Product Design Specification for BME 301-Group 52: Digital Thermometer

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Problem Statement:

Emerging countries are in need of a durable, low-cost thermometer to operate with the MedCal, a handheld medical output device. The thermometer's incorporated circuitry should produce accurate temperature measurements through the use of a human interface.

Client Requirements:

- Interface with hub, which connects to laptop via analog signal
- Should not introduce cross contamination between patients
- Handheld device
- Sturdy and durable
- Calibrated according to international standards

1. Design Requirements

The device must meet all of the client requirements.

a. *Performance requirements:* The device must run at a maximum of 3.3 V per thermometer. It must require less than 500 mA of current.
b. *Safety:* The device must cause no harm to the patient from the circuitry or sensory interface.
c. *Accuracy and Reliability*: It must be ±1 °C to the true temperature. The device must be accurate within 32 to 42 °C.
d. *Life in Service*: The device must last for a minimum of 5 years under normal operating conditions.
e. *Shelf Life*: Must be able to withstand humid and hot conditions (up to ~47 °C) as well as any transportation.
f. *Operating Environment*: The device must be able to function properly in high heat. It must be easy to use for untrained persons with minimal maintenance.
g. *Ergonomics*: The handheld structure must be comfortable for both the patient and the operator.
h. *Size*: The device must be small enough to be handheld.
i. *Weight*: The device must be lighter than 0.4 kg.
j. *Materials*: The device must use low cost materials, excluding latex, which can be easily sterilized in a 10% bleach solution.
k. *Aesthetics, Appearance, and Finish*: The device must be self-contained and compact. The contact point should be comfortable for the patient.

2. Product Characteristics

a. *Quantity*: One working prototype with goal of cost effective mass production.
b. *Target Product Cost*: The product will sacrifice aesthetics and accuracy for low cost, the goal being below $2.

3. Miscellaneous

a. *Standards and Specifications*: International standards.
b. *Customer*: Requires simplicity, ruggedness, and low maintenance.
c. *Patient Related Concerns*: The device must be sterilized between patients using a 10% bleach solution.
d. *Competition*: Mercury, digital, and infrared thermometers.