BME 405 Project 2. "The Smart Cup" In Class Test and Report on March 28th

You will design a cup that reports if the content are cold, warm, or hot (three labels). You will decide the cut-off temperature for each case. The test will involve water of varied temperature being poured into your cup (exactly 100 mL) and the cup has 10 seconds to report the right label. The label should be clear. If the label is not clear, not clearly visible in room light, flickers form one label to the other, that is a failure...

Design Input: Using only one or two 9V batteries, any resistors, any thermistors (any models), any BASIC op-amps, any LEDS, any buzzers, and lights, any wire, and material to support connection (bread board, solder, wires). You can use any mechanical components you want of any kind for the cup or other supporting materials. Use of any other electrical components will result in automatic failure. No arduino, no A/D, no computer...

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) A statement of purpose/scope. What are the design inputs? Constraints, goals..
2) 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) Explanation/calculation of circuit performance (ideal). Theory, math, chart...
4) Testing / calibration results. The method of testing should be clearly described and the result 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) Explanation of how final device performs and is used. Explanation of device accuracy at this final stage. 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.
6) 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 component 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 an 10% error in .... but were compensated for by..."). Do not mentioned 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.