Lucas **Nunes**

PhD Student and Research Assistant · Center for Robotics, University of Bonn

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Research Interests

Generative Models · Representation learning · 3D scene understanding · Perception

Education

Ph.D. Student — *University of Bonn*

Supervisor: Prof. Dr. Cyrill Stachniss — *Nov 2020 – Present*

M.Sc. in Computer Science — *University of São Paulo*

Thesis: "Environment reconstruction on disparity images using surface features and Generative Adversarial Networks" — *Feb 2018 – Mar 2020*

(Supervisor: Prof. Dr. Denis F. Wolf)

Internship Student — *Karlsruhe Institute of Technology*

Aug 2018 – Nov 2018

Bachelor in Computer Science — *University of São Paulo*

Jan 2013 – Jan 2018

Academic Positions

Doctoral Researcher — *University of Bonn*

Photogrammetry & Robotics Lab, Institute of Geodesy and Geoinformation — *since Nov 2020*

Master Researcher — *University of São Paulo*

Mobile Robotis Laboratory, Institute of Mathematics and Computer Science — *Feb 2018 – Mar 2020*

Junior Research Assistant — *University of São Paulo*

Mobile Robotis Laboratory, Institute of Mathematics and Computer Science — *Ago 2014 – Jun 2017*

Teaching

From Perceptron to Generative Adversarial Networks: The Evolution of Neural Networks — 2019

Mini Course in the Institute of Mathematics and Computer Science in São Carlos, Brazil

Machine Learning for Robotics and Computer Vision, Summer Semester 2021 — 2021

In charge of tutorials, assignments preparations and corrections for the Machine Learning for Robotics and Computer Vision from the University of Bonn

Machine Learning for Robotics and Computer Vision, Summer Semester 2021 — 2022

In charge of tutorials, assignments preparations and corrections for the Machine Learning for Robotics and Computer Vision from the University of Bonn

M.Sc. Project Supervisor: Open-World Panoptic Segmentation of Traffic Participants, 2023 — 2023

Supervised a M.Sc. Project with the title "Open-World Panoptic Segmentation of Traffic Participants" at the University of Bonn

Techniques for Self-Driving Cars, Winter Semester 2023 — 2023

Lecture on Unsupervised Learning for the Techniques for Self-Driving Cars from the University of Bonn

Advanced Techniques for Mobile Sensing and Robotics, Summer Semester 2024 — 2024

Gave lectures from the photogrammetry related topics in the Advanced Techniques for Mobile Sensing and Robotics course together with Prof. Dr. Cyrill Stachniss.

Advanced Techniques for Mobile Sensing and Robotics, Summer Semester 2025 — 2025

Lecturer in the Advanced Techniques for Mobile Sensing and Robotics course from the University of Bonn

Thesis Supervision

M.Sc. Thesis - Novel View Synthesis of Indoor Dynamic Scenes
Supervisor a M.Sc. Thesis with the title "Novel View Synthesis of Indoor Dynamic Scenes" from the University of Zurich — 2024

Invited Talks

How Autonomous Vehicles can perceive what is happening around and make decisions?
Data Science Sanca Meetup. São Carlos, Brazil. — Mar 2018

The Autonomous Vehicles Revolution: A New Relation Between User and Vehicle.
4CORP Meetup, Futurecom. São Paulo, Brazil. — Out 2019

Academic Services

Editorial Services & Reviewing

Reviewer for conferences: IROS, ICRA, IV, ICCV
Reviewer for Journals: RA-L, T-RO, T-PAMI

Professional Experience

Software Engineer — *IVEX*
Apr 2020 – Nov 2020
Development of front and back-end for safety assessment tool and urban simulated environments in the context of autonomous vehicles.

Technical Leader — *Juristec+*
Jan 2019 – Apr 2020
Coordination of a web crawler programming team for data collection and development/maintenance of a back-end database server.

Python Developer — *Juristec+*
Jan 2018 – Aug 2018
Development of web crawler python scripts for data collection.

Additional Skills

Languages
- Portuguese: Native
- English: Upper-Intermediate
- German: Beginner

Programming
- C
- Python
- Java
- R
- Matlab

Frameworks
- Scikit-learn
- Tensorflow
- Keras
- Pytorch

Technical experience
- Linux Operating System
- Robot Operating System (ROS)
- Parallel programming
- SQL/NoSQL Database
- Data mining
- CARLA Simulator

Publication List

Peer-reviewed journal articles

[1] R. Marcuzzi, L. Nunes, E. Marks, L. Wiesmann, T. Läbe, J. Behley, and C. Stachniss, "SfmOcc: Vision-Based 3D Semantic Occupancy Prediction in Urban Environments," *IEEE Robotics and Automation Letters (RA-L)*, 2025.

[2] L. Wiesmann, T. Läbe, L. Nunes, J. Behley, and C. Stachniss, "Joint Intrinsic and Extrinsic Calibration of Perception Systems Utilizing a Calibration Environment," *IEEE Robotics and Automation Letters (RA-L)*, vol. 9, no. 10, pp. 9103–9110, 2024.

[3] R. Marcuzzi, L. Nunes, L. Wiesmann, J. Behley, and C. Stachniss, "Mask-Based Panoptic LiDAR Segmentation for Autonomous Driving," *IEEE Robotics and Automation Letters (RA-L)*, vol. 8, no. 2, pp. 1141–1148, 2023.

