

Tim J. Schoonbeek

PHD CANDIDATE · COMPUTER VISION

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Summary

PhD candidate at ASML Research and Eindhoven University of Technology, in the final year of a four-year PhD program focused on developing neural networks for head-mounted augmented reality systems in industrial settings. These settings contain a wide variety of procedural actions and a significant cost associated with mistakes. A solution requires scalable and robust algorithms, which we deploy on augmented reality devices (e.g. HoloLens 2) to provide advanced support. Current research combines procedural understanding and multimodal interaction to enhance human-robot collaboration in industrial settings. Passionate about bridging the gap between AI and real-world applications, I bring a unique blend of technical expertise, hands-on experience, and creativity.

In my leisure time, I cultivate other passions, including studying Portuguese, swimming, riding and maintaining motorcycles, and traveling. As a member of the Cambridge Union Debating Society, I actively engage in critical thinking and public speaking activities.

RESEARCH INTERESTS

Computer vision, machine learning, augmented reality, human-robot interaction, egocentric video understanding

Education

University of Cambridge

Cambridge, United Kingdom

PHD VISITING STUDENT

Oct. 2024 - April 2025

- Conducted research on enhancing human-robot interaction, focusing on AI systems to assist industrial operators in procedure execution.
- Designed computer vision algorithms for quality inspection and AR support systems; conducted user studies with AR glasses.
- Reached the finals (top 2.5%) in the OxBridge AI Startup Challenge, a competition between students from Cambridge and Oxford.

International Summer School

Matera, Italy

EXTENDED REALITY AND ARTIFICIAL INTELLIGENCE

July 2023

- Completed courses on the intersection of AI & extended reality (XR) from Prof. Rita Cucchiara and Prof. Joaquim Jorge, amongst others.
- Pro-actively took up the role as a link between the programmers and designers in a multidisciplinary project, besides my technical roles.
- Won the *best project award* for our work on an XR app for engagement with cultural heritage.

Eindhoven University of Technology

Eindhoven, Netherlands

PHD IN ADVANCED AUGMENTED REALITY SOLUTIONS FOR AI-BASED SERVICITIZATION (ELECTRICAL ENGINEERING FACULTY)

Sept. 2021 - Nov. 2025

- Doctoral project funded by ASML on industrial procedure understanding using computer vision and machine learning algorithms.

Eindhoven University of Technology

Eindhoven, Netherlands

M.Sc. IN AUTOMOTIVE ENGINEERING (SPECIALIZATION: MOBILE PERCEPTION SYSTEMS)

Feb. 2019 - May 2021

- Earned the *cum laude* honours distinction for a 4.0 GPA (8.5/10).
- Master thesis "Learning to Predict Collision Risk from Simulated Optical Flow" awarded a 9.0/10.0. Conducted research on sim-to-real domain generalization by design, rather than through explicit domain adaptation techniques.
- Published paper, singled out among the top 5% of submissions for *oral presentation* at the 2022 IEEE Intelligent Vehicles Symposium.

Eindhoven University of Technology

Eindhoven, Netherlands

B.Sc. IN ELECTRICAL ENGINEERING (AUTOMOTIVE TRACK)

Sept. 2015 - Feb. 2019

- Bachelor thesis on depth estimation from disparity and segmented images awarded a 8.5/10.

Experience

ASML Research

Eindhoven, the Netherlands

PHD CANDIDATE: ADVANCED AUGMENTED REALITY SOLUTIONS FOR AI-BASED SERVICITIZATION

Sept. 2021 - Nov. 2025

- PhD project on automatic extraction of relevant and meaningful information from procedural actions within an industrial setting.
- Filed a patent, published peer-reviewed articles, and contributed to the ASML Technology Conference, the world's largest developer event.
- Held lectures on efficient video recognition and supervised three graduate students' thesis projects.

Honda Research Insititute Europe GmbH

Frankfurt, Germany

MASTER INTERNSHIP: INTERACTION-AWARE TRAJECTORY PREDICTION USING GRAPH NEURAL NETWORKS

Mar. 2020 - Jul. 2020

- Researched spatio-temporal graph neural networks for trajectory prediction of surrounding vehicles in highway driving scenarios.

