Hanna Krasowski

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Position_

06/2024 – today Postdoc Electrical Engineering and Computer Sciences · University of California, Berkeley

Affiliations _____ 11/2022 – 05/2024 Junior Member Munich Center for Machine Learning · TUM & LMU Munich 05/2020 - 05/2024 Member DFG Graduate School ConVeY · TUM & LMU Munich 05/2020 – 05/2024 PhD student Graduate School of Computation, Information and Technology · TUM Munich Interests _____ Methods reinforcement learning · formal methods · temporal logic · reachability analysis Topics autonomous systems · robotics · motion planning safety-critical applications · Education ____ **Technical University of Munich** Munich, Germany **PhD in Computer Science** 04/2020 - 06/2024 (exp.) School of Computation, Information and Technology Cyber-Physical Systems Group (Matthias Althoff) **California Institute of Technology** Pasadena, CA, US **RESEARCH VISIT** 07/2022 - 12/2022

Department of Mechanical and Civil Engineering AMBER Lab (Aaron D. Ames)

Technical University of Munich

MSc Robotics, Cognition, Intelligence Focus on artificial intelligence and machine learning | passed with high distinction

Technical University of Darmstadt

BSc Mechanical and Process Engineering Focus on product development and mechatronics | Top 10%

Boğaziçi University

STUDY ABROAD (ERASMUS+ PROGRAM)

Department of Mechanical Engineering

Publications _____

* first author(s)

Munich, Germany

10/2017 - 02/2020

10/2013 - 04/2017

Istanbul, Turkey

09/2015 - 03/2016

Darmstadt, Germany

JOURNAL ARTICLES

Hanna Krasowski^{*} and Matthias Althoff. "Provable Traffic Rule Compliance in Safe Reinforcement Learning on the Open Sea". In: *IEEE Transactions on Intelligent Vehicles* (2024), pp. 1–18. DOI: 10.1109/TIV.2024.3400597

- Hanna Krasowski^{*}, Jakob Thumm^{*}, Marlon Müller, Lukas Schäfer, Xiao Wang, and Matthias Althoff. "Provably Safe Reinforcement Learning: Conceptual Analysis, Survey, and Benchmarking". In: *Transactions on Machine Learning Research* (2023). eprint: https://openreview.net/pdf?id=mcN0ezbnz0
- Niklas Kochdumper*, **Hanna Krasowski***, Xiao Wang*, Stanley Bak, and Matthias Althoff. "Provably Safe Reinforcement Learning via Action Projection using Reachability Analysis and Polynomial Zonotopes". In: *IEEE Open Journal of Control Systems* 2 (2023), pp. 79–92. DOI: 10.1109/0JCSYS.2023.3256305

CONFERENCE PAPERS

- Hanna Krasowski^{*}, Prithvi Akella, Aaron D. Ames, and Matthias Althoff. "Safe Reinforcement Learning with Probabilistic Guarantees Satisfying Temporal Logic Specifications in Continuous Action Spaces". In: *IEEE Conference on Decision and Control*. 2023, pp. 4372–4378. DOI: 10.1109/CDC49753.2023.10383601
- Andreas Doering*, Marius Wiggert*, **Hanna Krasowski**, Manan Doshi, Pierre F.J. Lermusiaux, and Claire J. Tomlin. "Stranding Risk for Underactuated Vessels in Complex Ocean Currents: Analysis and Controllers". In: *IEEE Conference on Decision and Control*. 2023, pp. 7055–7060. DOI: 10.1109/CDC49753.2023.10383383
- Hanna Krasowski^{*}, Yinqiang Zhang^{*}, and Matthias Althoff. "Safe Reinforcement Learning for Urban Driving using Invariably Safe Braking Sets". In: *In Proc. of the IEEE Int. Conf. on Intelligent Transportation Systems (ITSC)*. 2022, pp. 2407–2414. DOI: 10.1109/ITSC55140.2022.9922166
- Hanna Krasowski* and Matthias Althoff. "CommonOcean: Composable Benchmarks for Motion Planning on Oceans". In: In Proc. of the IEEE Int. Conf. on Intelligent Transportation Systems (ITSC). 2022, pp. 1676–1682. DOI: 10.1109/ITSC55140. 2022.9921925
- Hanna Krasowski* and Matthias Althoff. "Temporal Logic Formalization of Marine Traffic Rules". In: In Proc. of the Intelligent Vehicles Symposium (IV). 2021, pp. 186–192. DOI: 10.1109/IV48863.2021.9575685
- Xiao Wang*, **Hanna Krasowski**, and Matthias Althoff. "CommonRoad-RL: A Configurable Reinforcement Learning Environment for Motion Planning of Autonomous Vehicles". In: *In Proc. of the IEEE Int. Conf. on Intelligent Transportation Systems (ITSC)*. 2021, pp. 466–472. DOI: 10.1109/ITSC48978.2021.9564898
- Hanna Krasowski^{*}, Xiao Wang^{*}, and Matthias Althoff. "Safe Reinforcement Learning for Autonomous Lane Changing Using Set-Based Prediction". In: *Proc. of the IEEE Int. Conf. on Intelligent Transportation Systems (ITSC)*. 2020, pp. 1–7. DOI: 10.1109/ITSC45102.2020.9294259

