Power Electronics Testbed of eVTOL Vehicles

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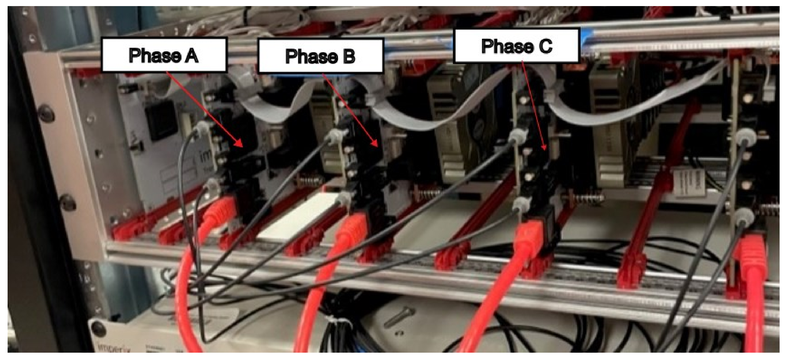
Background

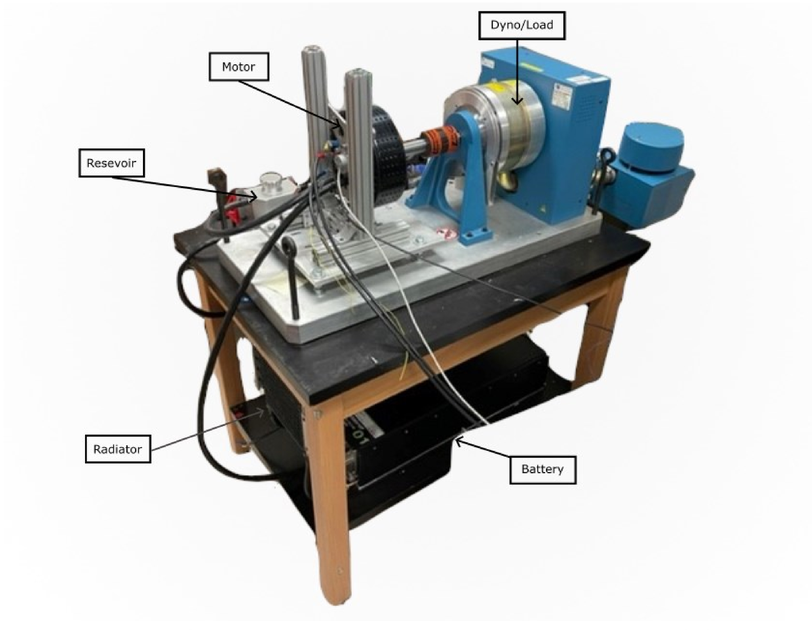
- Electric vertical takeoff and landing (eVTOL) aircraft have the potential to revolutionize air travel. eVTOL aircraft can takeoff and land in tight spaces allowing for use without a runway.
- eVTOL aircraft benefit from maintenance cost and more robust powertrains.
- The energy density of batteries creates concerns about weight constraints. This necessitates higher efficiency to achieve similar performance to fueled aircraft.
- The goal of the eVTOL power electronics testbench at USC is to enable the cost-effective co-design of power electronics and energy storage systems.



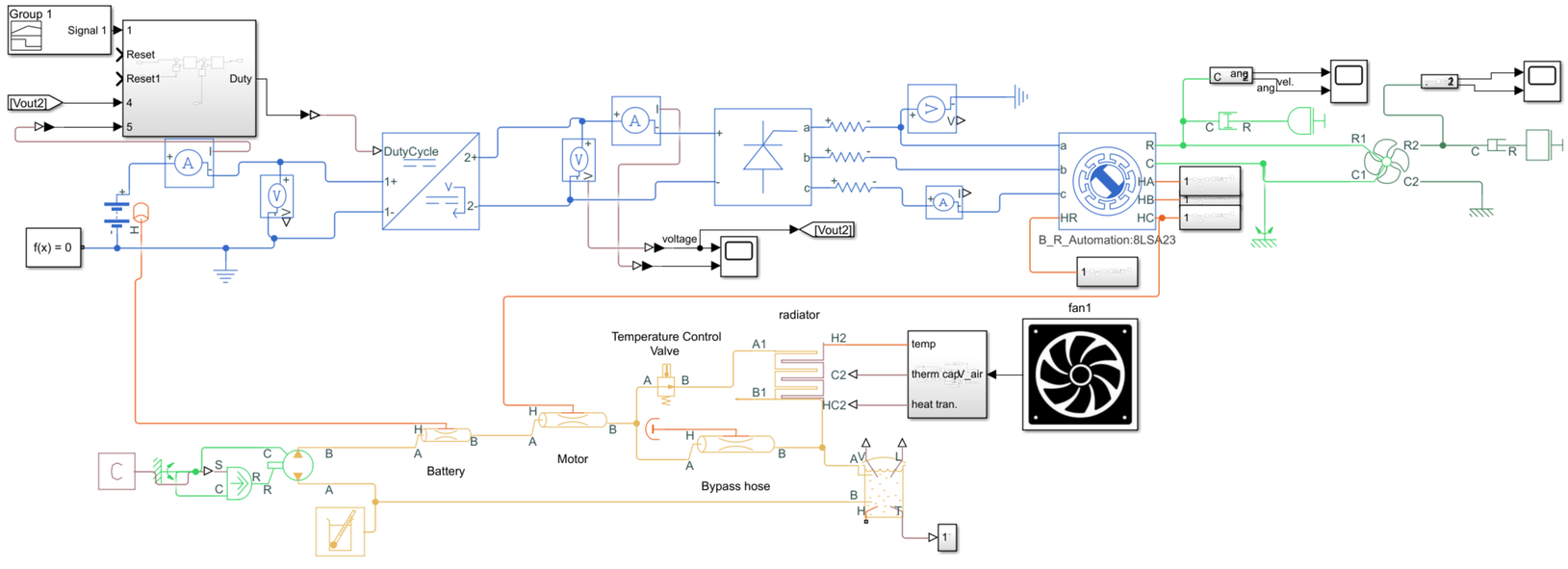
Fully controllable power modules connected to the bed.

Objectives

- Create a Test Bench to model the performance of an eVTOL with the expected load profile
- Use the physical hardware to create a digital twin that accurately models the physical hardware in real-time.
- Test the performance advantages of liquid cooling for the motor, power electronics, and energy storage systems.
- Safety testing the reliability of the motor and battery of an eVTOL aircraft.
- Test capability and efficiency of load sharing with two batteries.



The eVTOL power electronics testbed at the USC.



Simulink thermal model of an electrical airplane

https://github.com/ARTS-Laboratory/Multi-physics-modeling-of-electric-light-aircraft-powertrain

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