THE UNIVERSITY OF TENNESSEE KNOXVILLE

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About Me

I am an aerospace engineering student at the University of Tennessee with a passion for hands-on problem-solving and innovative projects. I leverage technical skills, problem-solving abilities, and a strong work ethic to deliver quality results within any organization.

I have contributed to numerous positions, utilizing my technical skills in design engineering, stress analysis, and advanced manufacturing processes. This portfolio aims to supplement my resume by presenting more information on previous work experiences, extracurriculars, and academic projects. In the following pages, you can learn more about each work experience and how they have equipped me with skills and prepared me for the space and defense industries.

Outside of academic and work responsibilities, I pursue my interests in the outdoors, taking on DIY projects, and participating in any sports activity (big fan of backpacking at the moment).



Skills

Applications: SolidWorks/EPDM, PTC Creo/Windchill, Fusion 360, AutoCAD, Simcenter FEMAP, Microsoft Office Suite (Certified), ANSYS Discovery

Composites: Vacuum Assisted Resin Transfer Molding (VARTM), Compression Molding, Destructive/Non-Destructive Testing, C/C, Strength Testing

Manufacturing: CNC Milling, Manual Mill, Manual Lathe, 3D Printing, ASME Y14.5 GD&T

Programming: C, C++, MATLAB, LaTeX, Arduino

Relevant Coursework

- ME 463: Vibrations
- ME 466: Machine Design II
- AE 422: Aerodynamics
- AE 424: Astronautics
- AE 425: Propulsion
- ME 344: Heat Transfer
- ME 366: Computer Aided Engineering and Manufacturing

Work Experience

Lockheed Martin

Senior Design Project Member

Honors Interdisciplinary Senior Design

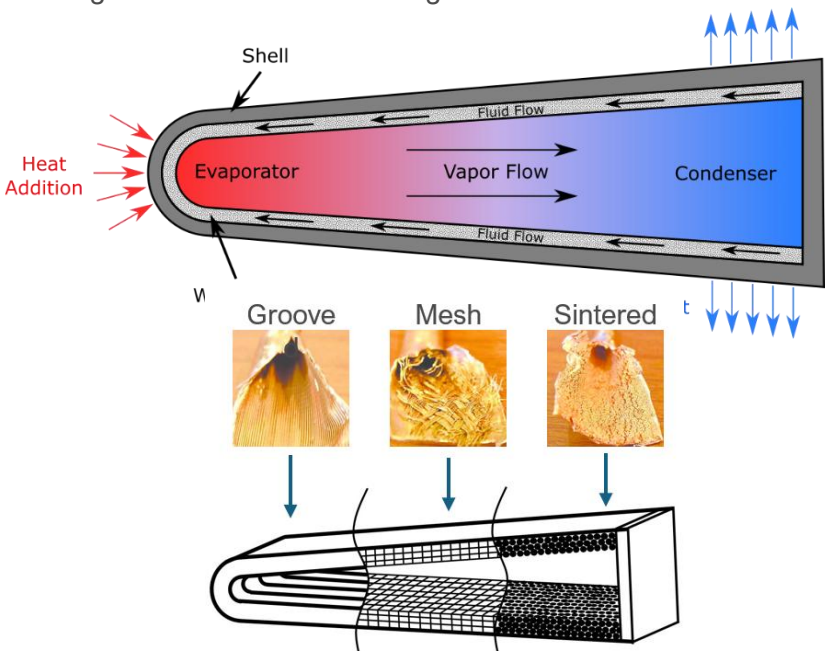
Through a unique collaboration with Lockheed Martin, there is a senior design project within the University of Tennessee's Interdisciplinary Senior Design (ISD) program. This partnership enables engineering and business students to collaboratively design, build, and test real-world hypersonic systems, fostering practical experience and teamwork skills. The project emphasizes systems engineering principles and includes comprehensive business reports, preparing students for the demands of the aerospace industry.

Novel 3D Printed Heat Pipe for Hypersonic Applications

- Designed a passive cooling heat pipe TPS for high-speed thermal mitigation.
- Conducted make/buy analyses to assess producibility and 3D print feasibility.
- Integrated a heat pipe into a wedge shape for hypersonic vehicle leading edges.
- Performed CFD analysis in ANSYS Fluent to optimize heat transfer and fluid flow.

Current Progress and Prototype

- Additively manufactured of 316L stainless steel using selective laser sintering.
- Sealed water as working fluid, transferring heat through evaporation and capillary action.
- Grooved wicking structure for initial testing and validation.



Leidos-Dynetics (Land Systems)

