



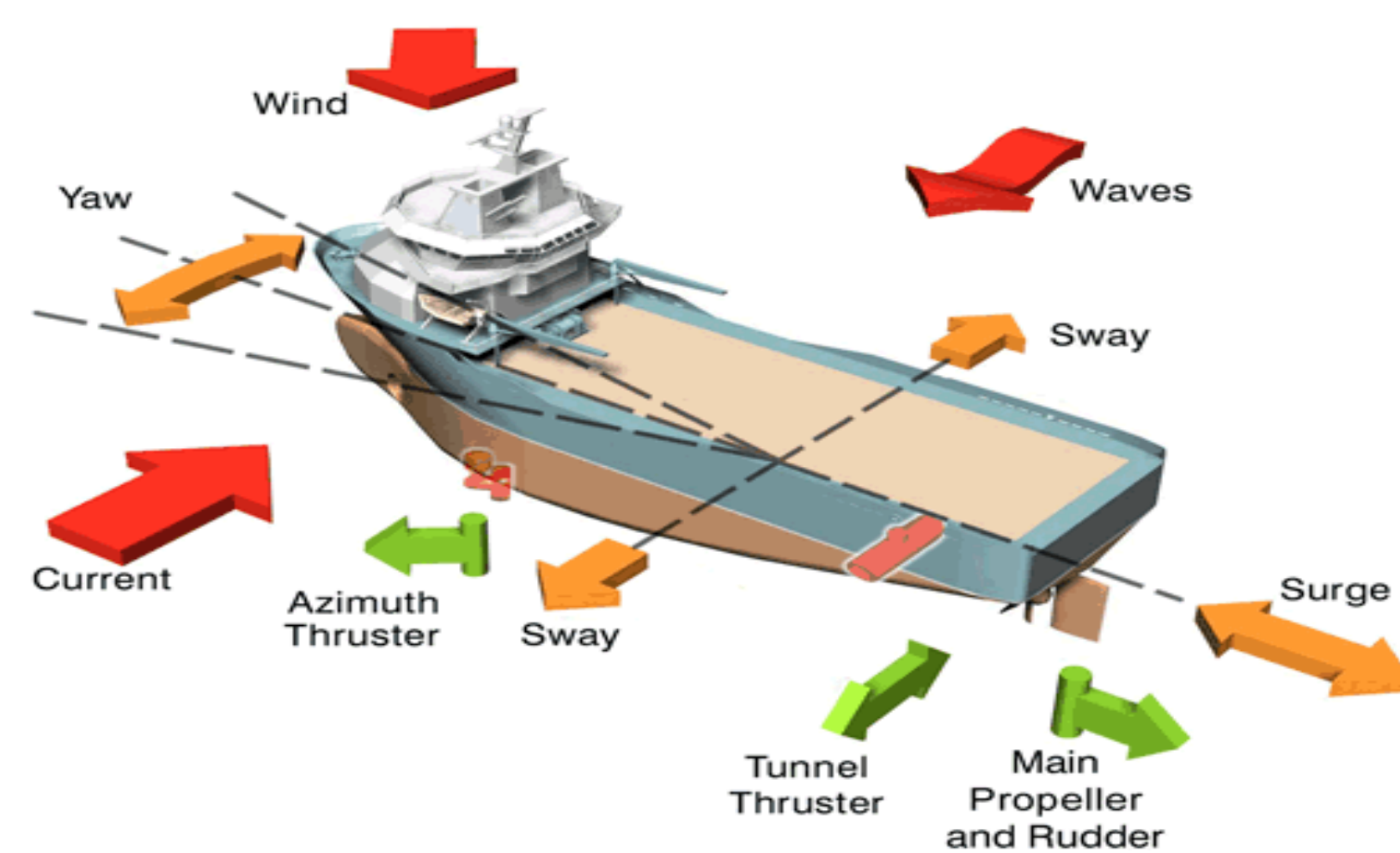
## ECE Capstone Design Programs

# Kongsberg Maritime Dynamic Positioning Vessel

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### Project Description

- Kongsberg Maritime's dynamic positioning system (DP) was designed in order to facilitate safe drilling in the harsh environment of the North Sea
- DP systems are installed on large vessels, making it difficult to realistically test and demonstrate DP
- Our goal is to design and prototype a safe, realistic, small scale model for testing and demonstration purposes
- We will accomplish this by integrating Kongsberg's DP system into a recreational sized vessel
- This prototype will be operational from the shoreline, removing the safety risks of testing the system out at sea.

