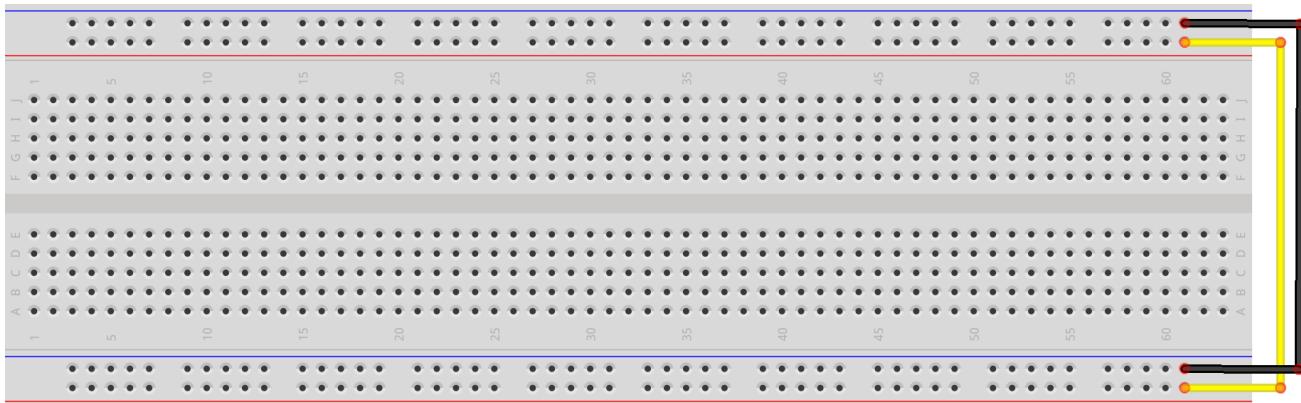


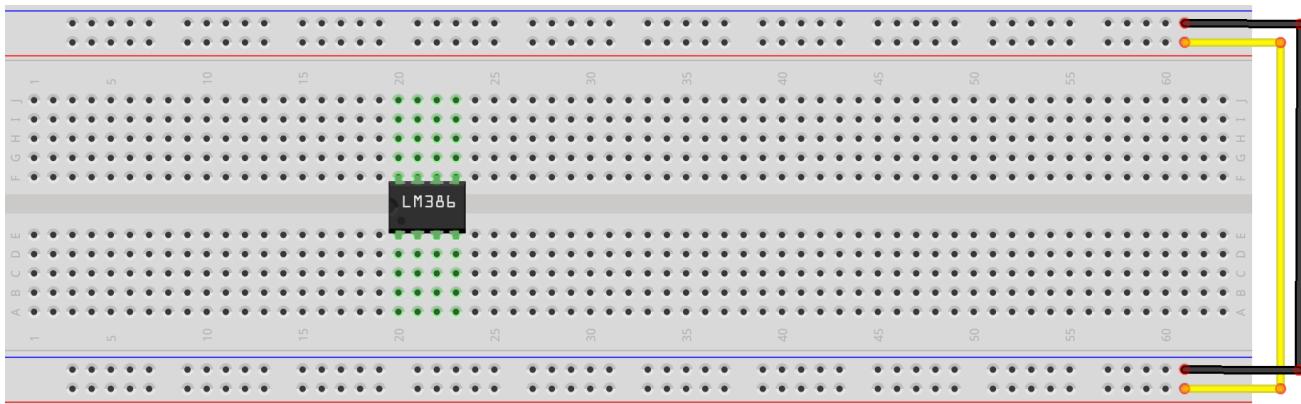
fritzing

First, start with a breadboard. This is an object that helps prototype electrical projects by allowing electrical connections to form without having to solder anything.



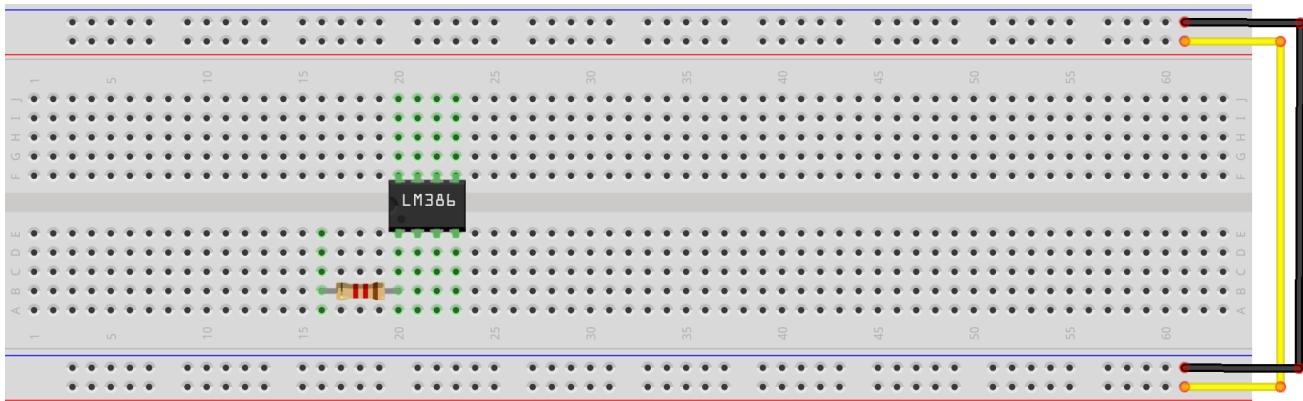
fritzing

Connect the two sides of the breadboard. The row of holes nearest the blue line (symbolized by the minus sign) is ground and the side nearest the red line (the plus sign) is voltage. The color of the wires doesn't matter but pay attention to where the wires connect.



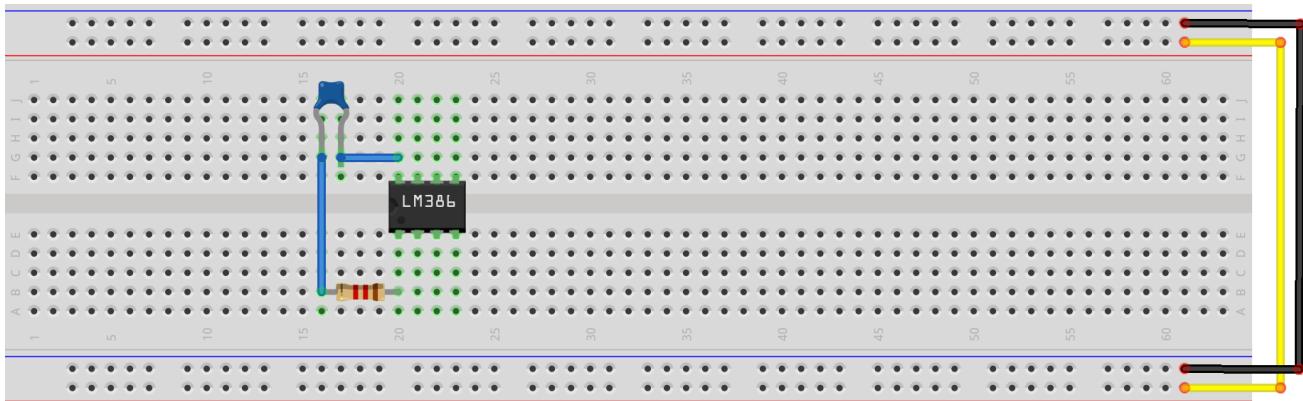
fritzing

Place the amplifier on the breadboard straddling the gap. It is important to note which direction the notch on the chip is facing as the pins of the amplifier are numbered 1 – 8 starting on the bottom left side in this orientation. A diagram of the LM386 amplifier can be found in the appendix.



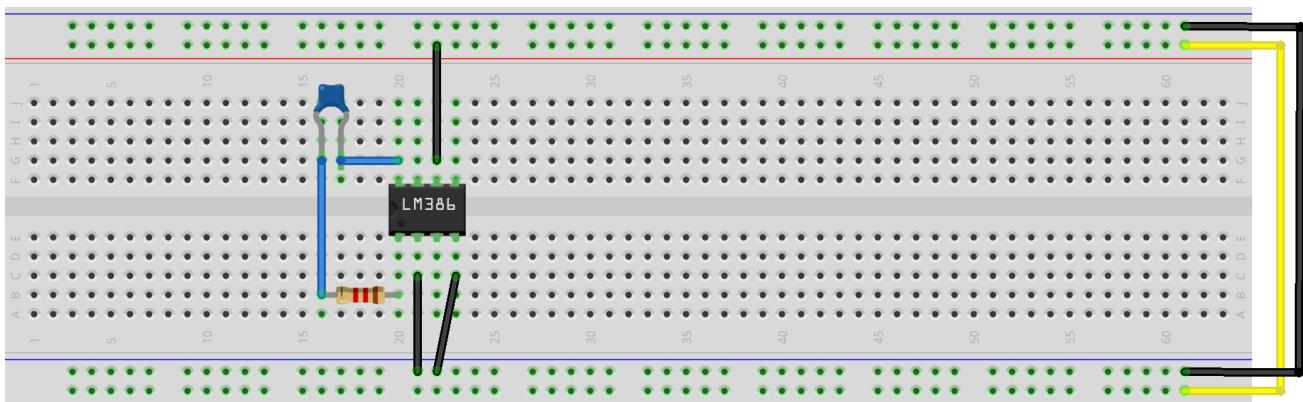
fritzing

Connect a 1.2K ohm, $\frac{1}{4}$ watt resistor to pin 1 of the amplifier. In this schematic, the color of the resistors are not necessarily the correct color so be sure to check the label they came with or check using a multimeter.



