

## EDUCATION

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- **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

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- [Street-View Image Generation from a Bird's-Eye View Layout](#), Alexander Swerdlow, Runsheng Xu, Bolei Zhou. Preprint, 2023.
- [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

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- **Prof. Bolei Zhou Laboratory** Los Angeles, CA  
*Undergraduate Researcher* *July 2022 - Present*
  - 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.
  - Researching self-supervised pretraining of image encoders for use in downstream object detection and BEV Segmentation models.
- **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**

*Software Engineering Intern*

El Segundo, CA

*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 Aircropter Project**

*Project Member*

Los Angeles, CA

*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**

*Lab Researcher*

Los Angeles, CA

*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

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- **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

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- **Languages:** Python, C/C++, Kotlin, Java, Matlab, Simulink, L<sup>A</sup>T<sub>E</sub>X, JavaScript, HTML/CSS
- **Technologies:** PyTorch, CUDA, ROS, NumPy, Tensorflow, Docker, Kubernetes, Apache Kafka, gRPC, PromQL, Git

## STUDENT ORGANIZATIONS

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