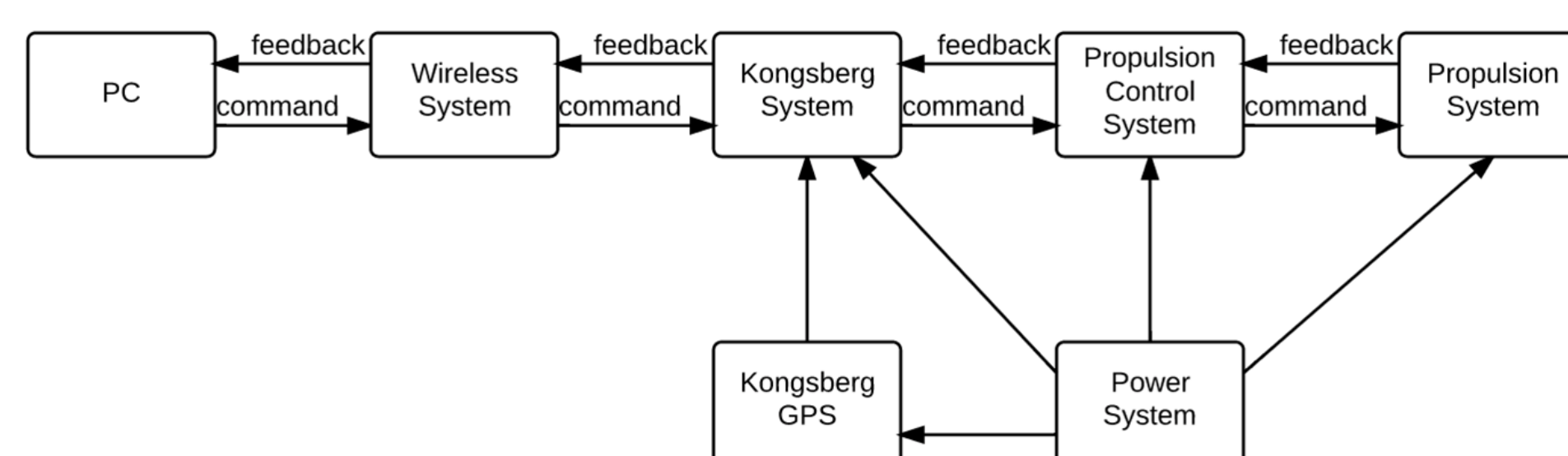


### Engineering Requirements

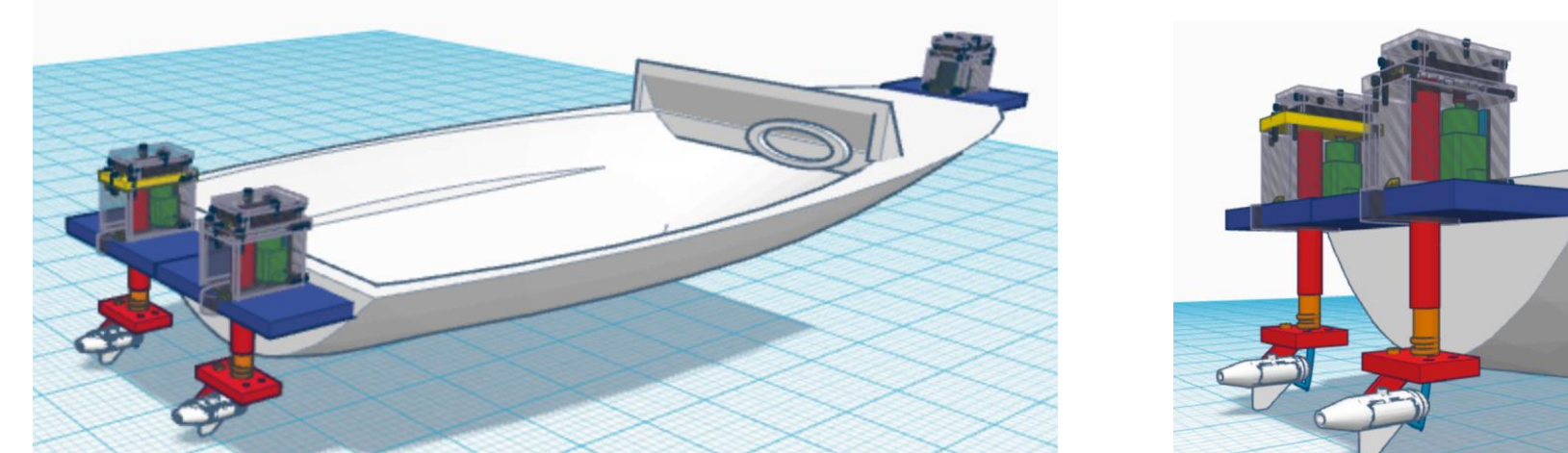
Vessel must:

