

BME 405 Project 1. Report ONLY.

Note on performance environment: You will measure the temperature of water of the surface of a chair when someone sits on it. You may hold the device in you hand but not the probe that will not be accessible when the person sits. It will be a typical office or university seat. Accommodating motion and other artifact is part of the assignment. The person sitting may or may not fidget.

Design Input: Using only one or two 9V batteries, any resistors, and one or two thermistors (of only the model used in class) design a device which is accurate to 1 degree for measurements between 25 and 30 degrees. Use any third party gold standard (thermometer, your multi-meter) but document which gold standard you used. Use of any other electrical components will result in automatic failure.

Hardcopy Report: Two-page report fully summarizing device design, testing, and use (Arial, 11pt font, 0.5" margins) – additional pages may be used for a circuit schematic (hand-drawn schematics will be graded 0, unprofessional or cartoony or even partial incomplete or unclear circuit schematics will be heavily penalized without exception). Additional pages may be used for references. No additional pages for any material. No cover page. Format is flexible but must include all the content indicated. Unclear or poor writing style will be penalized up to 50% of final grade. Every single incomplete sentence in the entire report will be an automatic 5% deduction without exception.

Your report must include

- 1) (5 points) A statement of purpose/scope. What are the design inputs, constraints, and goals?
- 2) (5 points) A complete circuit schematic with all components listed. Any aspect of your circuit that is not reproducible will result in a failing grade for the circuit design component. Any connection on the circuit you “choose” not to show will result in a failing grade on this component.
- 3) (10 points) Explanation/calculation of circuit performance (ideal). Theory, math, chart...
- 4) (10 points) Testing / calibration results. The method of testing should be clearly described and the results shown. Only exhaustive and careful testing plans will receive credit. Compare results from testing with theory. You must consider stability of performance (over time, testing conditions), document this stability, so that you later address how to compensate for it. Consider limitations of device accuracy without compensation methods. Only a detailed and comprehensive testing plan will receive a passing grade for this component.
- 5) (15 points) Explanation of how final device performs and is used. Explanation of device accuracy at this final stage.
 - a. You must provide specifics on how you calculate device accuracy based on a detailed testing plan. Only a sophisticated plan, that explicit references the detailed testing plan, will received a passing grade for this component.
 - b. Any addition correction to the calculations needed to use the device based on this calibration should be clearly explained and justified.

Do not explain failed designed you did not use. Do no explain problems you had that are irrelevant to the design and calculations. Avoid using and language that “tells a story”. For example instead of “I placed the sensor in the fluid” say “The sensor was placed in the fluid.” Avoid any “fantastic” or vague speculation on sources of error (e.g. “maybe the components are off”). If you believe there is a source of error be specific on the source and what you did you correct/quantify it (“Variations in component x are within manufacturer reported tolerance leading to a 10% error in but were compensated for by...”). Do not mention suggested improvements you did not do (and will never do) or “future work” or what you might have done differently – it is irrelevant and random.

Additional points to prevent failing regardless of technical content:

Any plagiarism form any source will result in automatic zero. If you're still not sure what this means ask *before* you hand in. There will be no exceptions.

Under no conditions “float” text in your report. Any floated text will result in automatic and substantial penalty. If any word is not part of a sentence (except for inside figures or schematics) it will result in automatic and cumulative penalties.