Senior Capstone Project Proposal

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

Title	Franklin Electric IoT Gateway
Sponsor	Contact person: Kevin Fox Company name: Franklin Electric
	Contact info: kevin.fox@fele.com, 260-704-1479
Description	This project will be a continuation of the 2021-2022 senior design project by five PFW Computer Engineering students. Goal: *Design and develop a system to securely monitor and control Franklin Electric Drive products remotely.* Design and build the next generation of the IoT device based upon learning from the 2021-2022 school year. • Update hardware with requested updates. • Continue to improve user interface. ▪ Added features, graphing options • Design and build a NEMA 3R enclosure for the device. • Create a QuickStart guide and User Manual for device. • Launch units into the field on a limited basis and monitor success. Problem Statement for the 2021-2022 AY: Since its founding in 1944 as an electric motor company, Franklin Electric has grown into an industry leader in electric motors and pumps for water and fuel applications [1]. Headquartered in Fort Wayne, Indiana, Franklin Electric maintains a presence across the globe. In addition to pumps and motors, Franklin Electric also produces variable frequency drives (VFDs) to control their electric motors. These variable frequency drives are the source of Franklin Electric's need for this project. In the design process for Franklin Electric's VFDs, field tests are required where units are subjected to continuous workloads and extreme conditions. During this process, collecting data is essential to understanding the product's limits, detecting performance issues, and understanding device failures. Since field tests require extended periods of time, collecting, monitoring, and controlling the VFD during the field test remotely is desirable. Currently, Franklin Electric utilizes products from Netbiter to fill this remote monitoring and control functionality, but Franklin Electric is seeking a replacement that is more tailored to their specific needs [2]. Therefore, the problem for this project

[1]In general, one semester has 15 weeks. For a 3 credit hours course, a student is expected to work minimum of 8 hours per week for the project which is equivalent to minimum of 120 hours.

	is to design a system to monitor and control Franklin Electric Drive products remotely.
Disciplines (ME, EE, CS, etc.)	4 CS + Fuelling, Cody A. (EE); Islam, Ishrat B. (EE)
Estimated budget	$10,000
Technology Disclosed? If so, what?	Embedded firmware, schematics, board layouts
Additional requirements	None
NDA or IP Assignment agreement requested?	Yes, same as last semester.
Faculty Advisor	Dr. Chao Chen
Notes	Pending on the CS participation

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

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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.

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