- Hold equipment + 300lbs.
- Maintains position to within 3m and 3° of heading at all times
- Run continuously for minimum of 2hrs.
- Refuel/Recharge within 15min.
- Be deployable within 1hr
- Be between 12-20ft.
- Comply with FCC/Coast Guard regulations

### Behavioral Model

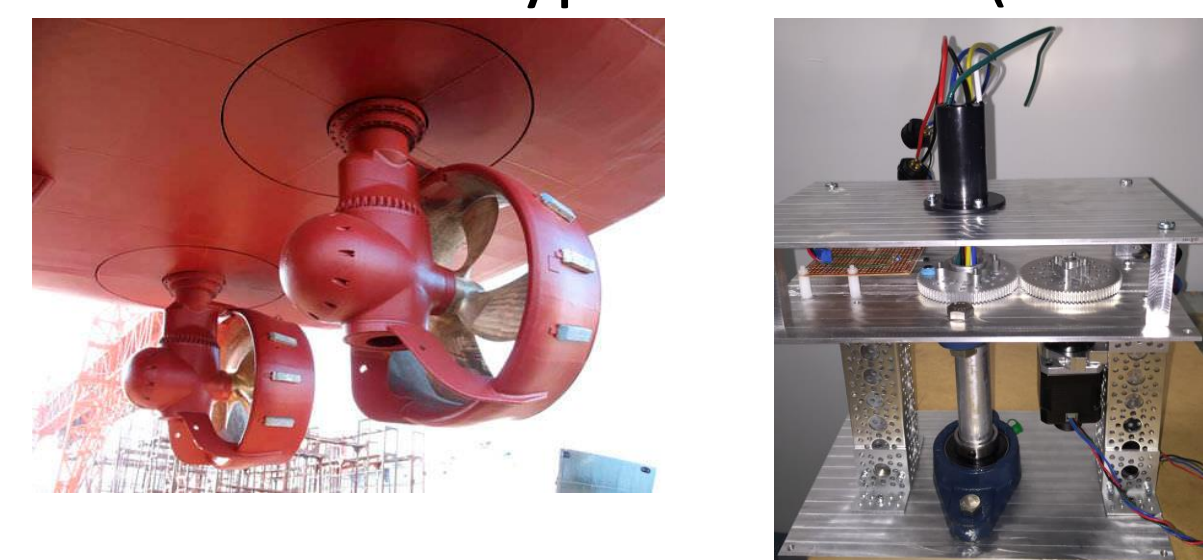