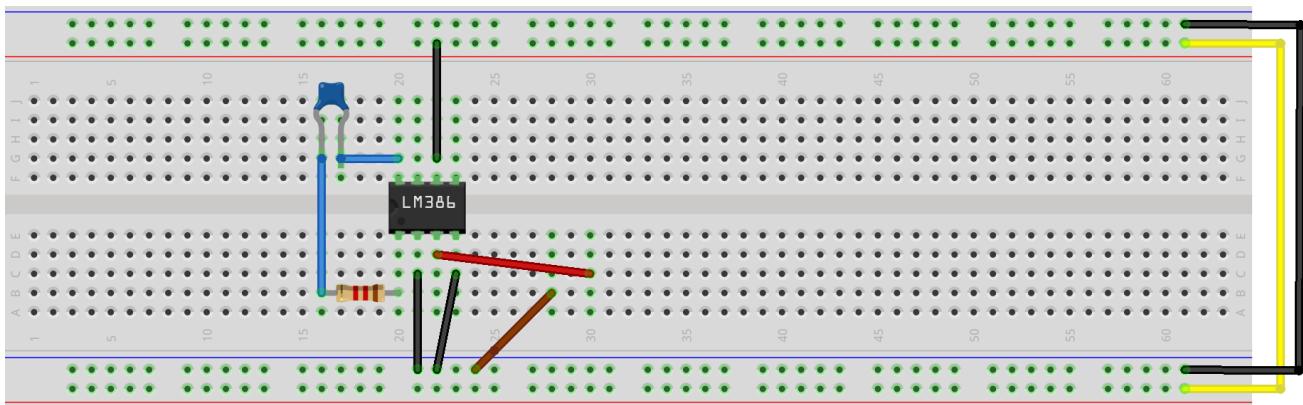
fritzing

Add a $10\mu\text{F}$ ceramic capacitor to the breadboard and connect it to both pin 8 of the amplifier and the resistor.



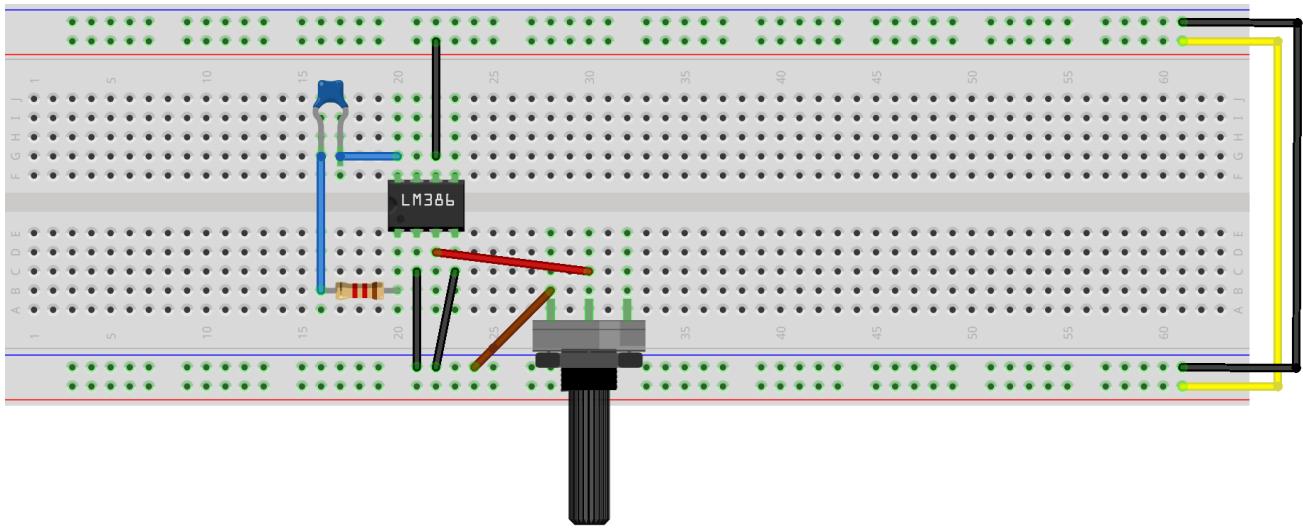
fritzing

Connect pins 2 and 4 of the amplifier to ground and pin 6 to voltage.



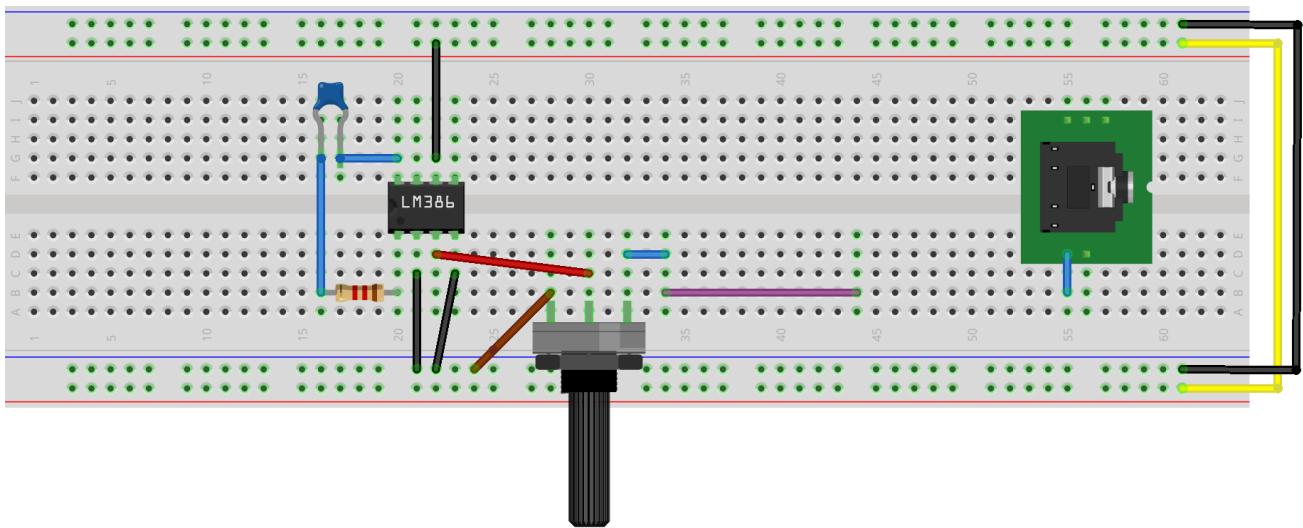
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Give yourself some working space by connecting pin 3 of the amplifier and ground other locations on the breadboard.



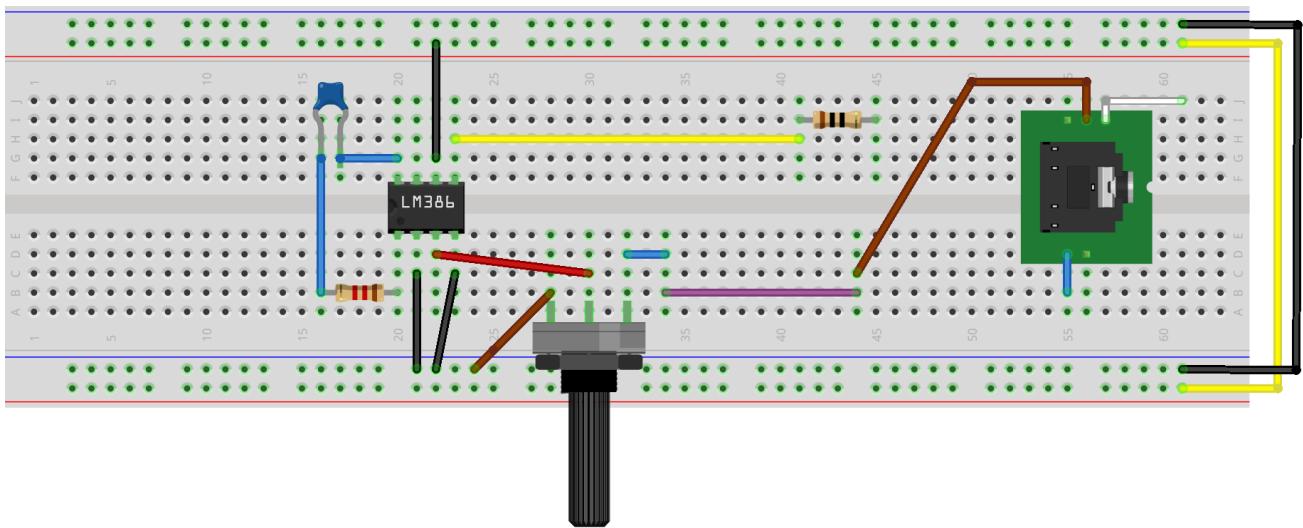
fritzing

Add a 10k ohm potentiometer. The potentiometer has 3 leads. The middle lead should be connected to the wire that connects to pin 3 of the amplifier and one of the others to the lead from ground.



