

James Brynn
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EDUCATION

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

See portfolio for details: 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

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

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