EE 193 Homework 4

The objective of this assignment is simple: measure temperature using your breakout board!

Temperature IC

Write whatever code is necessary to get temperature measurements from your sensor. You're welcome to collaborate with your classmates and to share code. However, you need to compile and run the code from your computer and capture your own data.

Thermistor

I suggest you tackle the thermistor in two steps:

1. Write code to read the ADC value from the thermistor. Do something to make it get warmer or colder (putting your finger on it should suffice) and confirm that the value changes.
2. Figure out the conversion from ADC value to temperature. The thermistor temperature-resistance curve is well documented in the datasheet, so converting voltage to temperature should be straightforward (although the equation isn't necessarily simple).
   The ESP32 ADCs are terribly non-linear (at least near the endpoints), so you will almost certainly need to do some calibration to convert the raw readings into meaningful voltage measurements.

Capturing some data

Set up your development board somewhere and have it capture temperature data long enough to see something interesting happen. Some possibilities:

- In a window with sunlight
- Hanging outside a window overnight
- Next to a heating vent
- Inside a refrigerator
- Blow on the sensors with a heat gun or hair dryer

Include a brief description of your experiment and a plot of your data in your writeup. Needless to say, you should measure temperature from both the thermistor and IC simultanously and compare their results.

Looking ahead

Suppose you stick your temperature-monitoring system outside somewhere on campus to measure temperature. How will you gain confidence that your measurements are accurate?

Write down a possible plan for analysis/calibration/testing/etc that you could realistically use to ensure that the measurements reported by your system are accurate.

What to turn in

Your writeup should contain:

- Notes about what calibration/conversion you had to do to get useful values from the thermistor.
- A brief description of your temperature-logging setup, and a plot of your data
- Your plan for how you might test/calibrate/verify your sensor once it's deployed in the field.

As usual, upload your writeup to the `hw4_sensors` folder in Google Drive.