

# Lucas Nunes

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## Research Interests

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

## Education

### Ph.D. Student

SUPERVISOR: PROF. DR. CYRILL STACHNISS

University of Bonn

Nov 2020 – Present

### M.Sc. in Computer Science

THESIS: "ENVIRONMENT RECONSTRUCTION ON DISPARITY IMAGES USING SURFACE FEATURES AND GENERATIVE ADVERSARIAL NETWORKS"

(SUPERVISOR: PROF. DR. DENIS F. WOLF)

University of São Paulo

Feb 2018 – Mar 2020

### 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

PHOTOGRAMMETRY & ROBOTICS LAB, INSTITUTE OF GEODESY AND GEOINFORMATION

University of Bonn

since Nov 2020

### Master Researcher

MOBILE ROBOTIS LABORATORY, INSTITUTE OF MATHEMATICS AND COMPUTER SCIENCE

University of São Paulo

Feb 2018 – Mar 2020

### Junior Research Assistant

MOBILE ROBOTIS LABORATORY, INSTITUTE OF MATHEMATICS AND COMPUTER SCIENCE

University of São Paulo

Ago 2014 – Jun 2017

## Teaching

### From Perceptron to Generative Adversarial Networks: The Evolution of Neural Networks

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

2019

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

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

2021

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

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

2022

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

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

2023

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

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

2024

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

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

2025

## Supervision

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### M.Sc. Project - Open-World Panoptic Segmentation of Traffic Participants

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

2023

### 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

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### 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

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### EDITORIAL SERVICES & REVIEWING

**Reviewer for conferences:** IROS, ICRA, IV, ICCV

**Reviewer for Journals:** RA-L, T-RO, T-PAMI

## Professional Experience

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### Software Engineer

DEVELOPMENT OF FRONT AND BACK-END FOR SAFETY ASSESSMENT TOOL AND URBAN SIMULATED ENVIRONMENTS IN THE CONTEXT OF AUTONOMOUS VEHICLES.

*IVEX*  
Apr 2020 – Nov 2020

### Technical Leader

COORDINATION OF A WEB CRAWLER PROGRAMMING TEAM FOR DATA COLLECTION AND DEVELOPMENT/MAINTENANCE OF A BACK-END DATABASE SERVER.

*Juristec+*  
Jan 2019 – Apr 2020

### Python Developer

DEVELOPMENT OF WEB CRAWLER PYTHON SCRIPTS FOR DATA COLLECTION.

*Juristec+*  
Jan 2018 – Aug 2018

## Additional Skills

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### 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

## 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] Y. Chong, L. Nunes, F. Magistri, X. Zhong, J. Behley, and C. Stachniss, “Zero-Shot Semantic Segmentation for Robots in Agriculture,” in *Proceedings of the IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, 2025.
- [2] E. Marks, L. Nunes, F. Magistri, M. Sodano, R. Marcuzzi, L. Zimmermann, J. Behley, and C. Stachniss, “Tree Skeletonization from 3D Point Clouds by Denoising Diffusion,” in *Proceedings of the IEEE/CVF Int. Conf. on Computer Vision (ICCV)*, 2025.
- [3] 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.
- [4] 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.
- [5] 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.
- [6] 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.
- [7] 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.
- [8] 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.
- [9] L. P. N. Matias, M. Sons, J. R. Souza, D. F. Wolf, and C. Stiller, “VelGAN: Vectorial Inpainting Generative Adversarial Network for Depth Maps Object Removal,” in *2019 IEEE Intelligent Vehicles Symposium (IV)*, 2019, pp. 310–316.
- [10] 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.
- [11] 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.