UNDER REVIEW

- Matthias Killer*, Marius Wiggert*, **Hanna Krasowski**, Manan Doshi, Pierre F.J. Lermusiaux, and Claire J. Tomlin. *Maximizing Seaweed Growth on Autonomous Farms: A Dynamic Programming Approach for Underactuated Systems Navigating on Uncertain Ocean Currents*. 2023. arXiv: 2307.01916
- Roland Stolz*, **Hanna Krasowski***, Jakob Thumm, Michael Eichelbeck, Philipp Gassert, and Matthias Althoff. *Excluding the Irrelevant: Focusing Reinforcement Learning through Continuous Action Masking*. 2024. arXiv: 2406.03704

Software Packages

CommonOcean Benchmarking framework for motion planning on oceans

CommonRoad-RL Reinforcement learning environment for motion planning of autonomous vehicles

Invited Talks_

- December 2023. *Benchmarking for motion planning Showcasing CommonRoad and beyond*. CDC 2023, Workshop on Benchmarking, Reproducibility, and Open-Source Code in Controls, Singapore. Youtube recording.
- October 2023. Toward Trustworthy Cyber-physical Systems Through Provably Safe Reinforcement Learning. Group seminar, Murat Arcak, UC Berkeley.
- November 2022. Provably Safe Reinforcement Learning General Framework and Results for Autonomous Driving. Group seminar, Hybrid Systems Lab (Claire J. Tomlin), UC Berkeley.
- July 2022. Provably Safe Reinforcement Learning Motion Planning for Safety-critical Tasks. Group seminar, Ames-Burdick Labs, Caltech.

June 2021. *Temporal Logic Formalization of Marine Traffic Rules*. ConVeY seminar, LMU/TUM Munich.

July 2020. Safe Reinforcement Learning for Autonomous Lane Changing Using Set-based Prediction. ConVeY seminar, LMU/TUM Munich.

Teaching Experience_____

Lectures				
Summer 2021 & 2022 Fall 2020 & 2021	Cyber-Physical Systems, Teaching assistant Formal Methods for Cyber-Physical Systems, Teaching assistant and lecture conceptualization			
Student Projects				
Fall 2020 – Fall 2023 Fall 2020 – Summer 2022	 Practical course · Motion Planning for Autonomous Vehicles, Advising students on group programming projects Selected topics: motion planning for autonomous vessels; set-based prediction of vessels; benchmarking marine motion planning Seminar · Cyber-Physical Systems, Advising students on literature research Selected topics: acfe rainforsement learning with legical specifications dynamic yearsel models 			
	and their applications; safe multi-agent reinforcement learning			
STUDENT THESES SUPERVISION				
2020 -	Master theses, six at Technical University of Munich (TUM) and two at University of California Berkeley (UCB)			
2020 -	Bachelor theses, six at Technical University of Munich (TUM)			
Skills				

Programming	Python (proficient) \cdot LaTeX (proficient) \cdot Matlab (advanced) \cdot C++ (advanced) \cdot C (beginner) \cdot
Languages	German (native) · English (fluent) · Swedish (beginner) · Turkish (beginner) · French (beginner)

Professional Experience

03/2019 - 04/2019	Visiting associate · Boston Consulting Group
03/2018 - 07/2018	Innovation project · Bosch Center for Artificial Intelligence
05/2017 – 07/2017	Internship · Continental Powertrain Research & Development
04/2015 - 08/2016	Undergraduate teaching assistant · Technical University of Darmstadt
07/2013 - 08/2013	Manufacturing internship · Liebherr Group

Service to the Profession _____

INITIATIVES		
2020 - 2023	TUM Entdeckerinnen, Organization of recurring 2-day robotics workshop for female high-school students	TUM
2018 –	Girls macht MI(N)T!, Lead initiatives of female role models who encourage female students to consider a career in STEM	Femtec Alumnae
Committees	& ORGANIZATION	
04/2022	ConVeY Workshop Spring 2023, Organization of a four-day workshop with poster sessions and talks for the ConVeY graduate school at Neuschönau, Germany	ConVeY
2021 – 2022	Faculty Appointment Committee, Interview and selection process for associate professorship in computer science	TUM
2021 – 2024	CPS-RL Seminar Series, Organization of bi-weekly group-internal seminar on reinforcement learning for cyber-physical systems	TUM
10/2021	CPS Workshop, Organization of a four-day workshop for CPS group at Lake Garda, Italy	TUM
10/2020	CPS Workshop, Organization of a three-day workshop for CPS group in Munich, Germany	TUM

PEER REVIEW

Journals: Transactions on Vehicular Technology (TVT), Transactions on Intelligent Vehicles (TIV), Transactions on Intelligent Transportation Systems (T-ITS)

Conferences: International Conference on Robotics and Automation (ICRA), International Conference on Intelligent Robots and Systems (IROS), Conference on Decision and Control (CDC), Conference on Learning for Decision and Control (L4DC), Conference on Intelligent Transportation Systems (ITSC), Advanced Control of Chemical Processes (ADCHEM)

Awards, Fellowships, & Grants _____

- 2022 Research stay scholarship, German Academic Exchange Service (DAAD)
- 2021 Exceptional engagement award, Femtec Alumae Association (FTA)
- 2019 2024 Fast forward program membership, Boston Consulting Group (BCG)

2018 – 2019 Study scholarship, Technical University of Munich (TUM)