Hot or Cold—Thermal Monitoring System with Thermistors (CBL Module #2 Fall 2022)

Circuits Stuff You'll Learn/Review Today:

- What is a thermistor? How does it work in practice?
- What is a servo motor? What can be they be used for?
- What is a piezoelectric? How does this apply to speakers and sound generation?
- What is voltage? How does a thermistor change temp→ resistance → voltage?
- Basic testing: use fingers or ice pack to warm or cool the thermistor. Plot the result in real time.
- Make it fun!
    - Have the students run around the gym to warm themselves even further, then measure their temp directly afterward
    - Gamify it: have them find the warmest or coolest spot they can think of (in the sun, dig in the dirt to find cold earth, etc.

Arduino Code

Use your Arduino code from Lab 3 and/or demos from the 'non-lab'. Modify to taste!   Strongly recommend

1) downloading code onto your computer BEFORE going to elementary school
2) Upload code onto the Arduino BEFORE going to the school. That way you can just power up the Arduino and let it rip. Once the firmware is uploaded, it will be remembered forever (until you upload a new set of instructions).
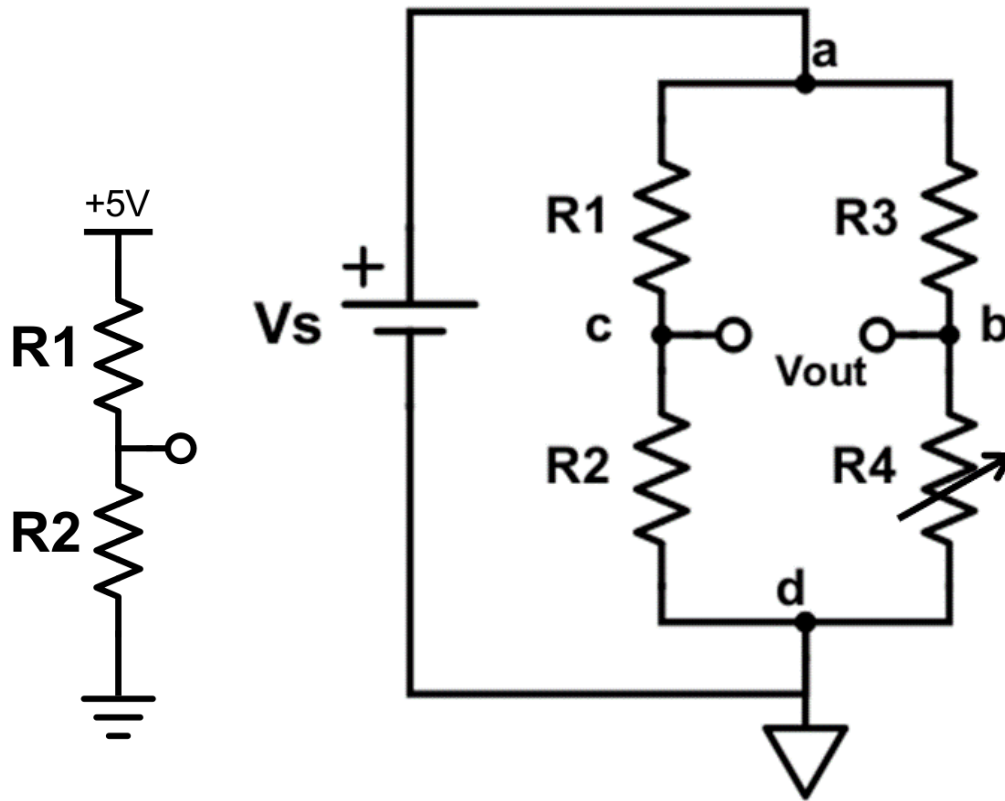
Figure 1. Two Temperature measurement circuits. All resistors = 10 kΩ
Left: The thermistor could be R1 or R2. The other is a typical resistor.
Right: Wheatstone Bridge configuration. The changing resistance is R4.

Indicator/Display

Make a visual or audio indicator of temperature. An example dial indicator using a servo motor is pictured below. You could instead or in addition use a piezo speaker to play a sound or song indicating a high or low temperature.
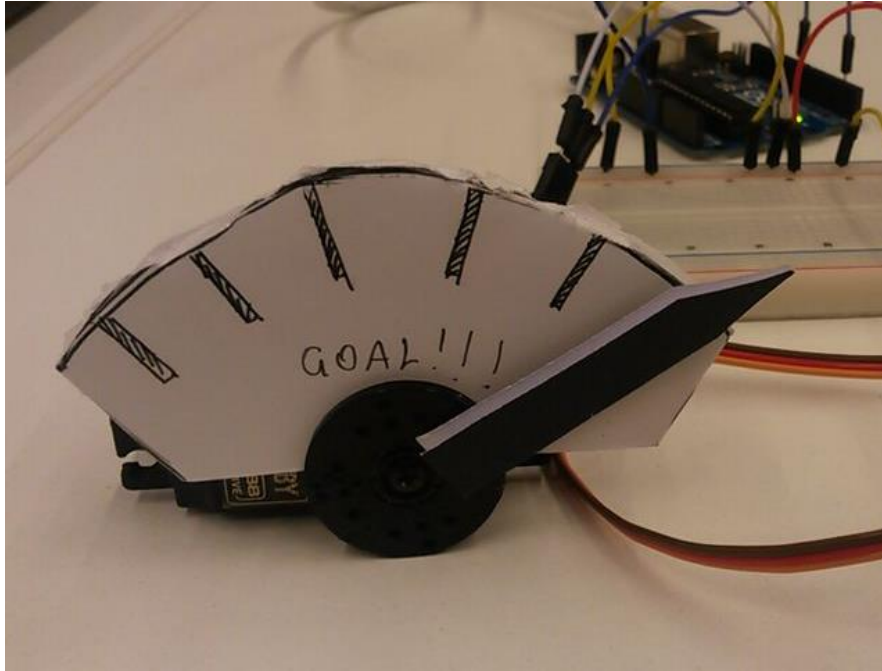
Figure 2. Example Dial Indicator. Note the servo hiding in the background. *Image credit: https://www.instructables.com/id/Arduino-Jump-Challenge/*

Figure 1. Piezo Speaker. Image credit: alliedelec.com