INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*Annihilare*	**Date Submitted**	*05/13/2022*
Project Title	*Design of a Process Chemistry Measurement System- Phase 2* **(ANNIHILARE_CHEM2)**	**Planned Starting Semester**	*Fall 2022*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	1
Computer	2	Systems	

Company and Project Overview:

At Annihilare, we are ushering in a new generation of clean. We promote healthy environments for all people with our cutting-edge infection prevention technology, including EPA-registered disinfectants, on-site generation technology and state of the art facilities management tools.

Annihilare is pioneering a new approach in the development of cleaning products which do not rely on harmful chemicals. The actual process that creates our cleaners and disinfectants is called electrolysis – which is a form of electrochemistry. Basically, we start with a simple brine solution and use electricity to create a powerful disinfectant and degreaser without using harmful chemicals.

Like everything natural, our products revert back into simple salt water and don't burden the environment that we all live in. The same cannot be said about traditional products. This project's objective is to further develop a measuring system into a production unit for implementation into healthcare markets. This project is a Phase 2 of a project started in Fall of 2021.

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NCMEP North Carolina Manufacturing Extension Partnership	This project is partially supported by a grant from the NC Manufacturing Extension partnership, an organization the helps to support business and job growth for NC companies. To learn more about the NC MEP, click on this link: https://www.ncmep.org/.

Project Requirements:

Annihilare makes their cleaning products in two ways: 1) at their production facility and 2) on their customer premises. When doing the processing, it is important to measure different aspects of the fluid characteristics in the batch. The parameters to measure are pH, ORP (Oxygen Reduction Potential), and salinity. Meters for these parameters are available off the shelf. The objective of this project is to package them together into a custom system with a user interface that meets Annihilare's needs. There is a working prototype of this unit, utilizing Arduino and user interface screen for display of information, calibration, etc. The goal of this project is to further design and develop the system into a proprietary scalable production unit.

Expected Deliverables/Results:

- Take the lessons learned and materials from the previous prototype phase project and design and spec out a production model that can be repeatable, available and supportable
- Convert the Arduino unit to more robust discrete components or implement the Arduino into a more robust / assembled package that can handle field conditions
- Design Improvements and fortify the code for system alerts that can be supported in the field
    - If using Arduino, the C-based code can be used as a starting point
    - If using other IC components, Python or other low-level logic can be used (based on the proven Arduino code's logic)
    - Work with Annihilare to integrate alerts into a database hosted on a web server for development into a web application
- Build a Bill of Materials (BOM) for manufacturing
- Perform a make or build analysis on the Bill of Materials and identify trustworthy vendors for components beyond those of which Annihilare already conducts business with
- The unit will work according to plans already developed

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

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List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Arduino devices
- OEM Sensors
- Development of user interface systems
- Mechanical packaging
- Web servers and database
- Wiring or digital/analog components