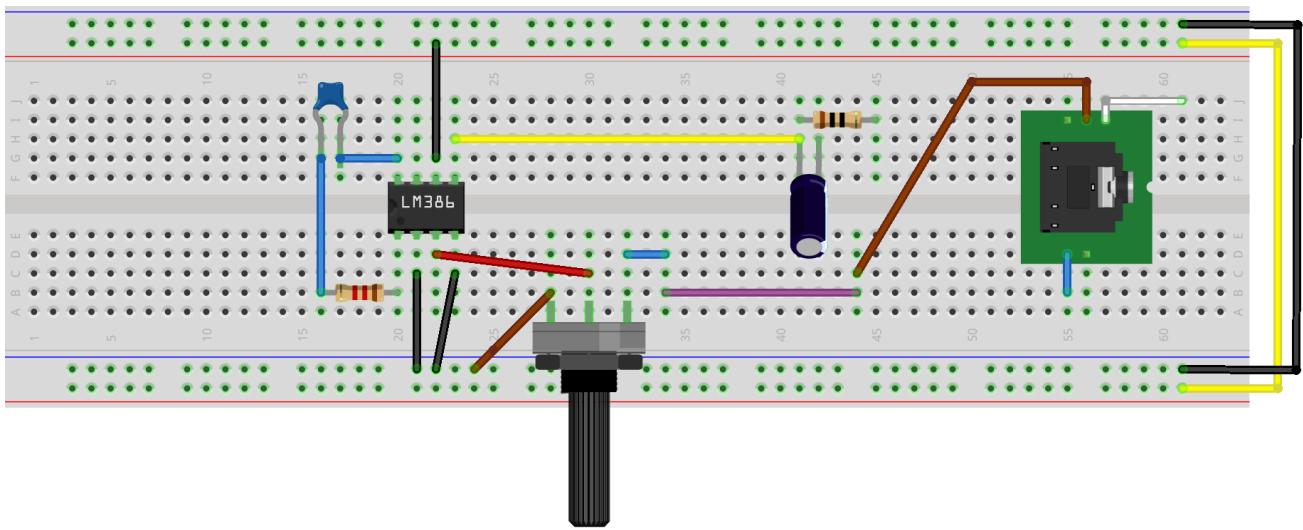
fritzing

Connect the remaining lead of the potentiometer as shown and add the breadboard-friendly audio jack. Sometimes the jacks have different configurations so check with the manufacturer. For our purposes, extend the reach of pin 4 with a small amount of wire.



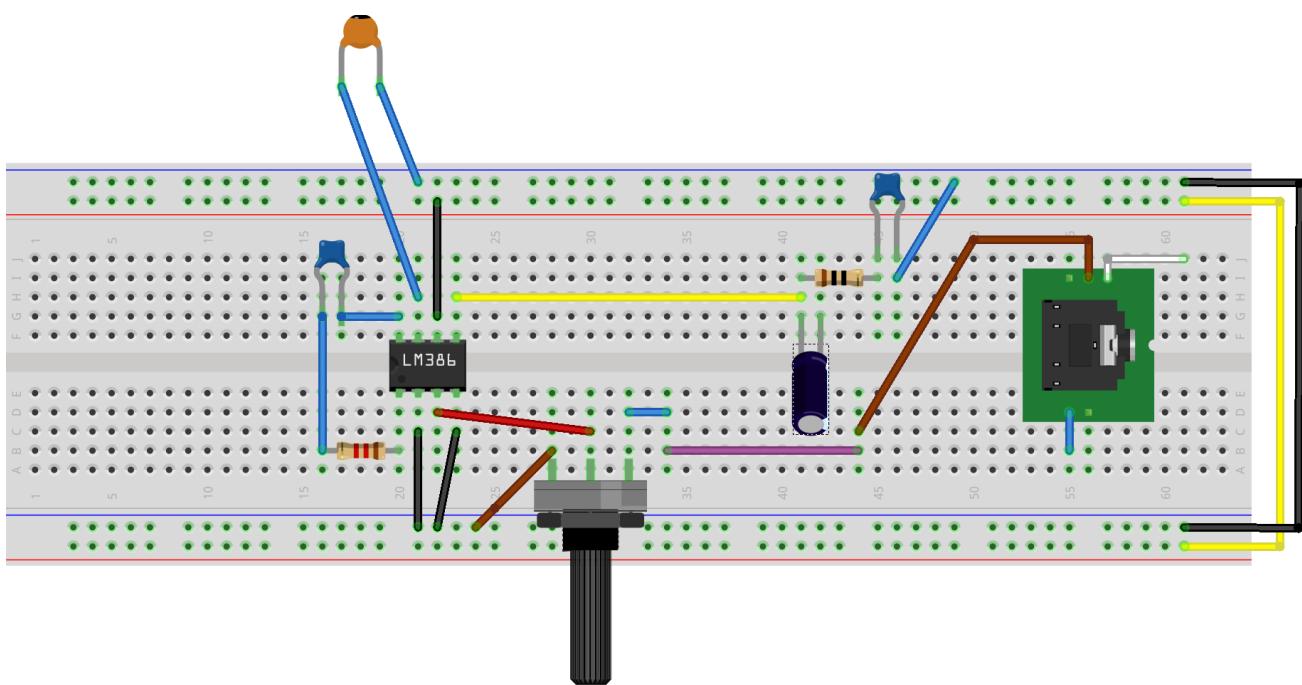
fritzing

Connect pin 5 of the amplifier to a 10 ohm resistor and connect pin 2 of the jack to the last lead on the potentiometer (brown wire). Extend pin 1 of the jack out a bit (white wire).



