

# Niclas Vödisch

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## EDUCATION

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- University of Freiburg**, Ph.D. Candidate in Computer Science Freiburg, Germany  
• Topic: “Simultaneous Localization and Mapping using Deep Learning for Mobile Robotics” *June 2021 – Present*  
• ELLIS PhD student, advised by Prof. Wolfram Burgard and Prof. Abhinav Valada
- ETH Zurich**, M.Sc. in Computational Science and Engineering Zurich, Switzerland  
• Research-centered program with a focus on autonomous driving and deep learning *Sept 2018 – May 2021*  
• Master’s thesis supervised by Dr. Dengxin Dai at CVL, published in RA-L [8]
- Carnegie Mellon University**, visiting undergraduate student Pittsburgh, PA, USA  
• Coursework in robotics, machine learning, and computer vision *Aug 2016 – May 2017*  
• Fall 2016 Dean’s List
- RWTH Aachen University**, B.Sc. in Computational Engineering Science Aachen, Germany  
• Bachelor’s thesis: “Design, Implementation, and Evaluation of a System for Optimizing a Scenario Detector for Highly Automated Vehicles” *Sept 2014 – June 2018*

## EXPERIENCE

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- AMZ Driverless** Zurich, Switzerland  
*Formula Student Driverless team of ETH Zurich*  
**CTO** *Aug 2019 – Aug 2020*  
• Led an international team of approx. 20 master’s students to ensure the technical progress of the project.  
• Despite COVID-19, cancellation of the competitions, and working remotely for several months, we managed to have a running autonomous race car and pushed our on-track performance to the next level.
- Perception Engineer** *Oct 2018 – Aug 2019*  
• Driverless champions at FS Germany 2019 and FS East 2019.  
• Worked on the LiDAR pipeline and extended it by a sensor fusion approach with RGB contributing to [10].
- Intern - Sensor Fusion Team** Munich, Germany  
*AID (acquired by Argo AI)* *Sept 2019 – Feb 2020*  
• Created a globally consistent 3D map from LiDAR and GNSS data using a GraphSLAM-based approach.  
• The method helped to verify existing localization methods as well as LiDAR-to-LiDAR calibration, and provided great material for virtual reality walks.
- Intern - Automated Driving Team** Renningen, Germany  
*Robert Bosch GmbH* *Apr 2018 – July 2018*  
• Worked on a deep learning-based method to predict the future path of vehicles approaching an intersection that is equipped with smart infrastructure to detect cars.
- Student Research Assistant - Automated Driving Group** Aachen, Germany  
*fka GmbH* *Apr 2018 – July 2018*  
• Helped preparing the [highD](#) dataset.
- Student Research Assistant - Automated Driving Group** Aachen, Germany  
*Institute for Automotive Engineering (ika)* *Aug 2017 – Mar 2018*  
• Various tasks including developing a web interface for monitoring the in-house GPU cluster.

## PROJECTS

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- The FSO CO Dataset** [[Paper \[9\]](#) | [Website](#) | [Code](#)]  
• Public dataset providing ground truth labels for cone detections to Formula Student Driverless teams.  
• Developing SW tools to get started with our data and guiding teams through the contribution procedure.

## INVITED TALKS

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### **Continual Learning for Robotics.**

*Summer School on Deep Learning for Autonomous Systems and Smart Cities, Aarhus University.*  
May 2023. Aarhus, Denmark.

### **Formula Student Driverless: Autonomous Driving at the Limit.**

*Seminar on Vehicles and Engine Technology, TU Darmstadt.* May 2021. Darmstadt, Germany (online).

**ML in Sensing – Benefits and Drawbacks.** *FSG Academy Waymo.* Aug 2020. Hockenheim, Germany.

### **Dealing with Uncertainties in a Multi-Sensor Perception Setup.**

*Formula Student Symposium.* Nov 2019. Győr, Hungary.

**The FSD Winning Car.** *FSG Academy Magna.* Nov 2019. Untergruppenbach, Germany.

## TEACHING AND STUDENT SUPERVISION

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### **Teaching:**

*University of Freiburg*

- **FreiCAR: Practical Autonomous Driving**, Lead organizer (SS 22, WS 22/23, WS 23/24) [[Website](#)]
- **Foundations of Deep Learning**, TA (WS 21/22)

### **Student theses:**

*University of Freiburg*

- Ahmet Çanakçı: **Label-Efficient Panoptic LiDAR Segmentation**, *Master's Thesis*, ongoing
- Markus Käppeler: **Label-Efficient Panoptic Segmentation With Self-Supervised Vision Foundation Models**, *Master's Thesis*, 12/2023 [2]
- Jonas Schramm: **BEVCar: Camera-Radar BEV Object and Semantic Map Segmentation**, *Master's Thesis*, 12/2023 [1]
- Tim Steinke: **Mapping, Navigation, and Control on a Real-World Autonomous Platform**, *Master's Project*, 09/2023
- Elias Greve: **COBUS: Collaborative Urban Scene Graph Generation Using Long-Term Panoptic SLAM**, *Master's Thesis*, 07/2023 [3]
- Markus Käppeler: **Cross-Modal Distillation for Multi-Camera 3D Object Detection and BEV Map Segmentation**, *Master's Project*, 03/2023
- José Arce: **PADLoC: Deep Loop Closure Detection and Registration Using Panoptic Attention**, *Master's Thesis*, 06/2022 [6]

