

# ANTON BREDENBECK

## PhD Researcher

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anton-bredenbeck

antbre



## EXPERIENCE

### Ph.D. Researcher

#### TU Delft

⌚ June 2022 – now ⚖️ Delft, Netherlands

- Supervised by Salua Hamaza and Cosimo Della Santina I am conducting research on how drones can better exploit contact in guidance, navigation and control.
- Visiting researcher @UC Berkeley working with Mark W. Mueller on a tactile approach to high-speed collision recovery for UAVs.
- Actively involved in teaching through master student supervision, exercise development, and outreach activities.

### Research & Teaching Assistant

#### Julius-Maximilians University

⌚ June 2020 – August 2021 ⚖️ Würzburg, Germany

- Worked on project DAEDALUS on hardware-and software of the robotic prototype for 3D point-cloud mapping of lunar caves.
- TA for "Advanced Sensory Systems and Sensor Data Processing".

### Research Assistant

#### DFKI

⌚ October 2020 – December 2020 ⚖️ Bremen, Germany

Worken on project Fast & Slow on software development for a ROS 2 interface to enable reinforcement learning of TurtleBots.

### Working Student

#### Zentrum für Telematik e.V.

⌚ October 2019 – December 2019 ⚖️ Würzburg, Germany

Validation, design and manufacturing of electronics for CubeSats

### Research Assistant

#### Finish Geospatial Research Institute

⌚ March 2019 – August 2019 ⚖️ Helsinki, Finland

Development of a GNSS-interference detection-and surveillance service (GNSS-Finland) and a "Dual Frequency Measurement Correction" System for Android Devices.

## STRENGTHS

Hard-working Resilient Thorough

Robotics Control Estimation Tactile Sensing Design

C/C++ Python ROS 2 ROS MATLAB Julia

## EDUCATION

### Ph.D. in Robotics

#### Biomimetic Intelligence Lab, TU Delft

⌚ June 2022 – now ⚖️ Delft, Netherlands

I work on "*Tactile-driven Control for Aerial Robots*". Thereby I want to enable **aerial robots** to robustly and safely **interact** with the world around them, while exploiting contact as a source of information.

### M.Sc. in Satellite Technology

#### Julius-Maximilians University

⌚ 2019 – 2022 ⚖️ Würzburg, Germany

Graduate with honors with the grade (1,0).

- Six months specialization in Robotics & Control @CTU in Prague
- Master thesis @ESA/ESTEC working on trajectory optimization and control for a free floating platform. The results were published at IROS 2022 in Kyoto.

### B.Sc. in Aerospace Computer Science

#### Julius-Maximilians University

⌚ 2016 – 2019 ⚖️ Würzburg, Germany

Six month internship at the Finish Geospatial Research Institute in Helsinki, Finland.

## REFEREES

### Prof. Dr. Salua Hamaza

@ Biomimetic Intelligence Lab, Assistant Professor, TU Delft  
✉️ s.hamaza@tudelft.nl

### Prof. Dr. Mark W. Mueller

@ HiPeR Lab, Associate Professor, UC Berkeley  
✉️ mwm@berkeley.edu

### Prof. Dr. Cosimo Della Santina

@ Cognitive Robotics, Associate Professor, TU Delft  
✉️ c.dellasantina@tudelft.nl

# PUBLICATIONS

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## Journal Articles

- A. Bredenbeck, C. D. Santina, and S. Hamaza, "Embodying compliant touch on drones for aerial tactile navigation," *IEEE Robotics and Automation Letters*, vol. 10, no. 2, pp. 1209–1216, 2025. DOI: 10.1109/LRA.2024.3519888.
  - A. Bredenbeck, T. Yang, S. Hamaza, and M. W. Mueller, "A tactile feedback approach to path recovery after high-speed impacts for collision-resilient drones," [UNDER REVIEW] *IEEE Robotics and Automation Letters*, 2025.
  - F. Arzberger, J. Zevering, A. Bredenbeck, D. Borrmann, and A. Nüchter, "Unconventional trajectories for mobile 3d scanning and mapping," *Autonomous Mobile Mapping Robots*, 2022.
  - F. Arzberger, A. Bredenbeck, J. Zevering, D. Borrmann, and A. Nüchter, "Towards spherical robots for mobile mapping in human made environments," *ISPRS Open Journal of Photogrammetry and Remote Sensing*, p. 100 004, 2021.
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## Conference Proceedings

- M. Schuster\*, A. Bredenbeck\*, M. Beitelschmidt, and S. Hamaza, "Tactile odometry in aerial physical interaction," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024)*, 2024.
- F. Arzberger, J. Zevering, A. Bredenbeck, D. Borrmann, and A. Nüchter, "Mobile 3d scanning and mapping for freely rotating and vertically descended lidar," in *2022 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, IEEE, 2022, pp. 122–129.
- A. Bredenbeck, C. Della Santina, and S. Hamaza, "End-effector contact force estimation for aerial manipulators," in *IROS 2022 Workshop on Mobile Manipulation and Embodied Intelligence (MOMA): Challenges and Opportunities*, 2022.
- A. Bredenbeck, S. Vyas, W. Suter, et al., "Finding and following optimal trajectories for an overactuated floating robotic platform," in *16th Symposium on Advanced Space Technologies in Robotics and Automation (ASTRA)*, 2022.
- A. Bredenbeck, S. Vyas, M. Zwick, D. Borrmann, M. Olivares-Mendez, and A. Nüchter, "Trajectory optimization and following for a three degrees of freedom overactuated floating platform," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2022, pp. 4084–4091.
- J. Zevering, D. Borrmann, A. Bredenbeck, and A. Nüchter, "The concept of rod-driven locomotion for spherical lunar exploration robots," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2022, pp. 5656–5663.
- D. Borrmann, A. Nüchter, A. Bredenbeck, et al., "Lunar caves exploration with the daedalus spherical robot," in *52nd Lunar and Planetary Science Conference*, 2021, p. 2073.
- R. Pozzobon, A. Rossi, S. Ferrari, et al., "Marius hills skylight hazard characterization as a possible landing site for lunar subsurface exploration," in *52nd Lunar and Planetary Science Conference*, 2021, p. 1886.
- A. P. Rossi, F. Maurelli, V. Unnithan, et al., "Daedalus-descent and exploration in deep autonomy of lava underground structures: Open space innovation platform (osip) lunar caves-system study," 2021.
- J. Zevering, A. Bredenbeck, F. Arzberger, D. Borrmann, and A. Nüchter, "Imu-based pose-estimation for spherical robots with limited resources," in *2021 IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI)*, IEEE, 2021, pp. 1–8.
- S. Nikolskiy, A. Bredenbeck, T. Rikkinen, et al., "Gnss signal quality monitoring based on a reference station network," in *2020 European Navigation Conference (ENC)*, IEEE, 2020, pp. 1–10.
- J. Zevering, A. Bredenbeck, F. Arzberger, D. Borrmann, and A. Nüchter, "Luna - a laser-mapping unidirectional navigation actuator," in *International Symposium on Experimental Robotics*, Springer, Cham, 2020, pp. 85–94.