



ALVIN ZHANG

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RESEARCH INTERESTS

Computer Vision

- Incorporate rich neural priors into systems that enforce geometric self-consistency.
- Optimize for unsupervised objectives during inference, not just in training.

Robotics

- Learn actionable representations of an agent's state, including its external environment.
- Experimentally evaluate research on real-world robotic systems to demonstrate robustness.

EDUCATION

University of California, Berkeley

2016 - 2020

B.Sc., Electrical Engineering and Computer Science

GPA: 3.845

Selected Coursework:

Computer Vision (A+), Robotic Manipulation and Interaction (A+), Machine Learning (A+), Artificial Intelligence (A+), Computer Graphics (A+), Statistical Learning Theory (A), Feedback Control Systems (A)

EMPLOYMENT

Research Engineer

May 2021 - present

Matician (Autonomous Household Robotics Startup)

Mountain View, CA

- Develop, integrate, and test a novel Bayesian 3-D mapping algorithm, enabling for the first time our autonomous robot to navigate through a customer's home with centimeter-level precision and real-time visualization.
- Integrate IMU measurements into a Visual-SLAM system, identifying previously uncharacterized sources of sensor noise and mitigating their impact with low-pass filtering.

Perception Software Engineer

Jan 2021 - Apr 2021

Nuro (Autonomous Delivery Vehicle Startup)

Mountain View, CA

- Review SOTA literature on optical flow; train and evaluate industrial-sized models for optical flow.

Perception Engineer

May 2020 - Jan 2021

Ike Robotics (Autonomous Trucking Startup), acquired by Nuro in Jan 2021

San Francisco, CA

- Research, develop, and evaluate neural approaches for 3-D bounding box segmentation from LiDAR point clouds.
- Co-authored, with Lance Martin, a blog post on "[Perception for Automated Trucking](#)".

RESEARCH EXPERIENCE

Research Intern

May 2022 - Jan 2022

Redwood Center for Theoretical Neuroscience, UC Berkeley

Berkeley, CA

- Empirically demonstrate that a hierarchical generative model performs "explaining away" of nuisance factors, and that this process follows the theoretical neural dynamics of predictive coding and Bayesian inference.
- Extend NeRF by learning 3-D structural priors for a multi-scale volumetric rendering system, with the goal of improving reconstruction quality in sparse-view scenarios.

PUBLICATIONS

Generalized Skill Learning, Safety, and Exploration with Flow-Based Models [\[link\]](#)

May 2019

Workshop, Task-Agnostic Reinforcement Learning, ICLR

New Orleans, LA

- Single-author paper. Demonstrate an unsupervised exploration algorithm that guides a policy to learn general behaviors, including flips. Uses the time required to navigate between states as the cost function.

PROJECTS

A Geometric Introduction to Lie Theory [\[link\]](#)

Nov 2022

Blog Post

- Provide an intuitive, visual introduction to Lie theory through the motivating example of rigid-body motion.

Named Tensors [\[link\]](#)

Nov 2021

PyTorch Library

- Support named dimensions for multidimensional arrays. Reduces code ambiguity; enables better debugging and run-time checks. Provides more functionality than PyTorch's native implementation.

Type-Safe Coordinate Transforms [\[link\]](#)

Oct 2022

Rust Library

- Implements type-safety for transforms between coordinate systems: projecting a point in coordinate frame A into camera B raises a compile-time error.