# Martin Rudorfer *19 June 1987*

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Department of Computer Science
Aston University
Birmingham, B4 7ET, UK

m.rudorfer@aston.ac.uk
mrudorfer.github.io • linkedin.com/in/mrudorfer

## Professional Experience

**Lecturer (Assistant Professor) in Computer Science, Aston University, Birmingham, UK** 2022 – present

- Member of the Autonomous Robotics and Perception Lab
- Robotic grasping and manipulation, reproducibility of robotics research, ethics in robotics & AI

**Research Fellow in Robotics and Computer Vision, University of Birmingham, UK** 2020 – 2022

- Member of the Intelligent Robotics Lab with Mohan Sridharan and Aleš Leonardis
- Work on EU CHIST-ERA project BURG: Benchmarking and Understanding Robotic Grasping
- Data-driven robotic grasping with two-finger grippers based on single-view point clouds

**Graduate Research and Teaching Assistant, Technical University Berlin, Germany** 2014 – 2019

- Member of Industrial Automation Technology group with Jörg Krüger
- Industrial image processing, object detection and 6d pose estimation, service-based architectures in manufacturing industries and innovative strategies for industrial robot control and programming

**Lecturer, Technical University Berlin, Germany** 2016 – 2019

- Freelance engagement in a seminar which introduces didactic concepts to graduate teaching assistants and provides guidance for the design and implementation of university courses

**Lecturer, Turkish German University Istanbul, Turkey** 2015 – 2019

- Part of the Flying Faculty for the mechatronics programme

**Student Assistant, Berner & Mattner Systemtechnik GmbH (expleo), Berlin, Germany** 2013 – 2014

- Design and implementation of methods for smartphone-based traffic sign recognition

**Student Assistant, Technical University Berlin, Germany** 2010 – 2013

- Work at Machine Tools and Production Technology group of TU Berlin
- Conception and implementation of a controlling tool based on a PostgreSQL data base server with Excel/VBA clients, to support the administration of the group (ca. 40 researchers plus 60 students)
- Development of a LabVIEW-based force controller for a piezo-actuated tribometer

## Education

**PhD in Computational Engineering Science, Technical University Berlin, Germany** 2015 – 2020

- Thesis: "Towards Robust Object Detection and Pose Estimation as a Service for Manufacturing Industries" (DOI: 10.14279/depositonce-11302)
- Grade: summa cum laude

**Diploma in Computational Engineering Science, Technical University Berlin, Germany** 2007 – 2014

- Thesis: "Design and Implementation of a Classification Algorithm for Speed Limit Traffic Sign Recognition"
- Grade: 1.1, equivalent to M.Sc.

## Other Research Experiences

**Participation in the World Robot Competition, Tokyo** 2018

- Lead of team "BerlinAUTs" with members from TU Berlin, Fraunhofer IPK Berlin and TGU Istanbul
- Participation in the assembly challenge, achieving rank 10/16

**Research Visit at Czech Technical University, Prague** 2017

- Collaboration with the Multi-Robot Systems group of Martin Saska
- Work on cloud-based, multi-robot bin picking during a one-month research stay

## Highlighted Works & Publications

**End-to-End Learning to Grasp from Object Point Clouds** 2022

- Considering the problem of grasping objects with a two-finger gripper based on a partial point cloud from a single-view depth image, we propose a learning-based approach which combines contact point sampling, grasp regression, and grasp evaluation
- A. Alliegro, M. Rudorfer, F. Frattin, A. Leonardis and T. Tommasi, 'End-to-end learning to grasp via sampling from object point clouds,' *IEEE Robotics and Automation Letters*, vol. 7, no. 4, pp. 9865–9872, 2022 (Impact Score 6.54 / SJR 1.123)

**Robots Assembling Machines: Learning from the World Robot Summit 2018 Assembly Challenge** 2019

- After participating in the Assembly Challenge, we conducted a survey among all teams and analysed their competition performances to categorise different approaches and to investigate associated benefits, drawbacks and identify potential future research directions
- F. Von Drigalski, C. Schlette, M. Rudorfer, N. Correll, J. C. Triyonoputro, W. Wan, T. Tsuji and T. Watanabe, 'Robots assembling machines: Learning from the world robot summit 2018 assembly challenge,' *Advanced Robotics*, vol. 34, no. 7-8, pp. 408–421, 2020 (Impact Score 2.04 / SJR 0.466)

**Towards learning 3d object detection and 6d pose estimation from synthetic data** 2019

- Annotating 6d object poses in training images is expensive and time-consuming, therefore we explored training a Deep Neural Network with synthetic images generated using CAD models
- M. Rudorfer, L. Neumann and J. Krüger, 'Towards learning 3d object detection and 6d pose estimation from synthetic data,' in *2019 24th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, 2019, pp. 1540–1543

**Holo Pick'n'Place** 2018

- We created an intuitive, drag-and-drop-like programming approach for pick-and-place tasks with industrial robots, enabled by object detection and augmented reality using a Microsoft HoloLens
- M. Rudorfer, J. Guhl, P. Hoffmann and J. Krüger, 'Holo pick'n'place,' in *2018 IEEE 23rd International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, vol. 1, 2018, pp. 1219–1222

