Alexander J. Swerdlow
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EDUCATION

- **Carnegie Mellon University** — Pittsburgh, Pennsylvania
  Master of Science in Robotics — *Aug 2023 – Current*

- **University of California, Los Angeles** — Los Angeles, CA
  Bachelor of Science in Computer Science, GPA: 3.98 — *Sep 2019 – June 2023*
  - **Relevant Coursework**: Computational Imaging, Deep Learning, Computer Vision, Computational Robotics, Large Scale Networks (Graph Theory, Reinforcement Learning), Applied Numerical Computing, Algorithms & Complexity, Systems and Signals, Computer Architecture, Operating Systems, Computer Networks

PUBLICATIONS

- [Street-View Image Generation from a Bird's-Eye View Layout](), Alexander Swerdlow, Runsheng Xu, Bolei Zhou — IEEE RA-L, 2024.

- [SCALER: A Tough Versatile Quadruped Free-Climber Robot](), Yusuke Tanaka, Yuki Shirai, Xuan Lin, Alexander Schperberg, Hayato Kato, Alexander Swerdlow, Naoya Kumagai, Dennis Hong — IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.

EXPERIENCE

- **Prof. Katerina Fragkiadaki** — Pittsburgh, Pennsylvania
  Graduate Student Researcher — *Aug 2023 - Current*
  - Researching generative models for scene understanding and reconstruction.

- **Prof. Bolei Zhou Laboratory** — Los Angeles, CA
  Undergraduate Researcher — *July 2022 - June 2023*
  - Developed an image generation model to create realistic images from virtual cameras conditioned on a map of nearby roads and actors. Built an end-to-end pipeline that took randomly created birds-eye-view (BEV) maps, generated paired first-person view (FPV) images, and analyzed performance using BEV Segmentation models and image fidelity metrics.

- **Waabi** — Toronto, Canada
  Research Intern — *March 2022 - June 2022*
  - Developed novel LiDAR + Camera fusion method that outperformed SOTA LiDAR-only baseline. The model used a novel form of deformable cross-attention between LiDAR voxel features and image features that allowed the network to select and weight important image features with the relevant scene geometry as context.
  - Re-implemented existing SOTA 3D Semantic Segmentation models in PyTorch. Implemented new pipeline for segmentation models including dataset pre-processing, inference, and visualization.

- **UCLA Robotics & Mechanisms Laboratory** — Los Angeles, CA
  Undergraduate Researcher — *April 2021 - March 2022*
  - Built a vision system for quadrupedal climbing robot to detect, model, and localize handholds. The system used a Mask R-CNN 2D Segmentation model to pick out suitable handholds and then performed an ellipsoid fitting on the corresponding 3D point cloud. Used a series of AruCo tags for global localization and VI-SLAM for short-term odometry.
  - Developed GNN 2D-3D fusion model to perform patch-wise material recognition from RGB-D data and tested against various baselines. [Presented poster at the 2022 SoCal Robotics Symposium]().
  - Created simulation framework with MuJoCo for offline controls development. Contributed to controls and infrastructure code.

- **DoorDash** — San Francisco, CA
  Software Engineering Intern, Logistics — *June 2021 - Sep 2021*
  - Developed an experimentation platform for testing multiple pricing hypotheses at the same time in production. The system dynamically combines experiments to test interactions between values (A/B/n) and inputs.

- ○ Integrated a caching layer with Redis that serves tens of thousands of requests per second to mitigate DB load. Added a Kafka publisher for a high-volume endpoint to write additional data points to a Snowflake DB.
- ○ Migrated gRPC endpoints and scripts from a legacy Python codebase to a new Kotlin codebase.

- **The Aerospace Corporation** El Segundo, CA
  Software Engineering Intern *June 2020 - Sep 2020*
  - ○ Developed and trained a multi-stage pose network in PyTorch for satellite keypoint detection to obtain relative 6-DOF with an RGB camera. The network was based off an existing SOTA model for human pose estimation.
  - ○ Converted the experimental model weights to run on a Jetson Nano using TensorRT and optimized the performance.
  - ○ Tested a variety of object detection networks in Tensorflow, and re-architected model to use a shared feature backbone to reduce inference time.
  - ○ Developed a system that allows for secure, highly scalable, real time streaming of Apache Kafka topics to external web clients. (Docker, Kubernetes, Spring Boot, WebSockets)

- **UCLA IEEE Aircopter Project** Los Angeles, CA
  Project Member *Sep 2019 - June 2020*
  - ○ Wrote code in C for sensor serial communication, sensor fusion, and motor control for a remote controlled quadcopter (I2C, SPI). Helped design the PCB schematic for the quadcopter which included the IMU, radio, motor drivers, and an STM-32 Microcontroller.

- **UCLA Cyber-Physical Systems Laboratory** Los Angeles, CA
  Lab Researcher *June 2018 - Sep 2018*
  - ○ Built the software architecture on top of ROS for a mobile robot and researched correct-by-design control algorithms for high-speed navigation. Created system models in Simulink.
  - ○ Integrated standard SLAM algorithms for autonomous navigation with global and local costmaps. Made upgrades to existing local path planners (C++).

Projects

- **Visual Localization**: Implemented a visual localization system based on reference street-view images and monocular camera and IMU. Used camera extrinsics/intrinsics to find a set of candidate images for feature-matching and performed a weighted local bundle adjustment using factor graph optimization with g2o. Used standalone visual-inertial odometry as an additional pose constraint.

Programming Skills

- **Languages**: Python, C/C++, Kotlin, Java, Matlab, Simulink, LaTeX, JavaScript, HTML/CSS
- **Technologies**: PyTorch, CUDA, ROS, NumPy, Tensorflow, Docker, Kubernetes, Apache Kafka, gRPC, PromQL, Git

Student Organizations

- Member of Eta Kappa Nu, Upsilon Pi Epsilon, and Tau Beta Pi at UCLA. Tutored students in lower division courses.
- Director of Technology and Trip Lead for Peaks & Professor at UCLA.