

Test and Evaluate

ASSIGNMENT

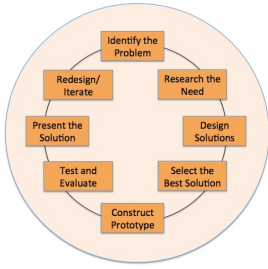
Suppose your design team has just finished collecting data for a temperature sensor. The data are provided at the end of this document.

Your goal is to determine whether or not you have collected enough data from the sensor.

- Is the data at each temperature normally distributed? If so, how did you (mathematically) determine that the data was normally distributed? If not, what is distorting the data (positive skew, negative skew, something else)? For this part, graph histograms of the data at each calibration (temperature) point and clearly explain how you tested each dataset for normality.
- The temperature sensor is supposed to be linear. Is it? How would you describe the goodness of the linearity? Explain the parameter(s) you use to describe the goodness of a (linear) fit to the data and how you determined whether the parameters were "good", "bad" or in between.
- What is the best fit transfer function (output voltage as a function of input temperature) for this sensor?
- Suppose you now set out to calibrate the sensor at yet another temperature. You set up the experiment for a constant temperature of 65 degrees Celsius. The resulting voltage output of the sensor has a negative skew. What could be two potential sources of this kind of skew? Be specific.
- Is this a good choice of sensor to measure human body temperature? Why or why not?

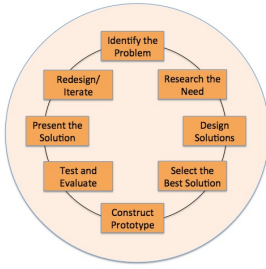
In your responses, be sure to clearly label any graphs (x-axes, y-axes, titles, and any other relevant data within the graphs or plots). Explain your answers clearly, repeating parts of this assignment as necessary for completeness of your explanation and solutions.

Input (degrees C)	Output (Voltage)
27	2.00
27	2.03
27	2.02
27	2.01
27	2.03
27	2.02
27	2.04



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27	2.07
27	1.99
27	1.98
27	1.99
27	1.99
27	1.98
27	2.00
27	2.00
27	2.00
27	1.97
27	1.97
27	1.90
27	2.01
30	3.00
30	3.03
30	3.02
30	3.01
30	3.03
30	3.02
30	3.04
30	3.07
30	2.99
30	2.98
30	2.99
30	2.99
30	2.98
30	3.00
30	3.00
30	3.00
30	2.97
30	2.97
30	2.90
30	3.01
33	4.00
33	4.03
33	4.02



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33	4.01
33	4.03
33	4.02
33	4.04
33	4.07
33	3.99
33	3.98
33	3.99
33	3.99
33	3.98
33	4.00
33	4.00
33	4.00
33	3.97
33	3.97
33	3.90
33	4.01
33	4.05
33	4.04
33	4.10
33	4.08
33	4.075
33	4.12
33	4.16