16-722 Sensing and Sensors

Lab Assignment 4

Sensor characterization *or* **Any sensing experiment of your choice (*with prior approval*)**

Do 1 of the following 2 assignments.

I. Perform a characterization of a sensor of your choice. Report your results in traditional laboratory report format. Your report should characterize the sensor with regard to at least the following items.

1. Measurement range, or dynamic range, or span.
2. Transfer function. Fit an appropriate line or curve to the data.
3. Accuracy. *Take care to establish appropriate ground truth of good quality*. (For this assignment, manufacturer data sheets/labels of light sources, motors, etc., are acceptable as a source of ground truth.)
4. Precision, expressed as the standard deviation of measurements.
5. Linearity. Report *independent linearity* as defined in the Bourns reference below.
6. Drift. Record for at least 1 hour.
7. Bode plot.
8. Step response. Identify rise time, peak overshoot, time to peak, and settling time. Use either the Bode plot or the step response to identify the bandwidth of the sensor.

The following resources may be helpful to you.

- "Performance characteristics of sensors & actuators" (on Canvas)
- "Kalantar-Zadeh, Sensors Characteristics" (on Canvas)
- Reference for independent linearity: https://www.bourns.com/docs/technical-documents/technical-library/sensors-controls/technical-notes/Bourns_pot_linearity_technote.pdf

II. Perform any sensing experiment you like, and report the results in traditional laboratory report format. Note: to follow this option, **before submission, you are required to obtain prior approval of your experiment from the instructor**. You are welcome to propose an experiment that relates directly to your thesis research.