Jannik **Zürn**

Doctoral Researcher in Robotics

University of Freiburg, Georges-Koehler-Allee 80, 79110 Freiburg im Breisgau, Germany

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Summary

Doctoral robotics researcher at the University of Freiburg, Autonomous Intelligent Systems. I am interested in working on intelligent machines that are able to autonomously operate 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 software engineering perspective.

Skills

Research Interests Robotics, Perception, Self-Supervised Robot Learning, Computer Vision, Multi-Modal Learning, Scene Understanding

Programming Python, PyTorch, ROS, OpenCV, LaTeX, C/C++, TensorFlow

Languages German (native), English (business fluent), Spanish (elementary)

Education

University of Freiburg, Germany
Freiburg, Germany

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

- Advisor: Prof. Dr. Wolfram Burgard
- Research Focus: Self-Supervised Robot Learning, Perception for Autonomous Robots

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

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.

Undergraduate Research Assistant — *Karlsruhe, Germany*

Institute for Technical Thermodynamics, KIT — *Oct. 2014 – Apr. 2015*

Undergraduate Research Assistant — *Karlsruhe, Germany*

Institute for Applied Computer Science, KIT — *Jun. 2013 – Jun. 2014*

- Implemented computer vision algorithms for automated geometry detection in MATLAB and Simulink.

Selected Publications

Zürn, Jannik, Sebastian Weber, and Wolfram Burgard. "TrackletMapper: Ground Surface Segmentation and Mapping from Traffic Participant Trajectories." Conference for 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.

Software & Datasets

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`

Self-Supervised Visual Terrain Classification

A Self-Supervised Terrain Classification Framework using Sound and Vision

`http://deepterrain.cs.uni-freiburg.de`

Semantic Segmentation of Thermal Images

Bridging the Day-Night Domain Gap in Semantic Segmentation with Thermal Images

`http://thermal.cs.uni-freiburg.de`

LaneGraphNet

Lane Graph Estimation for Scene Understanding in Urban Driving

`http://lanegraph.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), AAAI Conference on Artificial Intelligence (AAAI), IEEE International Conference on Multisensor Fusion and Integration (MFI)

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