Samuel Lihn

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Education

The Johns Hopkins University **January 2025 - May 2027**
M. S. Robotics - Controls and Dynamical Systems Track *Baltimore, MD*
Relevant Coursework: Learning-Based Control for Robotics, Trajectory Generation for Space Systems, Robot Kinematics and Dynamics

The Johns Hopkins University **August 2023 - May 2027**
B. S. Mechanical Engineering *Baltimore, MD*

Experience

Zoox **May 2026 – August 2026**
Robot Dynamics Simulation Engineer Intern *Foster City, CA*
- Built end-to-end vehicle dynamics model simulation pipeline to validate candidate changes to vehicle model and evaluate model fidelity.
- Developed metrics to quantify vehicle simulation data similarity against vehicle test data, using cross-correlation and statistical divergence analysis
- Deployed internal analysis tool for identifying model fidelity regressions and narrowing regressions to specific performance regimes.

Autonomous Control and Exploration Lab - Johns Hopkins LCSR **August 2025 – Present**
Undergraduate Researcher *Baltimore, MD*
- Implemented generative sampling-based motion planning on MuJoCo-based 7-DOF satellite locomanipulation task and compared task completion and loop time to MPPI, CEM, and DIAL-MPC.
- Trained diffusion policies with expert trajectory data to warm-start model predictive control loop for reduced planning latency.

Zoox **May 2025 – August 2025**
Suspension Bench Test & Data Analysis Intern *Foster City, CA*
- Conducted data-driven active suspension usage study to identify efficiency gaps in system utilization and extend lifetime of vehicle fleet, using knowledge of control strategies and mechanical system limitations.
- Created statistical models of subsystem performance to validate real-world vehicle behavior against design specs and supplier data.
- Tuned Simulink models against physical HIL test data to inform controls strategy improvements for future vehicles.
- Identified potential for 36% reduction in component utilization achievable with parameter tuning and controller signal processing improvements, while maintaining ride comfort.

Fulfil Solutions **June 2024 – August 2024**
Systems Engineering Intern *Plymouth Meeting, PA*
- Performed bring-up and integration testing of novel autonomous packing system to uncover new hardware- and software-related operational issues.
- Performed root cause analysis of machinery failures through hands-on debugging of hardware and embedded systems.

Baja SAE at Johns Hopkins **August 2023 – July 2025**
Controls & DAQ Systems Integration Engineer *Baltimore, MD*
- Developed embedded control system for engine dynamometer with novel synchronous motor braking solution.
- Designed and optimized rack and pinion steering subsystem for JH21XT race car using Solidworks and ANSYS.
- Integrated data acquisition electronics and sensors with vehicle by designing custom ingress-protected enclosures and wiring harnesses.

Projects

13-DOF Coupled-Dynamics Satellite Locomanipulation **ACE Lab**
- Investigating motion planning techniques for robot arm and satellite base control in zero-gravity, under highly coupled nonlinear dynamics, limited compute, and low actuator power. Using 2D planar satellite testbed and 3D rigidbody simulator for evaluation.
- Tested SPC approaches like MPPI and CEM, and evaluating policy-based methods such as Generative Predictive Control.

Autonomous Vision-Language-Action Evaluation on Local Models **Treehacks 2026**
- Built vision-language-based task evaluation pipeline to supervise smaller VLA behavior with inter-agent feedback, provide feedback to VLA, and re-prompt VLA with modified instructions until task completion.
- Deployed Qwen3.5 VLM on NVidia DGX Spark with llama.cpp and ran Pi0.5-FAST on Jetson Orin Nano with SO-101 arm.

Technical Skills

Robot Motion Planning: Implementation and tuning of sampling-based and policy-based model predictive control and trajectory optimization methods.
Control System Design: Experience with MATLAB, Simulink, and scipy for System Modeling and Signal Processing.
Data Analysis: Experience with Databricks and Spark for large-scale data mining and aggregation. Familiar with Pandas and scipy for exploratory analysis and data experiments.
Programming Languages: C++ (6 years), Python (5 years), MATLAB, C#, Rust
Robotics & ML: MuJoCo, Isaac Sim, Robot Operating System, JAX, PyTorch, Hydrax