



# Raphael Hagmanns

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## Curriculum Vitae

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### Education

- 2020 – today **PhD Student**  
*Karlsruhe Institute of Technology, Institute for Anthropomatics and Robotics, Vision and Fusion Laboratory, Chair of Prof. Jürgen Beyerer, in cooperation with Fraunhofer IOSB*  
Fields of Research:
  - Realtime Semantic Mapping
  - Mobile Robot Inspection
  - Autonomous Heavy Machinery
- 2017 – 2019 **M.Sc. in Computer Science**  
*Karlsruhe Institute of Technology*  
Major fields of study:
  - Theoretical Foundations
  - Image Processing
  - Algorithm Engineering
  - Optimization Theory
- 2013 – 2017 **B.Sc. in Computer Science**  
*Karlsruhe Institute of Technology*
- 2005 – 2013 **General Qualification for University Entrance (Abitur)**  
*Couven-Gymnasium, Aachen*

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### Employment

- 2020 – today **Research Assistant**  
*Karlsruhe Institute of Technology, Institute for Anthropomatics and Robotics, Vision and Fusion Laboratory Karlsruhe*
- 2020 – today **Full Stack Developer**  
*Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB, Autonomous Robotic Systems Karlsruhe*  
Selected Research Projects:
  - Competence Center ROBDEKON** Technical fullstack development of autonomous heavy machinery for autonomous decontamination in hazardous environments.  
<https://robdekon.de>
  - GOOSE Dataset** Enhancing semantic segmentation in unstructured environments.  
<https://goose-dataset.de>
  - SynDAB** Synthetic data for the robustification of autonomous heavy machinery.

2015 – 2020 **Student Research Assistant**

*Fraunhofer IOSB, Karlsruhe*

Main topics worked on:

- Geoinformation Software in Front- and Backend
- Geographical Data Processing (OWS, OSM, OL)
- 3D data visualization (Cesium, Terrain Meshing, three.js)
- Android Development

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## Teaching

2021 – today **Teaching Assistant** *Lecture Pattern Recognition*

2020 – 2022 **Practical Course** *Image processing- and fusion*

2020 – 2023 **Seminar** *Image processing- and fusion*

2020 – 2024 **Theses Supervision**

*Bachelors:* Leo Garbe, Hongchen Ji, Max Weißer, Rabanus Bockmühl

*Masters:* Shreyas Manjurnath, Kübra Karatas, Vincent Kübler, Thomas Friedel

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## Selected Publications

- 2024 Jürgen Beyerer and Raphael Hagemanns and Daniel Stadler, Pattern Recognition: Introduction, Features, Classifiers and Principles, *Book, DeGruyter*
- 2024 Peter Mortimer and Raphael Hagemanns and Miguel Granero and Janko Petereit and Thorsten Lüttel, The GOOSE Dataset for Perception in Unstructured Environments, *Conference, IEEE International Conference on Robotics and Automation (ICRA)*
- 2023 Raphael Hagemanns and Thomas Emter and Leo Garbe and Jürgen Beyerer, Factor Graph-based Dense Mapping for Mobile Robot Teams using VDB-Submaps, *Conference, Lecture Notes in Computer Science (LNCS) Springer 2023 (IAS-18)*
- 2023 Alexander Schuster and Raphael Hagemanns and Iman Sonju and Andreas Löcklin and Janko Petereit and Chrstof Ebert and Michael Weyrich, Synthetic Data Generation for the Continuous Development and Testing of Autonomous Construction Machinery, *Journal, at - Automatisierungstechnik Special Issue Mobile Maschine*
- 2022 Raphael Hagemanns and Thomas Emter and Marvin Grosse-Besselmann and Jürgen Beyerer, Efficient Global Occupancy Mapping for Mobile Robots using OpenVDB, *Conference, Workshop Agile Robotics: Perception, Learning, Planning, and Control at IEEE International Conference on Intelligent Robots and Systems (IROS)*

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## Selected Workshops and Invited Talks

- 2023 Robustifying Perception for an Autonomous Excavator, *Invited Talk at Workshop on Configurable Collaborative Robot Technologies in Construction, IEEE International Conference on Robotics and Automation (ICRA)*
- 2022 Robotic Systems for Decontamination in Hazardous Environments, *Invited Talk at Workshop on Intelligent Autonomous Robots for Hazardous Decommissioning Tasks, The 17th International Conference on Intelligent Autonomous Systems*
- 2022 Workshop for Perception and Navigation in Unstructured Environments (PNARUDE), *Workshop Organization at IEEE International Conference on Intelligent Robots and Systems (IROS)*

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## Theses

- 2019 **Master Thesis**  
*6-DoF Object Pose Estimation for Industrial Applications using Deep-Learning Techniques*  
Fraunhofer IOSB, Karlsruhe  
Reviewer: Prof. Dr. Jürgen Beyerer, Advisors: Manuel Martin and Marco Pattke
- 2016 **Bachelor Thesis**  
*Development of a Modular System for Handwritten Symbol Classification*  
Fraunhofer IOSB, Karlsruhe  
Reviewer: Prof. Dr. Jürgen Beyerer, Advisor: Gabriel Unmüßig

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## Scholarships

- 2013 – 2016 **German Academic Scholarship Foundation**  
Full Scholarship

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## Skills and Interests

### Programming

- C/C++ mostly for robotic applications
- Java backend development
- Python pose estimation framework using Tensorflow & Keras
- Javascript frontend development, experience with Vue, OpenLayers, Cesium, three.js

### Tools

ROS, ROS2, Linux, px4, Emacs, Docker, git, L<sup>A</sup>T<sub>E</sub>X, postgresql

### Topics of Interest

Semantic Mapping, VIO, SLAM, Image and Point Cloud Processing, Automated Planning

### Hardware of Interest

UAVs, pixhawk, embedded devices, all kinds of robots

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## Languages

**German** Native

**English** Fluent

**Swedish** Basic

*bilingual secondary school*

*stay abroad*