Daniel Tanneberg | Dr.-Ing.

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Education

Dr.-Ing. Computer Science — **TU Darmstadt**
Machine Learning & Robotics @ Intelligent Autonomous Systems Lab — *2015 – 2020*

Master of Science (with honors) — **TU Darmstadt**
Computer Science, Focus: Machine Learning | Minor: Biological Psychology — *2013 – 2015*

Bachelor of Science — **TU Darmstadt**
Computer Science — *2008 – 2013*

University qualification (german: Abitur) — **BS Gelnhausen**
Data Processing Technology, Focus: Maths & 'Technical Science' — *2007*

Research Interests

Machine Learning / AI: (Memory-augmented) Neural Networks, (Bio-inspired) Learning, Evolutionary Strategies, Lifelong Learning, Intrinsic Motivation

Computational Neuroscience: Neural Information Processing, Learning in Humans, Spiking Neural Networks, Synaptic Plasticity, Brain-Computer-Interfaces

Robotics: Open-ended and autonomous learning, Transfer Learning and Adaptation, Cognitive Robotics, Human-Robot-Interaction,

Publications

Journal Papers

1. **Tanneberg, D.**; Rueckert, E.; Peters, J. (2021). **SKID RAW: Skill Discovery from Raw Trajectories**, *IEEE Robotics and Automation Letters (⇒)*
2. **Tanneberg, D.**; Rueckert, E.; Peters, J. (2020). **Evolutionary Training and Abstraction Yields Algorithmic Generalization of Neural Computers**, *Nature Machine Intelligence* (⇒)
3. **Tanneberg, D.**; Peters, J.; Rueckert, E. (2019). **Intrinsic Motivation and Mental Replay enable Efficient Online Adaptation in Stochastic Recurrent Networks**, *Neural Networks*, (⇒)
4. van Hoof, H.; **Tanneberg, D.**; Peters, J. (2017). **Generalized Exploration in Policy Search**, *Machine Learning (MLJ)*, (⇒)
5. Rueckert, E.; Kappel, D.; **Tanneberg, D.**; Pecevski, D; Peters, J. (2016). **Recurrent Spiking Networks Solve Planning Tasks**, *Nature PG: Scientific Reports*, (⇒)

Conference Papers

1. Keller, L.; **Tanneberg, D.**; Stark, S.; Peters, J. (2020). **Model-Based Quality-Diversity Search for Efficient Robot Learning**, *International Conference on Intelligent Robots and Systems (IROS)*, (⇒)
2. **Tanneberg, D.**; Rueckert, E.; Peters, J. (2019). **Learning Algorithmic Solutions to Symbolic Planning Tasks with a Neural Computer Architecture**, *arXiv*, (⇒)
3. **Tanneberg, D.**; Peters, J.; Rueckert, E. (2017). **Online Learning with Stochastic Recurrent Neural Networks using Intrinsic Motivation Signals**, *Proceedings of the Conference on Robot Learning (CoRL)*, , (⇒)
4. **Tanneberg, D.**; Peters, J.; Rueckert, E. (2017). **Efficient Online Adaptation with Stochastic Recurrent Neural Networks**, *Proceedings of the International Conference on Humanoid Robots (HUMANOIDS)*, , (⇒)
5. **Tanneberg, D.**; Paraschos, A.; Peters, J.; Rueckert, E. (2016). **Deep Spiking Networks for Model-based Planning in Humanoids**, *Proceedings of the International Conference on Humanoid Robots (HUMANOIDS)*, (⇒)

Workshop & Symposium Papers

1. Delfosse, Q.; Stark, S.; **Tanneberg, D.**; Santucci, V.; Peters, J. (2019). **Open-Ended Learning of Grasp Strategies using Intrinsically Motivated Self-Supervision**, *Workshop at the International Conference on Intelligent Robots and Systems (IROS)*.
2. Thiem, S.; Stark, S.; **Tanneberg, D.**; Peters, J.; Rueckert, E. (2017). **Simulation of the underactuated Sake Robotics Gripper in V-REP**, *Workshop at the International Conference on Humanoid Robots (HUMANOIDS)*.
3. Sharma, D.; **Tanneberg, D.**; Grosse-Wentrup, M.; Peters, J.; Rueckert, E. (2016). **Adaptive Training Strategies for BCIs**, *Cybathlon Symposium*.
4. Friess, T.; Fiebig, K.H.; Sharma, D.; Faber, N.; Hesse, T.; **Tanneberg, D.**; Peters, J.; Grosse-Wentrup, M. (2016). **Personalized Brain-Computer Interfaces for Non-Laboratory Environments**, *Cybathlon Symposium*.

