

Jonas Frey

PH.D. STUDENT · ETH ZÜRICH · MAX PLANCK INSTITUTE · ROBOTICS & LEARNING
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Research Interest

Main Areas perception, navigation, locomotion, reinforcement learning, intrinsic motivation, mapping
Applications search & rescue, long-term autonomy, legged robots, environmental monitoring

Education

Ph.D. in Robotics - ongoing

LEARNING PERCEPTION, NAVIGATION, AND LOCOMOTION - TOWARDS AUTONOMOUS LEGGED ROBOTS IN THE WILD

ETH Zurich / MPI-IS

Mar. 2022 - now

M.Sc. in Robotics Systems and Control - summa cum laude / mit Auszeichnung

THESIS: CONTINUAL LEARNING OF SEMANTIC SEGMENTATION FOR MOBILE ROBOTS - BEST GRADE 6.0/6.0

ETH Zurich

Sep. 2019 - Aug. 2021

B.Sc. Electrical Engineering - Top ~ 5%

THESIS: DEEP NEURAL NETWORKS FOR DEFORMATION MODELLING IN ROBOTICS - BEST GRADE 1.0/1.0

Karlsruhe Institute of Technology

Oct. 2015 - Jan. 2019

Work and Research Experience

Visiting Researcher

UNIVERSITY OF OXFORD - DYNAMIC ROBOT SYSTEMS GROUP

- Collaboration as part of the EU DigiForest Project
- Development of a Visual Traversability Estimation Framework

England

1/2023 - 1/2023

Visiting Researcher

NASA - JET PROPULSION LABORATORY

- Navigation and Traversability Estimation for Off-Road Vehicle
- Development of the RoadRunner Framework

USA, CA

9/2022 - 3/2023

Robotics Engineer

ETH ZÜRICH - ROBOTIC SYSTEMS LAB

- Navigation and Traversability Estimation for Legged Robot ANYmal C
- PyTorch, Physics Simulation, Sparse CNN, ROS

Switzerland

9/2021 - 3/2022

Hardware Designer

ETH ZÜRICH - ROBOTIC SYSTEMS LAB

- PCB-Design: Altium Designer in collaboration with Bota Systems
- Industrial Standards (EtherCAT, HighSpeed, Cortex)

Switzerland

2/2020 - 10/2020

Collaborative Robotics Engineer

SEW-EURODRIVE - R&D DEPARTMENT

- Navigation software stack development for mobile robots
- Industrial automation C++ 11 (ROS) and IEC-61131-3
- Application software (KUKA Robot Language)

Germany

2/2019 - 8/2019

Research Visit

ROBOT LEARNING - NARA INSTITUTE OF SCIENCE AND TECHNOLOGY

- Implementation and validation of a statistical Deep Neural Network for deformation modeling for robotics.
- Bachelor's Thesis, Experience in TensorFlow and ROS

Japan

6/2018 - 8/2018

Research Assistant / Internship

KARLSRUHE INSTITUTE OF TECHNOLOGY - HIGH-PERFORMANCE HUMANOID TECHNOLOGIES

- Design of a Battery and Power Management System
- Integration into the Humanoid Robot ARMAR-6 (EU SecondHands Project)

Germany

6/2017 - 6/2018

Robotics in High-School

SIMPERT-KRAEMER-GYMNASIUM

Germany

09/2007 - 07/2015

- Participation at the International RoboCup Junior.
- 2nd place in Germany 2013.
- Development of autonomous soccer and rescue robots

Teaching

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|------|--|------------|
| 2022 | Teaching Assistance , Course: Perception and Learning for Robotics (PLR) - Dr. Cesar Cadena | ETH Zurich |
| 2022 | Student Supervision , 8 x Master's Thesis, 15 x Semester Projects, 7 x PLR - Course Projects, 3x Others | ETH Zurich |
| 2017 | Teaching Assistance , Course: Digital Technologies - Prof. Jürgen Becker | KIT |

Others

SCHOLARSHIPS

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|------|---|-------------|
| 2022 | Doctoral Fellowship , Max Planck ETH Center for Learning Systems (CLS) | Switzerland |
| 2019 | Scholarship of the German people , for Master's Degree ETH Zurich | Germany |
| 2019 | Karolina Ruedi Foundation , for Master's Degree ETH Zurich | Switzerland |
| 2018 | Scholarship - Continuous Learning in International Collaborative Studies , for Bachelor's Thesis | Japan |