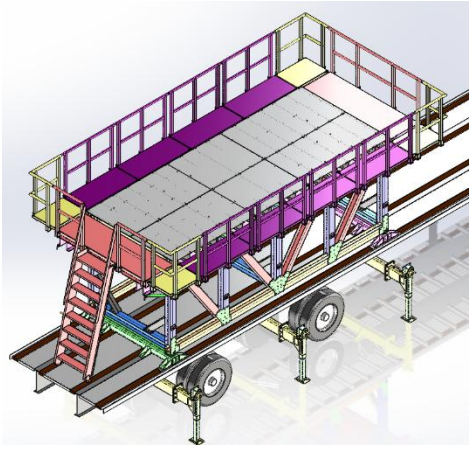
Design and Analysis Engineering Intern

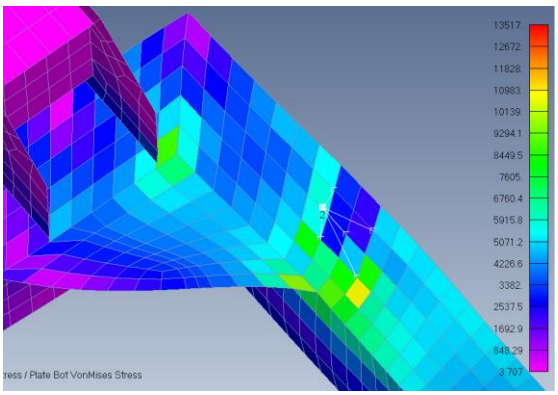
Company Overview

Dynetics is a leading provider of advanced, mission-critical services and solutions to the U.S. Government. Our portfolio of innovative capabilities spans across many segments, including hypersonics, force protection, space and other advanced solutions. We provide an unmatched combination of speed, value and security.

Radar Operations Facility (ROF)

- Designed deployable platforms for Sentinel A3/A4 Radar access on a truss-mounted flatbed trailer.
- Created a folding design with clevises, hinges, and supports for highway transportability.
- Conducted FEMAP and SolidWorks stress simulations to ensure strength and design integrity.
- Produced detailed assembly and parts drawings for streamlined procurement and assembly.





University of Tennessee Composites Research

Undergraduate Research Assistant - Hypersonics

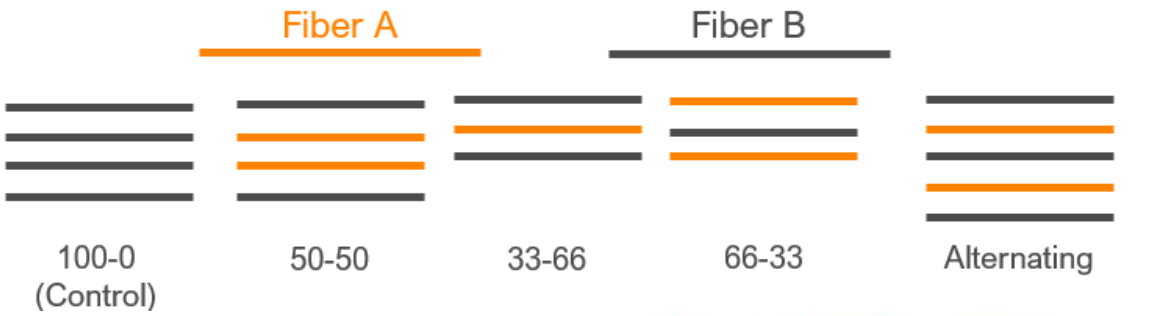
Fibers and Composites Manufacturing Facility

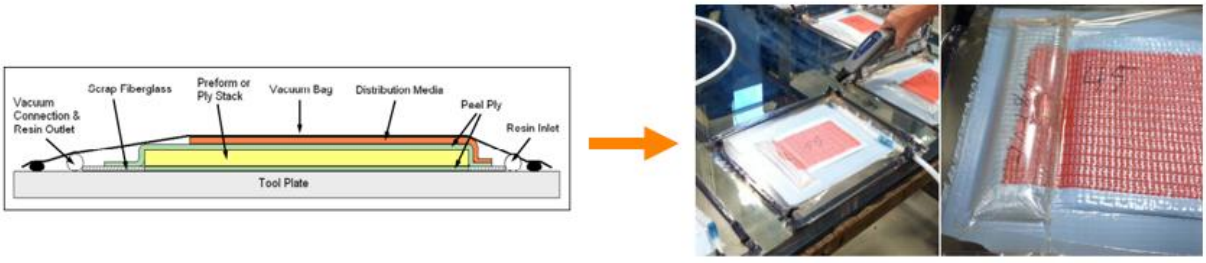
The Fibers and Composites Manufacturing Facility (FCMF) at the University of Tennessee, Knoxville, focuses on comprehensive research and development to prototyping of advanced fiber reinforced plastics and composites.

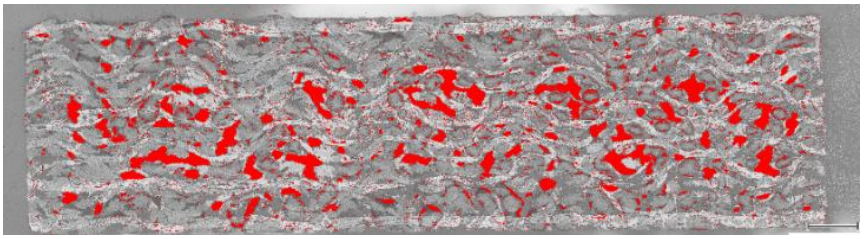
- Contributed to manufacturing and characterizing composite panels for hypersonic vehicles.
- Executed Vacuum-Assisted Resin Transfer Molding, compression molding, and hand layup techniques for C/C composites.
- Performed destructive, nondestructive testing and SEM imaging to evaluate Interlaminar Shear Strength (ILSS) and Interlaminar Tensile Strength (ILT).

Hybrid Composite Panels

- Characterized hybrid panels with varying fiber weights, layering orders and configurations.
- Pioneered a Bladder Bag VARTM for uniform resin infusion.







JLG Industries, Inc.