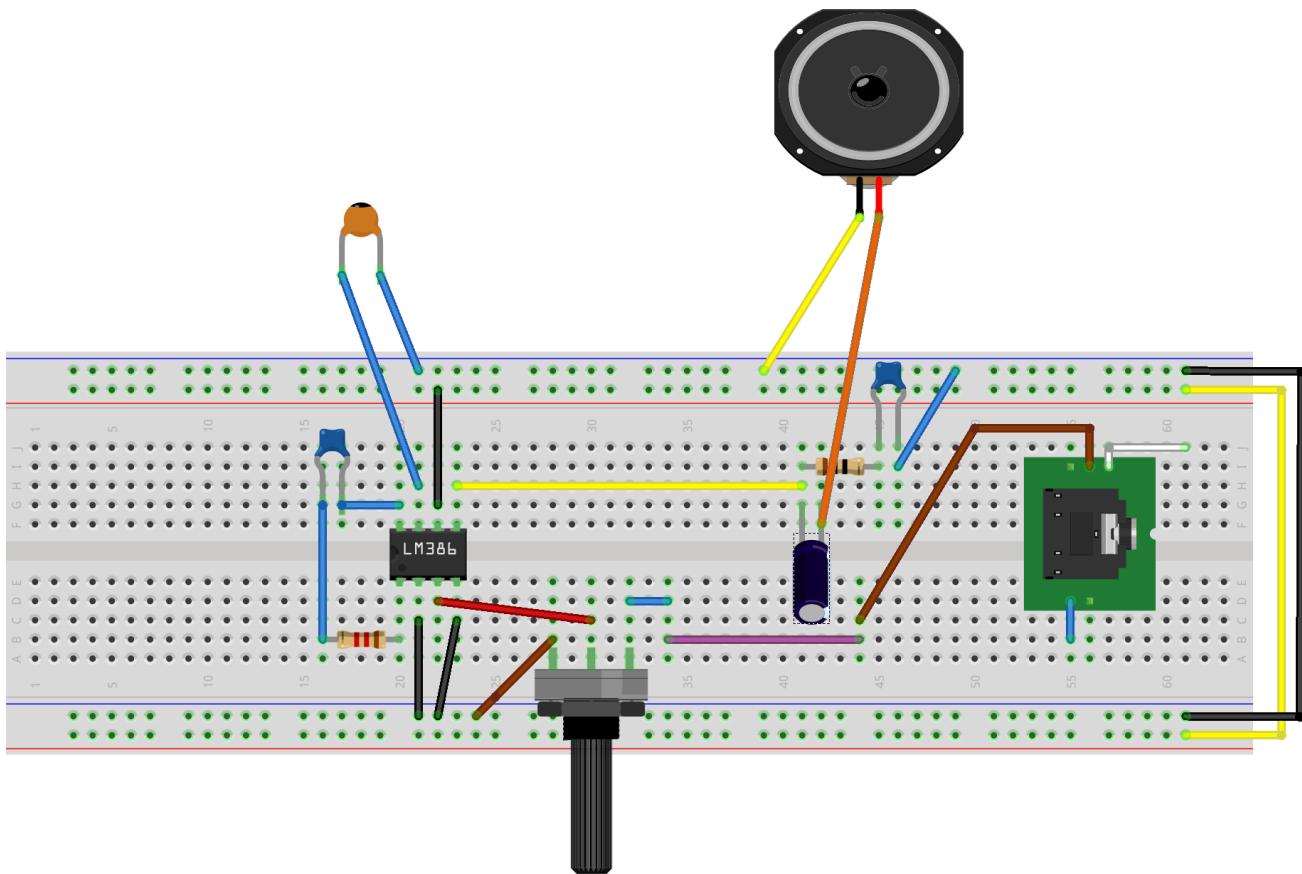
fritzing

Add a $250\mu\text{F}$ electrolytic capacitor just on the other side of the wire coming from pin 5 of the amplifier. Electrolytic capacitors have a polarity meaning they need to face a particular direction. Place the pin with the white minus marking furthest from the wire coming from pin 5 of the amplifier. Add a $0.05\mu\text{F}$ ceramic capacitor on the other end of the resistor.



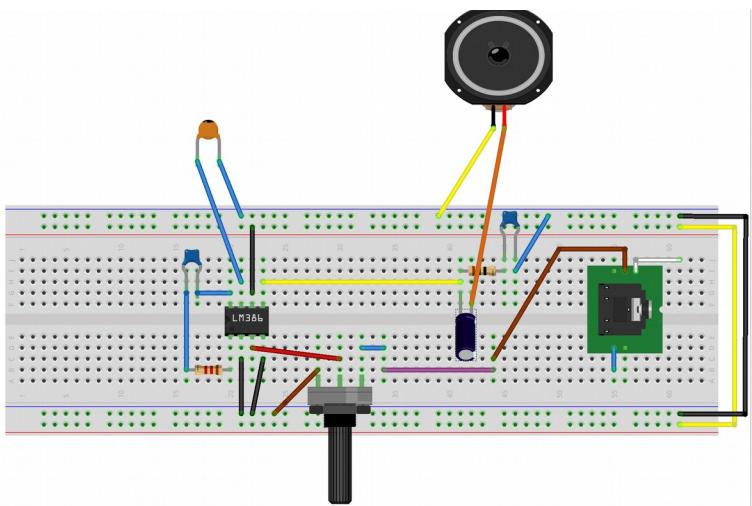
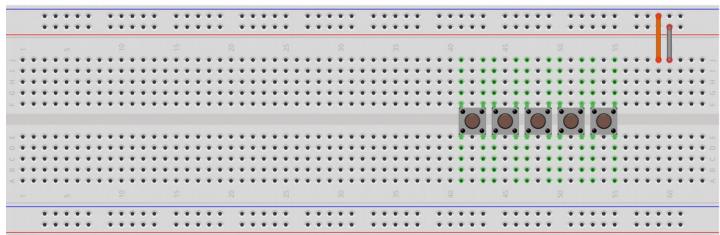
fritzing

Connect the remaining lead of the ceramic capacitor to ground and then add a ceramic capacitor that is connected to both ground and pin 7 of the amplifier.

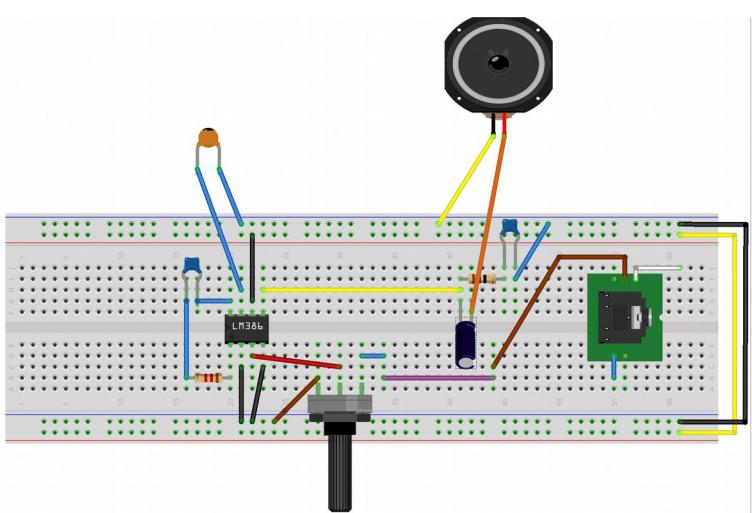
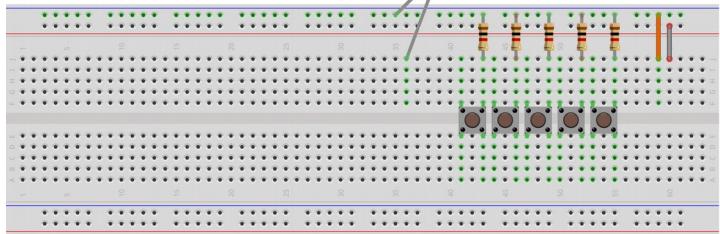


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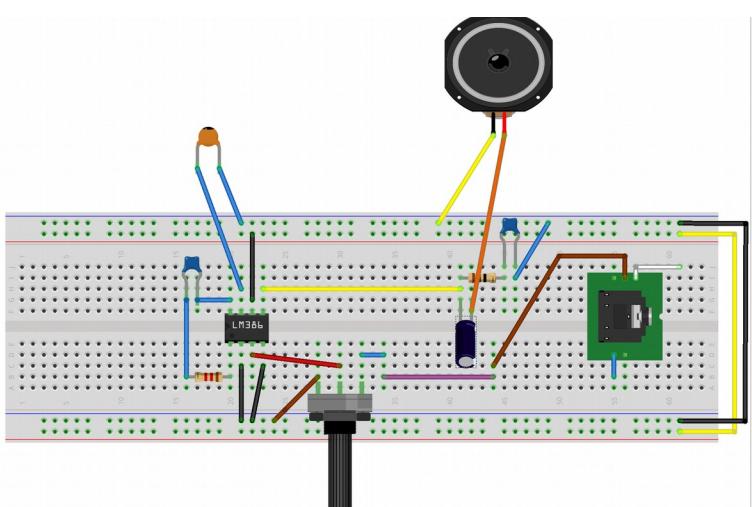
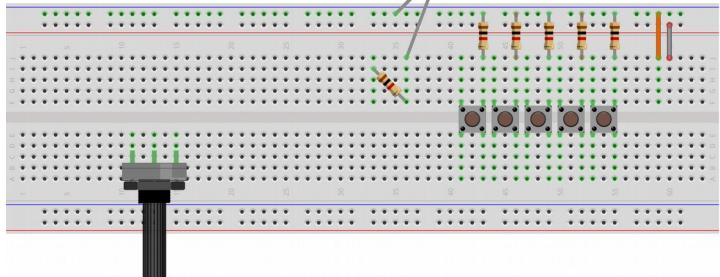
Connect an 8 ohm speaker to both ground and the output of the electrolytic capacitor.



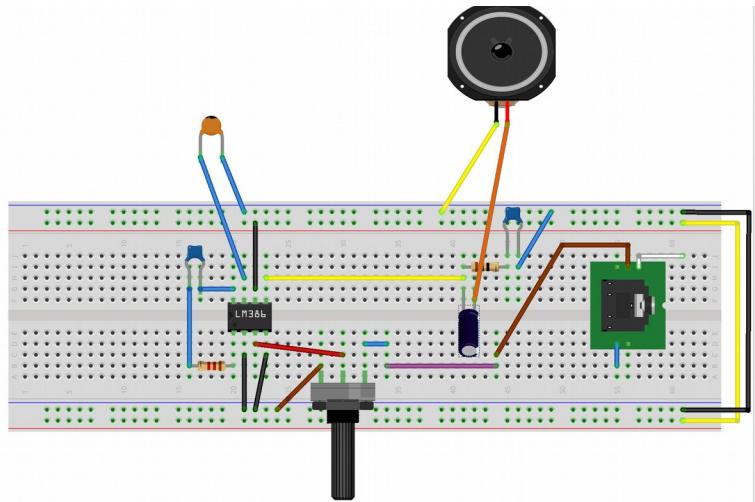
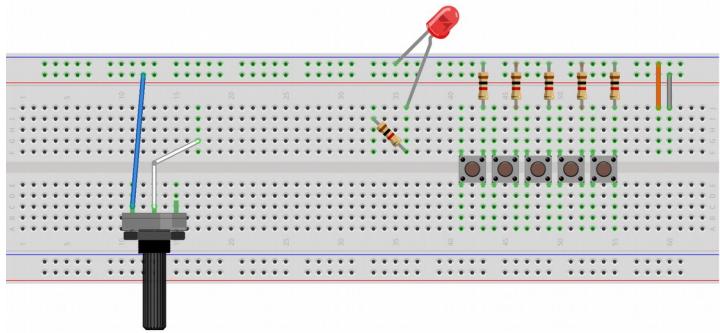
We're ready to start working on the second breadboard. Attach 5 push buttons to straddle the gap and connect a column of the breadboard to ground and a column to voltage.



