# Allison Ann Richards

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## Education

**Mechanical Engineering BS**, University of Utah GPA: 3.9 Graduating December 2025

- Member of Tau Beta Pi Engineering Honor's Society
- Dean's List Fall 2021- Present
- Daniel's Scholarship Program
- DAAD Scholar

## Technical Skills

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|---|---|---|---|
| Matlab | Python | Dream3D | Ansys |
| Paraview | Visio | SolidWorks (CSWA Certified) | Dragonfly |

## Experience

**University of Utah Multiscale Mechanics & Materials Laboratory** **August 2022 - Present**

*Undergraduate Research Assistant*

1.) **Pore and Grain Interaction Study -** *August 2023 - Present*

**Objective:** Investigate the interactive role of pore and grain structures on fracture behavior of additive manufactured Inconel 718 using 3D microstructure measurements and numerical modeling.

**Approach:**

- Prepare HEDM data and developed semi-synthetic microstructures to model regions lacking experimental data.
- Systematically manipulate pore characteristics (size and shape) within the AM sample to create a matrix of test configurations.
- Simulate fracture behavior using nonlocal damage mechanics and LS-EVPFFT modeling frameworks to evaluate the transition from pore-dominated to grain-dominated fracture initiation.

**Skills Acquired/Used:** Python, Dream3D, Paraview, HEDM data analysis, computational simulations (LS-EVPFFT), fracture mechanics, semi-synthetic microstructure modeling.

**Significance:** Understanding the interaction between pores and grain structures enhance the predictability of fracture behavior in AM metals, contributing to improved reliability and applications in industrial settings.

2.) **HEDM Reconstruction -** *August 2022 - August 2023*

**Objective:** Reconstruct HEDM data to study the microstructure and structural mechanics of Inconel 718

**Approach:**

- Utilized MIDAS to process and reconstruct HEDM data
- Used CT segmentation to provide a surface roughness to reconstructed HEDM data

**Skills Acquired/Used:** MIDAS, Python, 3D image processing and reconstruction, Dragonfly segmentation

**Significance:** This HEDM reconstruction provides data to be used for grain statistics used to develop synthetic microstructures.

**DAAD German Academic Exchange Service** **May 2024 - August 2024**

*Summer Research Assistant*

1.) **Viscoelastic/Plastic Material Parameter Characterization in 3D Printed Polymers**

**Objective:** Investigated material parameters of 3D-printed polymers to allow for accurate simulations of mechanical behavior and failure prediction, while accounting for nonlinear and stochastic material properties.

**Approach:**

- Conducted tensile testing for material characterization, including data collection and analysis.
- Designed and validated Ansys-based simulation models, achieving a correlation of 0.9979.
- Analyzed results and refined models for identifying parameters such as viscoelasticity and plasticity.

**Skills Acquired/Used:** Material testing, Ansys simulation, data analysis, mechanical property characterization, interdisciplinary collaboration.

**Significance:** Improved understanding of 3D-printed materials enables more precise engineering applications and helps to advance the reliability of simulations and failure predictions.