Info

Name	Dr.-Ing. Timo Korthals
Web Page	https://www.timo-korthals.de/
Skills	sensor & information fusion, robotics, curiosity driven / reinforcement / unsupervised / deep / machine learning, embedded and high-level programming in C/C++, ROS, embedded systems development, Python, Tensorflow, Linux application development, Yocto, Matlab

Professional Career

01/21 - today	**DLR Project** Agri-Gaia - An agribusiness AI ecosystem for the agri-food industry (CES)
10/20 - today	CLAAS E-Systems GmbH (CES)

Ph.D. Thesis

Affiliation	Bielefeld University - Cognitronics & Sensor Systems Group
Title	Deep Generative Models for Multi-Modal Perception under the Influence of Ambiguity
At-A-Glance	My work tackled the **learning of acting on multi-modal data** while facilitating **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.

Academic Career

Affiliations	Cognitronics & Sensor Systems Group (AG-KS) Research Institute for Cognition and Robotics (CoR-Lab) Center for Cognitive Interaction Technology (CITEC) Bielefeld University - Germany (UBi)
11/18 - 09/20	**BMBF Project** ML4Pro^2 Machine Learning for Production and Products - Distributed Robot Fleet Management (CoR-Lab in association with **Miele Cie. KG**)
11/17 - 02/18	**BMBF Concept Elaboration** for Self-Organising Machine Control Systems for Cooperating Agbot Fleets entitled Agrosystems of the Future (CITEC)

01/17 - 12/19	**DAAD PPP Grant** on Learning to act on Multi-Modal Data in collaboration with Queensland University of Technology
02/15 - 02/16	**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 in association with **CLAAS KGaA mbH**)
09/13 - 12/18	**DFG Project** Mini Robot Developement (CITEC)
09/13 - 06/14	**PhD Scholarship Holder** Mini Robot Developement (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 Monucalur Video Streams

RoboCup Competitions

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

Literature

Herbrechtsmeier, Stefan et al. (2016). "AMiRo: A Modular & Customizable Open-Source Mini Robot Platform". In: *ICSTCC*.

Korthals, Timo, Andreas Skiba, and Thilo Krause (2016). "Einsatz Event-Basierter Systemarchitektur für Erntemaschinen zur Elektronischen Umfelderkennung". In: *74. Tagung LAND.TECHNIK*. VDI e.V.

Korthals, Timo et al. (2016a). "Evidenzkarten-basierte Sensorfusion zur Umfelderkennung und Interpretation in der Ernte". In: *Informatik in der Land-, Forst und Ernährungswirtschaft*, pp. 15–18.

Korthals, Timo et al. (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 et al. (2017). "ToBI – Team of Bielefeld: Enhancing Robot Behaviors and the Role of Multi-robotics in RoboCup@Home". In: *RoboCup 2016: Robot World Cup XX*. Ed. by Sven Behnke et al. Cham: Springer International Publishing, pp. 577–588.

Korthals, Timo et al. (2017a). "Semantical Occupancy Grid Mapping Framework". In: *2017 European Conference on Mobile Robots, ECMR 2017*. IEEE.

Korthals, Timo et al. (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 et al. (2018a). "Path Evaluation via HMM on Semantical Occupancy Grid Maps". In: *ArXiv e-prints*. arXiv: 1805.02944 [cs.RO].

Korthals, Timo, Thilo Krause, and Thorsten Jungeblut (2018). *Elektronische Umfelderkennung bei Erntemaschinen : Verbundprojekt itsOWL-EUE innerhalb des Spitzenclusters it's OWL : Abschlussbericht des itsOWL-EUE Konsortiums*. Tech. rep. Claas Selbstfahrende Erntemaschinen GmbH, pp. 1–38.

Korthals, Timo, Jürgen Leitner, and 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.

Korthals, Timo et al. (2018b). "Obstacle Detection and Mapping in Agriculture for Process Evaluation". In: *Frontiers in Robotics and AI Robotic Control Systems* 1.1.

Korthals, Timo (2019). *M^2 VAE - Derivation of a Multi-Modal Variational Autoencoder Objective from the Marginal Joint Log-Likelihood*. arXiv: arXiv : 1903 . 07303.

Korthals, Timo, Malte Schilling, and Jürgen Leitner (2019). *A Perceived Environment Design using a Multi-Modal Variational Autoencoder for learning Active-Sensing*. arXiv: 1911.00584 [cs.RO].

Korthals, Timo et al. (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, pp. 1–6.

Korthals, Timo et al. (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*, pp. 1–8.

Korthals, Timo et al. (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 et al. (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*, pp. 1–2.

Bach, Nicolas et al. (2020). "Learn to move through a combination of policy gradient algorithms: Ddpg, d4pg, and td3". In: *Machine Learning, Optimization, and Data Science: 6th International Conference, LOD 2020, Siena, Italy, July 19–23, 2020, Revised Selected Papers, Part II 6*. Springer International Publishing, pp. 631–644.

Schilling, Malte, Kai Konen, and 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)*. IEEE, pp. 946–953.

Schilling, Malte et al. (2020). "Decentralized deep reinforcement learning for a distributed and adaptive locomotion controller of a hexapod robot". In: *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, pp. 5335–5342.

Korthals, Timo (2021). "Deep Generative Models for Multi-Modal Perception under the Influence of Ambiguity". In:

Melnik, Andrew et al. (2021). "Using Tactile Sensing to Improve the Sample Efficiency and Performance of Deep Deterministic Policy Gradients for Simulated In-Hand Manipulation Tasks". In: *Frontiers in Robotics and AI*, p. 57.