

Name Timo Korthals, M.Sc.
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Info

Affiliation Cognitronics & Sensor Systems Group ([AG-KS](#))
Research Institute for Cognition and Robotics ([CoR-Lab](#))
Center for Cognitive Interaction Technology - Graduate School ([CITEC](#))
Bielefeld University - Germany ([UBi](#))

Interests **Learning to Act on Multi-Modal Data:** My work tackles the development of **multi-modal deep generative models** to learn **multi-sensory fusion**. In the context of **artificial intelligence**, my approach contributes to **unsupervised curiosity-driven** learning of **active sensing** for a robot fleet equipped with visual, depth, and proximity sensors (**Ph.D. due date 11/20**).

Skills embedded and high-level programming in C/C++, robotics, ROS, embedded systems development, Python, Tensorflow, curiosity driven / reinforcement / unsupervised / deep / machine learning, sensor & information fusion, Linux application development, Matlab

Academic Career

11/18 - today **BMBF Project** ML4Pro² Machine Learning for Production and Products - Distributed Robot Fleet Management (CoR-Lab)
01/17 - 12/19 **DAAD PPP Grant** on Learning to act on Multi-Modal Data in collaboration with Queensland University of Technology
02/15 **ERASMUS+ Lecturer** at Aarhus University
07/14 - 10/17 **BMBF Project** in the Leading Edge Cluster for Cyber-Physical Systems for Electronic Environment Detection and Mapping in Agriculture Scenarios (CoR-Lab)
09/13 - 12/18 **DFG Project** Mini Robot Development (CITEC)
09/13 - 06/14 **PhD Scholarship Holder** Mini Robot Development (CITEC)

Education

03/12 - 06/13 **Electrical Engineering Master - University of Paderborn** Topic: Unsupervised Learning of Acoustic- and Word-Units via Hierarchical, Generative Models
03/10 - 08/10 **Peking/China**, Beihang University of Aeronautics & Astronautics
08/07 - 03/12 **Electrical Engineering Bachelor - University of Paderborn** Topic: Evaluation of Algorithms for Creating Disparity Maps on the Basis of Monocular Video Streams

RoboCup Competitions

03/12 - 08/16 Open Challenge Rescue League: 2012 Germany (3rd)
04/14 - 04/16 Open Challenge @Home: 2014 Germany (4th), 2015 Germany (3rd), 2016 Netherlands (2nd)
08/14 - 08/16 World Cup @Home: 2014 Brasil (3rd), 2015 China (3rd), 2016 Germany (1st)

