Senior Capstone Project Proposal

The project is designed for a team of students working toward completion of a project, within two semesters[1].

Title	CO_2 Incubator for Cell Culture
Sponsor	Contact person: Briana Smedberg Company name: Bionanomics / MIE
	Contact info: 260-710-2015
Description	• Carbon dioxide (CO_2) incubators are integral to laboratories because they provide a controlled environment essential for cell culture growth and experimentation. These incubators maintain precise levels of CO_2, temperature, and humidity, which are critical for replicating the physiological conditions necessary for cellular and microbial growth. The CO_2 helps maintain the pH of the culture medium, while stable temperature and humidity levels ensure optimal cell viability and proliferation. This controlled environment is crucial for reproducible and reliable experimental results. • CO_2 incubators are often very expensive for how relatively simple the instrument is. The Pelling Lab created a DIY incubator for around $350 (a few years ago, likely more expensive at this point) and posted the instructions along with the code to their blog linked below: ○ https://www.pellinglab.net/post/diy-incubator • **We would like you to re-create this incubator for our laboratory.** Beyond making a functional CO_2 incubator, you may want to improve upon the existing design in some way. Pelling Lab's blog has a post listing out possible improvements to be made.
Disciplines (ME, EE, CS, etc.)	
For ECE	• Hardware: analog circuit, signal conditioning, PLC • Software: I believe the existing code is written in C++ with Arduino specific libraries • (I am not engineering inclined at all, so please forgive me if any mistakes were made here)

Estimated budget	$500-$600, flexible
Technology Disclosed? If so, what?	No technology that isn't publicly available
Additional requirements	None
NDA or IP Assignment agreement requested?	No

Technology and ECCN:
"If your project involves 'technology' that is either (a) not publicly available or (b) includes proprietary source code (not executable files), then it requires an ECCN." 'Technology,' for this purpose, is defined as "information necessary for the development, production, use, operation, installation, maintenance, repair, overhaul or refurbishing of an item. Technology may be in any tangible form, such as written or oral communications, blueprints, drawings, photographs, plans, diagrams, models, formulae, tables, engineering designs and specifications, computer-aided design files, manuals or documentation, electronic media or information revealed through visual inspection."

Interactive tool to determine ECCN:
https://www.bis.doc.gov/index.php/export-control-classification-interactive-tool

NDAs and IP Assignments:
The sponsoring company typically has NDAs and IP assignment forms that it wishes to use. Neither the NDA nor the IP assignment is an agreement with Purdue directly; these agreements are between the students and the sponsoring company. Of course, our office can review the company-provided documents to be certain it aligns with Purdue's standards. Alternatively, our office has draft agreements which we could provide for the sponsor's use. Again, as NDAs are between the student and the

sponsor, Purdue cannot be a party to or advise the sponsor or the student on the NDAs, other than to outline some basic expectations as to fairness and suitability of the NDA to a student project.

Sponsor Acknowledgements:
By way of background, Purdue University professors who have senior capstone class projects involving outside sponsor companies notify our office so that we can prepare an acknowledgement form for the sponsoring company's completion. This is not a contract but an acknowledgement form signed by sponsoring companies which lays out Purdue's guidelines regarding class projects and outside company inputs, potential export control issues, and student intellectual property. Some sponsoring companies offer a monetary donation to the project, but that is not a requirement.