Company Information

Company Name	NAVAIR	Date Submitted	10/8/2024
Project Title	Fleet Additive Manufacturing Machine Health Monitoring (NAVAIR_ADDITIVE)	Planned Starting Semester	Spring 2025

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:

Home to nearly 4,000 employees, NAVAIR Fleet Readiness Center East has more than 1,100 engineers shaping the future of naval aviation. Engineers have the opportunity to work on a variety of different aircraft, components, and support equipment, growing their technical skillset and keeping America's Marines and Sailors in the fight.

NAVAIR Fleet Readiness Center East is home to a large number of Fleet Support Teams (FSTs), all of which possess technical authority to provide guidance to Naval and Marine Corps squadrons around the world. Each FST supports a major aircraft or platform and includes engineers in a variety of disciplines.

NAVAIR is an active participant in capstone projects for a variety of school and uses said projects as a means for recruiting high achieving engineers.

Project Requirements:

U.S. Marines and Sailors utilize forward-deployed Additive Manufacturing (AM) assets across the globe. While advanced in nature, these systems are often utilized in harsh or austere environments to produce parts and tools necessary for the warfighter to complete their mission. The addition of a machine health monitoring system utilizing a suite of sensors could increase machine reliability, part consistency, and data collection for program offices. This project would have students outfit a NAVAIR AM system with sensors and accompanying software to produce a meaningful Machine Health Monitoring profile, outputting data into common formats. This project would be able to capture printing issues, environmental conditions, and overall build characterization. Other requirements:

- Develop and design a sensory array package to be installed onto a NAVAIR T1 AM machine for the purposes of data collection and telemetry.

- For security purposes, no camera or vision systems should be used.

- Develop a software interface to interpret data, providing the user with meaningful results from collected data

- Use software and algorithms to determine AM part printing issues, reporting these to the user during print time (so a problem print can be paused or aborted to save filament) and when print is complete

- Output a complete print report, denoting a summarized evaluation of print parameters, and flagging issues or errors in appropriate categories.

- Make a Go/No-go determination for produced parts based upon data collected and customer inputted requirements from NAVAIR Technical Data Packages and other data systems.

Expected Deliverables/Results:

- A NAVAIR T1 Printer outfitted with complete sensor system installed and functional.
- Accompanying software application for sensor package that meets the project requirements.
- Test data showing compete system functionality, including fault detection for a full array of possible issues encountered during printing.

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 <u>mandatory</u> 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.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):
● Interest in Additive Manufacturing
● Interest in sensor monitoring system design