Jannik **Zürn**

Researcher and Engineer in Embodied Intelligence

jannik.zuern@gmail.com | jannik-zuern.com | jzuern | jannik-zuern | Jannik Zürn

Summary

Sr. ML Engineer at Parallel Domain Inc., currently focusing on building scene reconstruction models and neural simulators. Previously, a doctoral student at the University of Freiburg, Autonomous Intelligent Systems, working with Prof. Wolfram Burgard, with a focus on self-supervised and multi-modal robot learning. I am interested in understanding intelligent machines that can operate autonomously in complex environments. I like developing algorithms and models from a theoretical angle, but I am also passionate about bringing them to life at scale from the engineering perspective.

Skills

Research Interests Neural Radiance Fields, Robotics, Computer Vision, Self-Supervised Learning, Multi-Modal Learning, Scene Understanding

Programming Linux, Python, PyTorch, CUDA, ROS, OpenCV, LaTeX, C/C++

Languages German (native), English (professional proficiency), Spanish (elementary proficiency)

Education

University of Freiburg, Germany — *Freiburg, Germany*

Ph.D. Robotics and Artificial Intelligence — *Dec. 2018 – Nov. 2023*

- Advisor: Prof. Dr. Wolfram Burgard
- Title: Self-Supervised and Multi-Modal Learning for Perception in Mobile Robots and Autonomous Driving
  Final Grade: Magna Cum Laude

Karlsruhe Institute of Technology (KIT), Germany — *Karlsruhe, Germany*

M.S. Theoretical Mechanical Engineering (GPA: 3.7/4.0) — *Aug. 2015 – Aug. 2018*

- Thesis topic: Neural Networks for Steady-State Fluid Flow Prediction
- Advisors: Dr. S. Suwelack, Dr. Christof Megnin. Grade: 1.0

Karlsruhe Institute of Technology (KIT), Germany — *Karlsruhe, Germany*

B.S. Mechanical Engineering (GPA: 3.1/4.0) — *Oct. 2011 – Aug. 2015*

- Thesis topic: Numerical Solution of the Chemical Master Equation
- Advisor: M.Sc. A. Koksharov. Grade: 1.0

Work Experience

Senior Machine Learning Engineer — *Karlsruhe, Germany (hybrid)*

Parallel Domain — *06/25 – today*

- Development of Neural Radiance Field models for open-loop and closed-loop simulation.

Applied Scientist — *London, England*

Wayve Technologies Ltd — *Nov. 2023 – May 2025*

- Developed and optimized novel Neural Radiance Field models to achieve state-of-the-art photorealism in simulators for autonomous driving research and validation.
- Led the end-to-end development and curation of WayveScenes101, establishing a critical benchmark and public dataset for novel view synthesis tailored to complex autonomous driving scenarios
- Researched and leveraged generative video diffusion models to synthesize targeted training data, addressing key challenges in data scarcity and domain adaptation for end-to-end self-driving systems

Visiting PhD Student — *Oxford, England*

Oxford Robotics Institute, University of Oxford — *Oct. 2022 – Feb. 2023*

- Advisor: Prof. Dr. Ingmar Posner
- Research Focus: Self-supervised learning for lane graph estimation in the context of automated driving.

Graduate Research Assistant — *Karlsruhe, Germany*

Renumics GmbH — *Jun. 2018 – Aug. 2018*

- Development of machine learning models for steady-state-fluid flow approximation leveraging data-driven computational fluid dynamics.

Summer Internship, Robotics Software Engineering — *Redwood City, CA, USA*

Mayfield Robotics — *Jul. 2017 – Oct. 2017*

- Development and implementation of a machine learning model for visual place recognition in a companion robot product.

Graduate Research Assistant — *Karlsruhe, Germany*

FZI Research Center for Information Technology — *Sep. 2016 – Apr. 2018*

- Development of CUDA Kernels for GPU model inference and model optimization for improved performance with NVIDIA TensorRT

Graduate Research Assistant — *Karlsruhe, Germany*

Institute for Biomedical Engineering, KIT — *Jan. 2016 – Aug. 2018*

- Implemented 3D surface reconstruction algorithms for organic tissue from CT images.
- Conducted electrophysiological simulations of human hearts for atrial fibrillation research.

Summer Internship, Software Engineering — *San Diego, CA, USA*

ANSYS, Inc. — *May 2015 – Sep. 2015*

- Performed large-scale computational fluid dynamics experiments and parameter studies to optimize internal combustion engine fuel injector models.

Presentations and Talks

RoboNerF: 1st Workshop On Neural Fields In Robotics at ICRA 2024 — *Yokohama, Japan*

Invited Speaker and Penalist — *May 2024*

- Talk title: ”Navigating the Future: Building photorealistic simulators for autonomous driving”

Oxford Robotics Institute - Seminar Series — *Oxford, UK*

Invited Speaker — *December 2024*

- Talk title: ”AV 2.0: Challenges and New Horizons”

Teaching

WS 22/23 **Seminar Robot Perception for Navigation**, Teaching Assistant
SS 21 **FreiCar: Practical Autonomous Driving**, Co-Organizer, Lecturer
WS 20/21 **FreiCar: Practical Autonomous Driving**, Co-Organizer, Lecturer
SS 19 **Deep Learning Lab**, Teaching Assistant

