

# Alexander Zhao (He, Him, His)

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U.S. Citizen

## EDUCATION

**Carnegie Mellon University**, Pittsburgh, PA

M.S. in Artificial Intelligence Engineering - Materials Science and Engineering

Dec 2026

B.S. in Materials Science and Engineering, Minor in Computer Science

May 2025

GPA 3.60/4.00

## WORK EXPERIENCE

**Carnegie Mellon University - Robotics Institute**, Pittsburgh, PA

Mar 2024 - Present

Undergraduate Researcher

- Experimented with responsiveness of magnetically actuated haptic devices by creating 100+ mixtures of thermoplastic elastomers and magnetic particles using a microcompounder
- Designed workflows and led team to test tensile, deflection, and viscoelastic properties of oleogels, created test setup with 3D printing using AutoCAD and PreForm
- Developed 20+ test procedures and conducted exploratory data analysis to study the rheology of elastomers during curing
- Delegated tasks to team members to ensure 44 test reports are ASTM complied and delivered promptly

**Carnegie Mellon University - Manufacturing Futures Institute**, Pittsburgh, PA

May - Jul 2024

Research Intern

- Simulated 50+ uniaxial extensional flow of star, linear, and self-assembling polymer systems under multiple strain rates
- Ran system datafiles on LAMMPS software via CMU's TRACE supercomputer clusters and Linux terminals
- Calculated chain statistics such as end-to-end vectors, time correlations, and bond orientations by interacting with netCDF data through 10+ self-written Python programs
- Related structural information to properties of viscosity, stress, and strain by developing 200+ Matplotlib plots

**Procter and Gamble - FamilyCare TSDC**, Cincinnati, OH

May - Aug 2023

Research and Development Intern

- Led understanding of process hygiene buildup on paper-converting equipment, including rheometer test and flow simulation
- Directed 3 prototyping tests to examine 16 different processing conditions and their respective hygiene buildup
- Modeled scope of buildup and formulated other potential concerns related to upscaling of production
- Analyzed 20+ lab testing parameters regarding material properties using JMP software and interpreted how different processing methods affect consumer satisfaction, reported findings in cross-departmental meetings

## PROJECT EXPERIENCE

**Undergraduate Capstone – Covestro**

Sep 2024 – Apr 2025

Creep analysis of glass fiber reinforced polycarbonates (GFRPC)

- Studied creep and complex moduli of GFRPC of various fiber orientations using a Dynamic Mechanical Analyzer
- Investigated fiber orientations using cross-polarized light microscopy and how it affects mechanical properties via statistical methods such as PCA, regression, and effective medium models
- Collaborated in a team to design experiments and present findings via posters and presentations

**Materials Simulations**

Models and simulations of continuum transport, mesoscopic Monte-Carlo, and molecular dynamics

Jan - Apr 2024

- Utilized finite difference schemes to model diffusion systems
- Comparison of the Allen-Cahn and Cahn-Hilliard phase field models to see their differences in environments including spinodal decomposition, nucleation and growth, and magnetic domains
- Programmed a cellular automaton model to visualize deterministic and stochastic solidification processes

## SKILLS

**Applications:** Python, C, MATLAB, SML, MS Office, JMP, CrystalMaker, CrystalDiffract, SingleCrystal, ThermoCalc, Linux, Open visualization tool (OVITO), Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS), CAD, PreForm, Trios

**Instruments:** VSCode, Optical microscopy, X-Ray Diffraction (XRD), Fused Deposition Modeling (FDM), Polishing, Pressing, Annealing, Vickers hardness testing, Sand Casting, Instron tensile testing, Titrating, Sintering, Etching, Differential Scanning Calorimetry (DSC), Microcompounder, Charpy Testing, Scanning Electron Microscopy (SEM), Dynamic Mechanical Analyzer (DMA), Confocal Microscope, Rheometer, Atomic Force Microscopy (AFM)

## LEADERSHIP EXPERIENCE & HONORS

**Treasurer, CMU Club Swim**

Jan-Dec 2023

**Dean's list**

Aug-Dec 2023, Jan-Apr 2024, Jan-Apr 2025