Andrew Masker

Email: andrewimasker@gmail.com | **Phone:** (717) 251-0163
Personal Website: andrewmasker.com | **GitHub:** github.com/AndrewMasker

Summary

PhD student and NSF Graduate Research Fellow working on learned dynamics and physics-informed machine learning for robots. Seeking robot learning roles, especially vision-language-action and world action models.

Education

University of Pennsylvania, on medical leave; returning Fall 2027 — Philadelphia, PA
Ph.D. Mechanical Engineering and Applied Mechanics, 3.80/4.00 — August 2025 – Present
M.S.E. Robotics — August 2025 – Present

Pennsylvania State University, Schreyer Honors College — State College, PA
B.S. Mechanical Engineering, 3.97/4.00; thesis: *Neural Optical Flow* — August 2021 – May 2025

Experience

ScalAR Lab, University of Pennsylvania — Philadelphia, PA
Graduate Research Assistant, PI: Ani Hsieh — August 2025 – Present (on medical leave; returning Fall 2027)

- Built a knowledge-based neural ODE (KNODE) of a Franka Emika Panda arm operating underwater, combining rigid-body dynamics from MuJoCo with a neural network that learns the residual fluid torques.
- Trained it end to end through differentiable simulation on GPU (JAX, MJX, Diffrax); in simulation its predicted trajectories nearly overlapped the ground truth, while SINDy, GP, and nominal models drifted.

Grauer Lab, Pennsylvania State University — State College, PA
Undergraduate Research Assistant, PI: Samuel Grauer — January 2024 – May 2025

- Developed neural optical flow, measuring dense fluid velocity fields from planar and stereo PIV images (J1).
- On synthetic turbulence, cut velocity error to 0.07 NRMSE, versus 0.23 for cross-correlation and 0.09–0.10 for leading optical flow methods; in stereo, cut it to 0.28, versus 0.36–0.38.
- Added a divergence-free hard constraint and Navier–Stokes residuals as a soft constraint in PyTorch, recovering pressure directly from images at 0.08 NRMSE.

SHAPE Lab, Penn State, Undergraduate Researcher: multi-material laser powder bed fusion (C1) — 2023 – 2024

Projects

LMM Metal 3D Printer, Personal Project — 2026 – Present

- Building a low-cost Lithography-based Metal Manufacturing printer: a three-axis machine in Onshape and a KiCad carrier PCB (Teensy 4.0, Raspberry Pi Zero W, stepper drivers, heaters).
- Wrote C++ firmware for motion, homing, and PID heater control with hard safety cutoffs, plus a Python print stack; closed the loop on slurry temperature with IR sensing over three heater designs and seven slurries.

Bashputer, Personal Project: a 64-bit RISC virtual machine and assembler, all in Bash — 2026 – Present

Publications

J1. **A. Masker**[*], K. Zhou[*], J. Molnar, S. Grauer, "Neural Optical Flow for Planar and Stereo PIV," *Experiments in Fluids*, 2025. [*]Equal contribution.

C1. J. Griffis, **A. Masker**, J. Schreiber, G. Manogharan, "Site-Specific Property Informed Interface Design of Multi-Material Laser Powder Bed Fusion," *MSEC*, 2024.

Technical Skills

Programming: Python, C++ (Teensy, Arduino), MATLAB, Git
Machine Learning: PyTorch, JAX, Equinox, Diffrax, physics-informed machine learning, neural ODEs
Robotics & Simulation: MuJoCo/MJX, differentiable simulation, rigid-body dynamics, PID control
Hardware & CAD: KiCad, Onshape, SOLIDWORKS, Teensy, Raspberry Pi/Linux, I2C, SPI, UART, soldering

Awards

- NSF Graduate Research Fellowship (GRFP), 2026 — $159,000
- Penn State Provost Award — $24,000
- Third Place, Poster Presentation Competition, MSEC/NAMRC 2024