Frank Bieder

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My research lies at the intersection of machine learning, robotics, and computer vision, with a focus on scalable training data generation and cross-sensor domain adaptation for embodied AI systems. By bridging maps, perception and learning, I enable robust real-world models under limited annotation and significant sensor domain shifts.

During my studies I have

- completed extensive coursework in optimization, system theory and machine learning,
- gained research, industry and teaching experience in autonomous driving and robotics and
- developed strong proficiency in Python, C++, ROS and modern deep learning frameworks.

Education

May 2019 – Mar 2026	**Karlsruhe Institute for Technology**, **PhD Candidate** - Autonomous Systems / Deep Learning
	Thesis topic: Learning from Maps: Scalable Ground Truth Generation in Autonomous Driving. Supervisor: Christoph Stiller. Defense: 10. March 2026.
Aug. 2022 – Oct 2022	**UC Berkeley – Mechanical Systems Control Lab, Visiting PhD Candidate**– Embodied AI
	Research on map-less driving and map perception. Supervisor: Masayoshi Tomizuka.
Oct. 2014 – Aug 2018	**Karlsruhe Institute of Technology, M.Sc.** – Electrical Engineering / Computer Science
	GPA: 1.4/1.0 - Focus: Machine learning, system theory & robotics. Master's thesis: Supervised Domain Adaptation for Semantic Segmentation. Grade: 1.0/1.0
Aug. 2015 – May 2016	**University of Ottawa, Exchange Studies M.Sc.** – Electrical Engineering / Computer Science
	Canadian GPA: 3.8/4.0 - First semester: Lectures focusing on machine learning and data processing. Second semester: Research projects in two university labs.
Oct. 2011 – Oct. 2014	**Karlsruhe Institute of Technology, B.Sc.** – Electrical Engineering / Computer Science
	Bachelor's thesis: Fusion of Data from Stereo Camera and Radar Sensor for Tracking of Extended Objects, Grade: 1.0/1.0

Work Experience

May 2019 – today	**FZI Research Center for Information Technology, Karlsruhe – Research Scientist**
	Supervisor: Christoph Stiller. PhD student/Research Group Lead for Visual & Spatial Learning. Specializing in map perception and cross-sensor domain adaptation for embodied AI. Project led of multiple six-figure (industrial) research grants/projects. Co-maintenance of software and hardware stacks for (up to) two autonomous driving research vehicles.
Oct. 2018 - April 2019	**Atlatec GmbH, Karlsruhe (AI/AD start-up, acquired by Bosch in 2022) – Deep Learning Lead**
	Supervisor: Julius Ziegler. Developing of multimodal CNNs & weakly supervised learning methods for the automatic generation of high precision planning maps.
Nov. 2017 – Aug. 2018	**Daimler AG Image Understanding Group, Stuttgart – Master Thesis**
	Supervised by Uwe Franke / Fiete Botschen. Worked on domain adaptation: Use of synthetic data to improve the pixel-wise semantic classification of images in real-world applications.
May 2016 – Oct. 2017	**FZI Research Center for Information Technology, Karlsruhe – Research Assistant**
	Supervisor: Sascha Wirges. Research projects in environment perception / machine learning.
Jan. 2016 – May 2016	**University of Ottawa VIVA Lab, Ottawa Canada – Research Assistant**
	Supervisor: Robert Laganiere. Research project in RGB-D instance segm. of indoor scenes
Jan. 2015 – Jul. 2015	**Mercedes-Benz Research & Development, Sunnyvale USA – Research Internship**
	Supervisor: Jörg Hillenbrand. Research internship in MBRDNA's Vehicle Intelligence Group. Developed a framework to evaluate the driving behavior of an autonomous vehicle.

Publications (selection)

Frank Bieder, Hendrik Königshof, Haohao Hu, Fabian Immel, Yinzhe Shen, Jan-Hendrik Pauls, Christoph Stiller. XD-MAP: Cross-Modal Domain Adaptation using Semantic Parametric Mapping**.** *In arXiv preprint***,** 2026**.**

Fabian Immel, Jan-Hendrik Pauls, Richard Fehler, Frank Bieder, Jonas Merkert, Christoph Stiller. SDTagNet: Leveraging Text-Annotated Navigation Maps for Online HD Map Construction**.** *In NeurIPS,* 2025.

