E80 Project Proposal Checkoff Checklist

Date: Section #: Team #: Professor:

Proposal:

* ☐ Has a justifiable scientific goal
* ☐ The specified sensors will help achieve that scientific goal
* ☐ Some sense of whether signals are big or small. Are the measurements feasible?
* ☐ List exceptional or difficult design features of their robot
* ☐ Have considered whether specific launch times are beneficial to them. Make requests for specific times if need be. (Don’t forget that human activity is much lower in the morning.)
* ☐ Robot will deploy autonomously for one minute
* ☐ Three new sensors with two unique electrical interfaces will be installed
* ☐ Have listed five alternative project ideas

Budget:

* ☐ Are not purchasing any parts that we have in lab (Students may buy replacement speakers or pH probes because they are not available for permanent installation.)
* ☐ Justify any high cost sensors: students are not buying things that we can easily make
* ☐ Checked that sensors are not SMT or that students have sensors on breakout boards
* ☐ Checked interface type for each sensor is compatible with Teensy
* ☐ Included taxes and shipping costs in the budget
* ☐ Total cost less than $50
* ☐ Verified team knows about engineering purchase order request form
* ☐ Verified the team has a designated buyer & knows not to buy until they’re 2x checked
* ☐ Have plans to generate fake sensor outputs next week if parts have not arrived

Mechanical Drawing:

* ☐ Mass calculated
* ☐ Center of gravity calculated (especially if they have a winch)
* ☐ Center of buoyancy calculated
* ☐ Ballasting calculations? (if applicable)
* ☐ Will it float? (Or not float if that’s the desired behavior)
* ☐ Low profile against wind? (unless designed for high wind drag)
* ☐ Low profile against currents? (unless designed for high current drag)
* ☐ Thrust calculations for unusual behaviors (e.g.: do you really generate enough thrust to bury yourself in the sand? To submerge? To hoist that winch?)
* ☐ Sensor placement good for measuring desired quantities
* ☐ Motors as far away from IMU as possible (to avoid magnetic field interference). Try for at least 30 cm.
* ☐ Plans for cabling if sensors are far away
* ☐ Planned out a suitable number of penetrators for waterproof box. Have picked locations.
* ☐ What is waterproof and what is not? Plans for waterproofing sensors out in the water.

Schematic:

* ☐ Bypass capacitors for every op-amp
* ☐ Voltage swings annotated on every node, including sensor outputs
* ☐ Designed gains lead to the voltage swings specified on the design
* ☐ Do the designed offsets prevent clipping?
* ☐ Inputs to Teensy bounded between 0 V and 3.3 V
* ☐ Signals buffered appropriately, especially as they enter the Teensy
* ☐ Are there enough input channels on the Teensy, do they plan to use the extra pins?
* ☐ Are there enough digital interfaces on the Teensy, are they on the right pins? (if needed)
* ☐ Considered software needed to interface with digital sensors? (Don’t forget that this includes encoders & Hall flow meters. Weather vanes often easier as potentiomenters.)
* ☐ Have they picked good H-bridges for any extra motors they plan to use?
* ☐ Considered how to measure any audio signals? Are they using an envelope detector + analog channel or are they designing their own sampler in software?
* ☐ Is battery power sufficient to peak current load?
* ☐ Calculated average current draw and maximum mission life? (It can be helpful for debugging to annotate current for each branch.)
* ☐ Considered how to generate signals for sensors that require them? (e.g.: AC signals for salinity sensor?)

Administrative/Overall:

* ☐ Prof advised team on expected difficulty of their proposed project, made sure they all bought in. Especially important if the team is trying to do lots of fancy stuff.
* ☐ Prof reminded team of the importance of experimental design and measured data in the final evaluation of the projects.
* ☐ Prof reminded team of checkoff schedule for next three weeks – breadboard, soldered and integrated, deployment at BFS
* ☐ Prof updated the instructor checkoff spreadsheet in the Project folder (this is important so that Prof. Brake can approve purchase orders)