



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

## Senior Design Project Description

<b>Company Name</b>	NAVAL AIR SYSTEMS COMMAND FRC-E (NAVAIR)	<b>Date Submitted</b>	6/1/2018
<b>Project Title</b>	Remote Controlled Transport Device for Electronic Consolidated Automated Support System (eCASS) (NAV_TRANS)	<b>Planned Starting Semester</b>	FALL 2018

### Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	4	Electrical	2
Computer		Systems	
Other ( )			

### Company and Project Overview:

Naval Air Systems or “NAVAIR” is part of the Navy’s Fleet Readiness Center East. During its more than seven decades of operation, 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.

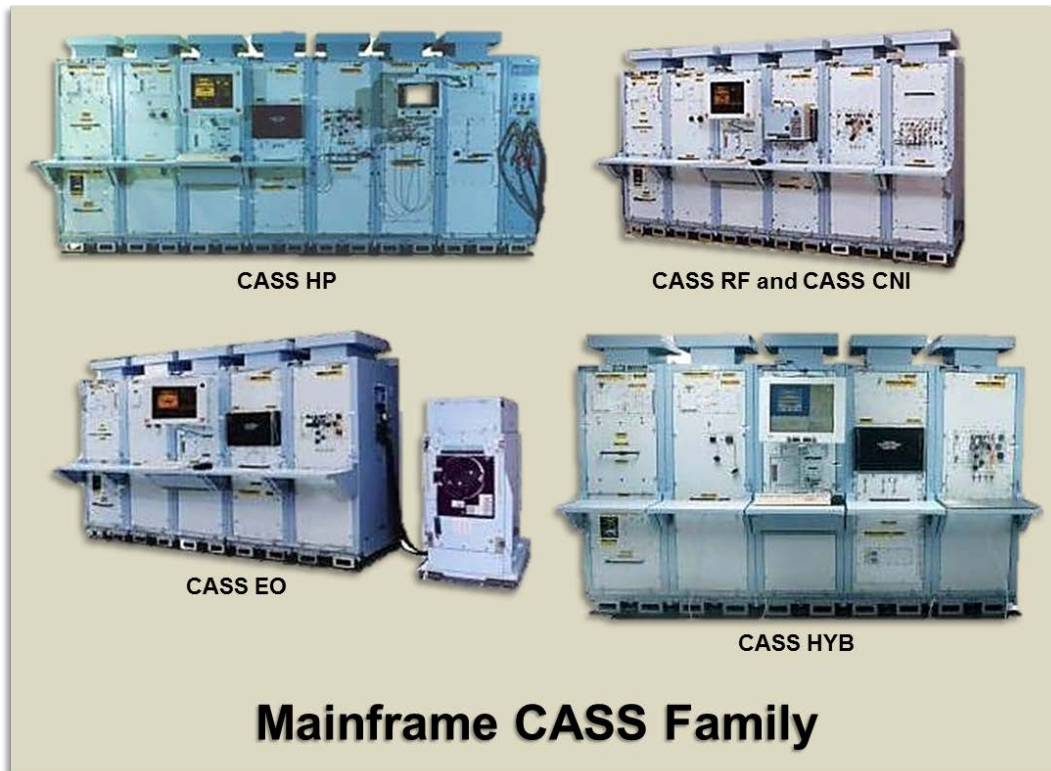


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The Consolidated Automated Support System (CASS) is the Navy's standard for automated testing of avionics components to ensure airworthiness and safety of flight.



While at sea or ashore, maintainers are able to connect avionics systems to an eCASS station, run a set of automated tests that identifies the problem, and perform the necessary maintenance to fix the issue. Once the maintenance is complete, the avionics are reconnected to the eCASS station to verify that the problem is fixed and the avionics are ready for flight.



