SEBASTIAN KOCH, M.SC.

PhD Candidate (2nd year)

University of Ulm & Bosch Center for Artificial Intelligence (BCAI)

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EDUCATION

PhD **Computer Science,** *University of Ulm. Advisor: Prof. Timo Ropinski.*

Apr 2022 – present PhD topic: 'Understanding 3D scenes using Scene Graphs', collaboration with BCAI.
The goal of my PhD is to develop 3D scene representations such as 3D Scene Graphs of the real world that enable robots to efficiently navigate and complete tasks in real-world environments.[1],[2]

M. Sc. **Computer Science**, *University of Tübingen.*

Apr 2020 – Mar 2022 Computer Science major with focus on machine learning, computer vision and robotics.
Thesis: 'Multi-View RGB-D Fusion for 6D Pose Estimation'
supervised by *Gerhard Neumann* & *Andreas Geiger*. GPA: *1.4 (1.0 is the best)*

B. Eng. **Computer Science**, *Baden-Württemberg Cooperative State University*.

Oct 2016 - Mar 2020 Computer Science major with additional automotive orientated courses. GPA: *1.8 (1.0 is the best)*
Bachelor-Thesis: 'Improvement of the robustness of a SLAM system with Computer Vision'

EXPERIENCE

BCAI **Master-Thesis (6D Pose Estimation)**

Oct 2021 – Mar 2022
- Designed a multi-view RGB-D fusion method for 6D Pose Estimation achieving SOTA results.
- Proposed a symmetry-aware keypoint voting approach for improved estimation of object poses [3].

University of Tübingen **Research Assistant (Embedded Object Detection)**

Sep 2020 – Oct 2021
- Conducted research on optimizing deep learning models for real-time object detection in high-resolution images using optimized *CUDA* and *TensorRT* implementations on embedded GPUs.
- Studied the effect of on-device image processing for remote sensing object detection accuracy [4].

Bosch Research **Working Student (Simulation & Integration for SLAM)**

Apr 2020 - Oct 2020
- Integrated object detection pipeline directly into a *ROS* system for improved localization & mapping.
- Responsible for synthetic data generation with *Unreal Engine* for reproducible mapping evaluation.

Oct 2019 - Jan 2020 **Bachelor-Thesis (Semantic Features for SLAM)**
- Demonstrated the benefit of object detection and semantic aware features for a *SLAM* pipeline.
- Evaluated different deep learning models based on accuracy and speed in a systematic manner.

Bosch Group **Cooperative Study Program**

Oct 2016 - Mar 2020 The Cooperative Study Program at Bosch provides the possibility to work on scientific projects in different departments at Bosch while I pursued my Bachelor's degree. I contributed in many projects in the software development using *C/C++* and *Python* in different automotive and robotics areas.

SERVICE

Reviewing ICCV 2023 Workshops

2019 - present I work as a volunteer and referee at RoboCup Junior events on a national and international level.

PUBLICATIONS

For a complete list of all publications see kochsebastian.com/publications.

2024 [1] **S Koch**, P Hermosilla, N Vaskevicius, M Colosi, T Ropinski: *Lang3DSG: Language-based contrastive pre-training for 3D scene graph prediction*. 3DV 2024

2023 [2] **S Koch**, P Hermosilla, N Vaskevicius, M Colosi, T Ropinski: *Auto3DSG: Autoencoding for 3D Scene Graph Learning via Object-Level Scene Reconstruction*. ICCV 2023 - SG2RL Workshop

2023 [3] F Duffhauss, **S Koch**, H Ziesche, NA Vien, G Neumann: *SyMFM6D: Symmetry-aware Multi-directional Fusion for Multi-View 6D Object Pose Estimation*. RA-L 2023

2022 [4] LA Varga, **S Koch**, A Zell: *Comprehensive Analysis of the Object Detection Pipeline on UAVs*. Remote Sensing 2023

HONORS & AWARDS

2021 1st place in the AI Chess Variant Competition conducted by the Cognitive Systems Lab of Prof. Zell.

2021 3rd place in the RL Hockey Competition of the MPI Autonomous Learning Group of 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 João Pessoa in the *super-team Rescue* competition.

2013 1st place at the RoboCup World Cup 2013 in Eindhoven in the *Rescue* competition.

SKILLS

Languages English: fluent — German: native

Technical Computer Vision | Deep Learning | 3D Scene Representation | Embodied Vision | Robotics

Python | Numpy | PyTorch | Lightning | GNU/Linux | ROS | Git | LaTeX