

Alexandra Vaughn

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EDUCATION

Ph.D. in Mechanical Engineering, The University of Texas at Austin

Aug 2025 – Present

Bachelor of Science in Mechanical Engineering, The University of Texas at Austin

Aug 2021 – May 2025

GPA 3.89/4.0; College Scholar (2023, 2024, 2025)

RESEARCH EXPERIENCE

Amorphous Carbon Tribofilm Formation on Pt-Au Alloys || Undergraduate Research Assistant

Aug 2024 – May 2025

Supervisor: Dr. Filippo Mangolini – Dept. of Mechanical Engineering, UT Austin

- Investigated the in-situ formation of amorphous carbon tribofilms as protective, solid-state lubricants for high-performance micro- and nano-scale electrical contacts (e.g., in NEMS/MEMS)
- Conducted experiments to form carbonaceous films via tribometer and calculated the steady-state coefficient of friction for each film to determine how frictional behavior changes under different mechanical cycling conditions
- Quantified film yield via optical profilometer; characterized film morphology (SEM) and elemental composition (EDS)

NASA's Gateways to Blue Skies Competition || Energy Systems Analyst & National Finalist (Top 8 Teams)

Oct 2021 – June 2022

Supervisor: Dr. Lina Sela – Dept. of Civil, Architecture, and Environmental Engineering, UT Austin

- Investigated zero-carbon emission energy solutions and their economic feasibility for the design of sustainable airport infrastructure capable of supporting the 2050s aviation landscape
- Developed a novel airport energy framework projected to reduce climate impact by 50-75% with H₂(l) projected to be \$4 to \$17 per kg and matching existing fuels costs
- Co-authored proposal that secured a national finalist position and presented findings at NASA's Langley Research Center

PROFESSIONAL EXPERIENCE

Kinder Morgan BOLT Internship Program || SACROC Surveillance Team – Reservoir Engineering Intern

June 2024 – Aug 2024

- Identified factors influencing success or failure of CO₂ enhanced oil recovery operations and provided recommendations for optimization including targeting certain rock intervals and project areas
- Designed an Excel database and Spotfire tool to visualize data sample containing over 100 projects across a 5-year period
- Validated economic benefits, demonstrating production doubled and development costs halved from \$12/BBL to \$6/BBL

LEADERSHIP & PROJECT EXPERIENCE

Texas Guadalupe || Engineering Advisor, Lead Infrastructure Engineer

Sept 2022 – May 2025

- Supervised a 10-person team in designing and manufacturing a hyperloop pod test track featuring adjustable geometries enabling active guidance and lane-switching mechanics, securing participation in European Hyperloop Week competition
- Designed mechanical systems with SolidWorks, conducted structural FEAs, and used machine shop for fabrication/assembly
- Achieved a 50% reduction in stress concentration & material deformation, reducing manufacturing costs from \$10k to \$3k

Senior Design Project: Biomedical Albumin Monitoring Device || Team Member

Jan 2025 – May 2025

- Collaborated within a 5-person team to develop an intermittent albumin monitoring device w/ automated bedside testing
- Designed, built, and validated hardware/software for photodiode-LED optical system & stepper motor, successfully demonstrating the device's proof-of-concept in detecting albumin-related colorimetric changes

ASCE Concrete Canoe Competition || Composite Materials Engineer

September 2021 – April 2022

- Designed canoe mold (AutoCAD & Fusion 360) and CNC toolpaths; constructed L- & U-Boxes for concrete analysis
- Evaluated various concrete mixtures and modified material composition to achieve a hydrodynamic design

SKILLS

Lab & Analytical Equipment: SEM/EDS, Optical Profilometer, Tribometer

Machining & Fabrication: CNC Mill, Manual Mill, Lathe, 3D Printing, Laser Cutting

Software: SolidWorks (CAD & Simulation), Fusion 360 (CAD & CAM), MATLAB, Python, Spotfire

Languages: Fluent in English and Romanian

HONORS & AWARDS

2025 Virginia and Ernest Cockrell, Jr. Fellowship in Engineering

2024 Ken and Carol Elliott Endowed Scholarship in Engineering

2023 Byron E. Short Endowed Presidential Scholarship in Mechanical Engineering