Eli Broemer

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SUMMARY

Versatile mechanical engineer with 7+ years of experience in research, design, development, and validation of hardware and software. Hands-on automotive diagnostics and data analysis background. Skilled communicator in working across diverse teams and bringing clarity and solutions to complex issues. My work has reduced project costs, automated processes, and supported $2M project funding.

WORK EXPERIENCE

Development Engineer | Michigan State University | East Lansing, MI Sept 2024 – Present

- Spearheaded the development of a user-friendly software suite for data processing, automating computational workflows to reduce analysis time by 75%, and eliminate sources of human error.
- Designed and fabricated custom laboratory devices, optimized for in-house manufacturability, eliminating vendor sourcing and reducing costs by up to 90%.
- Serving as the lead engineer for a cross-functional team of physiologists, providing expert technical consultation to identify problems and build solutions.

PhD Research Assistant | Michigan State University | East Lansing, MI Jan 2019 – May 2024

- Led end-to-end development of data analysis platform that translated raw data to 3D computational models, which was critical to securing $2 million NIH grant, and multiple peer-reviewed publications.
- Orchestrated material testing on fiber-reinforced composites, including data acquisition and interpreting results to discover previously unquantified material properties.
- Engineered 3D finite element model of the human thigh from MRI data using Siemens NX, Hypermesh, and Abaqus to simulate seating mechanics, identifying stress concentrations to inform ergonomic and medical device design.

Design Engineer Intern | Tailor Welded Blanks, LLC | Monroe, MI May 2017 – Aug 2017

- Designed a complete, automated weld quality inspection station for Tier 1 automotive supplier's chassis manufacturing line to replace manual process.
- Delivered full design package including 3D models in SolidWorks, calculations to support material selection and geometry, pneumatic actuator sizing, and cost analysis.
- Improved design of locator pin assembly to be stronger under shear, reducing line downtime.

Engineering Mentor | Michigan State University | East Lansing, MI Dec 2016 – May 2020

- Cultivated rapport with 75+ clients, seeing high repeat engagement as an effective communicator.

EDUCATION

Ph.D., Mechanical Engineering | Michigan State University 2024

- Doctoral Research: Focused on the intersection of experimental testing and computational modeling to characterize and predict the complex, anisotropic mechanics of soft biological tissues under large deformation.

B.S., Mechanical Engineering | Michigan State University 2018

PROJECTS

Custom Impact-Testing Machine for Industrial Partner Aug 2018 – Dec 2018

- In a four-person team, managed the design and fabrication of a novel materials test system for a German research organization to analyze thin-film coating wear from high-force cyclic impact.
- Drove key fabrication phases, including sourcing mechanical components, utilizing lathe and mill to machine custom parts, and ensuring proper assembly and function.
- Delivered robust prototype capable of >1500 lbf impact force, earning 1st Place Edison Award in College of Engineering's design competition.

Full Vehicle Restoration Dec 2018 – Dec 2021

- Directed classic car overhaul, performing root cause analysis and system teardowns.
- Rebuilt structural integrity of frame with body-off restoration, and integrated new body panels.
- Overhauled powertrain, including reassembly of engine top end, transmission repairs, and complete replacement of brake, suspension, and fuel systems.
- Completed roadworthy vehicle has served as a reliable daily driver for 3+ years.

Wooden Furniture Design and Fabrication Dec 2017 – Present

- Managed the product lifecycle for a portfolio of 10+ custom furniture pieces, translating client requirements for function, space, and aesthetics into structural designs.
- Optimized each design for structural integrity by analyzing load paths and joinery methods, creating pieces with quality validated by unsolicited offers of up to $1000.

SKILLS

Technical:

Cost Efficient Design - Electro-mechanical System Integration - Testing Development - Data Acquisition, Analysis and Validation - Instrumentation Troubleshooting and Repair - System and Software Validation - Automation - Root Cause Analysis (5-Whys)

Professional:

Project Management - Technical Presentations - Cross-Functional Team Collaboration - Technical Communication and Feedback - Process Documentation - Requirements Management

Software:

Python - MATLAB - LabVIEW - FEA - CAD (Siemens NX, SolidWorks, AutoCAD) - Microsoft Office