BARDIENUS PIETER DUISTERHOF

bduister@cmu.edu
Website ◇ Google Scholar

EDUCATION

Carnegie Mellon University, Pittsburgh, PA *Aug 2021 - Present*
PhD candidate in the Robotics Institute.

- 2023-Present: Working on 4D (3D + dynamics) perception for robot manipulation. Advisor: Jeffrey Ichnowski.
- 2021-2023: Worked on perception for resource-constrained aerial vehicles, with a special focus on geometric camera calibration. Led effort on an open-source toolbox TartanCalib. Advisor: Sebastian Scherer.

Delft University of Technology, Delft, the Netherlands *Sept 2015 – Dec 2020*
M.Sc. Control and Simulation, Aerospace Engineering - GPA 8.8/10.0 (Cum Laude)

- Coursework in computer vision, control theory, flight dynamics, human-machine interaction and autonomous systems.

Georgia Institute of Technology, Atlanta, GA *Aug - Dec 2017*
Exchange Student, Computer Science and Mechanical Engineering – GPA 4.0/4.0

- Exchange semester at Georgia Tech, coursework in algorithm design, robotics, computer vision, mobile and ubiquitous computing.

PROFESSIONAL EXPERIENCE

NAVER Labs Europe, Grenoble, France *Jul 2024 - Dec 2024*
Research Intern

- **DUSt3R Team**: Geometric Deep Learning Group for sparse structure from motion and novel view synthetis.

Prime Vision, Delft, the Netherlands *Feb 2021 - Jul 2021*
Robotics Engineer

- **Motion planning team**: automation of postal sorting processes using a swarm of 25+ robots avoiding each other and obstacles. My job was to develop C++ code to run onboard the robots for robust and efficient motion planning.

Delft University of Technology, Delft, the Netherlands *Jul 2016 - Jan 2021*
Undergraduate/Graduate Student

- **M.Sc. thesis** on evolutionary robotics for collaborative gas seeking with a swarm of nano quadcopters. Designed the full stack: hardware, software, simulator, algorithm.
  Graded: 9.5/10.0, PI: Guido de Croon.
- Participated in the **2018 IMAV autonomous drone race** in Melbourne, Australia. Developed efficient visual servoing algorithms for autonomous flight of a flapping-wing drone.
- Organized a study tour to Tokyo for a group of 20 students.

Harvard University, Cambridge, MA *May - Dec 2019*
Visiting Research Fellow

- Developed a **fully autonomous source-seeking nano quadcopter using RL**. Studied various machine learning techniques for deployment under stringent resource constraints.

European Space Agency (ESA), Delft, the Netherlands *Mar - Jul 2018*
Design Synthesis Exercise

- Designed an experimental orbital re-entry vehicle for the European Space Agency. Vehicle design included but was not limited to, thermal design, orbital trajectory design, and control system design. I was the lead for the control system design.

PUBLICATIONS

CV Computer Vision ROB Robotics TML TinyML

2024 **'MASt3R-SfM: a Fully-Integrated Solution for Unconstrained Structure-from-Motion'**, **Bardienus Pieter Duisterhof**, Lojze Zust, Philippe Weinzaepfel, Vincent Leroy, Yohann Cabon, Jerome Revaud – *Under Review* CV Structure from Motion

2024 **'DynOMo: Online Point Tracking by Dynamic Online Monocular Gaussian Reconstruction'**, Jenny Seidenschwarz, Qunjie Zhou, **Bardienus Pieter Duisterhof**, Deva Ramanan, Laura Leal-Taixé - *Under Review* - **arXiv** CV 3D Tracking ROB Manipulation

2024 **'DeformGS: Scene Flow in Highly Deformable Scenes for Deformable Object Manipulation'**, **Bardienus Pieter Duisterhof**, Zhao Mandi, Yunchao Yao, Jia-Wei Liu, Jenny Seidenschwarz, Mike Zheng Shou, Deva Ramanan, Shuran Song, Stan Birchfield, Bowen Wen, Jeffrey Ichnowski – *WAFR 2024* - **Project Page** CV 3D Tracking ROB Manipulation

2024 **'Cloth-Splatting: 3D State Estimation from RGB Supervision for Deformable Objects'**, Alberta Longhini, Marcel Büsching, **Bardienus Pieter Duisterhof**, Jens Lundell, Jeffrey Ichnowski, Mårten Björkman, Danica Kragic – *CoRL 2024* - **Project Page** CV 3D Tracking ROB Manipulation

2024 **'Learned Velocity-based Constraint for High-Speed Non-Prehensile Transport'**, Yuemin Mao, **Bardienus Pieter Duisterhof**, Moonyoung Lee, Jeffrey Ichnowski – *Under Review* ROB Manipulation

2024 **'Focus Bug: An RL-Based Environment-aware Approach for Mapless Navigation'**, Charles Dansereau, **Bardienus Pieter Duisterhof**, Gabriela Nicolescu – *Under Review* ROB Navigation TML Edge Computing

2023 **'MD-Splatting: Learning Metric Deformation from 4D Gaussians in Highly Deformable Scenes'** , **Bardienus P. Duisterhof**, Mandi Zhao, Yunchao Yao, Jia-Wei Liu, Mike Zheng Shou, Shuran Song, Jeffrey Ichnowski– *arXiv* - **Project Page** CV 3D Tracking ROB Manipulation

