Team: Movin On Engineer: Matthew Gould

What were the outcomes of the prior phase?

1. **What did I plan to do?**

- Come up with preliminary electrical hardware design
- Find an american supplier of choosen hub motor
- Finish IEEE standards grant application
- Continue motor algorithm research
- Figure out wire routing routes and the number of PCBs needed

2. **What did I do?**

- Choose hub motor and determined a method with the assistance of Erik Lydic of purchasing it in a manner that met RIT purchasing guidelines.
- Did PSPICE simulations of force sensor calibration circuitry in order to assess validity of potential circuit design.
- Began familiarizing myself with Eagle PCD design software
- Come up with a preliminary BOM for electrical components
- Began acquiring models and footprints of said electrical components to be used later in actual PCB design.
- Found and read white papers on a method of modifying the standard FOC algorithm to compensate for the non-sinusoidal back EMF of a BLDC motor.
- Determined how to program and debug MCUs and DSC despite of a pre-installed USB bootloader.
- Finished and submitted IEEE standards grant applications
- Determined test procedures to find BLDC motor parameters.
- Discovered that three PCBs each with either a DSC or MCU all connected via CANBUS was the best configuration for the board.

3. **What did I learn? How were plan and reality different?**
   PCB design is going to be as troublesome as I predicted it to be.

Team level goal for next phase

Start integration of the mechanical subsystems with the electrical components. Work to have complete BOM while determining which materials to purchase prior to summer break, taking into account long lead times. Find additional sources of funding or grants. Evaluate the detailed design output in the context of our engineering requirements. Design a functional unibody deck as testbed and then later build a second one that incorporates the folding mechanism to prevent bottlenecks in the workflow. Determine individual responsibilities for MSD II and any summer work that should be preformed.

What do I plan on doing to ensure that my team has a successful review at the end of the next phase?

1. Continue to collaborate with Kristen and come up with a completed electrical hardware design (60 hrs)
2. Assist other teammates in determining necessary wire routing(5 hrs).
3. Complete Electrical BOM (10 hrs)
4. Assemble the documentation needed to program the DSC/MCUs (2hrs)
5. Continue motor control algorithm research (10 hrs)
6. Develop a formula for relating force sensor output to acceleration and deceleration commands and adjusting for IMU output (15 hrs)
7. Research Mellow board to determine if dynamic breaking is feasible. (10 hrs)