SEBASTIAN KOCH

Doctoral Researcher (4th year)

koch.sebastian@mail.com https://kochsebastian.com Stuttgart, Germany

Education

2022 – 2026 **Ulm University, Germany**
PhD in Computer Science
- *Advisor*: Prof. Timo Ropinski
- *Thesis*: Open-Vocabulary 3D Scene Understanding and Reasoning with 3D Scene Graphs
- *Apr 2022 – Apr 2025*: Bosch Research Doctoral Program
- *May 2025 – Nov 2025*: Google Student Researcher

2020 – 2022 **Tübingen University, Germany**
Master of Science in Computer Science
- *Advisors*: Prof. Gerhard Neumann & Prof. Andreas Geiger
- *Thesis project*: Multi-View RGB-D Fusion for 6D Pose Estimation
- *GPA*: 1.4 (1.0 is the best)
- *Selected courses*: Computer Vision, Deep Learning, 3D Computer Vision, Mobile Robotics, Reinforcement Learning, Mathematics for Machine Learning

2016 – 2020 **Baden-Württemberg Cooperative State University (DHBW), Germany**
Bachelor of Engineering in Computer Science
- *Thesis project*: Improvement of the robustness of a SLAM system using Object Semantics
- *GPA*: 1.8 (1.0 is the best)

Experience

Google Research, Munich, Germany

May 2025 – Nov 2025 Student Researcher – 3D Scene Understanding for AR/VR Applications
- Advisors: Johanna Wald & Federico Tombari
- *Role*: Research on open-vocabulary 3D scene understanding for augmented reality solutions.

Bosch Center for Artificial Intelligence, Stuttgart, Germany

Apr 2022 – Apr 2025 Bosch Research Doctoral Program – 3D Scene Understanding for indoor Robotic Applications
- Advisors: Narunas Vaskevicius & Mirco Colosi
- *Role*: Research and development on 3D Scene Graphs for indoor 3D scene understanding, achieving over 50% reduction in labeled sample requirements through self-supervised learning, and introducing open-vocabulary relationship predictions for fine-grained inter-object reasoning. This work resulted in four first-author publications [1], [3], [4], [5].

Oct 2021 – Mar 2022 Industrial Master Thesis – 6D Pose Estimation
- *Advisor*: Fabian Duffhauss
- *Role*: Developed a multi-view RGB-D fusion method with a symmetry-aware keypoint voting approach, improving 6D Pose Estimation accuracy by 7.6% and achieving state-of-the-art results, resulting in a publication [6].

University of Tübingen, Tübingen, Germany

Sep 2020 – Oct 2021 Research Assistant – Real-time high-resolution remote sensing
- *Advisors*: Leon-Amadeus Varga & Prof. Andreas Zell
- *Role*: Research on encoder-only region proposal techniques combined with hardware-optimized TensorRT and CUDA implementations on embedded GPUs for real-time object

detection in high-resolution images. Studied the impact of on-device image pre-processing for enhanced remote sensing object detection accuracy, resulting in a publication [7].

Bosch Research, Stuttgart, Germany

Apr 2020 – Oct 2020 | Research Intern – Object-level Semantics for SLAM

- *Advisor*: Stefan Benz
- *Role*: Integrated an object detection pipeline into a ROS system for enhanced localization and mapping. Led synthetic data generation using Unreal Engine to enable reproducible mapping runs used in the evaluation section of a published paper.

Bosch Group, Stuttgart, Germany

Oct 2016 – Mar 2020 | Industrial Bachelor Student

- *Role*: Alongside my bachelor's in computer science at the university, I worked on scientific projects in different departments at Bosch, applying learned knowledge and collaborating with experienced developers and researchers.
- *Mentors*: Stefan Benz, Hanna Ziesche, Christopher Baker, Stephan Stühmer
- *Nov 2017 – Feb 2018*: Analyzed false-positive ultrasonic reflections in automotive sensors.
- *Jun 2018 – Sep 2018*: Implemented a play-back recording feature for ECU failure analysis.
- *Jun 2019 – Sep 2019*: Implemented a pedestrian simulator for ML-based human behavior prediction.
- *Sep 2019 – Mar 2020*: Researched the impact of semantic features for improved SLAM accuracy.

Honors & Awards

2024 | Accepted into International Computer Vision Summer School (ICVSS) 2024 for excellent PhDs in CV.

