Peter Werner

Citizenship: Swiss and US | wernerpe@mit.edu

LinkedIn | Google Scholar | wernerpe.github.io

Education

Massachusetts Institute of Technology (MIT) — Cambridge, MA
Ph.D. in electrical engineering and computer science in Prof. Daniela Rus' group — *Sep. 2021 – ...*

Eidgenössische Technische Hochschule Zürich (ETHZ) — Zürich
Bachelor in Mechanical and Process Engineering, focus on mechatronics — *Sep. 2016 – May 2020*
Masters in Robotics, Systems and Control, focus on learning and control. — *Sep. 2020 – May 2021*

University of Pennsylvania (UPenn) — Philadelphia
Exchange Semester at UPenn counting towards my MSc degree at ETHZ. — *Jan. 2020 – May 2020*

Gymnasium and Military Service — Bern and Zürich region
Gymnasium Kirchenfeld Matura in Physics and applied Mathematics, one year military service — *Aug. 2013 – May 2016*

Project and Work Experience

Grad. Research Assistant | *MARL, Combinatorial & Convex Optimization* | Prof. D. Rus — Sep. 2021 – present

- Research on applied multi-agent reinforcement learning for multi-robot coordination, and collision-free motion planning. (Distributed Robotics Laboratory CSAIL, MIT)

ANYmal learns Badminton | *Python, C++, Reinforcement Learning* | Prof. M. Hutter — Mar. 2021 – Sep. 2021

- For my master's thesis I used deep reinforcement learning in Nvidia Isaac Gym to train ALMA C (ANYmal with arm) to play a simplified version of badminton. (Robotic Systems Laboratory, ETHZ)

Vision-Based Sensing | *Python, C++, Computer Vision* | Prof. R. D'Andrea — Jan. 2019 – Sep. 2019

- For my bachelor's thesis I developed and implemented vision-based proprioceptive sensing for an inflatable linear soft actuator at the Institute for Dynamical Systems and Control (ETHZ). → Paper, Video

Research Assistant | *Python, C++, ROS, Optimization, Machine Learning* — Sep. 2019 – May 2020

- Modeling of residual dynamics of VoliroX drone using Gaussian Process Regression and Locally Weighted Projection Regression at the Autonomous Systems Lab (ETHZ). My work included the implementation of an optimization based compensation scheme to reduce the effects of the residual dynamics.
- Implementation of a model predictive contouring controller for autonomous racing on the F1TENTH platform at mLab, UPenn: Github

Undergraduate Teaching Assistant — Sep. 2018 – May 2019

- Held weekly recitations for courses in Mechanics, Dynamics and Quantum Mechanics for roughly 30 students
- Was selected as one of the best TAs for Quantum Mechanics and asked to hold an exam preparation course

Awards & Prizes

2x Outstanding D-MAVT Bachelor Award (1st year, overall) — ETH Zürich, Sep. 2017 & 2020
Received once for achieving one of the top 5 grade averages out of 543 students on the first year examinations and a second time for graduating with one of the top 5 GPAs out of 262 graduates.

SGA Förderpreis — SGA, Nov. 2019
Award for the best Bachelor's Thesis in the field of Automatic Control issued by the Swiss Society for Automatic Control (Schweizerische Gesellschaft für Automatik, SGA)

Excellence Scholarship & Opportunity Programme — ETH Zürich, Mar. 2020
Merit-based full-ride scholarship throughout the whole Master's program, awarded by the rector of ETH.

WAFR 2022 Best Paper Award — WAFR, Jun. 2022
Award for the best paper accepted to the 15th international Workshop on the Algorithmic Foundations of Robotics (WAFR). Title: *Finding and Optimizing Certified, Collision-Free Regions in Configuration Space for Robot Manipulators.*

ICRA 2023 Best Workshop Paper Award ICRA, Jun. 2023

Award for the best paper at the Multi-Robot Learning workshop at ICRA 2023. Title: *Dynamic Multi-Team Racing: Competitive Driving on 1/10-th Scale Vehicles via Learning in Simulation*

Publications

[1] Hongkai Dai*, Alexandre Amice*, **Peter Werner**, Annan Zhang, and Russ Tedrake. "Certified polyhedral decompositions of collision-free configuration space". In: *arXiv preprint arXiv:2302.12219* (2023).

[2] **Peter Werner***, Tim Seyde*, Paul Drews, Thomas Matrai Balch, Igor Gilitschenski, Wilko Schwarting, Guy Rosman, Sertac Karaman, and Daniela Rus. "Dynamic Multi-Team Racing: Competitive Driving on 1/10-th Scale Vehicles via Learning in Simulation". In: *7th Annual Conference on Robot Learning*. 2023.

[3] Alexandre Amice*, Hongkai Dai*, **Peter Werner**, Annan Zhang, and Russ Tedrake. "Finding and optimizing certified, collision-free regions in configuration space for robot manipulators". In: *International Workshop on the Algorithmic Foundations of Robotics*. Springer. 2022, pp. 328–348.

[4] Tim Seyde, **Peter Werner**, Wilko Schwarting, Igor Gilitschenski, Martin Riedmiller, Daniela Rus, and Markus Wulfmeier. "Solving Continuous Control via Q-learning". In: *The Eleventh International Conference on Learning Representations*. 2022.

[5] **Peter Werner**, Matthias Hofer, Carmelo Sferrazza, and Raffaello D'Andrea. "Vision-based proprioceptive sensing: Tip position estimation for a soft inflatable bellow actuator". In: *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2020, pp. 8889–8896.

Preprints

[1] Alexandre Amice, **Peter Werner**, and Russ Tedrake. "Certifying Bimanual RRT Motion Plans in a Second". In: (2023).

[2] **Peter Werner**, Alexandre Amice, Tobia Marcucci, Russ Tedrake, and Daniela Rus. "Approximating Robot Configuration Spaces with few Convex Sets using Clique Covers of Visibility Graphs". In: (2023).

Technical Skills

Languages: Python, C/C++, Matlab
Frameworks and Libraries: ROS, pandas, NumPy, Matplotlib, OpenCV, pyTorch, keras, CASADI, ForcesPRO, gym, isaacgym, Drake, CVXPY, Gurobi, Mosek
Developer Tools: Git, Docker, Visual Studio, PyCharm, CMake
Engineering Tools: Linux, Solidworks, Siemens NX, Latex, MS Office

Additional

Languages: English (native), German (proficient), Swiss German (native), French (working proficiency)
Interests: Running, hiking, badminton, skiing, comics, curating memes