2023 **'Residual-NeRF: Learning Residual NeRFs for Transparent Object Manipulation'** , **Bardienus P. Duisterhof**, Yuemin Mao, Si Heng Teng, Jeffrey Ichnowski– *ICRA 2024* - **Project Page** ROB Manipulation CV Multi-View Stereo

2022 **'TartanCalib: Iterative Wide-Angle Lens Calibration using Adaptive SubPixel Refinement of AprilTags'** , **Bardienus P. Duisterhof**, Yaoyu Hu, Si Heng Teng, Michael Kaess, Sebastian Scherer – *Under review* - **Project Page** CV Geometric Camera Calibration

2022 **'Tiny Robot Learning: Challenges and Directions for Machine Learning in Resource-Constrained Robots'** , Sabrina M. Neuman, Brian Plancher, **Bardienus P. Duisterhof**, Srivatsan Krishnan, Colby Banbury, Mark Mazumder, Shvetank Prakash, Jason Jabbour, Aleksandra Faust, Guido C.H.E. de Croon, Vijay Janapa Reddi – *IEEE 4th International Conference on Artificial Intelligence Circuits and Systems (AICAS 2022)* - **Paper** ROB Navigation TML SWAP Constraints

2022 **'The Role of Compute in Autonomous Micro Aerial Vehicles: Optimizing for Mission Time and Energy Efficiency'**, Behzad Boroujerdian, Hasan Genc, Srivatsan Krishnan, **Bardienus Pieter Duisterhof**, Brian Plancher, Kayvan Mansoorshahi, Marcelino Almeida, Wenzhi Cui, Aleksandra Faust, Vijay Janapa Reddi – *ACM Transactions on Computer Systems (TOCS 2022)* ROB Navigation TML Energy Efficiency

2021 **'Sniffy Bug: A Fully Autonomous Swarm of Gas-Seeking Nano Quadcopters in Cluttered Environments'** , **Bardienus P. Duisterhof**, Shushuai Li, Javier Burgués, Vijay Janapa Reddi, Guido C.H.E. de Croon – *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021)* - **Video** ROB Swarm Navigation TML Nano Robotics

2021 **'Tiny Robot Learning (tinyRL) for Source Seeking on a Nano Quadcopter'** , **Bardienus P. Duisterhof**, Srivatsan Krishnan, Jonathan J. Cruz, Colby R. Banbury, William Fu, Aleksandra

Faust, Guido C. H. E. de Croon, Vijay Janapa Reddi – *IEEE International Conference on Robotics and Automation (ICRA 2021)* - **Video** ROB Navigation TML Nano Robotics

2019 **'A Tailless Flapping Wing MAV Performing Monocular Visual Servoing Tasks'**, D.A. Olejnik, **B.P. Duisterhof**, M. Karásek, K.Y.W. Scheper, T. van Dijk and G.C.H.E. de Croon – *11th International Micro Air Vehicle (IMAV) Competition and Conference, Unmanned Systems Journal 2020* - **Video** ROB Visual Servoing CV Object Segmentation TML Nano Robotics

AWARDS AND FELLOWSHIPS

- CMU Center for Machine Learning and Health (CMHL) Fellowship in Digital Health. Full funding (stipend + tuition + misc) for 2023-2024 academic year.
- Best Graduate in Engineering (1/3,983), TU Delft, 2021.**Video**.
- Best Graduate in Aerospace Engineering, TU Delft, 2021. **Video**.
- **IMAV 2018 Autonomous Drone Race**: Innovation award in indoor competition with DelFly Nimble for visual servoing with a 30-gram flapping wing MAV.
- IMAV Conference 2019: **Best paper award nominee**, top 6 papers.

SELECTED MEDIA COVERAGE

- **Forbes**: 'Watch This Autonomous Microdrone Swarm Sniff Out A Gas Leak'
- **Robohub**: 'Sniffy Bug: A Fully Autonomous Swarm of Gas-Seeking Nano Quadcopters in Cluttered Environments'
- **Bitcraze Blog**: 'Sniffy Bug: A Fully Autonomous Swarm of Gas-Seeking Nano Quadcopters in Cluttered Environments'

TEACHING

- 16-720 at CMU: Computer vision with Deva Ramanan. Gave a guest lecture on object detection using HOG and SIFT features.
- 16-820 at CMU: Advanced Computer Vision. Designed a new homework on segmentation from scratch, held office hours, and graded assignments.
- AE2235 at TU Delft: Aerospace Systems & Control Theory. Supported undergraduate students in help sessions and developed Python learning tools for an improved remote learning experience during covid.

SERVICE

CMU Robotics Institute DEI and Climate Committee

- This committee focuses on creating a more diverse, inclusive and enjoyable working environment for students and faculty. During my two-year tenure, I focused on studying the recruitment and admissions process, especially from a diversity and inclusion perspective.

RoboOrg Leadership

- Part of the RoboOrg leadership, organizing events and initiatives with two other students to improve the student experience. My responsibility was to lead large events, such as a boat party with 200 attendees (summer 2022 and 2023), and a ski trip with 85 attendees (spring 2023).

Paper Reviewing

- Reviewed papers for conferences and journals in robotics, CV and ML including: RA-L, ICRA, IROS, CORL, NeurIPS, and ECCV, CVPR, AAAI.

Fund Raising

- Raised €3,116.35 ($3.4k) for children with muscle diseases, by swimming across a channel in the Dutch North Sea. Raised money from several companies by offering a swimming clinic for their executives in exchange for a donation.