[4] R. Marcuzzi, L. Nunes, L. Wiesmann, E. Marks, J. Behley, and C. Stachniss, "Mask4D: End-to-End Mask-Based 4D Panoptic Segmentation for LiDAR Sequences," *IEEE Robotics and Automation Letters (RA-L)*, vol. 8, no. 11, pp. 7487–7494, 2023.

[5] L. Wiesmann, L. Nunes, J. Behley, and C. Stachniss, "KPPR: Exploiting Momentum Contrast for Point Cloud-Based Place Recognition," *IEEE Robotics and Automation Letters (RA-L)*, vol. 8, no. 2, pp. 592–599, 2023.

[6] X. Chen, B. Mersch, L. Nunes, R. Marcuzzi, I. Vizzo, J. Behley, and C. Stachniss, "Automatic Labeling to Generate Training Data for Online LiDAR-Based Moving Object Segmentation," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 3, pp. 6107–6114, 2022.

[7] R. Marcuzzi, L. Nunes, L. Wiesmann, I. Vizzo, J. Behley, and C. Stachniss, "Contrastive Instance Association for 4D Panoptic Segmentation using Sequences of 3D LiDAR Scans," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 2, pp. 1550–1557, 2022.

[8] B. Mersch, X. Chen, I. Vizzo, L. Nunes, J. Behley, and C. Stachniss, "Receding Moving Object Segmentation in 3D LiDAR Data Using Sparse 4D Convolutions," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 3, pp. 7503–7510, 2022.

[9] L. Nunes, R. Marcuzzi, X. Chen, J. Behley, and C. Stachniss, "SegContrast: 3D Point Cloud Feature Representation Learning through Self-supervised Segment Discrimination," *IEEE Robotics and Automation Letters (RA-L)*, vol. 7, no. 2, pp. 2116–2123, 2022.

[10] L. Nunes, X. Chen, R. Marcuzzi, A. Osep, L. Leal-Taixé, C. Stachniss, and J. Behley, "Unsupervised Class-Agnostic Instance Segmentation of 3D LiDAR Data for Autonomous Vehicles," *IEEE Robotics and Automation Letters (RA-L)*, 2022.

Peer-reviewed conference papers

[1] L. Nunes, R. Marcuzzi, B. Mersch, J. Behley, and C. Stachniss, "Scaling Diffusion Models to Real-World 3D LiDAR Scene Completion," in *Proceedings of the IEEE/CVF Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2024.

[2] M. Sodano, F. Magistri, L. Nunes, J. Behley, and C. Stachniss, "Open-World Semantic Segmentation Including Class Similarity," in *Proceedings of the IEEE/CVF Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2024.

[3] H. Lim, L. Nunes, B. Mersch, X. Chen, J. Behley, H. Myung, and C. Stachniss, "ERASOR2: Instance-Aware Robust 3D Mapping of the Static World in Dynamic Scenes," in *Proceedings of Robotics: Science and Systems (RSS)*, 2023.

[4] L. Nunes, L. Wiesmann, R. Marcuzzi, X. Chen, J. Behley, and C. Stachniss, "Temporal Consistent 3D LiDAR Representation Learning for Semantic Perception in Autonomous Driving," in *Proceedings of the IEEE/CVF Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2023.

[5] I. Vizzo, B. Mersch, L. Nunes, L. Wiesmann, T. Guadagnino, and C. Stachniss, "Toward Reproducible Version-Controlled Perception Platforms: Embracing Simplicity in Autonomous Vehicle Dataset Acquisition," in *Proc. of the Intl. Conf. on Intelligent Transportation Systems Workshops*, accepted, 2023.

[6] D. Bruno, L. P. N. Matias, J. Amaro, F. S. Osório, and D. Wolf, "Computer Vision System with 2D and 3D Data Fusion for Detection of Possible Auxiliaries Routes in Stretches of Interdicted Roads," in *Proceedings of the Annual Hawaii International Conference on System Sciences (HICSS)*, 2019, pp. 7372–7381.

[7] L. P. N. Matias, M. Sons, J. R. Souza, D. F. Wolf, and C. Stiller, "VeIGAN: Vectorial Inpainting Generative Adversarial Network for Depth Maps Object Removal," in *2019 IEEE Intelligent Vehicles Symposium (IV)*, 2019, pp. 310–316.

[8] L. P. N. Matias, T. C. Santos, D. F. Wolf, and J. R. Souza, "Trajectory Planning for UGV Using Clothoids," in *Robotics*, F. Santos Osório and R. Sales Gonçalves, Eds., Springer International Publishing, 2016, pp. 281–298.

[9] L. P. N. Matias, T. C. Santos, D. F. Wolf, and J. R. Souza, "Path Planning and Autonomous Navigation using AMCL and AD," in *2015 12th Latin American Robotics Symposium and 2015 3rd Brazilian Symposium on Robotics (LARS-SBR)*, 2015, pp. 320–324.

Preprint papers

[1] L. Nunes, R. Marcuzzi, J. Behley, and C. Stachniss, "Towards Generating Realistic 3D Semantic Training Data for Autonomous Driving," *arXiv Preprint*, vol. arXiv:2503.21449, 2025.

[2] L. P. N. Matias, J. R. Souza, and D. F. Wolf, "Environment reconstruction on depth images using Generative Adversarial Networks," *arXiv Preprint*, vol. arxiv:1912.03992, 2019.

Thesis

[1] L. Nunes, "Environment reconstruction on disparity images using surface features and Generative Adversarial Networks," M.S. thesis, University of São Paulo, 2020.