Literature

- Herbrechtsmeier, Stefan u. a. (2016). “AMiRo: A Modular & Customizable Open-Source Mini Robot Platform”. In: *ICSTCC*.
- Korthals, Timo, Andreas Skiba und Thilo Krause (2016). “Einsatz Event-Basierter Systemarchitektur für Erntemaschinen zur Elektronischen Umfelderkennung”. In: *74. Tagung LAND. TECHNIK*. VDI e.V.
- Korthals, Timo u. a. (2016a). “Evidenzkarten-basierte Sensorfusion zur Umfelderkennung und Interpretation in der Ernte”. In: *Informatik in der Land-, Forst und Ernährungswirtschaft*, S. 15–18.
- Korthals, Timo u. a. (2016b). “Occupancy Grid Mapping with Highly Uncertain Range Sensors based on Inverse Particle Filters”. In: *ICINCO 2016 - Proceedings of the 13th International Conference on Informatics in Control, Automation and Robotics 2*.
- Borgsen, Sebastian Meyer zu u. a. (2017). “ToBI – Team of Bielefeld: Enhancing Robot Behaviors and the Role of Multi-robotics in RoboCup@Home”. In: *RoboCup 2016: Robot World Cup XX*. Hrsg. von Sven Behnke u. a. Cham: Springer International Publishing, S. 577–588.
- Korthals, Timo u. a. (2017a). “Semantical Occupancy Grid Mapping Framework”. In: *2017 European Conference on Mobile Robots, ECMR 2017*. IEEE.
- Korthals, Timo u. a. (2017b). “Towards Inverse Sensor Mapping in Agriculture”. In: *IROS 2017 Workshop on Agricultural Robotics: learning from Industry 4.0 and moving into the future*. Vancouver.
- Korthals, T u. a. (2018a). “Path Evaluation via HMM on Semantical Occupancy Grid Maps”. In: *ArXiv e-prints*. arXiv: [1805.02944](https://arxiv.org/abs/1805.02944) [cs.R0].
- Korthals, Timo, Thilo Krause und Thorsten Jungeblut (2018). *Elektronische Umfelderkennung bei Erntemaschinen : Verbundprojekt itsOWL-EUE innerhalb des Spitzenclusters it's OWL : Abschlussbericht des itsOWL-EUE Konsortiums*. Techn. Ber. Claas Selbstfahrende Erntemaschinen GmbH, S. 1–38.
- Korthals, Timo, Jürgen Leitner und Ulrich Rückert (2018). “Coordinated Heterogeneous Distributed Perception based on Latent Space Representation”. In: *IROS 2018 Second Workshop on Multi-robot Perception-Driven Control and Planning*. arXiv: [arXiv:1809.04558v1](https://arxiv.org/abs/1809.04558v1).
- Korthals, Timo u. a. (2018b). “Obstacle Detection and Mapping in Agriculture for Process Evaluation”. In: *Frontiers in Robotics and AI Robotic Control Systems* 1.1.
- Neitemeier, Dennis u. a. (2018). *AGRICULTURAL WORK MACHINE FOR AVOIDING ANOMALIES*.
- Homburg, Jonas Dominik u. a. (2019). “Constraint Exploration of Convolutional Network Architectures with Neuroevolution”. In: *International Work-Conference on Artificial Neural Networks*. Springer, S. 735–746.
- Korthals, Timo (2019). *M² VAE - Derivation of a Multi-Modal Variational Autoencoder Objective from the Marginal Joint Log-Likelihood*. arXiv: [arXiv:1903.07303](https://arxiv.org/abs/1903.07303).
- Korthals, Timo, Malte Schilling und Jürgen Leitner (2019). *A Perceived Environment Design using a Multi-Modal Variational Autoencoder for learning Active-Sensing*. arXiv: [1911.00584](https://arxiv.org/abs/1911.00584) [cs.R0].
- Korthals, Timo u. a. (2019a). “Fiducial Marker based Extrinsic Camera Calibration for a Robot Benchmarking Platform”. In: *European Conference on Mobile Robots, ECMR 2019, Prague, CZ, September 4-6, 2019*, S. 1–6.
- Korthals, Timo u. a. (2019b). “Jointly Trained Variational Autoencoder for Multi-Modal Sensor Fusion”. In: *22st International Conference on Information Fusion, FUSION 2019, Ottawa, CA, July 2-5, 2019*, S. 1–8.
- Korthals, Timo u. a. (2019c). “Multi-Modal Generative Models for Learning Epistemic Active Sensing”. In: *2019 IEEE International Conference on Robotics and Automation, ICRA 2019, Montreal, CA, May 20-25, 2019*. Montreal, Canada.
- Korthals, Timo u. a. (2019d). “Multisensory Assisted In-hand Manipulation of Objects with a Dexterous Hand”. In: *2019 IEEE International Conference on Robotics and Automation Workshop on Integrating Vision and Touch for Multimodal and Cross-modal Perception, ViTac 2019, Montreal, CA, May 20-25, 2019*, S. 1–2.

- Sang, C. L. u. a. (2019). “A Comparative Study of UWB-based True-Range Positioning Algorithms using Experimental Data”. In: *2019 16th Workshop on Positioning, Navigation and Communications (WPNC)*. IEEE, S. 1–6.
- Sang, Cung Lian u. a. (2019). “A Bidirectional Object Tracking and Navigation System using a True-Range Multilateration Method”. In: *2019 International Conference on Indoor Positioning and Indoor Navigation (IPIN)*. IEEE, S. 1–8.
- Schilling, Malte, Kai Konen und Timo Korthals (2020). “Modular Deep Reinforcement Learning for Emergent Locomotion on a Six-Legged Robot”. In: *2020 8th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)*. New York City, USA.
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