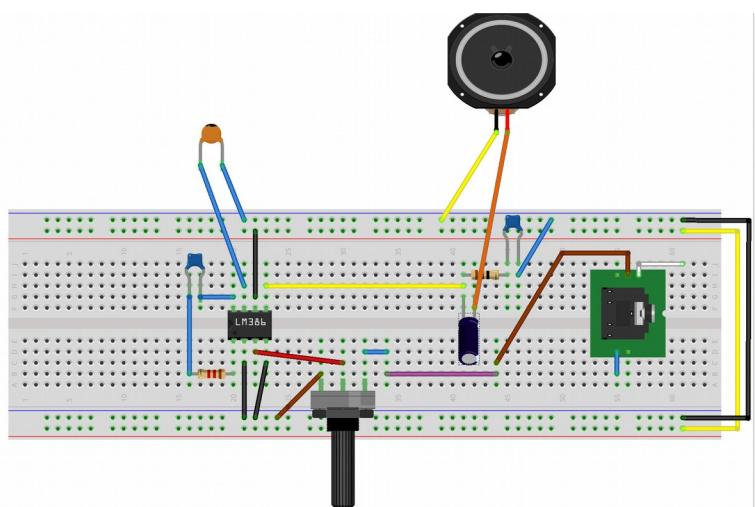
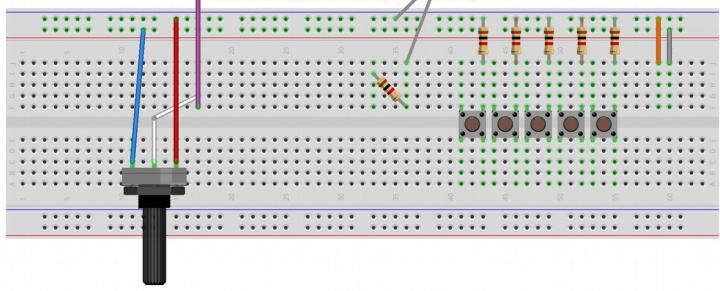
Add TYPE of resistors to the rightmost pin of each push button and ground. Connect an LED to the breadboard as well. LEDs have a polarity so be sure to connect the short lead to ground and the longer lead to a position on the breadboard.



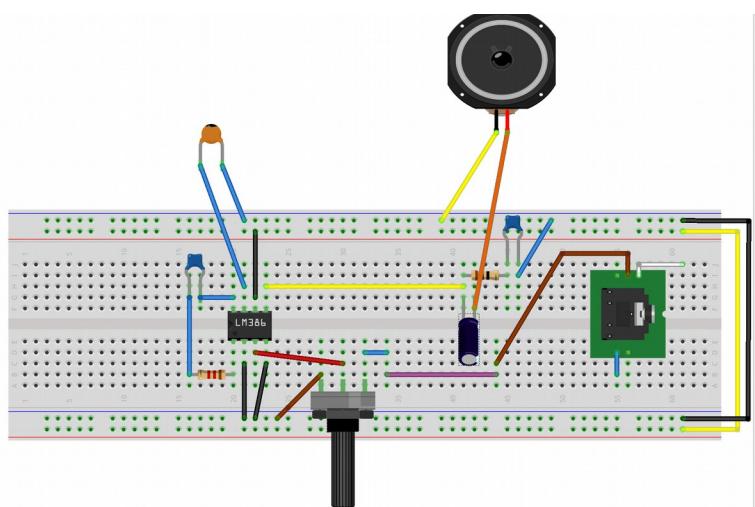
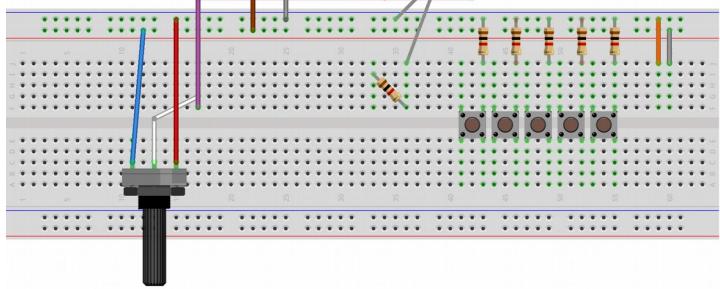
Add a resistor to the same column as the LED's long lead and a potentiometer.



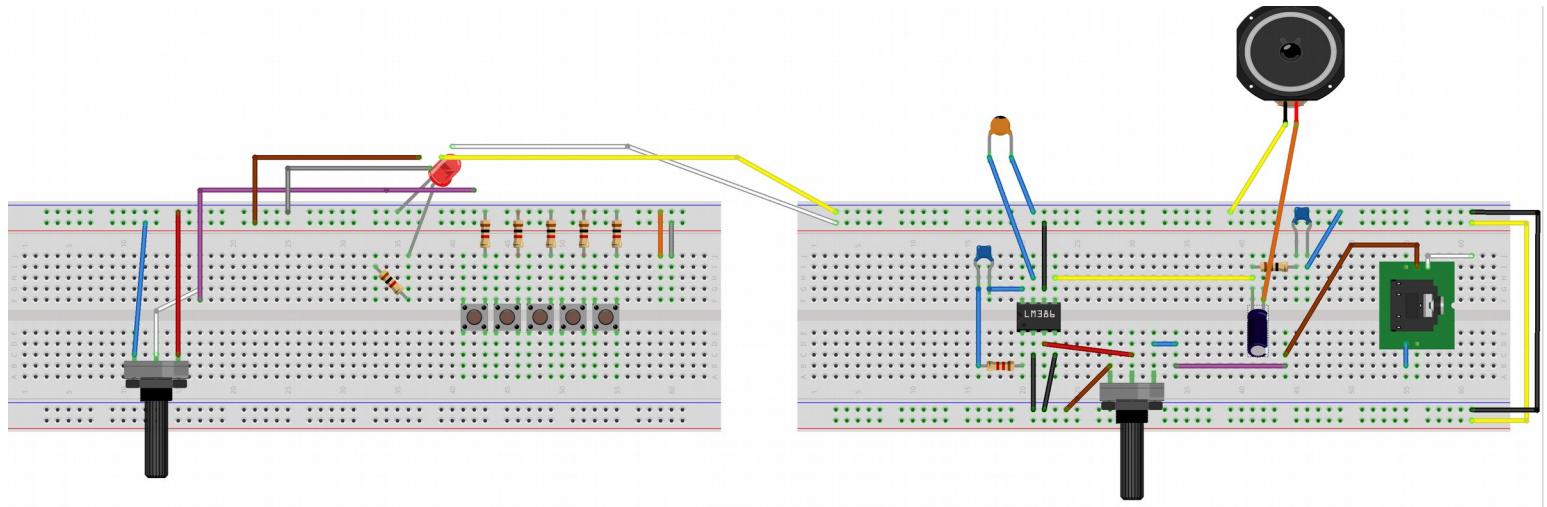
Connect one of the outer leads of the potentiometer to voltage and the middle lead to a position on the breadboard.



