ECE411 Practicum Project Specifications (2015/10/01)

You will design, build, test, document and demonstrate a device that:

- **MUST**
  - *Project Concept*
    - Have ≥ 1 sensor.
      - Sensors route information into the processor.
    - Have ≥ 1 actuator.
      - Actuators route information out of the processor.
    - Have a digital or analog processor.
    - Has to be safe.
  - *Schematic*
    - Be in a schematic capture program.
    - Be forward/backward annotated with your PCB design.
  - *PCB*
    - Have ≥ 2 layers, with solder mask and at least a top-side silk screen.
    - Have an area between > 9 cm^2 and < 900 cm^2
    - Have no linear dimension < 2 cm or > 30 cm.
    - Have the processor on your PCB (i.e., PCB may not be a daughter board or “shield”).
      - NB: Sensors and other ICs besides your processor may be on daughterboards.
    - Not started from an existing design file (e.g., Arduino board layout).
  - *Components*
    - Have ≥ 25% surface mount components
      - NB: “assembled by hand” below.
  - *Assembly and debug*
    - Be assembled by hand (yes, your hand).
    - Be tested.
    - Work.
  - *Documentation*
    - Have live documentation.
    - Have all documentation and design files under revision control.
    - Use collaborative documentation tools (e.g., Github wiki, Redmine wiki, Google Docs).

- **SHOULD**
  - *Project Concept*
    - Have a novel or interesting purpose.
    - Be packaged in an enclosure.
    - Have more complex sensors and actuators.
  - *Firmware*
    - Be “bare metal”, with no 3rd party code used besides an IDE and vendor-provided libraries
      - NB: this does **not** exclude Arduino since this is a SHOULD.
  - *PCB*
    - Be as small as possible.
  - *Components*
    - Have mostly all surface mount components.
  - *Assembly and debug*
    - *Use SMT components that are not hard to hand assemble*
      - *All parts ≥ 0603, no or very few QFNs, no BGAs, etc.*
  - *Documentation*
    - Have each component choice documented.

- **MAY**
  - *Project Concept*
    - Move / Explode
      - NB: “Be safe” is in MUST
    - Have a cool custom enclosure.
  - *Schematic*
    - Use EAGLE CAD (supported in ECE411)
  - *PCB*
    - Use EAGLE CAD (supported in ECE411)
  - *Documentation*
    - *Have a video describing concept, use, and technology overview*