

DAVID PAZ

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EDUCATION

University of California, San Diego

Computer Engineering, B.S.

June 2018

Intelligent Systems, Robotics, and Control, M.S.

March 2020

Computer Science and Engineering, PhD.

Planned 2023

Related Courses: Introduction to Autonomous Vehicle Technology, Introduction to Robotics, Computer Vision, Advanced Data Structures, Statistical Learning, Deep Learning, Reinforcement Learning, Sensing and Estimation, Operating Systems, Computer Architecture, and Software Engineering

EXPERIENCE

Contextual Robotics Institute, UC San Diego

Oct 2017 - Present

Autonomous Vehicle Laboratory Research Scientist and Project Lead

San Diego, CA

- Developed control strategies for steering, acceleration and braking on GEM e6 vehicles.
- Designed planning strategies for obstacle detection, vehicle following, and intersection logic.
- Built dense point-cloud maps at the UCSD campus for LiDAR-based localization
- Led team for the development of a probabilistic semantic mapping method. The approach was additionally used to generate large-scale semantic maps at UC San Diego and explore downstream applications on dynamic trajectory generation.
- Deployed two autonomous vehicles at the UCSD campus for mail delivery applications over the period of six months. The design and the performance of software stack is quantified and publically available.
- Mentored high school, undergraduate, and graduate students on various projects including simulation, system integration, sensor calibration, simultaneous localization and mapping (SLAM), and perception.
- Current research involves the multi-modal characterization of pedestrian and vehicle behavior and dynamic scene understanding –supervised by Dr. Henrik I. Christensen.
- For more details, please visit avl.ucsd.edu

Qualcomm

Nov 2021-Jan 2023

Robotics Research Assistant

San Diego, CA

- Developed open-source robotics applications using ROS1 and ROS2 for the Qualcomm Robotics RB5 platform. Applications include fiducial marker detection, GTSAM wrappers, and controllers for the mBot Mega.
- Outlined a process for building and loading custom kernel modules on the RB5 board.
- The initial mBot Mega robot prototype was adopted as a learning platform for a graduate class at UC San Diego. 100 mBot robots and RB5 platforms are actively used for class projects.
- For more details, please visit https://autonomousvehiclelaboratory.github.io/RB5_Robotics_Tutorials/

TuSimple

June 2021-Sept 2021

Perception Engineer Intern

San Diego, CA

- Quantified key performance benefits and constraints of flow data in an online perception system.
- Designed and implemented a context-aware tracking framework for occlusion scenarios.
- Engaged and collaborated with tracking team to develop, verify, and deploy tracker features on a full-scale autonomous truck.

TuSimple*L4 – Verification Engineer*

July 2018-May 2019

San Diego, CA

- Developed a logging device for bench-marking the performance of Level 4 autonomous trucks. Designed, verified and performed initial testing on UCSD self-driving cars. For additional details on the study, please click here.

Computation Structures Group, MIT CSAIL*Research Assistant*

June 2017 - Sept 2017

Cambridge, MA

- Developed flexible two-dimensional convolution accelerators ideal for IoT to provide significant performance gains over sequential computations and flexibility over application-specific accelerators such as Convolution Neural Networks–supervised by Dr. Arvind.

San Diego Supercomputer Center, UC San Diego*HPC Containerization Research Assistant*

December 2016 - July 2017

San Diego, CA

- Developed software for the Comet supercomputer and explored the capabilities and limitations of Singularity containers in HPC–supervised by Dr. A. Majumdar.

i-Trek, MIT*Lead Detection and Sensing Student Assistant*

August 2016 - August 2018

Cambridge, MA/ San Diego, CA

- Worked on the development of a portable device to detect harmful agents in water. Project supervised by Dr. N. Farve and Dr. K. Frazier.

TECHNICAL SKILLS

Programming

Python (+ PyTorch), C++, C, Shell Scripting

Robotics

LiDAR Technology, Sensor Fusion, Dynamic Trajectory Generation/Prediction

Machine Learning

SVM, PCA, LDA, EM, Deep Generative Models, Reinforcement Learning

Software Tools

ROS, PCL, Docker, Git, GDB, Valgrind, Singularity Containers

Digital Design

Verilog: FSM Design using Xilinx and BlueSpec Verilog

LEADERSHIP AND PROFESSIONAL ACTIVITIES

International Foundation of Robotics Research*Colloquia Organizer and Producer*

2020-2022

San Diego, CA

- Helped organize 25 virtual colloquia on robotics related topics including field robotics, aerial robotics, and autonomous driving.
- Information about presentations hosted can found at ifrr.org. The recordings are also publicly available on the IFRR YouTube channel.

Robotic Graduate Student Organization (RoboGrads)*Social Chair and President*

2021-Present

San Diego, CA

- Organized social events and bi-weekly seminars across the robotics graduate student community to promote collaboration and networking.
- Connected with tech. companies and organized joint networking events, campus visits, and presentations with students at the Contextual Robotics Institute.
- Organized high school and visiting student group tours for various robotics labs at UC San Diego.

