



Paolo De Petris

Robotics Engineer

Personal Information

Date of Birth 15/01/1994
Place of Birth Trieste (TS), Italy
Nationality Italian
Current Job PhD Candidate at the Autonomous Robots Lab, NTNU, Norway
Work Address O. S. Bragstads Plass 2D Trondheim, 7034, NO

Education

2020–present **PhD Student**, *Norwegian University of Science and Technology*, Norway.
2019–2020 **MS in Computer Science and Engineering**, *University of Nevada*, Reno.
2017–2019 **Master ICT e Progettazione Avanzata (III ed.)**, *University of Turin*, Italy.
2016–2018 **MS in Mechatronic Engineering**, *Polytechnic of Turin*, Italy.
2013–2016 **BS in Telecommunications Engineering**, *Polytechnic of Turin*, Italy.

Research Interests

Robotics, Unmanned Aerial Systems, Miniaturized System, Resilient Micro Aerial Vehicles, Autonomous Systems, Multi-Modal Perception in Degraded Environments, Optimization Strategies, Path–Planning, Sensor Fusion, Estimation, Reinforcement Learning and Optimal Control.

Current Research Investigation

Resilient autonomy for fast, agile, collision-tolerant and computationally-constrained flying robots.

Working Experience

2019–present **Graduate Research Assistance at the Autonomous Robots Lab**, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, Trondheim, NO.
Role: continuation of the previous employment after relocation.

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2019–2020 **Graduate Research Assistance at the Autonomous Robots Lab**, UNIVERSITY OF NEVADA, Reno, US.

Role: researcher with main focus on design and development of autonomy stack for collision-tolerant micro aerial flying vehicles.

ARL Web Page: <https://www.autonomousrobotslab.com/people.html>

2017–2019 **Project Manager and Robotics Engineer**, WPWEB SRL, Torino, Italy.

Role: Leader of the ARS (Autonomous Remote Sensing) Project: design, mechanical and software development, in-field testing of an autonomous aerial vehicle for tunnel inspection and 3D model reconstruction for maintenance of hydroelectric power plants environments.

Project Web Page: <https://poloinnovazioneict.org/en/projects/ars-2/>

Project Video Summary: <https://www.youtube.com/watch?v=o9nM3LCu7jg&t=83s>

Research Projects

2019–2021 **DARPA Subterranean (SubT) Challenge**, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY (DARPA), Total Budget: \$4,275,509.

Role: robotics engineer part of team responsible for the flying robots. Part of Team "CERBERUS: CollaborativE walking & flying RoBots for autonomous ExploRation in Under-ground Settings" Consortium involving a) the University of Nevada, Reno, b) ETH Zurich, c) University of California, Berkeley, d) Sierra Nevada Corporation, and e) Flyability.

Further details: <http://www.autonomousrobotslab.com/projects.html>

Official DARPA Website <https://subtchallenge.com/>

Project Website <https://www.subt-cerberus.org/>

2019–2020 **A-PNT Demonstration: Visual Odometry Module for High-Speed Navigation**, SIERRA NEVADA CORPORATION (SNC), Total Budget: \$148,150.

Role: design and develop of visual/visual-inertial solutions for urban and off-board GPS-denied autonomous ground vehicle navigation.

Further details: <http://www.autonomousrobotslab.com/projects.html>

2019–2020 **Mine Inspection Robotics**, NEVADA GOVERNOR'S OFFICE OF ECONOMIC DEVELOPMENT, BARRICK GOLD CORPORATION, ABOVEGEO, Total Budget: \$398,174.

Role: software and hardware developer, logistic support for in-field testing of flying robots for autonomous exploration.

