Tobias Fabian Niehues

Academic Curriculum Vitæ

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in *Tobias Niehues*
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Research Interests

General Interests	Computational Modeling, (Inverse) Decision-Making, Machine Learning, Perception & Action

Education

Since 04/2024	**PhD Student Cognitive Science** *Psychology of Information Processing Lab, Centre for Cognitive Science,* *Technical University of Darmstadt, Germany*
04/2020 - 02/2024	**Master of Science Autonomous Systems (Computer Science)** *Technical University of Darmstadt, Germany* Majors: Machine Learning & Robotics Grade average: 1.11 (scale 1-4, 1.0 best)
10/2020 - 11/2022	**Bachelor of Science Cognitive Science** *Technical University of Darmstadt, Germany* Final grade average: 1.13 (scale 1-4, 1.0 best); Majors: Perception & Action, (Inverse) Decision-Making
04/2018 - 04/2020	**Bachelor of Science Information Systems Technology** *Technical University of Darmstadt, Germany* Final grade average: 1.36 (scale 1-4, 1.0 best); Major: Control Theory and Systems Theory
10/2016 - 03/2018	**Bachelor of Science Electrical Engineering** *Technical University of Darmstadt, Germany* Cancelled due to change to Information Systems Technology
06/2016	**High School Diploma & College Entrance Qualification (Abitur)** *Martin-Niemöller-Schule Wiesbaden, Germany* Advanced Courses: Mathematics & Computer Science Final grade average: 1.4, (scale 1-4, 1.0 best)

Research & Work Experience

since 10/2021	**Student Research Assistant** ***Psychology of Information Processing Lab***, *Centre for Cognitive Science, Technical University of Darmstadt, Germany* ○ Research on active vision and human decision-making ○ Implementation, supervision and analysis of experiments involving different eye-tracking hard- and software
05/2020 - 03/2021	**Student Research Assistant** ***Real-Time Systems Lab***, *Technical University of Darmstadt, Germany* ○ Implementation of a domain-specific language in the context of pattern matching, graph transformations and triple-graph-grammars ○ Minor support in teaching as well (e.g. supervision of exams)
09/2017 - 02/2020	**Student Teaching Assistant** ***Computer Systems Group***, *Technical University of Darmstadt, Germany* ○ Supervision of groups of students and teaching them the concepts of the lecture *Logic Design* in each winter term ○ Designing and creating the course material for the lecture
04/2018 - 10/2019	**Student Teaching Assistant** ***Research Group Optimization***, *Technical University of Darmstadt, Germany* ○ Supervision of groups of students and teaching them the concepts of the lecture *mathematics for electrical engineering* (optimization, numerical methods and statistics) in each summer term. Also correcting the exam.

Publications & Talks

VSS 2024, Poster	**Bayesian inference of perceptual uncertainty, behavioral costs, and prior beliefs for continuous perception-action tasks** @ ***Annual Meeting of the Vision Sciences Society (VSS)***, *St. Pete Beach, Florida, USA*

Theses & Research Projects

03/2023 - 02/2024 **Approximate Bayesian Inference of Parametric Cost Functions in Continuous Decision-Making (Master's Thesis)**
Psychology of Information Processing Lab, *Centre for Cognitive Science, Technical University of Darmstadt, Germany*
Master's Thesis on decision-making in perception-and-action-tasks, using Bayesian methods and deep learning to infer parametric cost functions describing human behavior, supervised by Prof. Constantin Rothkopf; Prof. Jan Peters and Dominik Straub – [thesis] [code]

04/2022 - 11/2022 **Do Humans Adapt Their Planning Horizon? (Bachelor's Thesis)**
Psychology of Information Processing Lab, *Centre for Cognitive Science, Technical University of Darmstadt, Germany*
Bachelor's Thesis on human planning behavior leveraging eye-tracking data, supervised by Prof. Constantin Rothkopf and Florian Kadner – [thesis] [code] [poster]

10/2021 - 03/2022 **Theory of Mind Models for Human Robot Interaction under Partial Observability**
Institute for Intelligent Autonomous Systems, *Technical University of Darmstadt, Germany*
Integrated Project: Robot Learning with Franziska Herbert and Fabian Kalter on an artificial theory of mind for human-robot-interaction under partial observability, supervised by Prof. Jan Peters; Dr. Joni Pajarinen (University of Aalto, Helsinki, Finland); Dorothea Koert, PhD and David Rother – [report]

