

BME 405 Project 2 (Part 2): “Advanced Smart Cup” In Class Test Only and No Report.

Testing Conditions: You will design a cup that reports if the content is cold, warm, or hot (three labels). The test will involve water of different temperatures being poured into the cup. Your cup must be operational for water levels ranging from 20ml to 100ml. Your cup will have 10 seconds to report the correct label. The cut off temperature ranges listed below must be used.

Cold: 30°C to 35°C

Note: The device will not be tested for temperature range between 35°C to 37°C.

Warm: 37°C to 42°C

Note: The device will not be tested for temperature range between 42°C to 44°C.

Hot: 44°C to 50°C

Minimum Requirements (10 points)

Your device must meet the following conditions in order to pass:

- The labels must be clear.
- The LEDs must be clearly visible in room light.
- The LEDs must not be flickering from one label to another.
- You will have 30 seconds to set up the device and provide any specific instructions. Once the device is set up, you cannot provide any further instructions or touch any parts of your device. You cannot fiddle with the thermistor once the device testing has begun. You cannot ask the user to switch around wires, LEDs or make any rearrangements to your circuit.
- The cup must not be leaking water.
- The device must be operational for at least 5 minutes.
- The user must be able to dump the water out of the cup.
- **New:** The size of your device must not exceed the limit of L8in x W8in x H8in.
- **New:** There must be a power switch.
- **New:** There must be a low battery indicator for battery less than 6V. The low battery light must be ON for batteries less than 6V and OFF for batteries higher than 6V.
- **New:** Only one LED must light up for each label.

Extra Credit (10 points)

You will receive extra credit if the device meets the following requirements

- Size less than L4in x W4in x H4in. (2 points)
- Durable enough to pass a drop test of 2 feet to 3 feet and still be fully operational after the drop test. (3 points)
- Water proof device and is fully operational after completely submerged in water. (3 points)
- An extra sensor component other than a thermistor incorporated in your device. The sensor must be in its component form and cannot be a commercial sensor device placed inside your device. For example, we built circuits using a thermistor for our project and not using a temperature sensing device. You can use any sensor you for example a light sensor or a gyroscope. (2 points)

Design Input: Using only one or two 9V batteries, any resistors, any thermistors (any model), any basic op-amps, any LEDs, any buzzer, lights, wires, any extra sensors of extra credit, and materials to support connection (bread board, and solder). You can use any mechanical components you want of any kind for the cup or other supporting materials. You cannot use any other electrical components such as Arduino, or computers. You must use the multi-meter temperature sensor provided as the gold standard.