Manufacturing Engineering Intern – Process Optimization

Company Overview

JLG Industries, Inc. (An Oshkosh Corporation Company) is the world's leading designer, manufacturer, and marketer of access equipment such as Telehandlers, Scissor lifts, and Boom lifts, used for hard-to-reach areas safely and effectively.

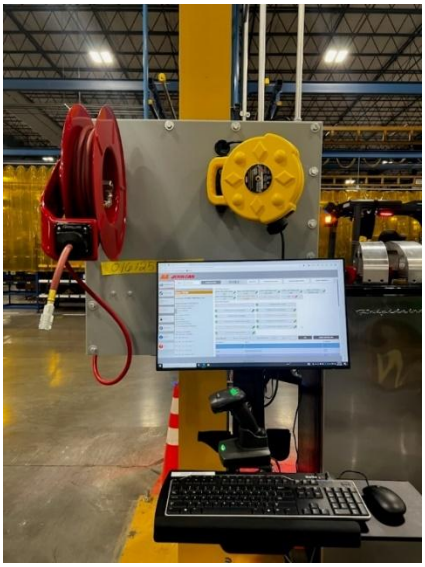
- Planned equipment, machinery, and layout upgrades using Six Sigma methodologies.
- Optimized processes with 3D modeling, enabling a one-unit daily production increase (+92,000/day)

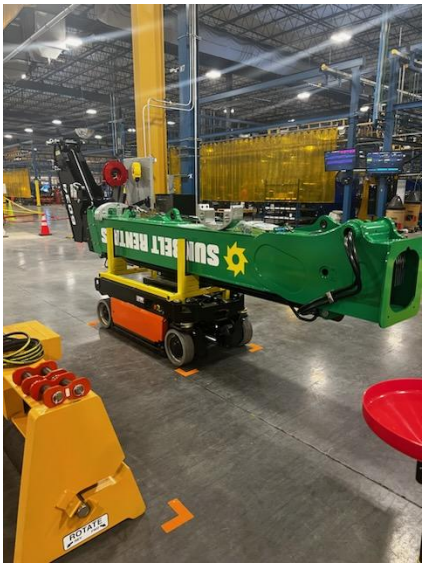
Boom Arm Transportation

- Designed a steel fixture using PTC Creo for boom arm transportation, saving JLG $150,000 annually.
- Retrofitted a scissor-lift base to cut transport route from 700 ft to 60 ft and time from 59.65s to 13.63s.
- Achieved faster, cost-effective results over purchasing specialized trucks and operators.

Assembly Line Utility Boards

- Designed and built multifunctional utility boards with computer stations, air hose reels, and chargers for a new assembly line.





Tennessee Valley Authority

AutoCAD Student Drafter

Company Overview

The Tennessee Valley Authority (TVA), established in 1933, employs engineering and computer-aided drafting (CAD) to design and maintain its power plants and infrastructure, supporting both environmental stewardship and economic development.

- Developed 2D engineering drawings in AutoCAD adhering to necessary specifications and standards.
- Revitalized and digitized drafted files onto a cloud database for modern use of older drawings regarding infrastructure or electrical blueprints

PrecisionX Mobile Detailing

Business Owner/Operator

Company Overview

Website: www.pxdetailing.com

Since launching in September 2020, I have been delivering detailing services to the Knoxville, Tennessee area. Built on a foundation of personal dedication and a commitment to quality, our business focuses on achieving 100% customer satisfaction.

- Delivered premium mobile car detailing services, overseeing finances, legal licensure, and clientele satisfaction.

Leadership Positions

Tau Beta Pi Engineering Honor Society

Industry Chair

- As Industry Chair, I have sought to build professional connections with prominent engineering companies to help the chapter's growth.
- Planned outreach and sponsorship opportunities with industry leaders and academic researchers, working with the University for successful events.

American Institute of Aeronautics and Astronautics

Treasurer

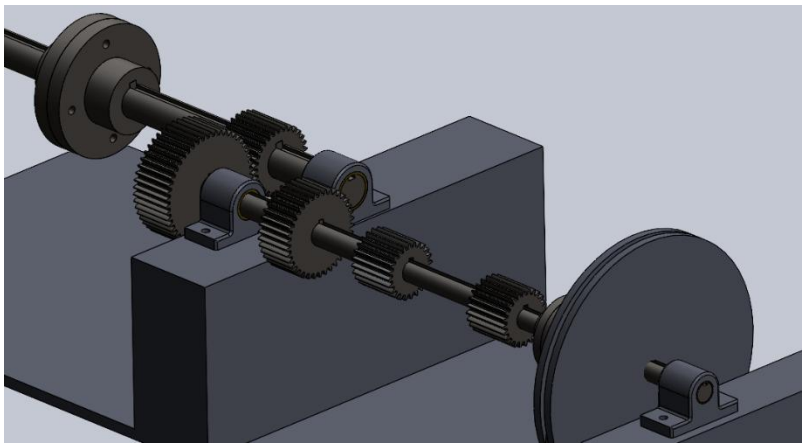
- Managed financial transactions, including dues, sponsorships, and strategic budgeting for future chapter growth.
- Spearheaded planning of an industry trip, coordinating logistics, funding, schedules and networking opportunities.