## Other Publications

### International Journals and Conferences

- A. Vick, M. Rudorfer and V. Vonasek, 'Benchmark concept for industrial pick&place applications,' *IOP Conference Series: Materials Science and Engineering*, vol. 1140, no. 1, 2021
- M. Ziegler, M. Rudorfer, X. Kroischke, S. Krone and J. Krüger, 'Point pair feature matching: Evaluating methods to detect simple shapes,' in *International Conference on Computer Vision Systems*, Springer, 2019, pp. 445–456
- M. Rudorfer, T. J. Pannen and J. Krüger, 'A case study on granularity of industrial vision services,' in *Proceedings of the 2nd International Symposium on Computer Science and Intelligent Control*, Best Student Paper Award, 2018, pp. 1–6
- M. Rudorfer and J. Krüger, 'Industrial image processing applications as orchestration of web services,' *Procedia CIRP*, vol. 76, pp. 144–148, 2018 (Impact Score 2.4 / SJR 0.683)
- A. Vick, C. Horn, M. Rudorfer and J. Krüger, 'Control of robots and machine tools with an extended factory cloud,' in *2015 IEEE World Conference on Factory Communication Systems (WFCS)*, IEEE, 2015, pp. 1–4

### Workshops and National Journals/Conferences

- M. Rudorfer, M. Suchi, M. Sridharan, M. Vincze and A. Leonardis, 'Burg-toolkit: Robot grasping experiments in simulation and the real world,' in *ICRA 2022 Workshop on Releasing Robots into the Wild: Simulations, Benchmarks, and Deployment*, 2022. [Online]. Available: https://arxiv.org/abs/2205.14099
- O. Kröger, J. Guhl, O. Heimann, M. Katanacho, C. Niebuhr, M. Rudorfer, T. Özkaya, J. Wassermann, J. Hügle, T. Pannen and J. Krüger, 'A service-oriented robotic manufacturing system: Lessons learned from participating in the world robot challenge 2018,' in *Tagungsband des 4. Kongresses Montage Handhabung Industrieroboter*, Springer, 2019, pp. 44–53
- M. Rudorfer, C. Krause, A. Vick and J. Krüger, 'Dienstebasierte Architekturen für Robotersysteme [service-based architectures for robot systems],' *Fortschritt-Berichte Fertigungstechnik: Produktion 2030 - Wandel in der Automatisierungstechnik*, 2019
- M. Rudorfer and M. Chemnitz, 'Dienstebasierte Integration objekt-spezifischer Lageerkennungsalgorithmen am Beispiel eines roboterbasierten Greifszenarios [service-based integration of object-specific pose detection methods for a robotic grasping scenario],' *Fortschritt-Berichte Fertigungstechnik: Industrie 4.0 - Wertschöpfungspotenziale in der dienstebasierten Produktion*, 2018
- M. Rudorfer and X. Kroischke, 'Evaluation of point pair feature matching for object recognition and pose determination in 3d scenes,' in *19. Anwendungsbezogener Workshop zur Erfassung, Modellierung, Verarbeitung und Auswertung von 3D-Daten*, GFaI Gesellschaft zur Förderung angewandter Informatik e.V., 2016, pp. 27–36

## Honors and Engagement

### Awards

- Best Student Paper Award at IARCE 2018 (Industrial Automation, Robotics, and Control Engineering), Stockholm, for the work: A case study on granularity of industrial vision services
- Nomination for the Manfred Hirschvogel award for best PhD thesis 2021

### Grants

- Securing of 10k€ travel fund for participation in the World Robot Competition 2018
- Contribution to project proposals for DFG and DAAD

### Community Engagement

- Reviewer of RA-L, IROS, ICRA, ICVS, ETFA, Procedia CIRP, and others
- Program Committee Member and Session Chair at ICVS 2021
- Co-organisation of a robotics seminar series at University of Birmingham, publication on YouTube
- Member of steering committee for postdoctoral and early career researcher development and training at University of Birmingham

## Teaching

### Modules and Courses

- As teaching assistant at Industrial Automation Technology Group, TU Berlin (2014 – 2019)

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|---|---|---|
| 50190 | Image-based Automation I | 40 students |
| 50191 | Image-based Automation II | 40 students |
| 50161 | Automation Technology Group Project | 50–80 students |
| 50061 | Robotics and Computer Vision Project | 10–15 students |
| 50355 | Industrial Robotics | 40 students |

- As Flying Faculty lecturer in Mechatronics at TGU Istanbul (2015 – 2019)

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|---|---|---|
| MEC105 | Introduction to Computer Science & Programming | 60 students |
| MEC321 | Image-based Automation I | 40 students |
| MEC324 | Image-based Automation II | 20 students |

- As Lecturer in Computer Science at Aston University (2022 – present)

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|---|---|---|
| CS4755 | Mathematics for AI | 70 students |
| CS4790 | Robotics and Autonomous Systems | tbd |
| CS3450 | Game Development | tbd |

**Supervision and Examination of Final Projects** 2015 – present

- Supervisor and examiner for 20 Master's and 6 Bachelor's theses at TU Berlin, Germany, 10 of them in cooperation with partners from industry
- Examiner of two Bachelor's theses at Czech Technical University, Prague
- Co-Supervisor for a Master's thesis at Politecnico di Torino, Italy
- Supervisor of final-year projects at Aston University, Birmingham

**Certification** 2018

- Completion of the "Continuing Education Programme for Promotion of Quality in Teaching" at TU Berlin, which is accredited following the procedure of the European Association for Quality Assurance in Higher Education (ENQA)