### System Mockup



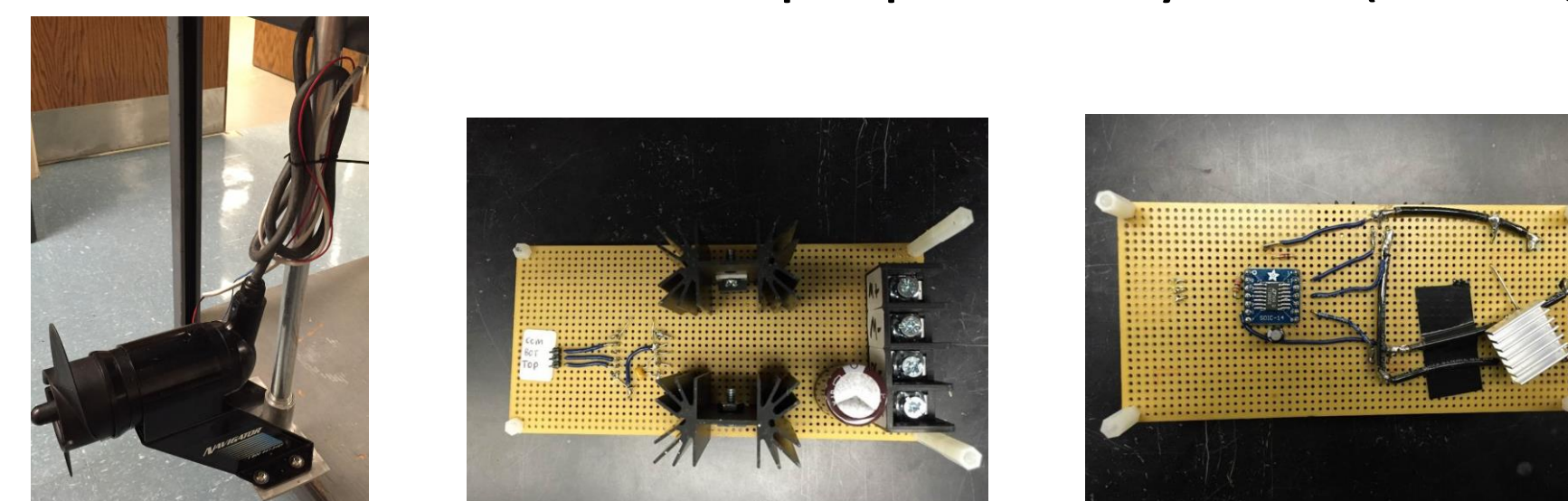
### Rotation System

- Made to emulate larger scale azimuth type thrusters (360 degrees continuous rotation)



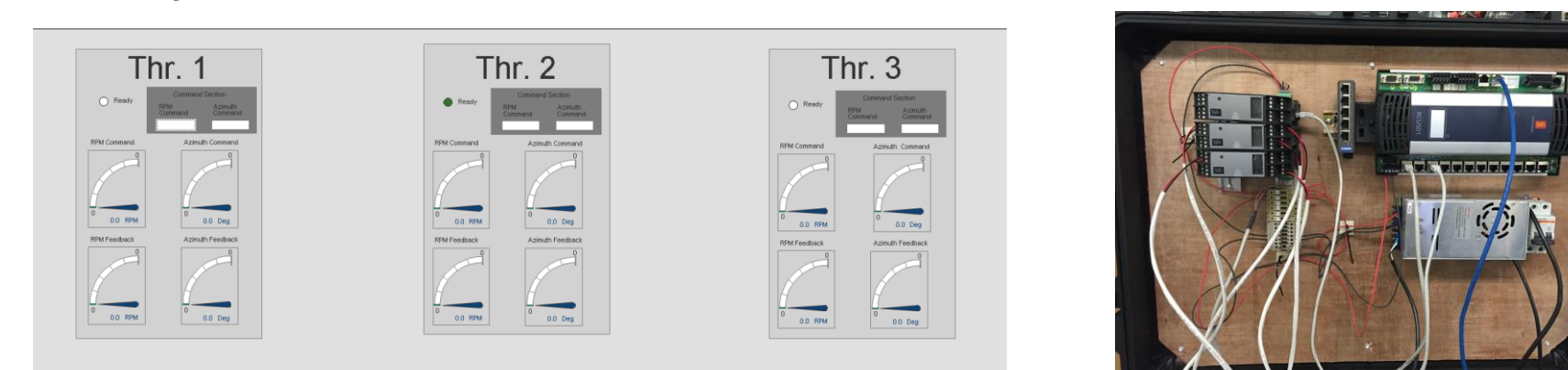
### Motor Controller

- Designed brushed DC motor controller for propulsion system (trolling motor)