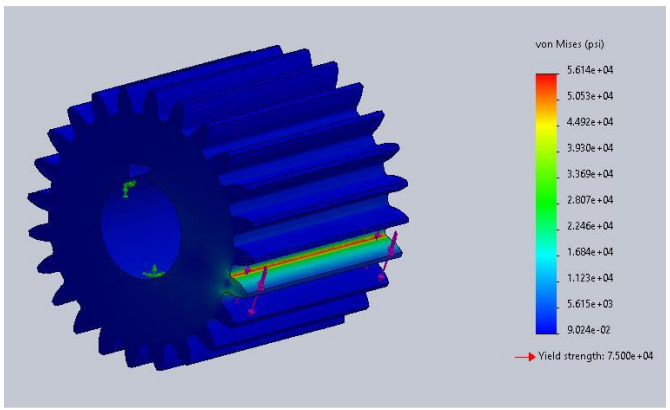
Relevant Projects

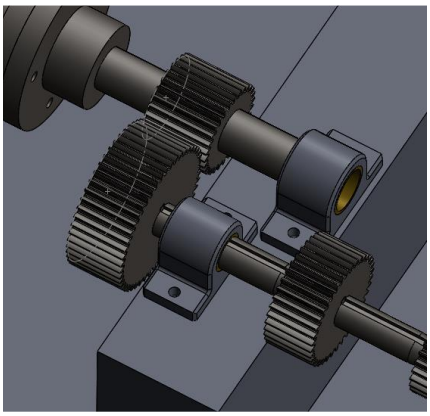
Academic Projects

Spur Gear Assembly Design and Analysis

- Designed and analyzed a spur gear assembly to transfer load from an electric motor to a gear system.
- Calculated torque transmission for various gear combinations and optimized shaft diameters using Excel and MATLAB.
- Created functioning CAD models for the assembly, including gears, keyway slots, couplings, and bearings.
- Performed FEA on components such as shafts, gears, and flange coupling bolts to optimize design.
- Designed key components and selected appropriate materials based on calculations and design requirements.
- A detailed project report is available for further insights.

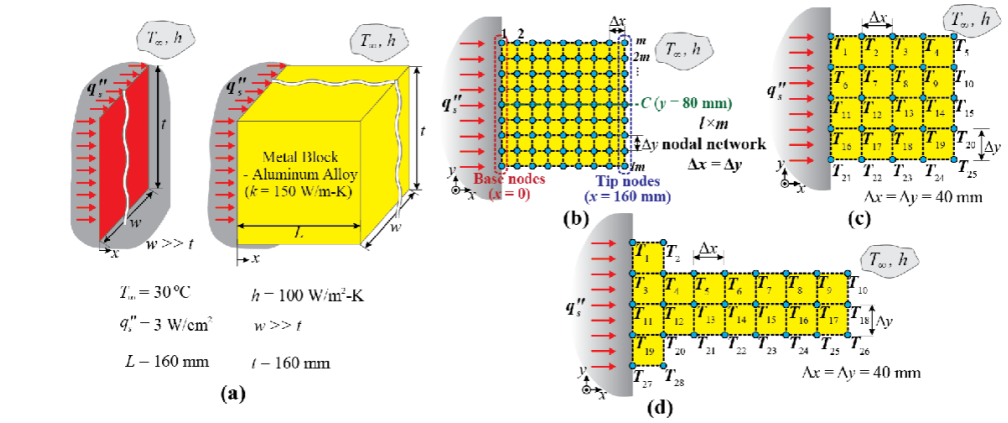


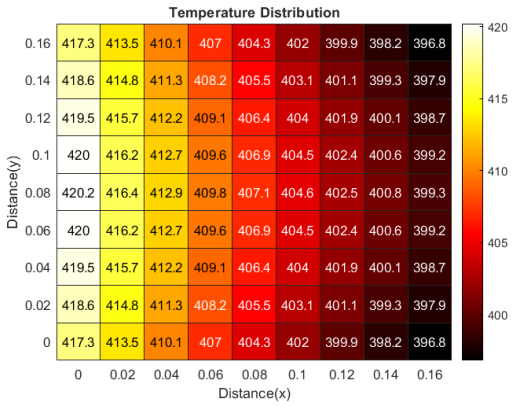


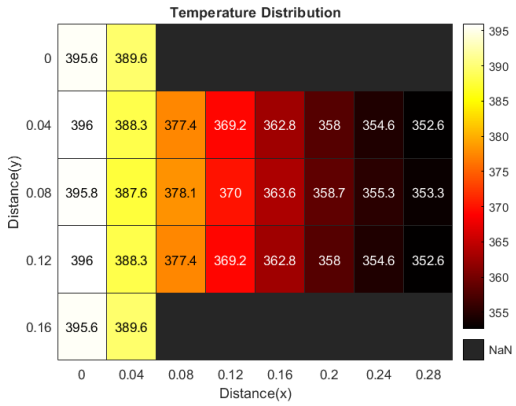


MATLAB Finite-Element Analysis (FEA) for Aluminum Fin

- Developed a MATLAB function to calculate heat dissipation of an aluminum fin using heat transfer principles.
- Applied finite element analysis by deriving energy balance equations for an NxN matrix of nodes.
- Solved temperature matrices using Gauss-Seidel iterative methods and refined results with MATLAB plots.
- A detailed project report is available for further insights.