Theses

Dissertation (2020). *Understand-Compute-Adapt: Neural Networks for Intelligent Agents*
Master Thesis. (2015). *Spiking Neural Networks Solve Robot Planning Problems*
(**received the Hanns-Voith-Stiftungspreis Award 2017**)

Bachelor Thesis (2013). *Minimax based Artificial Intelligences for Tourality*

Skills & Experience

Languages: german, english (fluent)

Programming & Tools: Python (incl. numpy, tensorflow, sonnet,..), C++, Matlab, ROS, LaTeX, Visualizations (e.g., matplotlib, Omnigraffle, PS,..)

Robots & Systems: KUKA LWR arms (⇒ & ⇒), AllegroHand (⇒), BioTac sensors (⇒), SAKE Gripper (⇒), iCub (⇒), OptiTrack, EEG-based BCI, Sensor Gloves, AR/VR systems, V-REP, Gazebo

Additional Activities

Athena-Minerva Cybathlon Team — **Darmstadt / Tübingen**
Cybathlon BCI-Race team of TU Darmstadt & MPI-IS Tübingen — *2015 – 2016*

Research Assistant — **Fraunhofer IGD Darmstadt**
Department Virtual and Augmented Reality — *2010 – 2015*

Talks

2019: International Summer School on Intrinsically Motivated Open-Ended Learning, *Frankfurt a.M., Germany*
2019: EU Review Meeting, *Frankfurt a.M., Germany*
2018: EU Project Meeting, *Darmstadt, Germany*
2017: EU Review Meeting, *Frankfurt a.M., Germany*
2017: EU Project Meeting, *Paris, France*
2017: Conference on Robot Learning, *Mountain View, USA*
2016: IEEE-RAS International Conference on Humanoid Robots, *Cancún, Mexico*
2016: EU Project Kick-Off Meeting, *Rome, Italy*
2016: EU Project Final Meeting, *Darmstadt, Germany*
2015: EU Review Meeting, *Genoa, Italy*

Reviewing

2020: IEEE International Conference on Intelligent Robots and Systems (**IROS**)
2020: IEEE International Conference on Robotics and Automation (**ICRA**)
2019: IEEE Robotics and Automation Letters (**RA-L**)
2019: International Conference on Machine Learning (**ICML**)
2019: IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**)
2018: Conference on Robot Learning (**CoRL**)
2018: Robotics: Science and Systems (**R:SS**)
2018: Neural Computation
2017: PLOS Computational Biology
2016: Conference on Neural Information Processing Systems (**NeurIPS**)
2016: Frontiers in Computational Neuroscience
2016: International Joint Conference on Artificial Intelligence (**IJCAI**)

Teaching

Robot Learning Project Class: Teaching Assistant, TU Darmstadt *(Summer 2017)*
Robot Learning Lecture: Teaching Assistant, TU Darmstadt *(Winter 2017/2018)*
Machine Learning I Lecture: Teaching Assistant, TU Darmstadt *(Summer 2018)*

Student Supervision

2020 Student Project; Keller, L.; (joint supervision with Svenja Stark)
Model-Based Quality-Diversity Search for Efficient Robot Learning

2019 Honor Thesis; Hussing, M.;
Exploration through Intrinsic Motivation in Stochastic Recurrent Networks

2019 Master Thesis; Delfosse, D.; (joint supervision with Svenja Stark)
Grasping Objects Using a Goal-Discovering Architecture for Intrinsically-Motivated Learning

2019 Student Project; Keller, L.; (joint supervision with Svenja Stark)
Learning object manipulation skills through novelty search and local adaptation

2019 Student Project; Hussing, M.;
Online Adaptation, Exploration through Forgetting in Stochastic Recurrent Networks

2019 Master Thesis; Wölker, A.;
Local Pixel Manipulation Detection with Deep Neural Networks

2018 Student Project; Hu, Z.; Lölkes, C.; Yang, H.; (joint supervision with Svenja Stark)
Learning Symbolic Representations for Abstract High-Level Planning

2017 Student Project; Karl-Heinz Fiebig
Spatio-spectral Transfer Learning for Motor Performance Estimation

2017 Master Thesis; Sharma, D.; (joint supervision with Elmar Rückert)
Adaptive Training Strategies for Brain Computer Interfaces

2017 Bachelor Thesis; Polat, H.; (joint supervision with Elmar Rückert)
Nonparametric deep neural networks for movement planning

2016 Bachelor Thesis; Plage, L. M.;
Reinforcement Learning for tactile-based finger gaiting