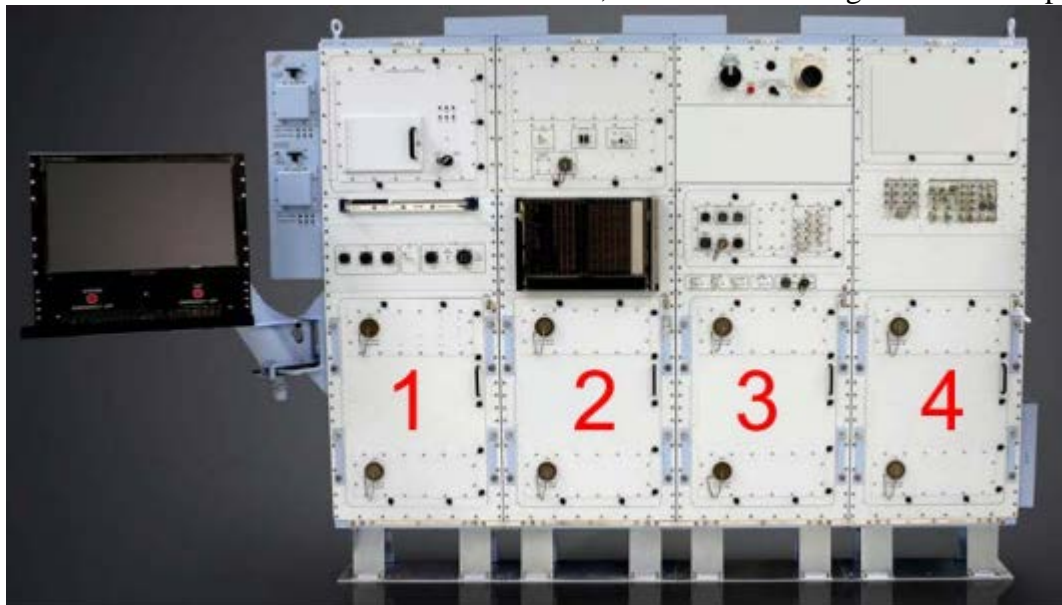
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eCASS stations are in the process of replacing the older CASS stations, which are much larger and have an outdated operating system. Replacing the older systems and installing the new eCASS systems on Navy ships can be a difficult process. The scope of this project will be to design and prototype a transport device that can remotely pick up, transport and lower individual eCASS racks into a precise location. The device would be operated via a laptop or smartphone app via Bluetooth.

### **Project Requirements:**

Every eCASS station consists of three or more racks that can be moved or replaced individually. Some eCASS stations have additional racks that allow for the testing of more equipment. Each eCASS station is assembled one rack at a time, and each rack weighs 1000-2000 pounds.



### *Design Objectives:*

The student team will be provided information about the physical configuration of each rack in the eCASS system. Information about the constraints of the shipboard environment will also be provided. Based on the specifications and constraints, the student team will develop a transport device that can safely lift an individual rack and transport it through the ship to the avionics testing bay. The operator will be near the device and direct it using a wireless controller. The device will place the rack on to a prepared “pad”. The pad will be attached to the floor and be pre-configured with rack mounting hardware. The device will be able to accurately place the rack onto the mounting location.

### **Requirements:**

The eCASS carrier must:

1. Securely attach to each rack configuration
2. Lift a 2000 pound load safely
3. Carry the load at most 5 in. off the floor
4. Have strap tie down points



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5. During installation onto Pad, be able to lift the load at least 9 in. off the floor
6. Fit through the 24 in. minimum operational space
7. Support lateral movement
8. Support remote control via a wireless interface and application
9. Have precise movement to align the racks on the mounting pad
10. Have at least a 2 hour active on-time (moving or holding up a rack)
11. Be safe to operate indoors

**Expected Deliverables/Results:**

1. Full system schematic
2. Parts list
3. Analysis of solution to prove all components will be sufficient
4. Solid models of physical design components. Should include detailed mounting and attachment information
5. Proof of concept prototype which is tested and verified with an actual rack that will be provided by NAVAIR.

**Disposition of Deliverables at the End of the Project:**

NAVAIR will take possession of all deliverables and research at the completion of the project. Project team to co-ordinate shipment with NAVAIR.

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

- Must be US Citizens (Students and Faculty Mentors)
- Must be willing (entire team, no exceptions) to travel to Cherry Point NC to gather data for project. Note mileage for travel will be reimbursed according to ISL procedures.