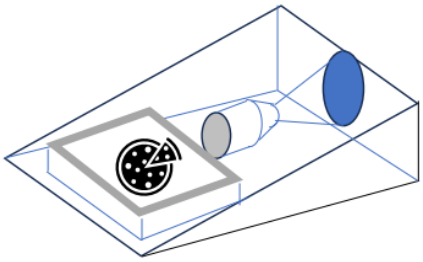




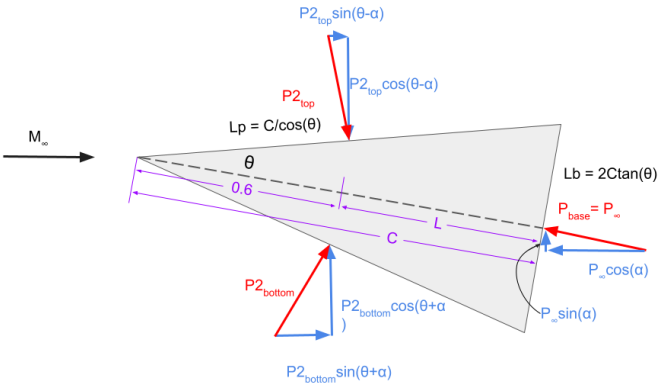


Hypersonic Pizza Delivery Missile (HPM)

- Designed a hypersonic wedge, performing propulsion and aerodynamic analysis for optimal rocket motor performance and flight stability.
- Analyzed steady-level flight at 80 kft for 20 minutes using isentropic relations, shock relations, and Fleigner's Formula.
- Iteratively solved MATLAB equations to account for oblique shock angles, pressures, and new Beta angles due to angle of attack adjustments.
- A detailed project report is available for further insights.

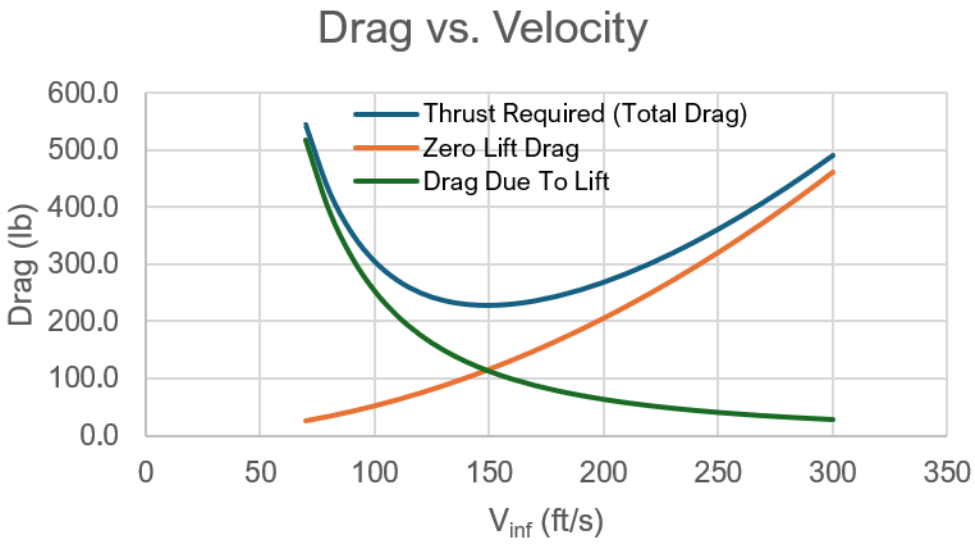


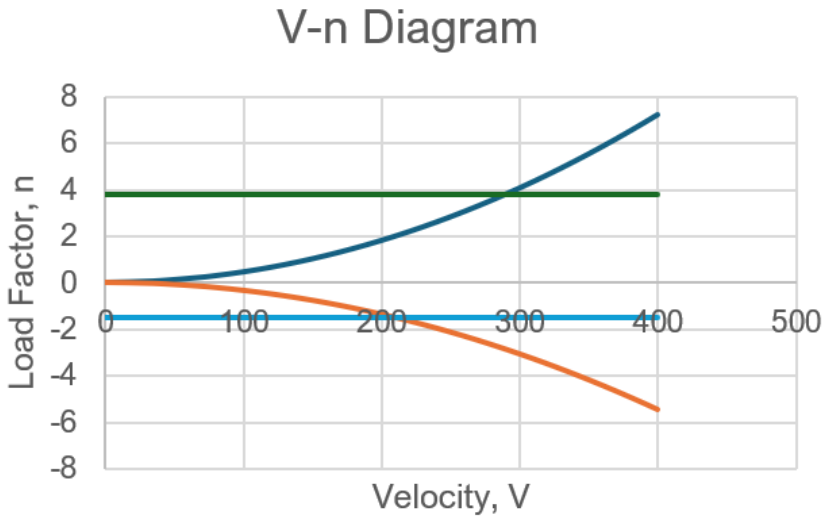
Motor	Mach#	Beta (deg)	P2/P1	Drag/Thrust (N)
A	6.3586	22.211	6.5738	7901
B	5.3343	29.208	7.7386	17068
C	3.9022	38.852	6.8242	21154