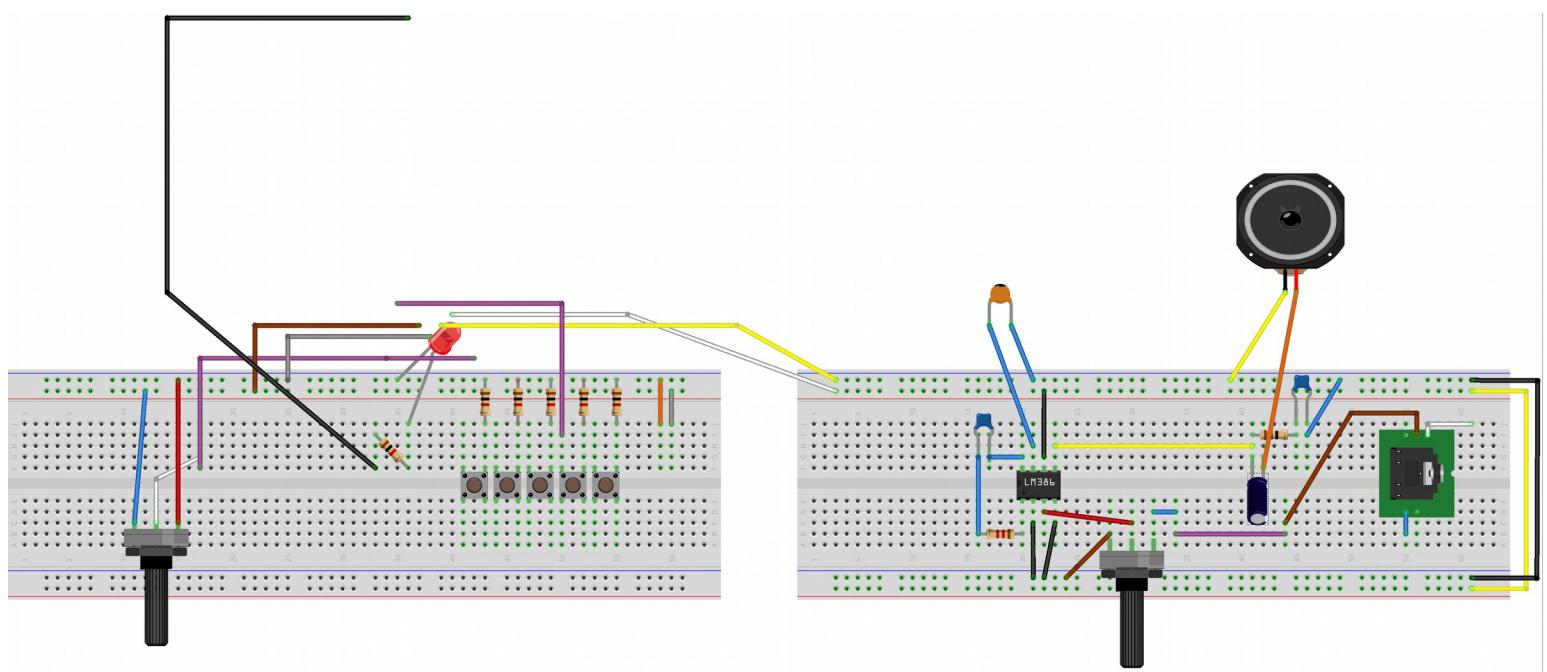
Connect the remaining potentiometer lead to ground and extend the wire from the middle lead off to the side for now.



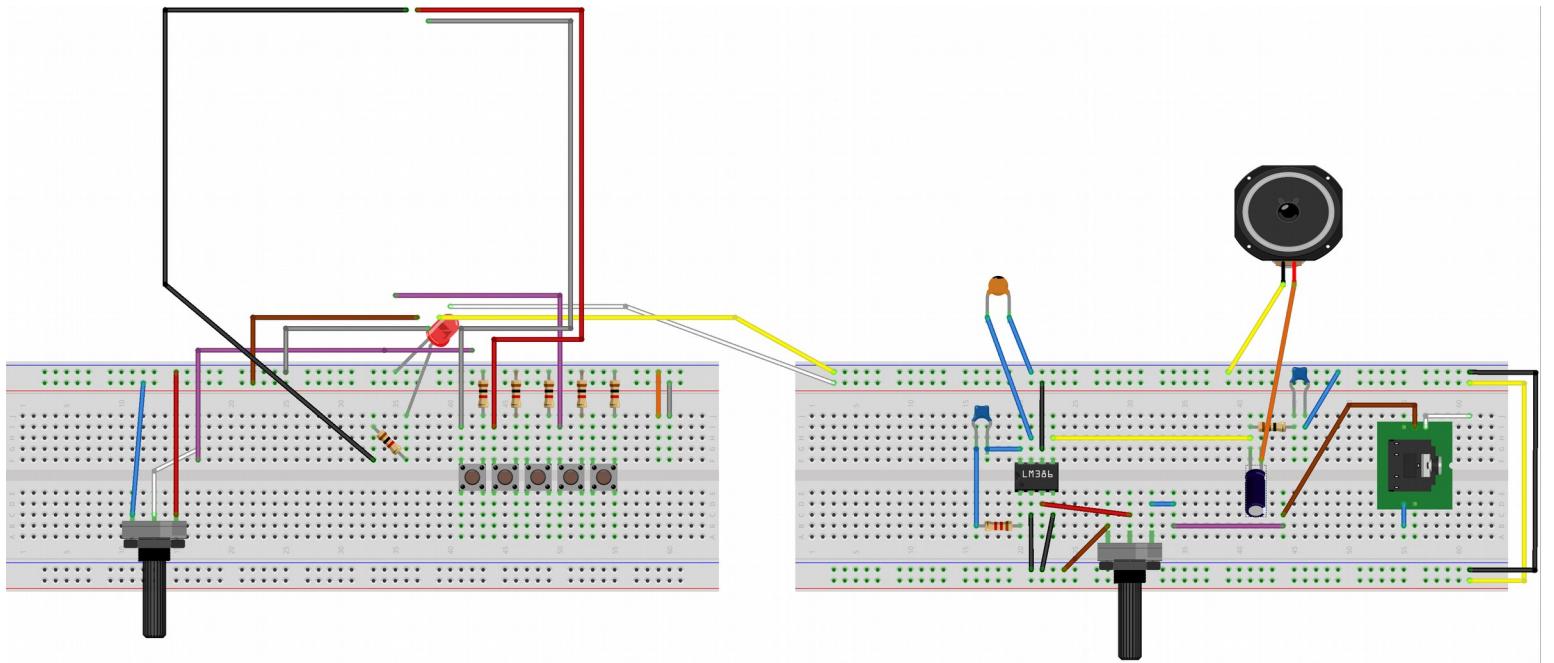
Add wires to ground and voltage and keep them disconnected for later.



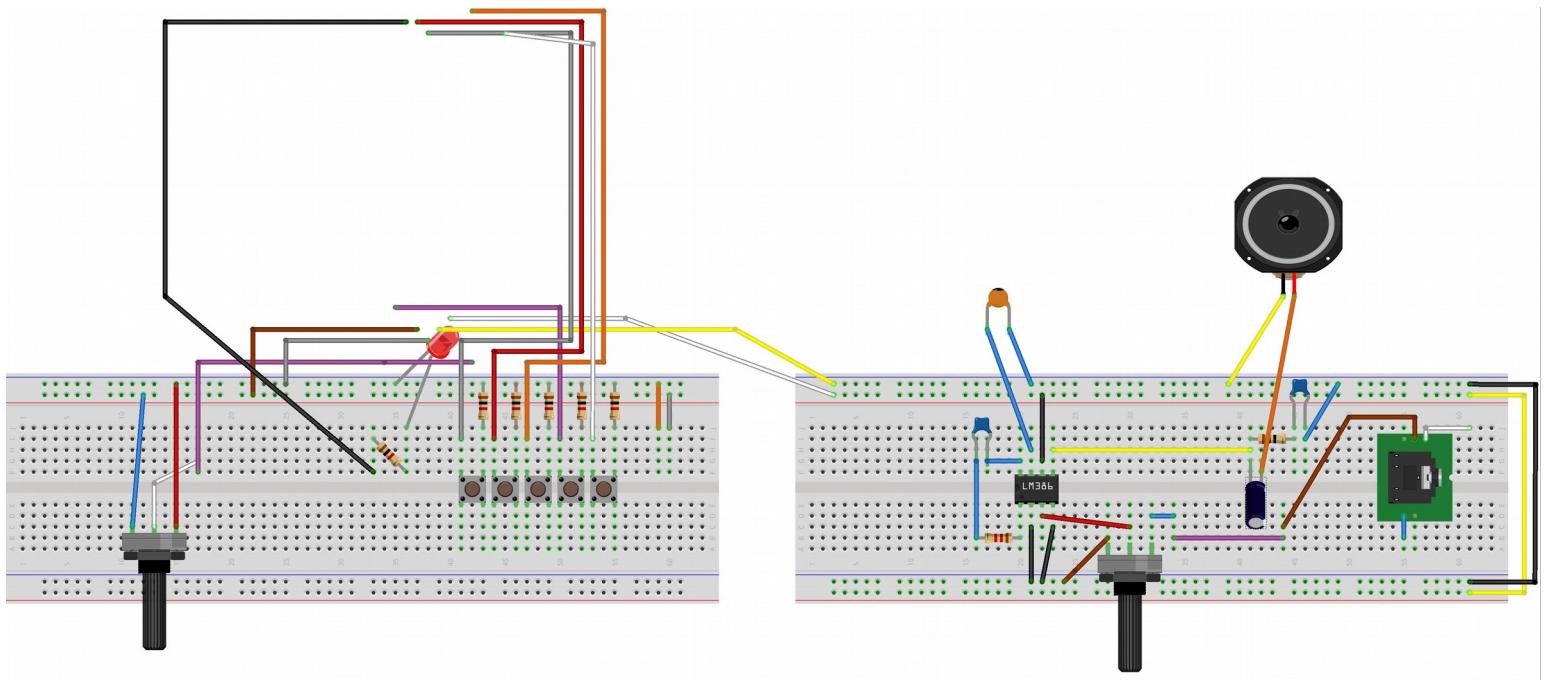
Add wires to ground and voltage on the other breadboard and keep them disconnected for later.