FIRST Tech Competition*Judge - Volunteer*

Feb. 2023

IEEE - Eta Kappa Nu (HKN)*Member and Mentor*

2017-Present

MENTORSHIP EXPERIENCE

Autonomous Vehicle Lab

Undergraduate Students Mentored.

1. Andrew Liang (2019-2022): Machine learning for dynamic scene understanding, and vehicle systems engineering.
2. Shiqi Tang (2019-2020): 3D modeling in simulation environments for autonomous driving, and vehicle systems engineering.
3. Andres Gutierrez (2020-2022): Machine learning for dynamic scene understanding.
4. Zheng Zhong (2020-2021): Characterizing road user trajectory forecasting requirements.
5. Yunchao Yao (2022): Dynamic Scene Modeling.
6. Shashank Venkatramani (2022-Present): UC San Diego Digital Twin and Simulation

M.Sc. Students Mentored.

1. Sumukha Harish (2018-2019): State-based PID controllers and Camera-LiDAR calibration.
2. Hengyuan Zhang (2018-2019): LiDAR based perception for autonomous mail delivery.
3. Shawn Winston (2018-2019): ROS driver development for Inertial Navigation System.
4. Nathan Chan (2018-2019): Autonomous mail delivery, HD map generation, and bench-marking.
5. Qinru Li (2020): Semantic segmentation for urban driving.
6. Yuqing Jiang (2019): Bench-marking for autonomous driving.
7. Yuhan Liu (2020-2021): Automatic camera calibration.
8. Yunhai Han (2020-2021): Automatic camera calibration.
9. Hao Xiang (2020-2021): Road user trajectory forecasting.
10. Srinidhi Srinivas (2021-Present): Dynamic Scene Modeling.
11. Jing-yan Liao (2021-Present): Anonymizing Pedestrian Identities
12. Seth Farrell (2022-Present): Systems and Software Integration.
13. Zihan Zhang (2022-Present): Monocular Depth Estimation
14. Narayan Ranganathan (2022-Present): 3D Detection and Simulation
15. Varun Vupparige (2022-Present): Dynamic Overtaking in Urban Roads
16. Kai Chuen Tan (2022-Present): Dynamic Overtaking in Urban Roads

PUBLICATIONS

1. **David Paz**, Srinidhi Srinivas, Yunchao Yao, and Henrik I. Christensen. Clinet: Joint detection of road network centerlines in 2d and 3d. 2023 (Under Review)
2. Hengyuan Zhang, Jing-Yan Liao, **David Paz**, and Henrik I. Christensen. Robust human identity anonymization using pose estimation. In *2022 IEEE 18th International Conference on Automation Science and Engineering (CASE)*, pages 619–626, 2022

3. **David Paz**, Hao Xiang, Andrew Liang, and Henrik I Christensen. Tridentnetv2: Lightweight graphical global plan representations for dynamic trajectory generation. In *International Conference on Robotics and Automation*, Philadelphia, May 2022. IEEE
4. Henrik Christensen, **David Paz**, Hengyuan Zhang, Dominique Meyer, Hao Xiang, Yunhai Han, Yuhan Liu, Andrew Liang, Zheng Zhong, and Shiqi Tang. Autonomous vehicles for micro-mobility. In *Autonomous Intelligent Systems*, 2021
5. **David Paz**, Henry Zhang, and Henrik I Christensen. TridentNet: A conditional generative model for dynamic trajectory generation. In *Intelligent Autonomous Systems-16*, Singapore, June 2021. (Best paper)
6. Yunhai Han, Yuhan Liu, **David Paz**, and Henrik Christensen. Auto-calibration method using stop signs for urban autonomous driving applications. In *International Conference on Robotics and Automation*, Xian, May 2021. IEEE
7. **David Paz**, Hengyuan Zhang, Qinru Li, Hao Xiang, and Henrik Christensen. Probabilistic semantic mapping for urban autonomous driving applications. In *International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, Oct 2020. IEEE/RSJ
8. **David Paz**. Autonomous vehicles: Their capabilities and limitations. In *UC San Diego Electronic Theses and Dissertations*, 2020
9. **David Paz**, Po jung Lai, Nathan Chan, Yuqing Jiang, and Henrik I. Christensen. Autonomous vehicle benchmarking using unbiased metrics. In *International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, Oct 2020. IEEE/RSJ
10. **David Paz**, Po-Jung Lai, Sumukha Harish, Hengyuan Zhang, Nathan Chan, Chun Hu, Sumit Binnani, and Henrik Christensen. Lessons learned from deploying autonomous vehicles at UC San Diego. In *Field and Service Robotics*, Tokyo, JP, August 2019
11. Emily Le and **David Paz**. Performance analysis of applications using singularity container on sdsc comet. In *Proceedings of the Practice and Experience in Advanced Research Computing 2017 on Sustainability, Success and Impact*, PEARC17, pages 66:1–66:4, New York, NY, USA, 2017. ACM