Flight Performance Evaluator

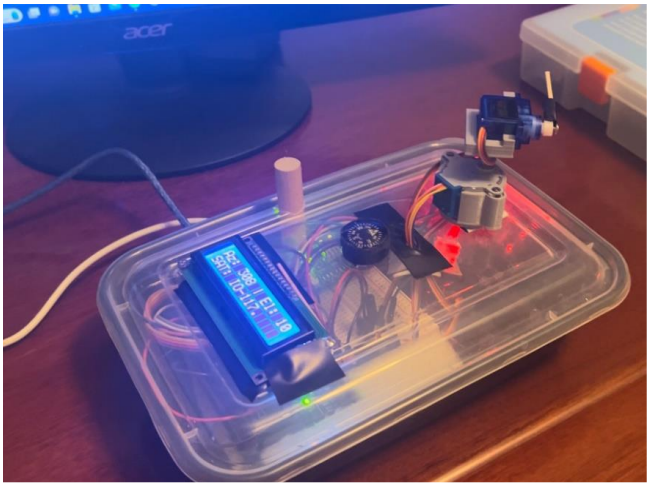
- Developed a flight performance evaluator that calculates key aircraft characteristics from input values like wingspan, weight, and chord lengths.
- The evaluator generates a Drag Polar diagram, V-n diagram, stall speed, and more.
- Useful for comparing aircraft, such as the Adam A500 and Cessna 172.
- Future plan: Convert it into an API to retrieve online aircraft data for calculations.

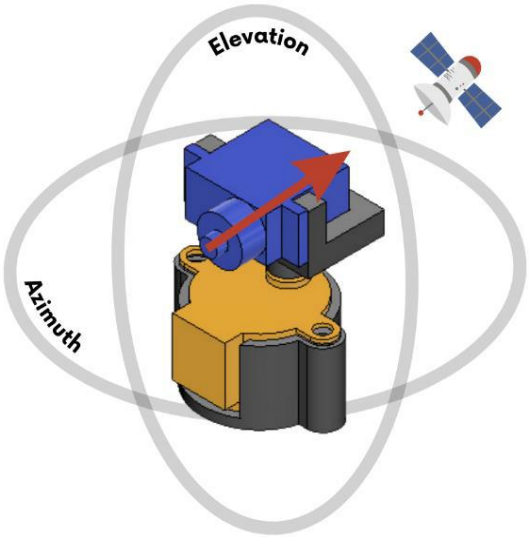


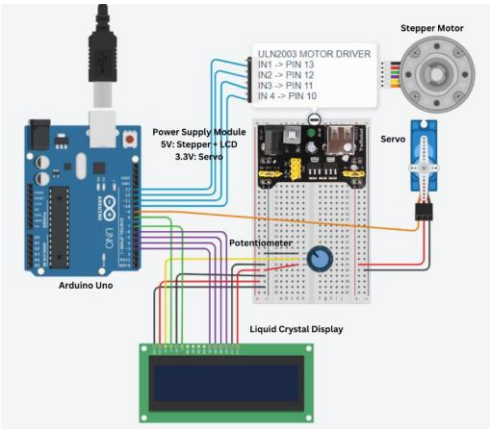


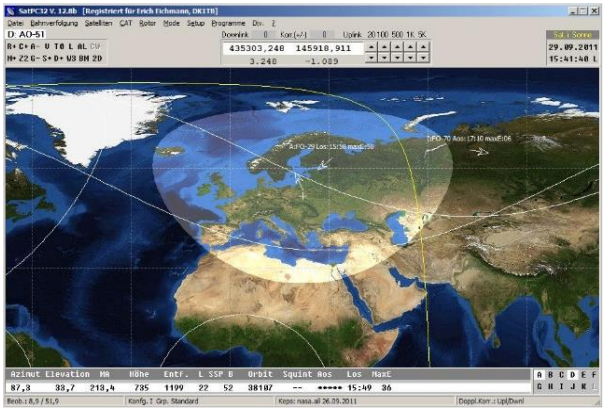
Arduino Satellite Tracker Rotor

- Built an automatic satellite tracker by integrating SatPC32 software with a custom-designed mechanical rotor.
- Used C++ to display elevation/azimuth angles and the tracked object's identity on an LCD screen.
- Displays important information like azimuth, elevation, and the tracked object.
- Future plan: Design a more visually appealing enclosure, currently being created in SolidWorks and 3D printed.



