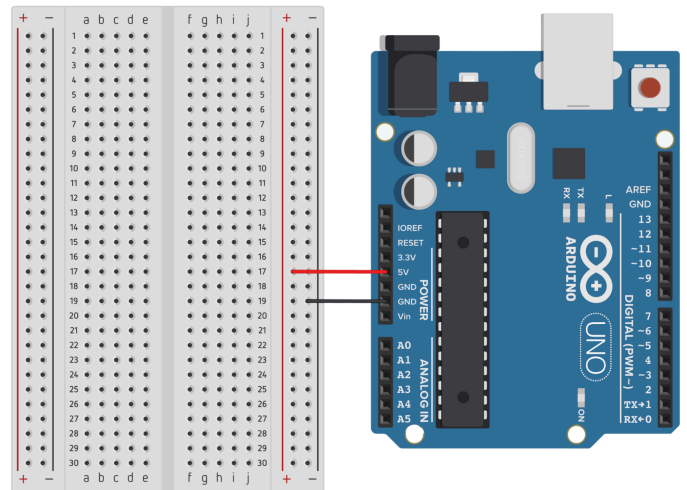


2x
LEDs

Step 2: Connect power to the breadboard rails:

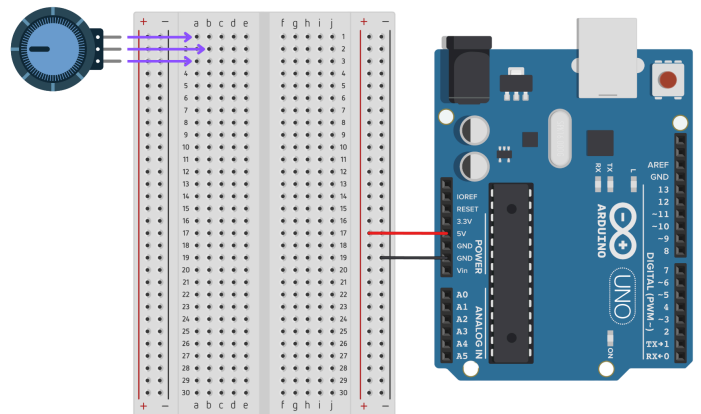
- Connect one wire (preferably **red**) between the '+' power rail on the breadboard and the '5V' pin on the Arduino.
- Connect one wire (preferably **black**) between the '-' power rail on the breadboard and any one of the two 'GND' pins on the Arduino.
- Note:** If the colour of your wires does not match the diagram, that is okay! The convention that we try to follow is :

- **RED** for connection to Power
- **BLACK** for connection to Ground



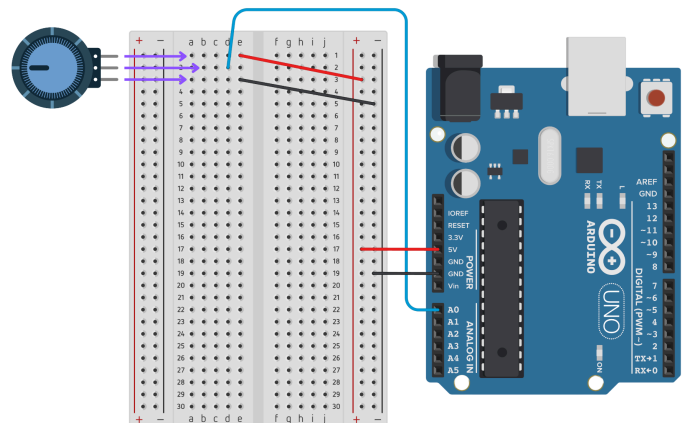
Step 3: Connect the Potentiometer:

- Plug-in the three pins on the potentiometer into a position on the breadboard as shown.
- Each pin must be on a different numbered row on the breadboard. In this case, pins 1(a), 2(b) & 3(a).



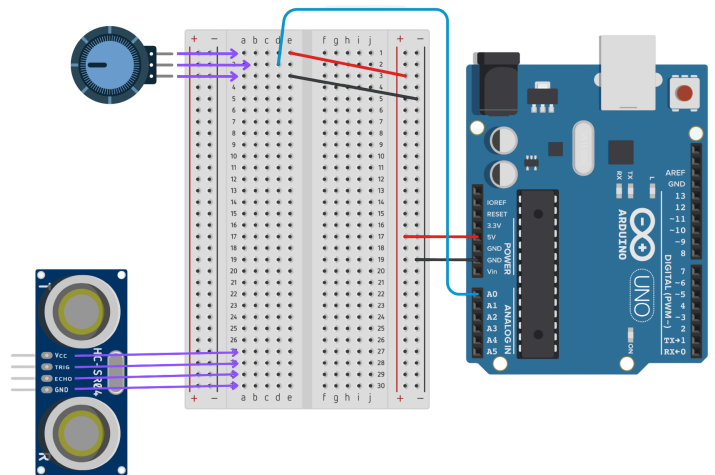
Step 4: Wire up the Potentiometer:

- Take a **wire** and connect the '+' breadboard power rail to a connection on the same row as the top pin (row 1 as shown here) of the potentiometer.
- Take a **wire** and connect the '-' breadboard power rail to a connection on the same row as the bottom pin (row 3 as shown here) of the potentiometer.
- Take a **wire** and connect the 'A0' pin on the Arduino to the middle pin (row 2 as shown here) of the potentiometer.



