

It's Getting Hot in Here—Thermal Warning System with Thermistors (CBL Module #3 Fall 2019)

Circuits Stuff You'll Learn/Review Today:

- What is a thermistor? How does it work in practice?
- What is a piezoelectric? How does this apply to speakers and sound generation?
- What is voltage? How does a thermistor change temp → resistance → voltage?
- Applications:
 - a. Thermal Warning System
 - i. You design! (choice bridge of voltage divider)
 - ii. Thermal system should have 3 elements:
 1. Speaker sounds
 2. LED blinks
 3. Real time display of temp
 - iii. Testing:
 1. Warm fingers
 2. Warmer fingers (have kids run around to generate extra heat)
 3. Something cold: ice pack? Resistance is NOT Futile: Build a pencil resistor
 - iv. Add-ons: make a dial meter out of a servo motor. Have it indicate regions such as cold, warm, hot, getting hotter.

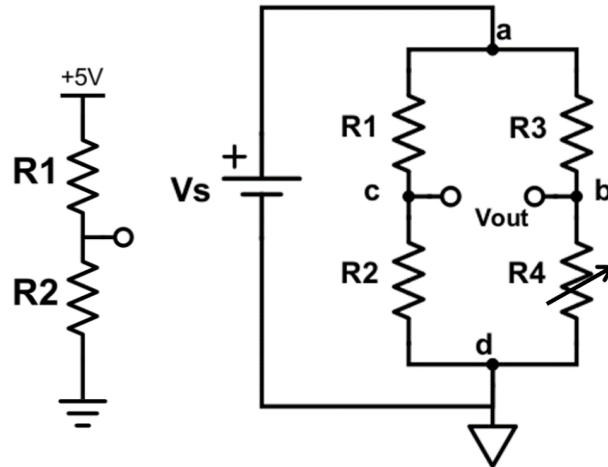


Figure 1. Left: Voltage Divider configuration. One of these resistors represents the variable resistor. The other is a typical resistor. Right: Wheatstone Bridge configuration. The changing resistance is R_4 . The bridge is 'in balance' ($V_{out} = V_b - V_c$) when $R_1 R_4 = R_2 R_3$. By contrast, the if we used $R_1 = R_2$ in the voltage divider, we'd start at $V_{out} = 2.5$ V.

Servo Dial Indicator/Display

Alternatively, you can build a dial that indicates the position of the finger. An example is illustrated in Figure 4. Play a game and see if you can get the dial to a desired position.

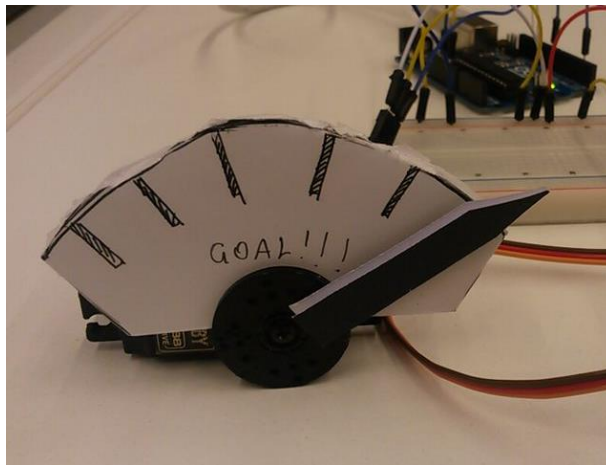


Figure 2. Example Dial Indicator. Note the servo hiding in the background. Image credit: <https://www.instructables.com/id/Arduino-Jump-Challenge/>

Arduino Code

Use your Arduino code from the last W&L Circuits lab!