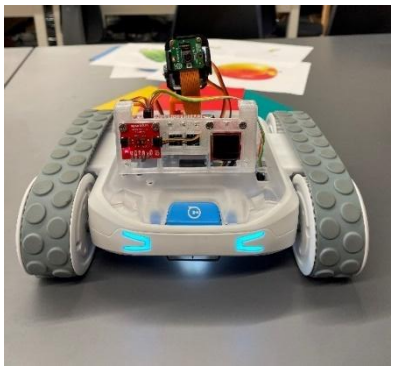


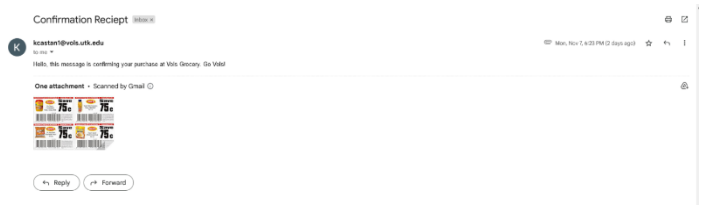


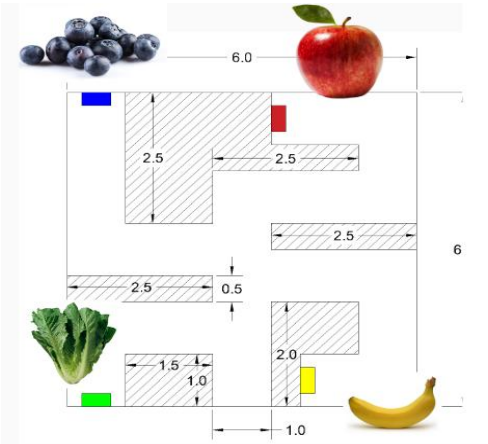


Autonomous Grocery Shopping Rover

- Programmed an autonomous grocery shopping rover using MATLAB and sensor feedback.
- Rover follows a path based on color-coded paper (Yellow for Bananas, Red for Apples, Blue for Blueberries, Green for Lettuce).
- The route is plotted live in MATLAB, and the rover halts if obstacles are detected using an ultrasonic sensor.
- Interactive code includes pop-ups for starting position, speed settings, item purchase confirmation, and journey updates.
- After the shopping trip, the rover sends a purchase confirmation email with coupons to the user.







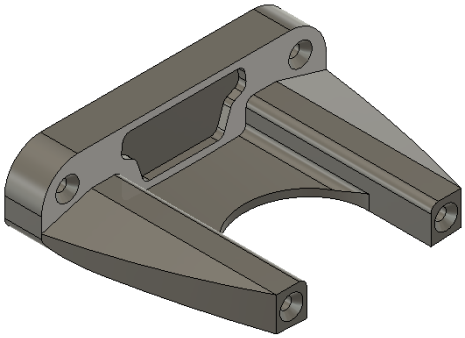
Arduino Interactive Torchbearer

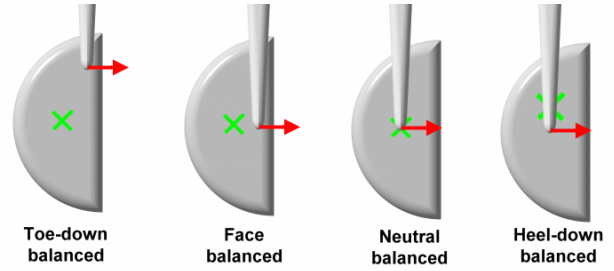
- Designed an LED light display to represent UTK culture by recreating the UTK Torchbearer Statue.
- Created a mini-figure statue in Fusion360 with a cavity to store a servo motor that raises and lowers the arm.
- Used a flex sensor on the shoulder to detect arm position by measuring resistance changes.
- Based on the resistance, the Arduino code triggers LED lights to light up in a sequence.

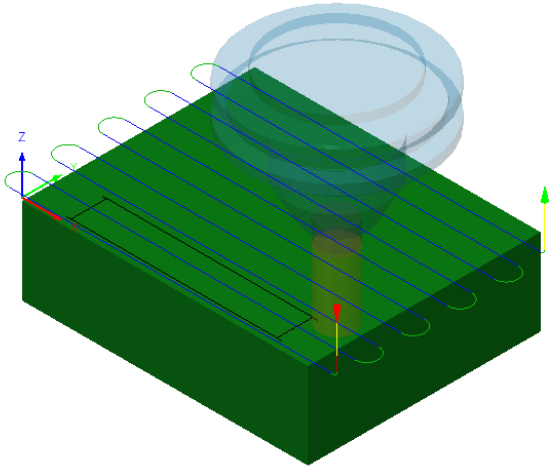
Personal Projects

Custom Golf Putter

- Designed a custom golf putter in Fusion360 for personal use and as gifts for my groomsmen.
- Machined the putter from aluminum using CNC, with four holes for sand or weights to create a heavier clubhead.
- Positioned lead weights and sand to maximize the moment of inertia, ensuring a stable, level putt.
- Ordered stainless steel hardware, shaft, and grip to complete the assembly after machining.



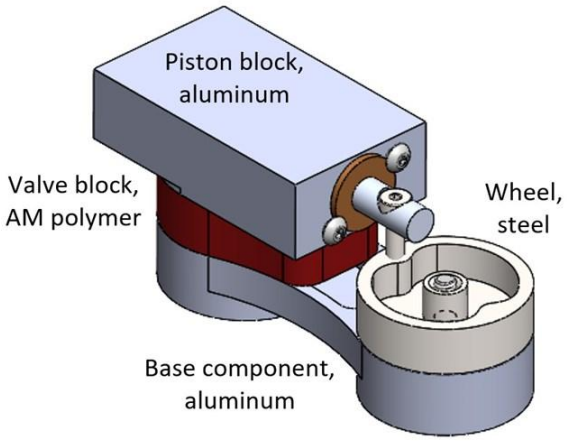




ACE CNC Machining Bootcamp

America's Cutting Edge (ACE) is a national initiative to restore the prominence of the U.S. machine tools sector. Through ACE, you can receive free online training and also qualify for hands-on, in-person training that can put you on a path to a career (or advancement) in the machine tool industry.