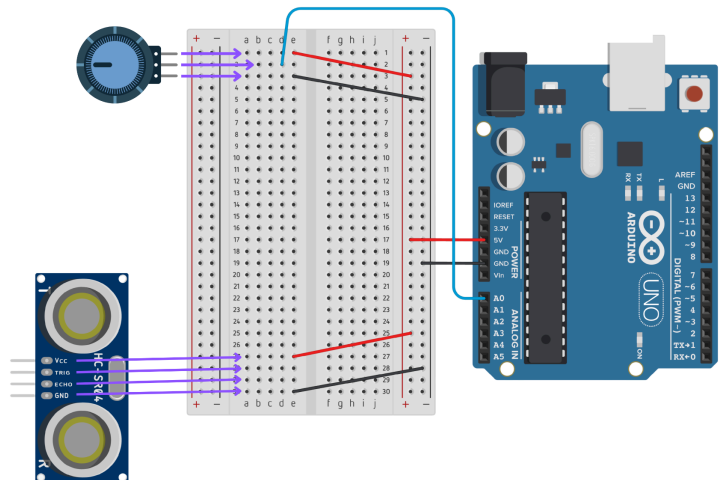
Step 5: Connect the Ultrasonic Sensor:

- Plug in the Ultrasonic Sensor's four pins into the breadboard as shown.
- The sensor should be facing outwards.
- Use the rows 27-30 on the breadboard.
 - VCC -> 27
 - TRIG -> 28
 - ECHO -> 29
 - GND -> 30



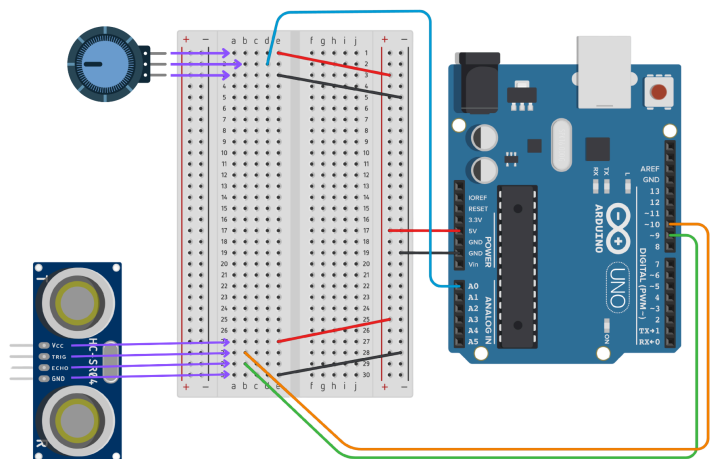
Step 6: Wire up the Ultrasonic Sensor:

- Take a **wire** and connect the '+' breadboard power rail to the VCC pin (row 27 as shown here) of the ultrasonic sensor.
- Take a **wire** and connect the '-' breadboard power rail to the GND pin (row 30 as shown here) of the ultrasonic sensor.



Step 7: Finish up wiring the circuit:

- Take a **wire** and connect the '10' pin on the Arduino to the TRIG pin (row 28 as shown here) of the ultrasonic sensor.
- Take a **wire** and connect the '9' pin on the Arduino to the ECHO pin (row 29 as shown here) of the ultrasonic sensor.
- Your circuit is now complete!
- Move on to the coding part of the worksheet on the next page.



Ultrasonic Music

Instructions for coding your circuit!

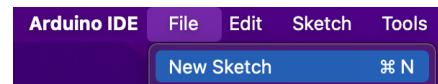
Step 1: Make sure you have the Arduino IDE software

- A. You can find it at: <https://www.arduino.cc/en/software>.
- B. Download the latest version.
- C. Open it once it finishes downloading.



Step 2: Get the Arduino IDE ready

- A. Open a new Arduino file
 - a. If using Arduino IDE for the first time, it will automatically open into a new file.
 - b. If a different file opens, just start a new one using 'File > New' in the menu above.
- B. Delete all the contents of the new file
 - a. Arduino puts in some starter code by default that we do not require.

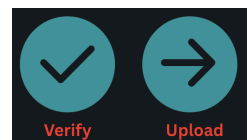


Step 3: Download the required code for our circuit

- A. In a browser, go to the website: <https://github.com/engoext/music/>.
- B. In a new tab, open the website mentioned on the homepage, we'll come back to this.
- C. Click on the file named: '*code.ino*' & copy the contents of this file.

Step 4: Connect your circuit to your device

- A. Connect your arduino to your device using the given blue cable.
 - a. If required, use the USB-C adapter in your kit to connect.
- B. Paste the copied code into the new file.
- C. Click on the 'Verify' button (the big tick inside a circle, in the top-left of the window).
 - a. Check for the '*Done Compiling*' confirmation message in the bottom-right.
- D. Once verified, click on the 'Upload' button next to it (big arrow inside a circle).
 - a. Check for the '*Done Uploading*' confirmation message in the bottom-right.



Step 5: Interact with the Ultrasonic Music device

- A. Go to the website that we opened in the new tab earlier.
- B. When prompted, select the port that the Arduino is connected to on your device.
- C. Click 'Connect' and follow the website's instructions!