Murat Khidoyatov

U.S. Permanent Resident

347-357-2112 • murat.khidoyatov@yale.edu • LinkedIn

Education

Yale University Graduation Date: May 2027

B.S. Mechanical Engineering (ABET)

Relevant Coursework: Linear Algebra, Differential Equations, Computational Mechanics, Numerical Methods, Fluid Mechanics

Awards: Competitive Yale personal research grant (8% acceptance rate) · Yale First-Year Research Fellowship

Publication

Shirani, M., Gueldner, P. H., **Khidoyatov, M.**, Warren, J. L., Ninno, F., & Humphrey, J. D. (2026). *Physics-Consistent Neural Networks for Learning Deformation and Director Fields in Microstructured Media with Loss-Based Validation Criteria.*

Technical Skills

Languages & Frameworks: Python, C/C++, JAX, Flax, Optax, PyTorch, NumPy, CUDA

ML & Scientific Computing: Physics-Informed Neural Networks, Energy-Based Models, Bayesian Optimization, Automatic Differentiation

Simulation & HPC: CFD (Python), FEA (COMSOL, ABAQUS), GPU Acceleration (NVIDIA L4, A100), Linux, MATLAB

Work Experience

Oak Ridge National Laboratory Oak Ridge, TN · Summer 2025

Research Intern

- Built ML surrogate models on sparse experimental alloy datasets achieving 96% predictive accuracy across high-dimensional material design spaces.
- Developed a Bayesian Optimization pipeline in Python combining surrogate inference with acquisition functions to efficiently navigate noisy experimental data near global optima.
- Validated learned models via feature-response correlation analysis; presented findings as a research poster on ML-driven material optimization.

Yale Engineering Humphrey Lab New Haven, CT · 2023 – Present

Undergraduate Researcher

- Implemented a Physics-Informed Neural Network (PINN) in JAX enforcing fluid and structural governing equations via automatic differentiation, achieving 95% accuracy relative to finite element solutions.
- Implemented and validated a dual-network framework coupling displacement prediction with a learned energy function against COMSOL benchmarks, achieving ±90% accuracy for Neo-Hookean nonlinear elasticity.
- Accelerated training via CUDA-based GPU kernels on NVIDIA L4 and A100 GPUs; developed visualization pipelines for deformation and director field outputs.
- Generated ground-truth CFD flow field datasets in Python for training and benchmarking physics-informed models.

Project Experience

Yale Undergraduate Robotics 2024 – Present

President & Science Sub-team Lead

- Programmed a forward and inverse kinematic simulator in Python for real-time robotic arm path planning and joint validation.
- Developed a custom spectrometer pipeline using image analysis and Fourier decomposition of spectral light data.
- Led a 10-member team designing mechanical and software systems for a Mars rover life-detection system.