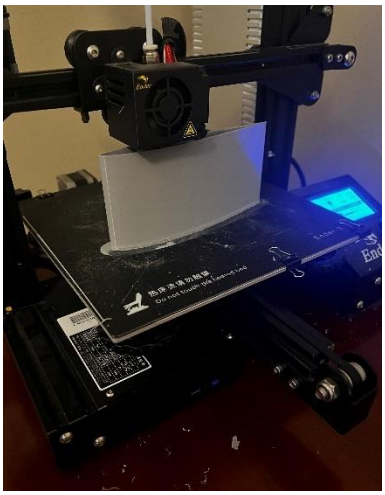
- Attended the ACE CNC Machining Bootcamp in April 2023 to enhance machining skills for engineering.
- Completed a 6-hour online training on Fusion360's Manufacturing extension and mechanisms.
- Participated in a 14-hour in-person training where we machined an air-driven piston engine from ABS, aluminum, and stainless steel.

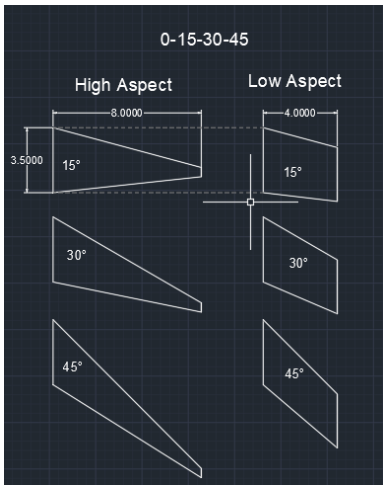


AIAA Wind Tunnel Research

“With the ever-changing state of the aviation industry, continuous research is required to optimize flight performance, whether it is concerning UAVs or commercial aircraft. This paper outlines research efforts regarding varying wing geometries to achieve a better understanding of their effects on flight performance. Utilizing 3-D printing techniques, high and low aspect ratio wings with varying sweep angles were developed with a NACA 2412 airfoil shape. However, to validate this manufacturing process and its testing feasibility, experimental data was generated with our manufactured airfoil and compared to accepted NACA 2412 data. After this validation experiment, the wings were placed into a blowdown wind tunnel and tested at multiple angles of attack to measure the resulting lift coefficients on various geometries. Comparing lift coefficients of varying wing geometries helps determine the ideal design of low or high-aspect-ratio wings to fit specific aircraft flight conditions and their purposes. This research provide-s insight into aircraft design and the efforts made towards advancing the future of flight.”

- As an active member of AIAA, I'm collaborating on research for the 2025 Region II Student Conference.
- Our study focuses on flight characteristics of 3D printed wing geometries, testing various high and low aspect ratio wings with different sweep angles.
- The goal is to validate the accuracy of 3D printed wings in wind tunnel research compared to NACA data.

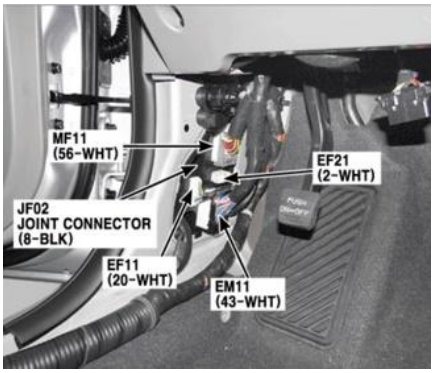


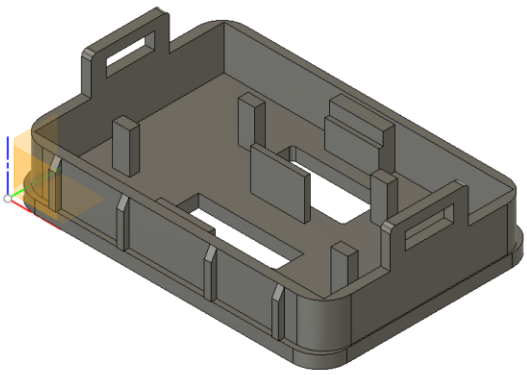


Car Stereo Installation

- Retrofitted a stereo head unit and backup camera for my car, focusing on three components: microphone integration, backup camera power, and 3D printed USB housing.
- Spliced a 3.5mm audio jack into the microphone wiring and tested pins to power the backup camera using T-tap connectors.
- Designed a 3D printed housing for USB and HDMI inputs to create a seamless dash look, replacing the original piece.

Pin No	Connector A	Connector B
1	Rear left speaker (+)	-
2	Front left speaker (+)	-
3	Front right speaker (+)	-
4	Rear right speaker (+)	Steering wheel remote
5	-	-
6	-	USB D (+)
7	IGN	USB/iPod VDD
8	Illumination (+)	AUX R IN
9	Detent	AUX GND
10	Rear left speaker (-)	Mic(+) (Blue tooth)
11	Front left speaker (-)	ACC
12	Front right speaker (-)	B+
13	Rear right speaker (-)	-
14	-	-
15	-	-
16	-	Speed
17	Illumination (-)	Remote GND
18	Remote anntena	USB D (-)
19		USB/iPod GND
20		AUX DETECT
21		AUX L IN
22		Mic(-) (Blue tooth)
23		-
24		Power GND





1996 Dodge Ram 1500 Restoration

- Working on restoring a 1996 Dodge Ram 1500 Base 8 Cylinder 5.2L to reliable condition.
- Troubleshot no-start issue to a chewed transmission wire after testing battery, relays, fuses, and starter.
- Replaced the alternator after diagnosing charging issues.
- Tuned up the ignition system, replacing spark plugs, wiring, ignition coil, distributor cap, and rotor.
- Replaced the oil filter, oil, and PCV valve.
- Currently diagnosing a vacuum leak causing engine stalling.