Rico Jonschkowski

Senior Research Scientist · Machine Learning, Robotics, Computer Vision, and RNA / Biotech

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Experience

Inceptive — *Berlin, Germany*

Member of Technical Staff — *Apr. 2022 – Present*

- Machine learning for RNA therapeutics

Google Brain — *Mountain View, USA*

Senior Research Scientist — *Nov. 2020 – Mar. 2022*

- Robotics team, machine learning and computer vision for robotics

Research Scientist — *May 2018 – Oct. 2020*

- Robotics team, unsupervised optical flow and depth estimation, differentiable algorithms

DeepMind — *London, UK*

Research Intern — *Jan. 2017 – Apr. 2017*

- unsupervised state representation learning for RL

Technische Universität Berlin — *Berlin, Germany*

Research Associate — *Oct. 2012 – Mar. 2018*

- Robotics and Biology Lab (Prof. Oliver Brock)
- Research: state representation learning, object detection, differentiable llgorithms
- Teaching: Robotics Fundamentals, Robotics, Advanced Robotics, Robotics Seminar, Robotics Project, Algorithms and Data Structures

Freie Universität Berlin — *Berlin, Germany*

Research Assistant — *Jan. 2012 – Sep. 2012*

- Machine Learning and Robotics Lab (Prof. Marc Toussaint)
- Research: temporal abstraction in reinforcement learning

Teaching Assistant — *Oct. 2009 – Sep. 2011*

- Teaching: Functional Programming, Object Oriented Programming, Computer Science and Society, Software Engineering

Education

Technische Universität Berlin — *Berlin, Germany*

Dr. rer. nat. (∼ PhD), graduated summa cum laude — *Oct. 2012 – May 2018*

- Thesis: Learning Robotic Perception Through Prior Knowledge
- Adviser: Prof. Oliver Brock

Freie Universität Berlin — *Berlin, Germany*

Master of Science, grade: 1.0, major: Robotics/AI, minor: Psychology — *Feb. 2011 – Sep. 2012*

- Thesis: New Approaches to Temporal Abstraction in Reinforcement Learning
- Adviser: Prof. Marc Toussaint

University of New South Wales — *Sydney, Australia*

Study Abroad — *Jul. 2011 – Dez. 2011*

- Project on mobile robot localization

Freie Universität Berlin — *Berlin, Germany*

Bachelor of Science, grade: 1.4, major: Computer Science, minor: Philosophy — *Oct. 2007 – Jan. 2011*

- Thesis: Behavior Control for Autonomous Humanoid Soccer Robots with XABSL
- Adviser: Prof. Raúl Rojas
- Member of RoboCup team FUmanoids

Honors & Awards

2020	**1st Place**, Robust Vision Challenge (Optical Flow), European Conference on Computer Vision (ECCV)	*Virtual*
2018	**Prize for Best EECS Dissertation**, Technische Universität Berlin, awarded by the Dr. Wilhelmy-Stiftung	*Berlin, Germany*
2017	**Best Paper Award**, Workshop "New Frontiers for Deep Learning", Robotics: Science and Systems [Jon17]	*Cambridge, MA, USA*
2016	**Best Paper Award finalist**, International Conference on Intelligent Robots and Systems (IROS) [Jon16]	*Daejeon, Korea*
2016	**Best Systems Paper**, Robotics: Science and Systems (RSS) [Epp16]	*Ann Arbor, MI, USA*
2015	**1st Place**, Amazon Picking Challenge, International Conference on Robotics and Automation (ICRA)	*Seattle, WA, USA*
2015	**Robotics Fellowship**, Twenty-Ninth Conference on Artificial Intelligence (AAAI)	*Austin, TX, USA*
2011	**4th Place**, RoboCup Worldcup	*Istanbul, Turkey*
2011	**2nd Place**, RoboCup German Open	*Magdeburg, Germany*
2011	**1st Place**, RoboCup Iran Open	*Teheran, Iran*
2010	**2nd Place**, RoboCup Worldcup	*Singapore, Singapore*
2010	**1st Place**, Technical Challenge at RoboCup Worldcup	*Singapore, Singapore*
2010	**1st Place**, RoboCup Iran Open	*Teheran, Iran*
2008	**2nd Place**, RoboCup German Open	*Hannover, Germany*

Publications

The **five most important publications** are boldfaced. *Authors contributed equally. Link to Google Scholar.

Peer-Reviewed Journal Articles

[Bod21] Cristian Bodnar, Karol Hausman, Gabriel Dulac-Arnold, and Rico Jonschkowski. A Metric Space Perspective on Self-Supervised Policy Adaptation. IEEE Robotics and Automation Letters 6 (3), 4329-4336, 2021.

