INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	Carotek (with support from Endress+Hauser)	**Date Submitted**	8/9/2023
Project Title	Design and Build of a Process Demonstration Unit **(CAROTEK_PROCESS)**	**Planned Starting Semester**	Spring 2023

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	3	Electrical	1
Computer	1	Systems	

Company and Project Overview:

CAROTEK®
The Power of Solutions
a SunSource Company

Carotek provides process equipment solutions for the industrial, commercial and municipal markets across five Southeastern states. Carotek is a leader in the providing their customers with innovative solutions that help reduce manufacturing costs, lower operating costs and increase productivity. Carotek represents many manufacturers in the process industry including. An example of one of our customers is Campbell's Soup. Check out the video below:

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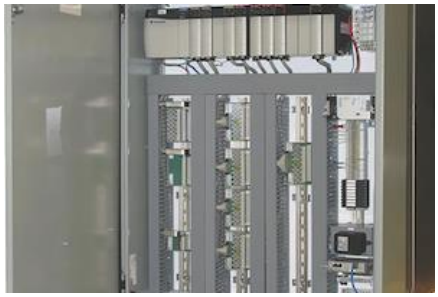
See examples and links below of our product offerings:

[Blowers & Vacuum Pumps]

[IIoT - Networks & Wireless]



[Control Panels & Systems]

[Instrumentation]

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[Process Skids]

[Pumps]

[Valves & Valve Automation - Flow Control]

[Water & Wastewater Products]

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Endress+Hauser

People for Process Automation

One of Carotek's primary manufacturers, Endress+Hauser USA, will play a supporting role in this project. Endress+Hauser is a global leader in measurement instrumentation. Their products provide process solutions in flow, level, pressure, analytics, temperature, and digital communications.

Both companies have recently been collaborating around workforce development initiatives and are investigating ways of introducing the process industry and technology to attract young talent. Often times that attraction includes career fairs, trade shows, and classroom demonstrations for K-12 and college students. The process industry is not commonly known among these students and educators. Therefore, the Endress+Hauser team is looking for ways to engage and interact with students as well as making them aware of this industry. The idea of a demonstration unit that would give students the chance to see process measurements in action, as well as the opportunity to interact with the system, would be such an awesome opportunity.

Project Requirements:

Design, test and build a portable process automation demonstration unit/kit for use in promoting Carotek and the Process Automation industry to K-12 and College students.

Intended Use of the Station after design/build

The Demonstration Unit will be utilized by Carotek's Workforce Development and Talent Acquisition team at career fairs, trade shows, and events.

Constraints

- Easily transportable considering weight, size, and ability to be shipped
- The unit should demonstrate flow, level, pressure, temperature, and pH
- Does not have to be connected in one system; instruments/demonstration can be independent
- The unit will require a process medium, but the medium should be easily accessible and disposable, and potentially related to a customer product that could be given to visitors
- Aesthetics is a primary need to engage students to visualize functionality of our products (ex: clear tubing to show flow of process medium)
- Any electrical for the unit will need to access a 110V outlet
- If unit is developed and operational, consider adding option to control and view readings virtually

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Recommended Instruments

Endress+Hauser (E+H) recommends the following lines of instruments:

- PicoMag
- MicroPilot
- Cerabar
- iTemp
- MemoSens

Expected Deliverables/Results:

- Portable Process Demonstration Unit/Kit
- Unit should include standard operating instructions
- A final report with future action necessary to implement system, as well as success/learnings throughout project that would be beneficial for future Learning & Development units/kits

Disposition of Deliverables at the End of the Project:

The process demonstration unit and accompanying curriculum that is developed will become the property of Carotek.

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.

Recommended Research

- Carotek PTU Visit in Mathews, NC
- Trade organizations, additional training unit/content developers

Suggested Courses (not required, but helpful)

- MEGR 3114 - Fluid Mechanics
- MEGR 3171L - Instrumentation Laboratory
- MEGR 3171 - Introduction to Measurements and Instrumentation
- MEGR 3216 - Thermal/Fluid Design
- MEGR 3237 - Introduction to Control Systems
- SEGR 4114 - Production Control Systems
- ECGR 2155 - Instrumentation and Networks Laboratory