

SMS 491- Sensor project 1 – Due Feb. 13th.

Build (individually or as a group of two) a digital sensor circuit of your choice on a breadboard from electrical components that can sense a property of the environment (e.g. temperature, light intensity, number of objects crossing a door threshold etc'). The sensor will be powered by battery or other power source. Measure the response of the sensor to the environment by having and LED flash at a rate that varies with the conditions (e.g. more flashes at higher temperature, light intensity, a flash everytime an object crosses the door, etc'). If you don't have an idea for a sensor please come see us.

Make sure to understand the role of every component in your circuit. Learn how to measure current in the circuit, voltage across a component in the circuit and the resistance of components in the circuit with a multi-meter.

If applicable, calibrate the sensor against a 'standard' (that is a calibrated sensor or some other known quantity) over a reasonable range of environmentally relevant values. Derive a calibration equation and assess likely uncertainty of sensor (e.g. +/- 2degrees).

Together with the Emmanuel Boss and/or Jim Loftin test your sensor and assess how well the sensor performed.

Submit a short paper which includes a short description of your sensor, the calibration data graph + the 'mystery' data, and a photograph of your sensor.

Grading: late submissions, 10pts down + 5pts for every extra day.

Rubric:

A	Sensor works, calibrated well and performs well in test (A- if minor details missing).
B	Sensor works, calibrated well but fails in test.
C	Sensor works, did not calibrate well and fails in test.
D	Sensor seems to respond to the environment but it is not obvious what the sensor is doing.
E	Some components are attached but no output is measurable.
F	No homework turned in.

Basic electronics resources:

Suggested reading:

Physical Computing: Sensing and Controlling the Physical World with Computers, *Dan O'Sullivan and Tom Igoe*, 2004, Thomson Course Technology PTR; ISBN: 159200346X

Make: Electronics, *Charles Platt*, 2009, O Reilly Media Books, ISBN: 978-0-596-15374-8

http://www.owl.net.rice.edu/~elec201/Book/basic_elec.html

Student guide to Elenco (in the lab).