[Epp18] Clemens Eppner*, Sebastian Höfer*, Rico Jonschkowski*, Roberto Martín-Martín*, Arne Sieverling*, Vincent Wall*, and Oliver Brock. Four aspects of building robotic systems: lessons from the Amazon Picking Challenge 2015. Autonomous Robots 42 (7), 1459-1475, 2018.

[JB15] Rico Jonschkowski and Oliver Brock. Learning State Representations with Robotic Priors. Autonomous Robots 39 (3), 407-428, 2015.

Peer-Reviewed Conference Papers

[Kal21] Dmitry Kalashnikov*, Jacob Varley*, Yevgen Chebotar, Benjamin Swanson, Rico Jonschkowski, Chelsea Finn, Sergey Levine, and Karol Hausman*. Scaling Up Multi-Task Robotic Reinforcement Learning. Conference on Robot Learning (CoRL), 2021.

[Sto21] Austin Stone*, Daniel Maurer*, Alper Ayvaci, Anelia Angelova, and Rico Jonschkowski. SMURF: Self-Teaching Multi-Frame Unsupervised RAFT with Full-Image Warping. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021.

[Jon20] Rico Jonschkowski, Austin Stone, Jon T. Barron, Ariel Gordon, Kurt Konolige, and Anelia Angelova. What Matters in Unsupervised Optical Flow. European Conference on Computer Vision (ECCV), 2020. ***Selected for oral presentation (2% of submissions).***

[Kar20] Peter Karkus, Anelia Angelova, Vincent Vanhoucke, and Rico Jonschkowski. Differentiable Mapping Networks: Learning Structured Map Representations for Sparse Visual Localization. International Conference on Robotics and Automation (ICRA), 2020.

[Liu20] Xingyu Liu, Rico Jonschkowski, Anelia Angelova, and Kurt Konolige. KeyPose: Multi-View 3D Labeling and Keypoint Estimationfor Transparent Objects. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 11602-11610, 2020.

[Gor19] Ariel Gordon, Hanhan Li, Rico Jonschkowski, and Anelia Angelova. Depth from Videos in the Wild: Unsupervised Monocular Depth Learning from Unknown Cameras. IEEE International Conference on Computer (ICCV), 8977-8986, 2019.

[Mor19] Marco Morik, Divyam Rastogi, and Rico Jonschkowski, Oliver Brock. State Representation Learning with Robotic Priors for Partially Observable Environments. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 6693-6699, 2019.

[JRB18] Rico Jonschkowski, Divyam Rastogi, and Oliver Brock. Differentiable Particle Filters: End-to-End Learning with Algorithmic Priors. Robotics: Science and Systems (RSS), 2018.

[Jon16] Rico Jonschkowski, Clemens Eppner, Sebastian Höfer, Roberto Martín-Martín, and Oliver Brock. Probabilistic Multi-Class Segmentation for the Amazon Picking Challenge. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2016. ***Best paper award finalist.***

[Epp16] Clemens Eppner*, Sebastian Höfer*, Rico Jonschkowski*, Roberto Martín-Martín*, Arne Sieverling*, Vincent Wall*, and Oliver Brock. Lessons from the Amazon Picking Challenge: Four Aspects of Building Robotic Systems. Robotics: Science and Systems (RSS), 2016. ***Best systems paper award.***

[JB14] Rico Jonschkowski and Oliver Brock. State Representation Learning in Robotics: Using Prior Knowledge about Physical Interaction. Robotics: Science and Systems (RSS), 2014.

Lightly Peer-Reviewed Workshop Papers

[Kan21] Juhana Kangaspunta, AJ Piergiovanni, Rico Jonschkowski, Michael Ryoo, and Anelia Angelova. Adaptive Intermediate Representations for Video Understanding. 4th Multimodal Learning and Applications Workshop at CVPR, 2021.

[Löw20] Sindy Löwe, Klaus Greff, Rico Jonschkowski, Alexey Dosovitskiy, and Thomas Kipf. Learning Object-Centric Video Models by Contrasting Sets. Workshop on Object Representations for Learning and Reasoning at NeurIPS, 2020.

[ZMJ20] Michael Zhu, Kevin Patrick Murphy, and Rico Jonschkowski. Towards Differentiable Resampling. Workshop on Structured Approaches to Robot Learning for Improved Generalization at RSS, 2020.

[KAJ19] Peter Karkus, Anelia Angelova, and Rico Jonschkowski. Differentiable Mapping Networks: Learning Task-Oriented Latent Maps with Spatial Structure. Perception as Generative Reasoning Workshop at NeurIPS, 2019.

[JS19] Rico Jonschkowski and Austin Stone. Towards Object Detection from Motion. Workshop on Robot Learning: Control and Interaction in the Real World at NeurIPS, 2019.