AWARDS

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| 2021 | Best Paper Runner-Up , NeurIPS 2021 - 4th Robot Learning Workshop Self-Supervised and Lifelong Learning | Virtual |
| 2013 | 2th Place , RoboCup Junior - Germany | Germany |
| 2013 | 3th Place , RoboCup Junior - Regional | Germany |

SERVICES

Reviewing, ICRA, IROS, TRO, RA-L, CoRL

OTHERS

- | | | |
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| 2024 | Volunteer , RoboCup Junior Vöhringen - Refeere (2024) | Germany |
| 2019 | Volunteer , RoboCup Junior Vöhringen - Refeere (2019) | Germany |

Publications

JOURNAL ARTICLES

RoadRunner - Learning Traversability Estimation for Autonomous Off-road Driving

Jonas, Frey, Shehryar Khattak, Patel Manthan, Atha Deegan, Nubert Julian, Padgett Curtis, Hutter Marco, Spieler Patrick
under review for Field Robotics (2024)

Wild Visual Navigation: Fast Traversability Learning via Pre-Trained Models and Online Self-Supervision

Matias Mattamala, **Jonas, Frey**, Piotr Libera, Nived Chebrolu, Georg Martius, Cesar Cadena, Marco Hutter, Maurice Fallon
under review for Autonomous Robots (2024)

SMUG Planner: A Safe Multi-Goal Planner for Mobile Robots in Challenging Environments

Changan Chen, **Jonas, Frey**, Philip Arm, Marco Hutter
IEEE Robot. Autom. Lett. (RA-L) 8.11 (2023) PP. 7170–7177. IEEE

Seeing Through the Grass: Semantic Pointcloud Filter for Support Surface Learning

Anqiao Li, Chenyu Yang, **Jonas, Frey**, Joonho Lee, Cesar Cadena, Marco Hutter
IEEE Robot. Autom. Lett. (RA-L) 8.11 (2023) PP. 7687–7694. IEEE

Continual Adaptation of Semantic Segmentation using Complementary 2D-3D Data Representations

Jonas, Frey, Hermann Blum, Francesco Milano, Roland Siegwart, Cesar Cadena
IEEE Robot. Autom. Lett. (RA-L) 7.4 (2022) PP. 11665–11672. IEEE

CONFERENCE PROCEEDINGS

Position Paper: Learning with 3D rotations, a hitchhiker's guide to SO(3)

A. René Geist, **Jonas, Frey**, Zobro Mikel, Levina Anna, Georg Martius
under review, 2024

Resilient Legged Local Navigation: Learning to Traverse with Compromised Perception End-to-End

Jin Jin, Chong Zhang, **Jonas, Frey**, Nikita Rudin, Matias Mattamala, Cesar Cadena, Marco Hutter
IEEE Int. Conf. Robot. Autom. (ICRA), 2024

Learning risk-aware quadrupedal locomotion using distributional reinforcement learning

Lukas Schneider, **Jonas, Frey**, Takahiro Miki, Marco Hutter

IEEE Int. Conf. Robot. Autom. (ICRA), 2024

MEM: Multi-Modal Elevation Mapping for Robotics and Learning

Gian Erni, **Jonas, Frey**, Takahiro Miki, Matias Mattamala, Marco Hutter

IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS), 2023

Fast Traversability Estimation for Wild Visual Navigation

Jonas, Frey, Matias Mattamala, Nived Chebrolu, Cesar Cadena, Maurice Fallon, Marco Hutter

Robotics: Science and Systems (RSS), 2023, Daegu, Republic of Korea

Versatile skill control via self-supervised adversarial imitation of unlabeled mixed motions

Chenhao Li, Sebastian Blaes, Pavel Kolev, Marin Vlastelica, **Jonas, Frey**, Georg Martius

IEEE Int. Conf. Robot. Autom. (ICRA), 2023

Unsupervised Continual Semantic Adaptation through Neural Rendering

Zhizheng Liu, Francesco Milano, **Jonas, Frey**, Roland Siegwart, Hermann Blum, Cesar Cadena

IEEE Int. Conf. Computer Vision and Pattern Recognition, 2023

Locomotion policy guided traversability learning using volumetric representations of complex environments

Jonas, Frey, David Hoeller, Shehryar Khattak, Marco Hutter

IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS), 2022

Learning Agile Skills via Adversarial Imitation of Rough Partial Demonstrations

Chenhao Li, Marin Vlastelica, Sebastian Blaes, Jonas Frey, Felix Grimmering, Georg Martius

Conf. on Robot Learning (CoRL), 2022