04/2021 - 09/2021 **Self-Paced Absolute Learning Progress as a Regularized Approach to Curriculum Learning**
Institute for Intelligent Autonomous Systems, *Technical University of Darmstadt, Germany*
Integrated Project: Robot Learning with Ulla Scheler on a new regularization method for reinforcement / curriculum learning, supervised by Prof. Jan Peters and Pascal Klink – [arxiv] [code]

10/2019 - 04/2020 **Specification of Rule-Based Simulations of Biochemical Processes (Bachelor's Thesis)**
Real-Time Systems Lab, *Technical University of Darmstadt, Germany*
Bachelor's Thesis on designing and implementing a domain-specific language for rule-based simulations of biochemical processes via graph transformations, supervised by Prof. Dr. rer. nat. Andy Schürr and Sebastian Ehmes – [thesis] [code]

Teaching Experience

Summer Term 2024, Seminar **Statistical Modeling for Cognitive Science**
Technical University of Darmstadt, Germany
Undergraduate course with weekly exercises and seminars, focused on statistical models of human behavior, especially with respect to Bayesian statistics and inference methods.

Voluntary Work

10/2023 - 02/2024 **Mentoring for Cognitive Science**
Student Council Human Sciences, *Technical University of Darmstadt, Darmstadt, Germany*
○ Mentor for the freshmen in cognitive science
○ Supervision of groups of and contact person for freshmen to provide a comfortable arrival in their new study environment
○ Organizing informational and educational events for the freshmen and all other cognitive science students
○ Organizing social events for networking within the student body

04/2023 - 04/2024 **Team Leader for Education and Domestic Work**
Engineers Without Borders, *Darmstadt, Germany*
○ Team Leader of the BILA-Group ("Bildung und Inlandsarbeit", providing workshops and general education related to EWB-topics within EWB but also at schools or other public institutions and events). My activities as a team leader include organizing events, moderating meetings and coordinating with the other groups on a regional and national level.
○ Also part of the SoWaDi-Group (designing a **So**lar thermal **Wa**ter **Di**sinfection plant for Tansania)
○ Member since 02/2023

06/2019 - 12/2022 **Member & Chair of the University's Sustainability Group**
TU Darmstadt Sustainability Group, *Technical University of Darmstadt, Germany*
○ Responsibilities included organizing events (e.g. panel discussions, lectures, etc.), public relations and IT administration.
○ Chair from 01/2021 to 12/2021
○ Co-Chair from 01/2020 to 12/2020
○ Member since 06/2019

01/2019 - 08/2019 **Member & Developer**
TU Darmstadt Space Technology Group, *Technical University of Darmstadt, Germany*
○ The TU Darmstadt Space Technology Group aims to build their own CubeSat, a small-scale satellite
○ I was part of the development team for the satellite's onboard-computer

06/2019 - 12/2022	**Member & Multiplier**
	Initiative "Climate Class", *German Federation for the Environment and Nature Conservation*
	○ We conducted several projects and workshops with school classes from grades 5 to 13
	○ Aim of the project was teaching and exploring the possibilities of a sustainable lifestyle in everyday life and at school together

Scholarships & Awards

Scholarship	○ Issued by *The Adaptive Mind*, a research cluster on the adaptive abilities and dynamics of the human mind during the summer term 2023
	○ Supporting my master's thesis *"Approximate Bayesian Inference of Cost Functions in Continuous Decision-Making"*
Jugend Forscht Alumni (since 2016)	○ *Jugend Forscht* is a network that supports young researchers in their scientific development
	○ Winner of *best interdisciplinary project* on regional level and *special prize for renewable energies* on federal level (one qualified upwards over regional and federal to national level) in 2016 with our project *Experimental Optimization of a Savonius-Darrieus-VAWT (Vertical Axis Wind Turbine)*

Additional Knowledge

Programming	Python, C/C++, Java, Matlab, LaTeX
Tools & Skills	NumPy, SciPy, Matplotlib, PyTorch, TensorFlow, Probabilistic Programming (TensorFlow Probability & PyMC), Scikit-Learn, Eye-Tracking, Design of Psychological Experiments

Tobias F. Niehues
Darmstadt, April 12, 2024