### **Student research assistants:**

*University of Freiburg*

- Tim Steinke: **FreiCAR Course TA**, 10/2023 – Present
- Ahmet Çanakçı: **OpenDR: Open Deep Learning Toolkit for Robotics**, 10/2022 – 12/2023
- Ivan Filimonov: **Sensor Integration**, 09/2023 – 12/2023
- Saurav Shetty: **FreiCAR Software Development**, 07/2023 – 10/2023
- Abdallah Ayad: **FreiCAR Hardware Integration**, 04/2022 – 06/2023
- José Arce: **OpenDR: Open Deep Learning Toolkit for Robotics**, 01/2022 - 06/2022

## PROFESSIONAL SERVICE

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### **Reviewer for several conferences & journals:**

- Robotics: Science and Systems (RSS)
- Conference on Robot Learning (CoRL)
- IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR) and Workshops (CVPR-W)
- IEEE Transactions on Robotics (T-RO)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- International Symposium of Robotic Research (ISRR)
- SAE International Journal of Connected and Automated Vehicles

## SKILLS & ACCOMPLISHMENTS

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**Languages:** English (proficient), German (native)

**Technical:** Python, C++, ROS 1, Git, deep learning

**Honors:** Dean's List at CMU (fall 2016)

**Grants:** DAAD full scholarship (Sept 2016 – May 2017), ELISE mobility fund (June 2021 – July 2024)

*Most recent works are listed first. The asterisk (\*) denotes equal contribution.*

- [1] J. Schramm\*, N. Vödisch\*, K. Petek\*, B.R. Kiran, S. Yogamani, W. Burgard, and A. Valada. **BEVCar: Camera-Radar Fusion for BEV Map and Object Segmentation**. *arXiv preprint arXiv:2403.11761*, 2024. [[Paper](#) | [Video](#) | [Website](#)]
- [2] M. Käppeler\*, K. Petek\*, N. Vödisch\*, W. Burgard, and A. Valada. **Few-Shot Panoptic Segmentation With Foundation Models**. *ICRA*, 2024. [[Paper](#) | [Video](#) | [Website](#)]
- [3] E. Greve\*, M. Büchner\*, N. Vödisch\*, W. Burgard, and A. Valada. **Collaborative Dynamic 3D Scene Graphs for Automated Driving**. *ICRA*, 2024. [[Paper](#) | [Video](#) | [Website](#)]
- [4] N. Vödisch\*, K. Petek\*, W. Burgard, and A. Valada. **CoDEPS: Online Continual Learning for Depth Estimation and Panoptic Segmentation**. *RSS*, 2023. [[Paper](#) | [Video](#) | [Website](#)]
- [5] N. Vödisch, D. Cattaneo, W. Burgard, and A. Valada. **CoVIO: Online Continual Learning for Visual-Inertial Odometry**. *CVPR Workshops*, 2023. [[Paper](#) | [Website](#)]
- [6] J. Arce, N. Vödisch, D. Cattaneo, W. Burgard, and A. Valada. **PADLoC: LiDAR-Based Deep Loop Closure Detection and Registration Using Panoptic Attention**. *RA-L (presented at IROS 2023)*, 2023. [[Paper](#) | [Video](#) | [Website](#)]
- [7] N. Vödisch, D. Cattaneo, W. Burgard, and A. Valada. **Continual SLAM: Beyond Lifelong Simultaneous Localization and Mapping through Continual Learning**. *ISRR*, 2022. [[Paper](#) | [Video](#) | [Website](#)]
- [8] N. Vödisch, O. Unal, K. Li, L. Van Gool, and D. Dai. **End-to-End Optimization of LiDAR Beam Configuration for 3D Object Detection and Localization**. *RA-L (presented at ICRA 2022)*, 2022. [[Paper](#) | [Video](#)]
- [9] N. Vödisch\*, D. Dodel\*, and M. Schötz\*. **FSOCO: The Formula Student Objects in Context Dataset**. *SAE Int. Journal of Connected and Automated Vehicles*, 2022. [[Paper](#) | [Website](#)]
- [10] L. Andresen\*, A. Brandemuehl\*, A. Hönger\*, B. Kuan\*, N. Vödisch\*, H. Blum, V. Reijgwart, L. Bernreiter, L. Schaupp, J. J. Chung, M. Bürki, M. R. Oswald, R. Siegwart, and A. Gawel. **Accurate Mapping and Planning for Autonomous Racing**. *IROS*, 2020. [[Paper](#) | [Video](#)]