[Jon17] Rico Jonschkowski, Roland Hafner, Jonathan Scholz, and Martin Riedmiller. PVEs: Position-Velocity Encoders for Unsupervised Learning of Structured State Representations. New Frontiers for Deep Learning in Robotics Workshop at RSS, 2017. ***Best paper award.***

[Höf16] Sebastian Höfer, Antonin Raffin, Rico Jonschkowski, Oliver Brock, and Freek Stulp. Unsupervised Learning of State Representations for Multiple Tasks. Workshop on Deep Learning for Action and Interaction at NeurIPS, 2016.

[JB16] Rico Jonschkowski and Oliver Brock. End-To-End Learnable Histogram Filters. Workshop on Deep Learning for Action and Interaction at NeurIPS, 2016.

[JB13] Rico Jonschkowski and Oliver Brock. Learning Task-Specific State Representations by Maximizing Slowness and Predictability. International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems (ERLARS), 2013.

Other Publications

[Sto21] Austin Stone*, Oscar Ramirez, Kurt Konolige, and Rico Jonschkowski*. The Distracting Control Suite–A Challenging Benchmark for Reinforcement Learning from Pixels. arXiv:2101.02722[cs.RO], 2021.

[Jon18] Rico Jonschkowski. Learning Robotic Perception Through Prior Knowledge. Dissertation at TU Berlin, 2018. ***Dissertation prize.***

[JHB16] Rico Jonschkowski*, Sebastian Höfer*, and Oliver Brock. Patterns for Learning with Side Information. arXiv:1511.06429[cs.LG], 2016.

Presentations

2020	**Science of Intelligence @ TU/HU Berlin**, Perception in Motion	*Berlin, Germany*
2020	**European Conference on Computer Vision (ECCV)**, What Matters in Unsupervised Optical Flow	*Virtual*
2018	**Robotics: Science and Systems (RSS)**, Differentiable Particle Filters: End-to-End Learning with Algorithmic Priors	*Cambridge, MA, USA*
2016	**International Conference on Intelligent Robots and Systems (IROS)**, Probabilistic Multi-Class Segmentation for the Amazon Picking Challenge	*Daejeon, Korea*
2016	**Robotics: Science and Systems (RSS)**, Lessons from the Amazon Picking Challenge: Four Aspects of Building Robotic Systems	*Ann Arbor, MI, USA*
2016	**CSAIL @ MIT**, The Things that Robots Don't Need to Learn	*Cambridge, MA, USA*
2016	**HCRI @ Brown University**, The Things that Robots Don't Need to Learn	*Providence, RI, USA*
2015	**MILA @ Université de Montréal**, Why Machine Learning Needs Robotics	*Montreal, Canada*
2015	**Twenty-Ninth Conference on Artificial Intelligence (AAAI)**, Representation Learning for Robotics	*Austin, TX, USA*
2014	**MLR @ University of Stuttgart**, State Representation Learning in Robotics: Using Prior Knowledge about Physical Interaction	*Stuttgart, Germany*
2014	**Robotics: Science and Systems (RSS)**, State Representation Learning in Robotics: Using Prior Knowledge about Physical Interaction	*Berkeley, CA, USA*
2013	**Dagstuhl Seminar on Reinforcement Learning / EWRL**, Temporal Abstraction by Sparsifying Proximity Statistics & State Representation Learning in Robotics	*Wadern, Germany*

Open Source Code

SMURF – Unsupervised Optical Flow
https://github.com/google-research/google-research/tree/master/smurf

The Distracting Control Suite
https://github.com/google-research/google-research/tree/master/distracting_control

UFlow – Unsupervised Optical Flow
https://github.com/google-research/google-research/tree/master/uflow

Differentiable Particle Filters
https://github.com/tu-rbo/differentiable-particle-filters

Amazon Picking Challeng Object Segmentation
http://gitlab.tubit.tu-berlin.de/rbo-lab/rbo-apc-object-segmentation

Learning State Representations with Robotic Priors
http://github.com/tu-rbo/learning-state-representations-with-robotic-priors

concarne – Learning with Side Information
https://github.com/tu-rbo/concarne

Service

Organized workshop "Combining Learning and Reasoning – Towards Human-Level Robot Intelligence" (Peter Karkus, Alina Kloss, Rico Jonschkowski, Leslie P. Kaelbling) at RSS 2019

Organized workshop "Nature versus Nurture in Robotics" (Rico Jonschkowski, Oliver Brock) at ICRA 2016

Reviewed for AAAI, AURO, CoRL, CVPR, ICCV, ICRA, IJRR, IROS, JAIR, JMLR, NeurIPS, RA-L, RSS, TIP, and TRO

Recognized as outstanding reviewer at CVPR 2020, CVPR 2021, and NeurIPS 2021

Mentor for Google's CS Research Mentorship Program (CSRMP) for students from underrepresented backgrounds 2021-2022.