MARK WAGNER PORTFOLIO

Undergraduate Research

As an undergraduate researcher in the Non-Traditional Manufacturing Laboratory, supervised by Dr. Hitomi Greenslet, I was the lead researcher studying the interior polishing of an additively manufactured workpiece with complex geometry. This project required a new polishing machine to be built, which I was responsible for. I was responsible for the concept generation, full CAD modeling, and manufacture of this machine. The manufacturing phase of the project was completed in under 7 weeks, with a total of 28 parts machined, including some parts made on the CNC. I also completed the motor control system of the machine, which is run on a Raspberry Pi using Python. This script runs two motors simultaneously and allowed me to use some of my knowledge from my computer science minor to achieve the desired motor behaviors. Due to the source of the workpiece requesting confidentiality, I am unable to share pictures of my machine, but can detail the work I have completed.

2021 AIAA Team Aircraft Design

During the Aerospace Design 2 course, my team and I have been completing the design of an austere field light attack aircraft, which we have named the UF-7 Sabretooth. The project was adopted from the 2021 AIAA undergraduate design competition, allowing my team to submit this design proposal for consideration in the competition at the completion of the project. This design project involves a 100-page report detailing the aircraft design, propulsion systems, crew station, airframe structure, stability and control of the aircraft, performance analysis and other aspects of the plane. This project is now complete, and the final report can be seen here. The final render of the CAD model for the aircraft is shown below.

Figure 1: UF-7 Sabretooth Render

Bolt-Action Pen

As a teaching assistant in the Design and Manufacturing lab at the University of Florida, I was able to learn many advanced manufacturing techniques that students are not shown. These techniques include CNC machining, boring, advanced metrology, and thread cutting on the lathe. To practice some of these techniques, and to grow my own skill, I decided to design and manufacture a bolt action pen. This pen was modeled in Solidworks and manufactured with engineering drawings for each of the associated parts. The CAD model and actual part are shown below.

Figure 2: Bolt-Action Pen Assembly

Figure 3: Bolt-Action Pen components

Figure 4: Bolt-Action Pen Render

Design and Manufacturing Lab Robot

I took the Design and Manufacturing Lab course in the summer of 2019 before I became a teaching assistant for the lab. During this course, students are given a design project and must generate concepts that can complete the project. For the summer 2019 semester, the project was to design a robot that could collect at least 5 tennis balls from various locations and heights in an arena and return them to a goal. This course first had students create engineering drawings by hand, then compare the designs and evaluate them in a group of four students, determining quantitatively which design components are the best using evaluation matrices and prototype testing. The chosen concepts were assembled in a complete CAD model with accompanying engineering drawings, with proper tolerances and made with design for manufacturability in mind. The robot my team and I created for this course successfully completed the project and my work in the class allowed me to later become a Teaching Assistant for the class. The CAD model and actual pictures of the robot are shown below.