Fabian Immel, Richard Fehler, Frank Bieder, Jan-Hendrik Pauls, Christoph Stiller. M3TR: A Generalist Model for Real-World HD Map Completion**.** *IEEE/RAS Robotics and Automation Letters (RAL)*, 2025.

Alexander Blumberg, Jonas Merkert, Richard Fehler, Fabian Immel, Frank Bieder, Jan-Hendrik Pauls, Christoph Stiller. Impact of Label Noise on Robustness in HD Map Construction. *In IEEE IV* 2025.

Frank Bieder, Haohao Hu, Johannes Schantz, Oguzahn Kirik, Florian Ries, Martin Haueis, Christoph Stiller. Map Learning: Ein Ansatz zur automatisierten Erstellung von Trainingsdaten unter Verwendung von HD-Karten und Mehrfachbefahrungen. *15. FAS Workshop,* 2023. **1nd Best Paper Award**

Haohao Hu, F. Han, Frank Bieder, Jan-Hendrik Pauls, Christoph Stiller.TEScalib: Targetless Extrinsic Self-Calibration of LiDAR and Stereo Camera for Automated Driving Vehicles with Uncertainty Analysis. *IEEE/RSJ IROS*, 2022.

Christoph Burger, Johannes Fischer, Frank Bieder, Ömer Tas, Christoph Stiller. Interaction-Aware Game-Theoretic Motion Planning for Automated Vehicles using Bi-level Optimization. *IEEE ITSC,* 2022. **2nd Best Paper Award** .

Kunyu Peng, Juncong Fei, Kailun Yang, Alina Roitberg, Jiaming Zhang, Frank Bieder, Philipp Heidenreich, Christoph Stiller, Rainer Stiefelhagen. MASS: Multi-Attentional Semantic Segmentation of LiDAR Data for Dense Top-View Understanding. In *IEEE T-ITS,* 2022.

Frank Bieder, Maximilian Link, Simon Romanski, Haohao Hu, Christoph Stiller. Improving Lidar-Based Semantic Segmentation of Top-View Grid Maps by Learning Features in Complementary Representations. *In FUSION,* 2021.

Frank Bieder, Sascha Wirges, Johannes Janosovits, Sven Richter, Zheyuan Wang, Christoph Stiller. Exploiting Multi-Layer Grid Maps for Surround-View Semantic Segmentation of Sparse LiDAR Data. *In IEEE IV,* 2020.

Scholarships/Awards

Nov 2023	**1st Best Paper Award Uni-DAS FAS Workshop** – First author of paper
Oct 2022	**2nd Best Paper Award IEEE ITSC 2022** – Co-author of paper
Aug 2022 – Oct 2022	**KHYS Exchange Grant** – Funding three months of study exchange with UC Berkeley
Nov 2021	**FUSION Travel Grant** – Conference fees, travel costs & accommodation in South Africa
Nov 2019 – today	**KSOP Scholarship** – Fully funding research of one PhD year and an MBA program in parallel
Jun 2016 – Jun 2019	**Daimler Student Partnership** – Scholarship covering personal mentoring and trainings
Sep 2015 – Dec 2015	**Ontario BaWü Program** – Fully funding one academic exchange year in Canada
Aug 2015 – May 2016	**German Academic Exchange Service Promos** – Scholarship for international studies
Jul 2011	**GDCH Award** – German Chemical Society's award for excellence in the high school diploma

Skills and Engagements

Languages	German (native), English (fluent), French (upper intermediate)
Technical Skills	Python (Pytorch, TensorFlow, OpenCV, numpy), C++, ROS, containerized workflows
Supervision	Supervised 11 MSc thesis projects, currently co-supervising 3 PhD students
Scientific Workshops	1st Organizer: FMAD Foundation Models for AD (ITSC 24/25), MB2ML Mapless AD (IV 22/23)
MBA Coursework	Completed MBA Fundamentals Program, Hector School of Engineering and Management
Voluntary Work	Engineers Without Borders (2012–2013); International Student Mentoring (2019–2022)
Further Interests	Hiking, sailing, scuba diving