2021 | 1st place in the AI Chess Competition conducted by the Cognitive Systems Lab of Prof. Andreas Zell.
3rd place in the RL Hockey Competition of the MPI Autonomous Learning Group of Prof. Georg Martius.

2020 | Accepted into the Students@Bosch program for students who excelled at Bosch internships.

2014 | 4th place at the RoboCup World Cup 2014 in Joao Pessoa Brazil in the Rescue Junior competition

2013 | German Champion at the RoboCup German Open 2013 in the Rescue Junior competition.
World Champion at the RoboCup World Cup 2013 in Eindhoven in the Rescue Junior competition.

Publications

For a complete list of all publications, including recent pre-preprints see: *kochsebastian.com/publications*

2025 | [1] **S Koch**, J Wald, M Colosi, N Vaskevicius, P Hermosilla, F Tombari, T Ropinski, *"RelationField: Relate Anything in Radiance Fields",* in Conference on Computer Vision and Pattern Recognition (**CVPR**), 2025.

[2] Y Liu, L Palmieri, **S Koch**, I Georgievski, M Aiello, *"DELTA: Decomposed Efficient Long-Term Robot Task Planning using Large Language Models"*, in IEEE International Conference on Robotics and Automation **(ICRA)**, 2025.

2024 | [3] **S Koch**, N Vaskevicius, M Colosi, P Hermosilla, T Ropinski, *"Open3DSG: Open-vocabulary 3D Scene Graphs from Point Clouds with Queryable Objects and Open-Set Relationships",* in Conference on Computer Vision and Pattern Recognition (**CVPR**), 2024.

[4] **S Koch**, P Hermosilla, N Vaskevicius, M Colosi, T Ropinski, *"Lang3DSG: Language-based contrastive pre-training for 3D Scene Graph prediction"*, in International Conference on 3D Vision (**3DV**), 2024.

[5] **S Koch**, P Hermosilla, N Vaskevicius, M Colosi, T Ropinski, *"SGRec3D: Self-Supervised 3D Scene Graph Learning via Object-Level Scene Reconstruction",* in Winter Conference on Applications of Computer Vision (**WACV**), 2024.

2023 | [6] F Duffhauss, **S Koch**, H Ziesche, NA Vien, G Neumann, *"SyMFM6D: Symmetry-aware Multi-directional Fusion for Multi-View 6D Object Pose Estimation",* in Robotics and Automation Letters (**RA-L**), 2023.

2022 | [7] LA Varga, **S Koch**, A Zell, *"Comprehensive Analysis of the Object Detection Pipeline on UAVs"*, in **Remote Sensing**, 2022.

Invited Talks

2025 | **Huawai Munich Research Center**: *Language-driven Scene Understanding with 3D Scene Graphs*, Munich 06.02.2025.

2024 | **RWTH Aachen. Computer Vision Group, Prof. Bastian Leibe**: *3D Scene Understanding with label-efficient and open-vocabulary 3D Scene Graphs*, Remote 27.02.2024.

Bosch Research US, Sunnyvale. *3D Scene Understanding with label-efficient and open-vocabulary 3D Scene Graphs*, Remote 07.02.2024.

Service

Reviewing: CVPR 2024–2025, ICCV 2023–2025, ICRA 2025, NeurIPS 2024, IROS 2024–2025

Volunteering: I work as a volunteer and referee at RoboCup Junior events on a national and international level.

Qualifications

Programming: Python, C/C++, MATLAB, Bash

Libraries: PyTorch, Lightning, JAX, NumPy, Matplotlib, Open3D, OpenCV, TensorRT

Software: Git, LaTeX, ROS, GNU/Linux, Office

Languages: German (native), English (fluent)

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Prof. Timo Ropinski. Full Professor, Ulm University. timo.ropinski@uni-ulm.de
Dr. Federico Tombari. Director of Research, Google Zurich. tombari@google.com
Prof. Pedro Hermosilla. Assistant Professor, TU Wien. phermosilla@cvl.tuwien.ac.at
Dr. Narunas Vaskevicius. Lead Research Scientist, Bosch Research. narunas.vaskevicius@bosch.com
Prof. Gerard Pons-Moll. Full Professor, University of Tuebingen. gerard.pons-moll@uni-tuebingen.de