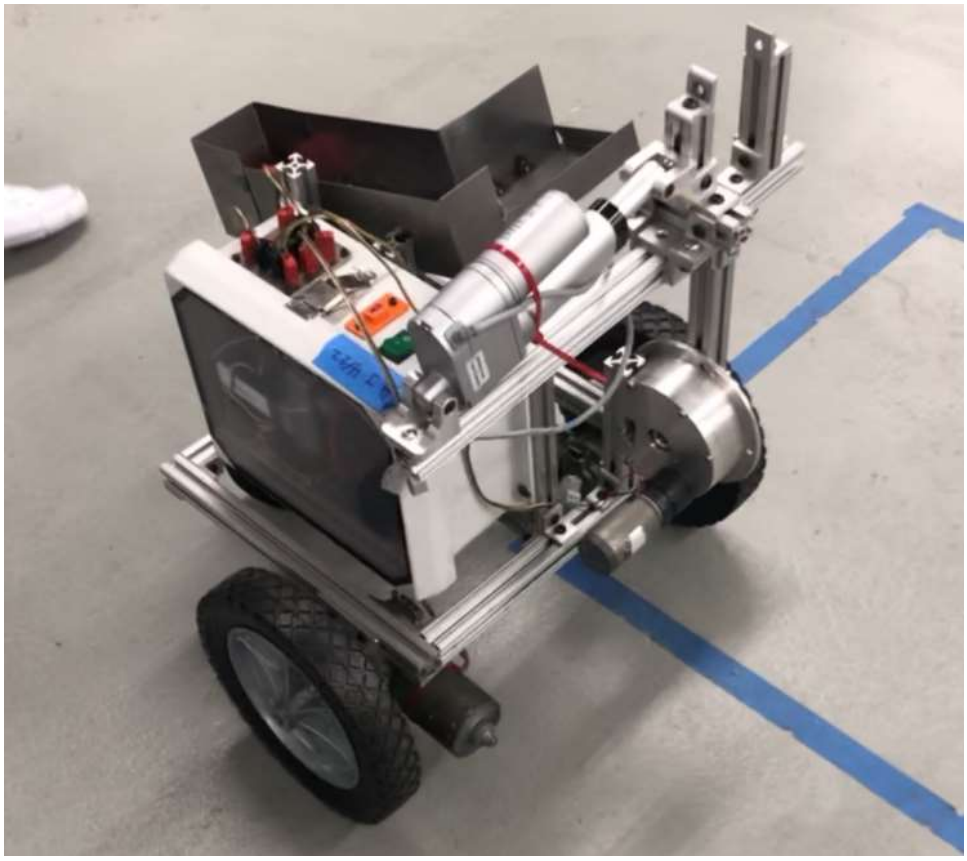

Figure 5: Design and Manufacturing Lab robot

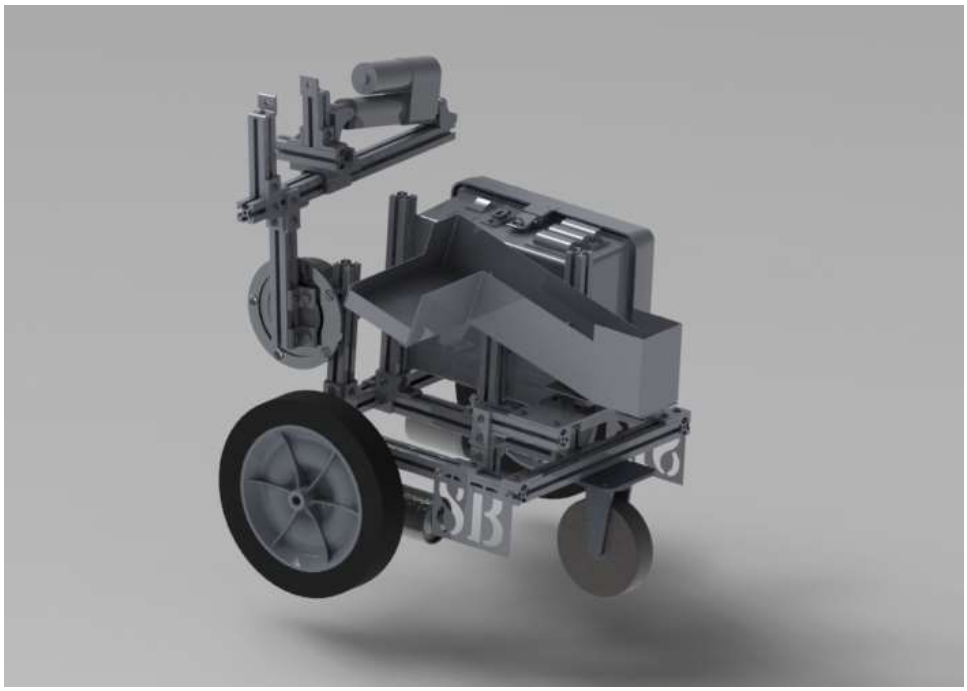

Figure 6: Design and Manufacturing Lab robot render