### Kongsberg System

- A GUI was created to interface Kongsberg commands and feedback with our system, which are sent to the system on the boat



- Commands are manually entered into the RPM and Azimuth Command windows, and feedback from our system is displayed in the RPM and Azimuth Feedback windows

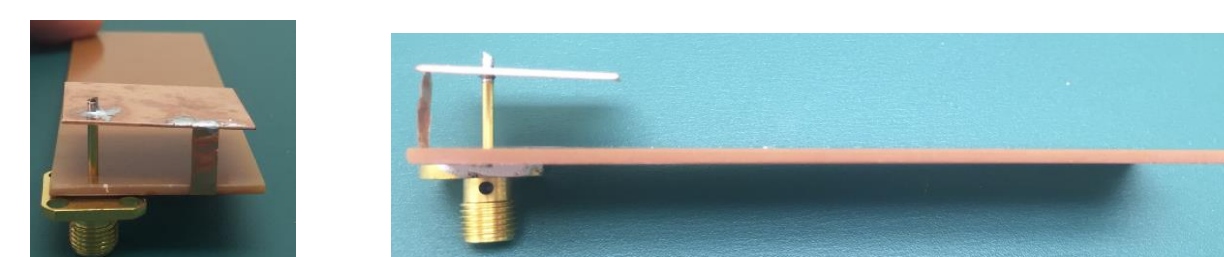
### Wireless Communication

- High gain outdoor router with an external antenna communicates between Kongsberg system and shore
- Designed 2.4GHz clover leaf/PIFA (planar inverted F antenna) antennas

