Rishi Iyer

iyer.ris@northeastern.edu — Portfolio — GitHub

EXPERIENCE

M.S. Research — Northeastern University September 2023 - June 2024
Deep Learning for Computational Fluid Dynamics and Heat Transfer

- Developed fourier neural operator architectures for solving convective heat transfer problems in surrogate for complex geometries
- Research thesis under Prof. Hongwei Sun

Machine Learning Engineer — Atomic Industries Remote — January 2023 - September 2023
Deep Learning for Manufacturing Optimization

- Architected graph attention networks with PyTorch Geometric to embed 100K+ CAD files, enabling scalable part similarity detection for Toyota, Otterbox
- Developed geometric deep learning algorithms applying discrete differential geometry for 3D surface characterization
- Implemented reinforcement learning approaches for physics-based inverse problem optimization

Thermofluids Engineer Co-op — Mesodyne Cambridge, MA — July 2022 - January 2023
Advanced Energy Systems and Thermal Analysis

- Helped design and manufacture a solid state generator which converts heat energy to stimulated photonic crystal monochromatic spectra emission
- Conducted heat transfer and combustion simulations to identify power loss areas using numerical optimization, leading to a 10% thermal efficiency improvement
- Designed and manufactured a cross-flow heat exchanger achieving 75% power recuperation using thin Inconel sheets
- Created physics-based simulations with chemical equilibrium modeling for combustion efficiency prediction

Mechanical Engineer Co-op — Massachusetts Materials Technologies Waltham, MA — July 2021 - December 2022
Materials Analysis and Regression

- Implemented computer vision segmentation using watershed algorithm for automated microstructure analysis
- Developed regression models for material strength prediction from microstructure features
- Led redesign of portable tester using FEA and fracture mechanics principles

SELECTED PROJECTS

Spectral Transformer Image Generation October 2024 -

- Invented a new image generation architecture based on autoregression of frequency components, mimicing the implicit coarse to fine structure generation of diffusion models while retaining the benefits of batch transformer training speed
- Sponsored by 1517 Medici Fund

LQG Thrust Vectored Control of Solid Rocket Motors July 2022 - May 2023
First Place, Northeastern University ME Capstone

- Developed novel control system for finless solid rocket stabilization
- Implemented LQR and Kalman filter on plant for unstable dynamics control
- Created physics-based simulation framework for aerodynamic modeling
- Validated through inverted spherical pendulum test stand, matching the parameters of the unstable ODE of a scaled up rocket

AeroNU Propulsion & Simulations Team Lead December 2019 - July 2022
Advanced Rocket Engine Development

- Led development of regeneratively cooled, pressure-fed rocket engine
- Ran comprehensive CFD simulations for design iteration on the regenerative cooling channels, pintle injector
- Developed numerical solver for rocket stabilization using MATLAB
- Designed and implemented thrust measurement system for 700 lb thrust engine

EDUCATION

Northeastern University Boston, MA — 2019-2024

- MS in Thermofluids
- BS in Mechanical Engineering and Physics
- Minor in Mathematics