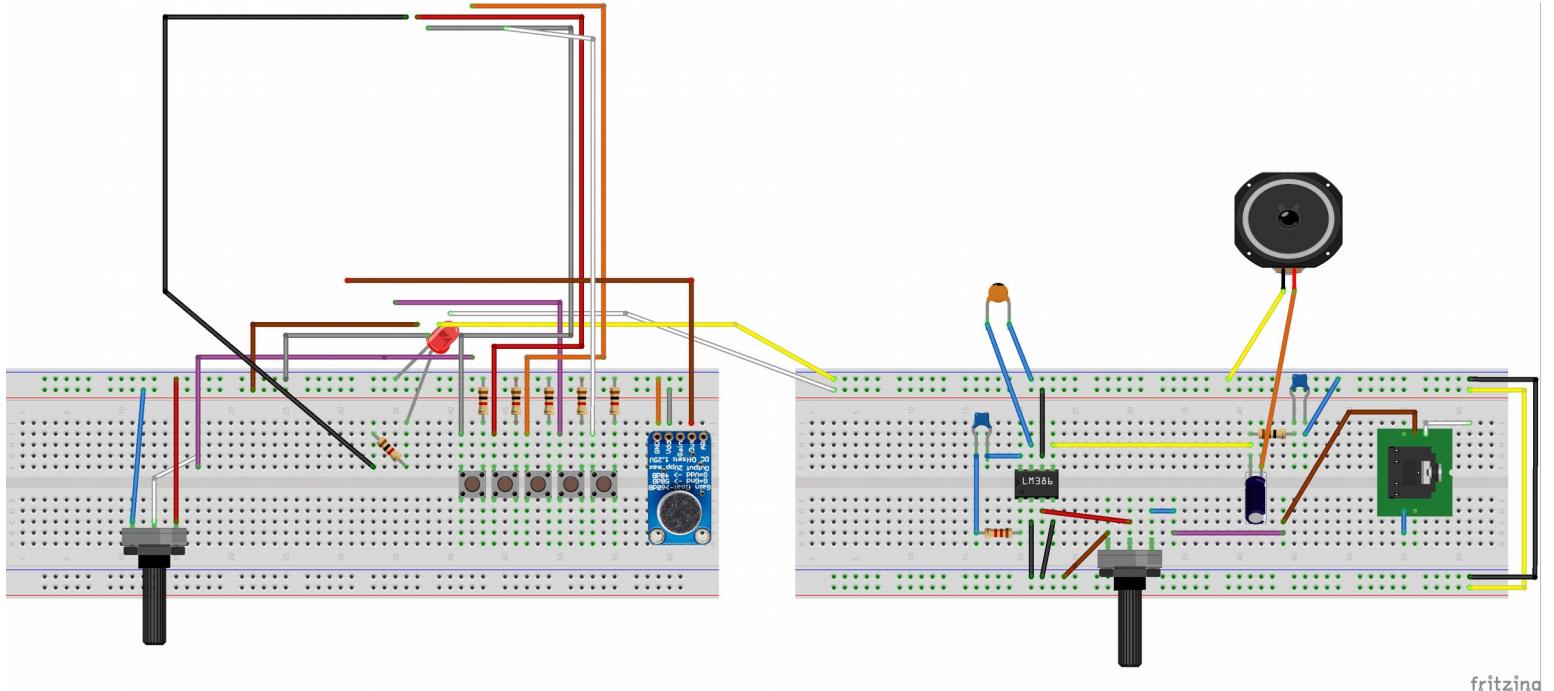
Add a wire to the end of the resistor and one to the left leads of the middle push button.



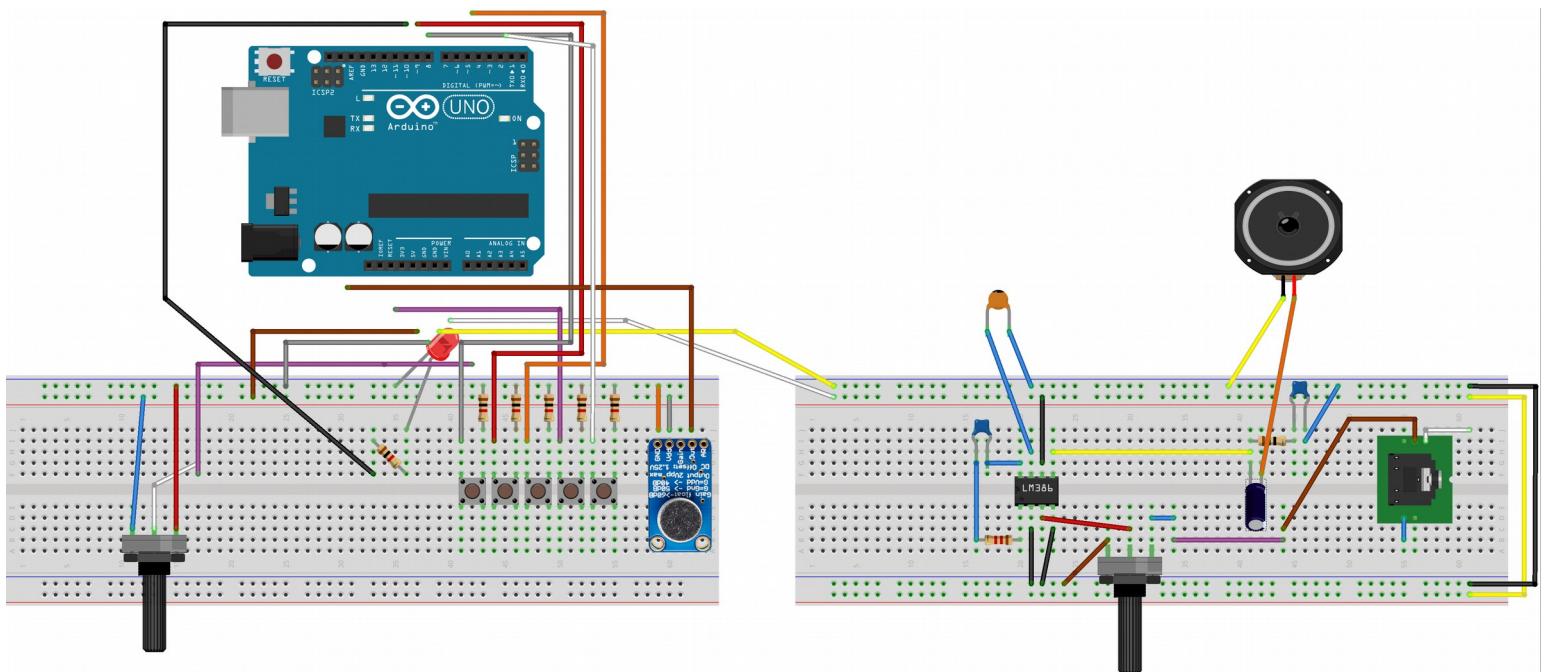
Add wires to the left lead of the first and second push buttons.



Add wires to the left leads of the remaining push buttons.