Clover Leaf Antenna



Planar Inverted F Antenna

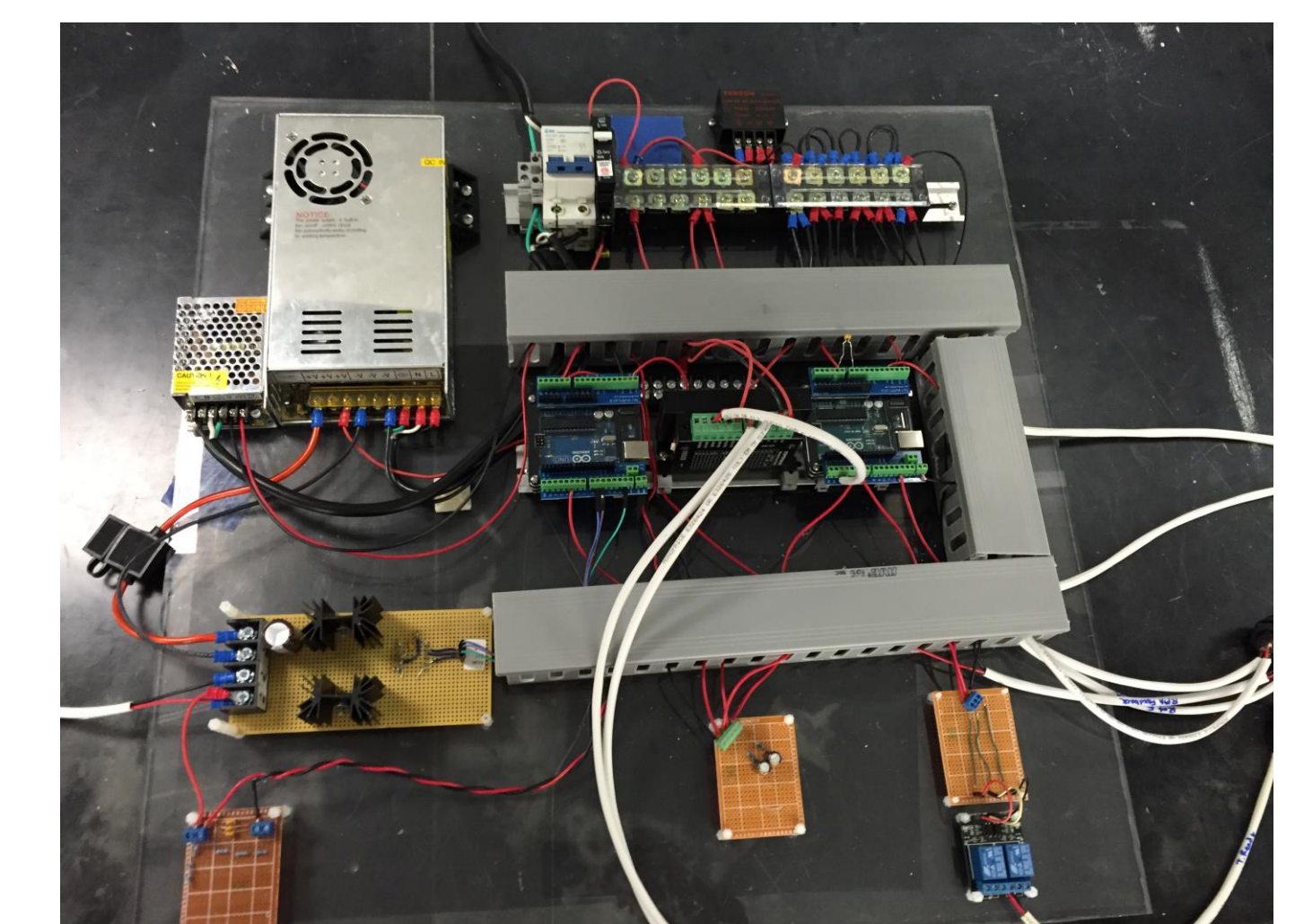


### System Integration

- Able to successfully interface Kongsberg's system with our rotation and propulsion system

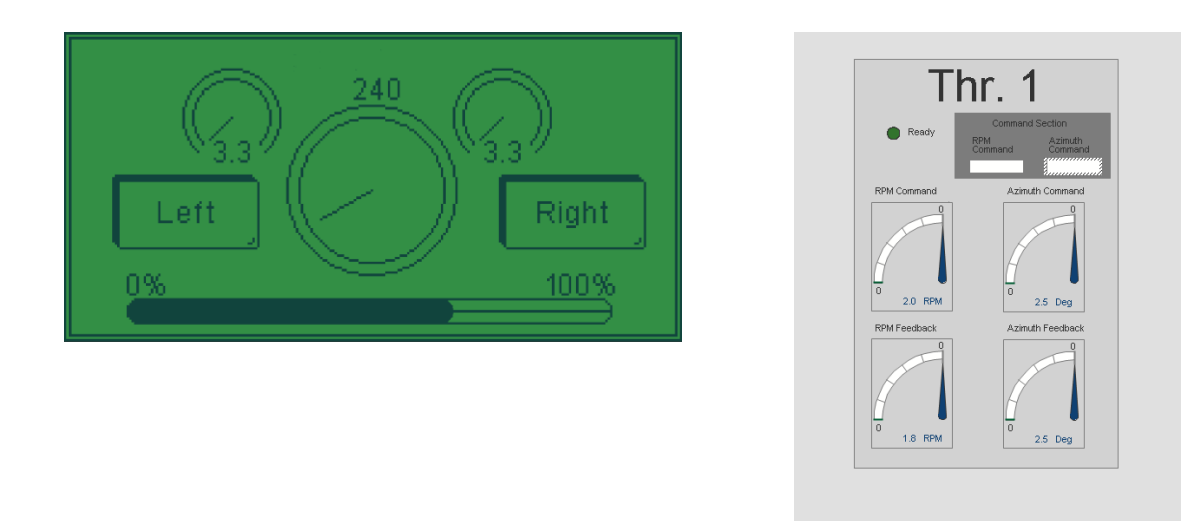
### Rotation/Propulsion Control System

- Power distribution/controller and misc. electronics



### Control Interface

- Manual/Automatic control options



### Conclusion

- Individual subsystems were quite simple to implement
- Majority of time was spent on system integration
- Always plan for fabrication lead time
- It is important to remain flexible when design changes become necessary throughout the design process

### Reference

Dynamic Positioning Image: <http://www.kongsberg.com/>

Sponsors: Kongsberg Maritime, LSU EECS

Advisors: Dr. Luis Alvergue, Nathan Ruth, Vivek Barve, Christopher O'Loughlin