Thesis Supervision

2021-2022 **S. Weber**, Self-Supervised Drivable Surface Segmentation for Pedestrian Robots, MS Thesis
2020-2021 **S. Al-Rawi**, Sound Event Localization and Detection, MS Thesis
2020 **G. Stief**, Optical Flow based Window Detection, BS Thesis
2019 **T. Krautschneider**, Multimodal Object Tracking with Deep Learning, BS Thesis
2019 **Y. Satyawan**, Semantic Segmentation of Curb and Curb Cuts in Street Imagery, BS Thesis

Conference Duties

Workshop on Autonomous Driving at CVPR 2024 — *Seattle, USA*

Co-Organizer — *June 2024*

Workshop on Autonomous Driving at CVPR 2025 — *Nashville, USA*

Co-Organizer — *June 2025*

Volunteering

LifeTeachUs — *Germany*

Mentor — *2025 – today*

- Visiting schools as an external speaker and discussing with students topics related to the consequences of AI in society.

Oxford Artificial Intelligence Society Mentorship Program *London/Oxford, England*

Mentor *March 2024*

- Provided mentorship for young PhD student seeking advice for navigating the challenges of working in academia.

Selected Publications

Zürn, J., Gladkov, P., Dudas, S., Cotter, F., Toteva, S., Shotton, J., ... & Mohan, N. (2024). WayveScenes101: A Dataset and Benchmark for Novel View Synthesis in Autonomous Driving. arXiv preprint arXiv:2407.08280.

Zürn, J., Posner, I., & Burgard, W. (2023). Autograph: Predicting lane graphs from traffic observations. IEEE Robotics and Automation Letters, 9(1), 73-80.

Büchner, Martin*, **Jannik Zürn***, Ion-George Todoran, Abhinav Valada, and Wolfram Burgard. "Learning and Aggregating Lane Graphs for Urban Automated Driving." IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR) (2023)

Zürn, Jannik, Sebastian Weber, and Wolfram Burgard. "TrackletMapper: Ground Surface Segmentation and Mapping from Traffic Participant Trajectories." Conference on Robot Learning (CoRL) (2022)

Zürn, Jannik, and Wolfram Burgard. "Self-Supervised Moving Vehicle Detection from Audio-Visual Cues." IEEE Robotics and Automation Letters 7.3 (2022): 7415-7422.

Zürn, Jannik*, Johan Vertens*, and Wolfram Burgard. "Lane Graph Estimation for Scene Understanding in Urban Driving." IEEE Robotics and Automation Letters 6.4 (2021): 8615-8622.

Vertens, Johan*, **Jannik Zürn***, and Wolfram Burgard. "Heatnet: Bridging the day-night domain gap in semantic segmentation with thermal images." 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). IEEE, 2020.

Zürn, Jannik, Wolfram Burgard, and Abhinav Valada. "Self-supervised visual terrain classification from unsupervised acoustic feature learning." IEEE Transactions on Robotics 37.2 (2020): 466-481.

Megnin, C., Moradi, B., **Zürn, J.**, Ossmer, H., Gueltig, M., and Kohl, M. (2020). Shape memory alloy based controllable multi-port microvalve. Microsystem Technologies, 26(3), 793-800.

Rottmann, M., **Zürn, J.**, Arslan, U., Klingel, K., and Dössel, O. (2016). Effects of fibrosis on the extracellular potential based on 3D reconstructions from histological sections of heart tissue. Current Directions in Biomedical Engineering, 2(1), 675-678.

Software & Datasets

WayveScenes101: Dataset for scene reconstruction models in the conext of autonomous driving.
`https://wayve.ai/science/wayvescenes101/`

UrbanTracklet Dataset: Lane Graph Estimation from Tracking Vehicles
`http://autograph.cs.uni-freiburg.de/`

UrbanLaneGraph Dataset: Large-Scale Lane Graph Estimation in Urban Scenes
`http://urbanlanegraph.cs.uni-freiburg.de/`

UrbanLaneGraph Dataset API: Dataset processing and Model evaluation API
`https://github.com/jzuern/lanegnn`

TrackletMapper: Ground Surface Segmentation and Mapping from Traffic Participant Trajectories
`http://trackletmapper.cs.uni-freiburg.de/`

AudioVisual Vehicles Dataset: Self-Supervised Moving Vehicle Detection from Audio-Visual Cues
`http://av-vehicles.cs.uni-freiburg.de/`

Freiburg Thermal Dataset: Semantic Segmentation with Thermal Images
`http://thermal.cs.uni-freiburg.de/`

Freiburg Terrains Dataset: Self-Supervised Visual Terrain Classification
`http://deepterrain.cs.uni-freiburg.de/`

Reviewing Activites

- **Journals:** IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters (RA-L)
- **Conferences:** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE International Conference on Robotics and Automation (ICRA), AAAI Conference on Artificial Intelligence (AAAI), IEEE International Conference on Multisensor Fusion and Integration (MFI), International Conference on Ubiquitous Robots (UR)

Personal Projects

Medium.com - Technical writing on various problems in robotics, machine learning, and general thinking | >100k Post views | `https://jannik-zuern.medium.com/`

Autonomous Boat - Building up mechanical, electrical, and software stack for an autonomous naval platform with two colleagues for research and amateur boating purposes

Personal Interests

Playing Cello, Rock Climbing, Road Cycling, Trail Running, Chess, European History