Leonard Bruns

Doctoral Candidate

Personal Details

Address	Löjtnantsgatan 13, 11550 Stockholm, Sweden
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Website	`https://roym899.github.io/`
Date of birth	5th September 1994 in Nastätten, Germany

Education

since 2019 **Doctoral Candidate**, *KTH Royal Institute of Technology*, Stockholm
Computer Science
Division of Robotics, Perception and Learning, supervised by Prof. Patric Jensfelt

2017–2019 **Master of Science**, *KTH Royal Institute of Technology*, Stockholm
T.I.M.E. Double Degree in Systems, Control and Robotics
Track: Robotics and Autonomous Systems
GPA 3.94[1]

2016–2019 **Master of Science**, *RWTH Aachen University*, Aachen
Electrical Engineering, Information Technology and Computer Engineering
Track: Information and Communication Technology
German grade *1.0* (excellent) / GPA 4.0 / Top 4%

2013–2016 **Bachelor of Science**, *RWTH Aachen University*, Aachen
Electrical Engineering, Information Technology and Computer Engineering
Track: Micro- and Nanotechnology
German grade 1.3 (excellent) / GPA 3.8 / Top 2%

Experience

since 03/2023 **Software Engineer**, *Rerun*, Stockholm
working part-time on visualizing recent computer vision algorithms with Rerun's open-source software to showcase possibilities, provide feedback, and test its functionality

since 10/2019 **Doctoral Candidate**, *KTH Royal Institute of Technology*, Stockholm
conducting research on shape and pose estimation of objects and SLAM with neural scene representations; further collaborations on visual relocalization and Bayesian inference in dynamic environments; completed doctoral courses necessary for graduation (totaling 60 ECTS)

03/2019 – 09/2019 **Master's Thesis Student**, *Robert Bosch GmbH*, Renningen
investigated the use of deterministic sequences and precomputed sets to achieve provable guarantees for sampling-based motion planning algorithms for nonholonomic systems, published in *IEEE Robotics and Automation Letters* and filed patent

06/2018 – 08/2018 **Internship**, *Ericsson Research*, Stockholm
researched state-of-the-art calibration of mixed reality headsets, implemented calibration algorithms, cross-platform development for both iOS and Microsoft HoloLens, estimation of eye offset by mounting a camera inside the headset using OpenCV for image analysis, lead-authored related patent

[1] Swedish grades: A→4.0, B→3.5, ..., E→2.0; German grades: 1.0→4.0, 4.0→2.0 (ECTS weighted, linear)

04/2017 – 08/2017 **Internship**, *Bosch Deepfield Robotics*, Renningen
performed multibody simulation and parameter identification of robot arm, implemented trajectory generation in Matlab, implemented and tested trajectory generation in ROS using C++, reduced latencies in ROS Control using PluginLib

11/2016 – 01/2017 **Student Assistant**, *RWTH Aachen University, Chair of Navigation*
involved in the development of the Satellite Navigation Lab, implemented GPS signal decoding and subsequent calculation of the position, added visualization of the process with Matlab UI

10/2015 – 02/2016 **Student Assistant**, *RWTH Aachen University, Chair of Electrical Engineering and Computer Systems*
designed layout and analyzed an integrated circuit to test resistive switches

11/2018 – 12/2018
04/2015 – 07/2015
10/2014 – 02/2015 **Teaching Assistant**, *RWTH Aachen University & KTH Royal Institute of Technology*
led practical exercise sessions and labs of up to 30 students in various computer science-related courses, covering programming fundamentals, various algorithms, and computer vision fundamentals

Languages

German	Native
English	Fluent (C1)
Swedish	Basic knowledge (B1/B2)

Technologies

Languages	**Python**, **C/C++**, Matlab, C#, JavaScript, LaTeX, HTML/CSS
Programs & Libraries	**ROS**, **OMPL**, **PyTorch**, **OpenCV**, **Open3D**, Blender, Matlab Simulink, Unity3D, Microsoft Office
OS	**Linux**, Microsoft Windows, macOS

Awards

2020	Friedrich Wilhelm Award for outstanding master's thesis
2020	Springorium Denkmünze for graduating with honors
2014–2019	Scholarship of the RWTH Education Fund
2014–2019	Dean's List of RWTH Aachen (top 5% in the program)
2013	DMV-Abiturpreis & Naspa-Schulpreis for outstanding performance in maths

Publications

2024 **Leonard Bruns**, Jun Zhang, Patric Jensfelt. Neural Graph Mapping for Scalable Dense SLAM with Loop Closure. *in submission*.

2024 José Manuel Gaspar Sánchez, **Leonard Bruns**, Jana Tumova, Patric Jensfelt, Martin Törngren. Transitional Grid Maps: Efficient Analytical Inference of Dynamic Environments under Limited Sensing. *arXiv*.

2023 **Leonard Bruns**, Patric Jensfelt. RGB-D-Based Categorical Object Pose and Shape Estimation: Methods, Datasets, and Evaluation. *Robotics and Autonomous Systems*.

2023 Fereidoon Zangeneh, **Leonard Bruns**, Patric Jensfelt. A Probabilistic Framework for Visual Localization in Ambiguous Scenes. *IEEE International Conference on Robotics and Automation*.

2022 **Leonard Bruns**, Patric Jensfelt. SDF-based RGB-D Camera Tracking in Neural Scene Representations. *IEEE ICRA Workshop on Motion Planning with Implicit Neural Representations of Geometry*.

2022 **Leonard Bruns**, Patric Jensfelt. SDFEst: Categorical Pose and Shape Estimation of Objects From RGB-D Using Signed Distance Fields. *IEEE Robotics and Automation Letters*.

2022 **Leonard Bruns**, Patric Jensfelt. On the Evaluation of RGB-D-Based Categorical Pose and Shape Estimation. *Intelligent Autonomous Systems 17*. **Best paper finalist**.

2022 José Araújo, **Leonard Bruns**, Diego G. Morin, Ioannis Karagiannis, Amir H. T. Kouhestani. Calibration of mobile electronic devices connected to headsets wearable by users. *US Patent*.

2021 **Leonard Bruns**, Kai O. Arras, Luigi Palmiri. Method and device for deterministic sampling-based motion planning. *US Patent Application*.

2021 Eric Heiden[1], Luigi Palmieri[1], **Leonard Bruns**, Kai O. Arras, Gaurav S. Sukhatme & Sven Koenig. Bench-MR: A Motion Planning Benchmark for Wheeled Mobile Robots. *IEEE Robotics and Automation Letters*.

2019 Luigi Palmieri[1], **Leonard Bruns**[1], Michael Meurer & Kai O. Arras. Dispertio: Optimal Sampling For Safe Deterministic Motion Planning. *IEEE Robotics and Automation Letters*.

[1] Equal contribution