Master of Engineering Multidisciplinary Project Listing

Deadline: July 30, 2021

1.
Project ID: ARL-MLS1
Supervisor: Professor Kamran Behdinan (MIE)
Disciplines Required: ECE (1), ME (1)
Start Date: Sept. 7, 2021
NDA: no
Project Title: Design and development of a coaxial drone propeller test rig

Project Description:

The use of autonomous drones has become increasingly popular as a method to transport items short distances. However, the area of drone propeller design is still lacking, and a method to optimize them is required. One way to accomplish this is Multidisciplinary Design Optimization. This allows the automatic generation of unique propeller designs given certain constraints. Due to these unique designs, it is important to test them and compare to theoretical and simulated performances. With the availability of modern 3D printers, it is now possible to produce prototypes quickly and cheaply. The objective of this project is to design a test bench and appropriate software to measure aerodynamic performance parameters such as torque and thrust of these prototypes.

2.
Project ID: EM&AM
Supervisor: Professor Yu Zou (MSE)
Disciplines Required: ECE (1), ME (1), MSE (1)
Start Date: Sept. 7, 2021
NDA: yes
Project Title: Building an autonomous hybrid metal additive manufacturing system

At the current stage, we're designing a hybrid vertical milling + directed energy deposition (DED) Metal Additive Manufacturing (M-AM) system. A hybrid M-AM system is advantageous in that it makes and postprocesses parts within one integrated process, and that it postprocesses areas that may not be accessible after the prints are finished. We are building the machine from scratch with the subsystems, i.e., laser source, deposition head, powder feeder, CNC vertical mill, etc, for the flexibility and openness of an in-house built machine. The students will work in team with other students to integrate the subsystems of the machine. The students will focus on the mechanical and electrical integration to make sure all components and the control system coordinate properly.

Deliverables:
- Functioning hybrid M-AM hardware system
- Design documentations
- Control programs, codes