UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

UNC Charlotte – Lee College of Engineering Senior Design Program

Senior Design Project Description

Company Name	*NAVAIR*	**Date Submitted**	*5/16/2019*
Project Title	*Crew Position Indicating and Recording System* **NAV_H60**	**Planned Starting Semester**	Fall 2019

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		Electrical	2
Computer	2	Systems	
Other ( )			

Company and Project Overview:

For more than 60 years, Fleet Readiness Center East, at Marine Corps Air Station, Cherry Point, N.C., has played an integral role in our national defense. The facility's In-Service Support Center provides multi-disciplinary, engineering services in both design and maintenance. Our workforce has earned a reputation of excellence, providing worldwide support for Navy and Marine Corps aviation.

Fleet Readiness Center East has provided maintenance, repair, and overhaul support to virtually every weapons platform the Marine Corps has flown – from the inverted gull-winged F4U Corsair of World War II fame, to the Corps newest aircraft, the F-35B Lightning II. It is one of eight fleet readiness centers operated by the United States Navy. It is also the Department of Defense Vertical Lift Center of Excellence. FRC East has a workforce of about 3,800 civilian, military, and contractor personnel. It is North Carolina's largest industrial employer east of Interstate 95. NAVAIR is an active employer for UNC Charlotte grad's and has many COE Alum's on their staff.

FRC East artisans perform phased depot maintenance, planned maintenance intervals, integrated maintenance concepts, modernizations, conversions, overhaul or in-service repair on the AV- and TAV-8B Harriers, the V-22 Osprey, the AH-1W Super Cobra, the AH-1Z Viper, the UH-1N Huey, the UH-1Y Venom, the CH-53E Super Stallion, and MH-53E Sea Dragon, the F/A-18 Hornet, the F-35B Lightning II, the H-3 Sea King; the H-60 Seahawk; the EA-6B Prowler; and the C-130 Hercules. The

depot is also the depot repair point for the drive and rotary systems of the MQ-8B Fire Scout.

This project will deal with large helicopters such as the H-60 pictured below:

Many of the Navy and Marine Corps' operational commitments are within extremely harsh environments. These harsh environments make it very difficult for pilots to maintain situational awareness, driving efforts to provide the pilots with superior systems as technology advances. Situational awareness is paramount for pilots, ensuring that the aircraft and crew are positioned correctly for safe and efficient operation. While intercommunication systems assist with this, they are not always an ideal solution. We would like to enhance pilot awareness by providing a means to actively track and record positional data of crew members in an aircraft and display it to the pilots.

Project Requirements:

Develop a prototype system that spatially locates and logs crew members within the confines of an aircraft. The system must meet the following specifications:

- Area of detection to be cockpit and cabin which combined measures 30 ' L x 8' W x 8' H –

- Display positional data in real time to the pilot and co-pilot so they can quickly determine where in the aircraft all crew are located.

- Record positional data every 10 seconds for 8 hours – data to be displayed in real time, but also logged so that location data for the entire crew can be reviewed post-mission
- Record up to 6 crew members at once (crew is two pilots and 4 crew people in the cabin) Pilot and Co-pilot must also be tracked as it is possible they will leave the pilot seat during the mission.
- Accurate within 12 inches – Consider the floor of the aircraft to be an X-Y coordinate system, crew reported location to be within 12 inches of actual spot in that X-Y space.
- Function in environments to include smoke, dust, and rain.
- Positional location information to be reported for each individual by name. Not just where the 6 people are, but where each person (by name) is located.

UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Expected Deliverables/Results:

- Proof of concept system which can be demonstrated and verified to perform within the specified physical dimensions.
- Hardware/software required to continuously (every 10 seconds) monitor and report each specific crew member's position to the pilot display.
- Cockpit display mechanical interface does not have to be determined or designed as display is only a proof of concept and not an actual aircraft integration.
- Display can be any practical sized display that gives the pilot and co-pilot a visual indication of where each specific crew member is in the aircraft.
- System must capture the data and allow replay on a computer (be downloadable to the computer) post mission.

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the Industry Supporter. Work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date.

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

- Image or Location technology processing
- Embedded software programming
- Circuit design and sensors
- Printed circuit board design
- Must be US Citizens