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## EDUCATION

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### University of Michigan — College of Engineering

M.S.E. & B.S.E. in Mechanical Engineering, *Minor in Computer Science*

GPA: **4.00 / 4.00 (M.S.E.)**, **3.99 / 4.00 (B.S.E.)**

Tau Beta Pi Engineering Honor Society; Baja SAE 3× Overall 1st Place (100+ teams)

## SELECTED QUANTITATIVE PROJECTS

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*See portfolio for details: [brynnj.github.io/projects](https://brynnj.github.io/projects)*

### Algorithmic Trading Platform

- Built a modular Python trading platform supporting asynchronous data ingestion, strategy state machines, replayable backtests, and live paper execution across multiple concurrently managed strategies.
- Designed for rapid strategy prototyping using templated strategy classes and shared backtest/live code paths.
- Developed and applied Monte Carlo sensitivity analysis on slippage, latency, and missed fills to evaluate execution robustness under realistic deployment assumptions.

### LLM-Driven Trading Agent (Crypto Futures)

- Implemented an ETH perpetual futures trading framework using structured LLM decisioning to study decision pipelines, constraint enforcement, and failure modes rather than alpha generation.
- Deployed live on AWS using Coinbase API and analyzed behavior across differing market conditions, identifying sensitivity to prompt structure and limitations in the market context provided to the model.

### Market Regime Classification

- Implemented a regime classifier using amplitude-based labeling and gradient-boosted trees with walk-forward, out-of-sample evaluation, to assess effectiveness as a feature in regime-dependent strategies.
- Constructed trend confidence scores and evaluated their relationship to forward returns (signed) and return magnitude (unsigned) across multiple time horizons.

### Downside Variance Minimized Portfolio

- Built a portfolio optimization system minimizing downside variance under allocation constraints using SLSQP, with weekly rebalance logic and paper execution. Automated with Alpaca Python API, deployed on EC2.

## PROFESSIONAL EXPERIENCE

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### Relativity Space — Multibody Dynamics Lead

Long Beach, CA

July 2024 – Present

- Lead the multibody dynamics analysis function for the Terran R launch vehicle (medium-heavy lift rocket, reusable first stage with barge landing).
- Own stage separation, landing, landing leg deployment, and fairing separation multibody dynamics analysis; team responsible for transport and recovery loads.
- Build and use Python-based dynamic simulations to generate loads, perform sensitivity studies, and evaluate system success with dispersed hardware & trajectory conditions using Monte Carlo analysis.
- Set requirements for GNC, hardware, and operations; support architecture trades & identify opportunities to improve mass-to-orbit performance or reliability of systems.
- Implement physics models including nonlinear actuators, energy attenuators, aerodynamics, propellant slosh, and contact dynamics while improving runtime, testing, and documentation across all team codebases.
- Own transient fluid models in MATLAB/Simulink, deriving loads and identifying in-flight and on-pad startup & shutdown sequences to minimize pressure surge & drawdown.

### University of Michigan — Graduate Student Instructor (MECHENG 495)

Ann Arbor, MI

Fall 2023 – Spring 2024

- Led laboratory sessions and graded reports and presentations for senior-level lab course covering dynamics, heat transfer, aerodynamics, nanometrology, and model-driven design.

## TECHNICAL SKILLS

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**Programming & Systems:** Python, MATLAB/Simulink, C++, Git, Linux, Docker, AWS (EC2, HPC workflows)

**Engineering:** HyperWorks, Femap, Nastran, Altair MotionSolve, LS-DYNA, Siemens Teamcenter/NX, SolidWorks