Automotive Technology InMotion (Student Team)

Helmond, the Netherlands

RACE ENGINEER - PART-TIME

Sept. 2018 - Sept. 2019

- Performed and optimized drive cycle simulations for an electric endurance racing car.

Publications

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| IEEE RA-L | Tim J. Schoonbeek <i>et al.</i> , Supervised Representation Learning towards Generalizable Assembly State Recognition |
| ECCV-W 2024 | Tim J. Schoonbeek and Dan Lehman <i>et al.</i> , Find the Assembly Mistakes: Error Segmentation for Industrial Applications |
| WACV 2024 | Tim J. Schoonbeek <i>et al.</i> , IndustReal: A Dataset for Procedure Step Recognition Handling Execution Errors in Egocentric Videos in an Industrial-Like Setting |
| IEEE VR-Abs 2023 | Tim J. Schoonbeek <i>et al.</i> , Beyond Action Recognition: Extracting Meaningful Information from Procedure Recordings |
| IS&T LIM 2022 | Tim J. Schoonbeek <i>et al.</i> , Augmented Reality for Automatically Generating Robust Manufacturing and Maintenance Logs |
| IEEE IV 2022 | Tim J. Schoonbeek <i>et al.</i> , Learning to Predict Collision Risk from Simulated Video Data |

Industry Contributions

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| Patent (<i>filed</i>) | Tim J. Schoonbeek <i>et al.</i> , Contrastive Deep Learning for Scanning Electron Microscope Defect Inspection |
| ASML TC 2024 | Tim J. Schoonbeek <i>et al.</i> , Verifying Procedure States of Assemblies using Contrastive Learning and Synthetic Data |
| ASML TC 2024 | Thomas Van de Moosdijk <i>et al.</i> , Superimposed Work Instructions using Augmented Reality |
| ASML TC 2023 | Tim J. Schoonbeek <i>et al.</i> , Automated Recognition of Procedural Actions for Real-Time Understanding of Service Tasks |

Recommendations

Dr. Hans Onvlee (hans.onvlee@asml.com), senior researcher at ASML and daily supervisor for PhD:

“From the start of his PhD project at ASML, Tim has always been someone who talked about complex challenges with genuine enthusiasm, followed by getting things in place to work on these challenges with the same enthusiasm. Tim is self-propelling, gets things done, has a nice style of presenting his results and a very nice colleague to work with. Half way his project we are already beyond what I dared to believe to be possible at the time we defined it, which is completely due to his practical, ‘can do’ mentality.”

Dr.Ir. Fons van der Sommen (fvdsonnmen@tue.nl), associate prof. at Eindhoven University of Technology and daily supervisor for PhD:

“Tim is a very talented, enthusiastic and motivated student. As a MSc student, Tim was always sitting in the front row in my class on neural networks for computer vision and brought a very positive energy to the educational setting. It was no wonder that he completed my class with the highest possible mark (10/10), which only a handful of the most talented students do. After obtaining his MSc degree cum laude, he started as a PHD student under my supervision, on a very challenging project at the intersection of academia and an industry research department (ASML). For us this was pioneering work in a very important collaboration, hence, the position came with a considerable responsibility. Tim is handling this extremely well and does not need external motivation to raise the bar for himself. This is highlighted by one of his recent publication at the IEEE/CVF Workshop on Applications of Computer Vision, for which he created a publicly available data set (<https://timschoonbeek.github.io/industreal.html>) for a newly defined task, that was not yet well described in literature. This demonstrates Tim’s ambition to have broader scientific impact at the highest level. I know Tim as an open person that is very eager to learn and I would highly recommend him for a research position in the field of computer vision (both in industry and academia).”

Dr.Ir. Tim Puphal (tim.puphal@honda-ri.de), my internship supervisor at Honda Research Institute Europe:

“During his internship Tim Schoonbeek completed all his research tasks motivated and diligently, while being friendly and supportive to his supervisors. His line of action was very systematic, and he could solve complex problems thoroughly in a fast manner. In the end of his stay, he wrote his report comprehensible and detailed at the same time. We highly recommend him without any reservation as a PhD student in the university or as a scientist in the industry.”