Further details: <http://www.autonomousrobotslab.com/projects.html>

Programming and other Hands-on Experience

- C++, C, Mixed C++ & C programming especially for single board computers
- Robot Operating System (ROS)
- Robots, sensors and environments modeling and simulation in Gazebo/Ignition
- Python scripting and mixed Python & C++
- Matlab & Simulink
- CAD Design: Solidworks, Blender, AutoCAD, FreeCAD, Fusion360
- Soldering, cable management, small scale robot design optimization
- FPV and LOS drone pilot

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Publications

- **Paolo De Petris**, Huan Nguyen, Mihir Dharmadhikari, Mihir Kulkarni, Nikhil Khedekar, Frank Mascarich, Kostas Alexis, "*RMF-Owl: A Collision-Tolerant Flying Robot for Autonomous Subterranean Exploration.*", International Conference on Unmanned Aircraft Systems (ICUAS2022)
- **Paolo De Petris**, Huan Nguyen, Mihir Kulkarni, Frank Mascarich, Kostas Alexis, "*Resilient Collision-tolerant Navigation in Confined Environments*", IEEE International Conference on Robotics and Automation (ICRA2021)
- **Paolo De Petris**, Huan Nguyen, Tung Dang, Frank Mascarich, Kostas Alexis, "*Collision-tolerant Autonomous Navigation through Manhole-sized Confined Environments*", IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR2020)
- Huan Nguyen, Sondre Holm Fyhn, **Paolo De Petris**, Kostas Alexis, "*Motion Primitives-based Navigation Planning using Deep Collision Prediction*", IEEE International Conference on Robotics and Automation (ICRA2022)
- Frank Mascarich, **Paolo De Petris**, Dinh Huan Nguyen, Nikhil Vijay Khedekar, Kostas Alexis, "*Autonomous Distributed 3D Radiation Field Estimation for Nuclear Environment Characterization*", IEEE International Conference on Robotics and Automation (ICRA2021)
- Mihir Kulkarni, Mihir Dharmadhikari, Marco Tranzatto, Samuel Zimmermann, Victor Reijgwart, **Paolo De Petris**, Huan Nguyen, Nikhil Khedekar, Christos Papachristos, Lionel Ott, Roland Siegwart, Marco Hutter, Kostas Alexis, "*Autonomous Teamed Exploration of Subterranean Environments using Legged and Aerial Robots*", IEEE International Conference on Robotics and Automation (ICRA2022)
- Marco Tranzatto, Frank Mascarich, Lukas Bernreiter, C. Godinho, Marco Camurri, Shehryar Khattak, Tung Dang, Victor Reijgwart, Johannes Loeje, David Wisth, Samuel Zimmermann, Huan Nguyen, M. Fehr, Lukas Solanka, Russell Buchanan, Marko Bjelonic, Nikhil Khedekar, Mathieu Valceschini, Fabian Jenelten, M. Dharmadhikari, Timon Homberger, **Paolo De Petris**, Lorenz Wellhausen, M. Kulkarni, Takahiro Miki, Satchel Hirsch, Markus Montenegro, C. Papachristos, F. Tresoldi, Jan Carius, Giorgio Valsecchi, Joonho Lee, Konrad Meyer, Xiangyu Wu, J. Nieto, Andrew Paul Smith, M. Hutter, R. Siegwart, M. Mueller, M. Fallon, K. Alexis, "*CERBERUS: Autonomous Legged and Aerial Robotic Exploration in the Tunnel and Urban Circuits of the DARPA Subterranean Challenge*", Field Robotics (FR2022)

Open Source Contribution

- [GBplanner2](#)
Graph-based subterranean exploration path planning using aerial and legged robots
- [Blackfly Nodelet](#)
ROS driver for Blackfly cameras

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- [Realsense T265 Depth](#)
Generate a point cloud using the Realsense T265 Tracking camera using the semi-global stereo block matching technique
- [CERBERUS Gagarin Virtual SubT Model](#)
Simulation model of the Gagarin robot for the DARPA SubT Virtual Circuit
- [CERBERUS M100 Virtual SubT Model](#)
Simulation model of the Alpha robot for the DARPA SubT Virtual Circuit
- [Image Brighten](#)
ROS node implementing a dehaze-based low light image enhancement algorithm
- [Arducam Stereo Hat Driver](#)
ROS node interfacing the time-synchronized Arducam Stereo Hat
- [Stair Detection](#)
ROS node stair detection algorithm based on raw Point Cloud data

Languages

Italian	Mother tongue
English	Excellent
Norwegian	Good
Spanish	Good
French	Good