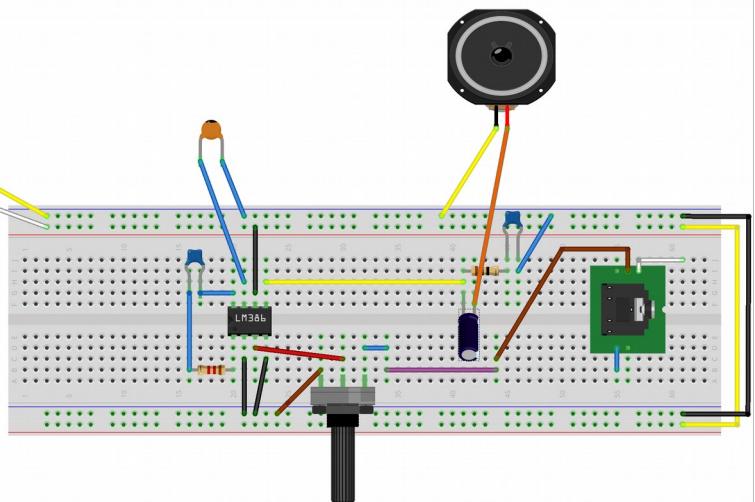
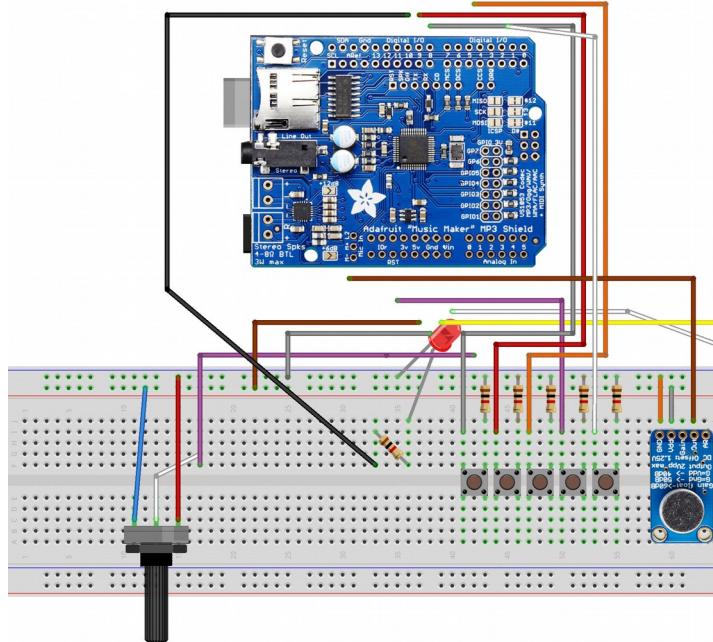


Add an Adafruit Max 9814 microphone and add a wire from its lead marked “out”.

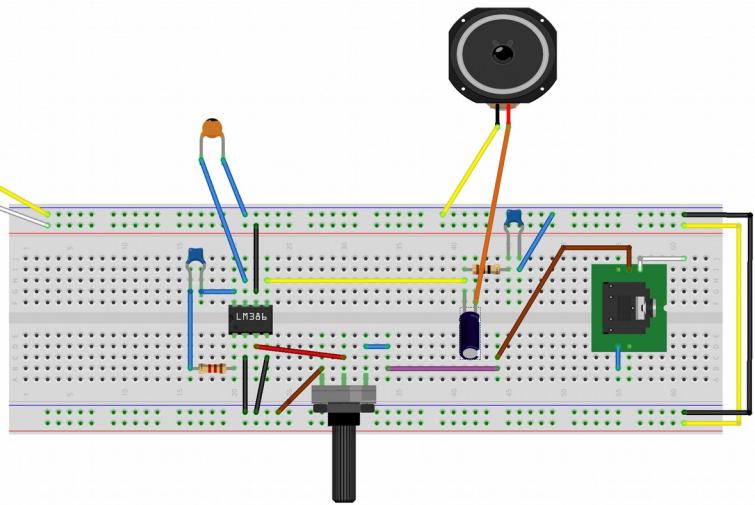
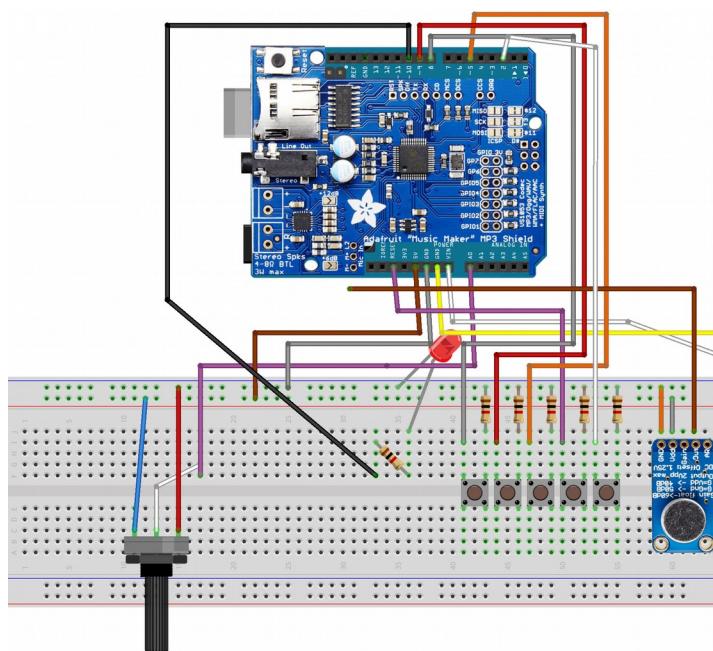


Add an Arduino Uno¹. The Uno will serve as the “brains” of the audio device and contains the core logic of the audio program.

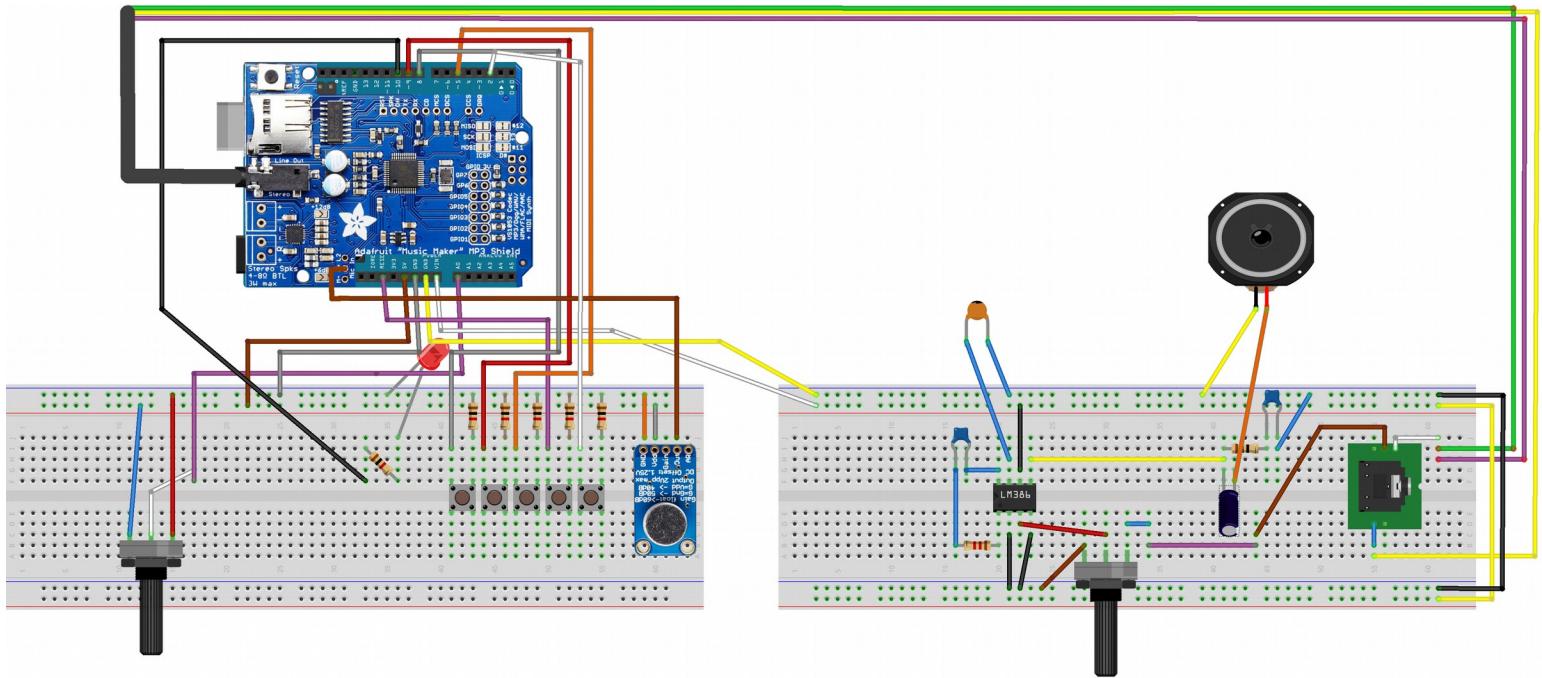
¹ With some modifications, an Arduino Mega can also be used.



The Uno has several pins on top that line up with the lower pins of the Adafruit MusicMaker shield. Insert a micro SD card into the slot found on the MusicMaker shield.



Connect the loose wires from earlier. The wires connect to the top of the MusicMaker shield. From left to right, the push buttons connect to digital pins 8, 9, 5, reset, and digital pin 2. Connect the leads from ground and voltage from both breadboards to the Uno's 5V, GND and VIN pins as shown. Lastly connect lead from the potentiometer to the Analog 0 position on the MusicMaker shield.



Finally, connect the lead from the “out” on the microphone to the “M+” position on the MusicMaker shield. Going back to the audio jack, connect the wire from pin 1 to two wires and pin 5 to a third wire. These three wires connect to the audio jack on the MusicMaker shield.

fritzing