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, Software Optimization for Computationally-constrained systems, Resilient Micro Aerial Vehicles, Autonomous Systems, Multi-Modal Perception in Degraded Environments, Optimization Strategies, Path–Planning, Sensor Fusion, Estimation, Reinforcement Learning and Optimal Control.

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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http://tiralonghipol.github.io/poldepetris/

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`

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

2023–now **SPEAR: Spatial Perception and Embodied Autonomy Research (HORIZON-CL4-2022-DIGITAL-EMERGING-02-06)**, European Commission, Total Budget: €6,746,086.25 (NTNU Budget: €1,126,210.00.
Role: consultant for embedding soft material in flying robotic systems. Dynamic control allocation of thrust and moments based on joints feedback of compliant arms.
Further details: `http://www.autonomousrobotslab.com/projects.html`

2023–now **AUTOASSESS: Autonomous aerial inspection of GNSS-denied and confined critical infrastructures (HORIZON-CL4-2022-DIGITAL-EMERGING-02-07)**, European Commission, Total Budget: € 10,061,182.50 (NTNU Budget: €1,156,922.50.
Role: flying robots design, develop, testing and field-readyness. Logistics. Field testing inside various ballast water and cargo tanks of FPSOs.
Further details: `http://www.autonomousrobotslab.com/projects.html`
Project Website: `https://autoassess.eu/`

2023–now **SYNERGIZE: A novel integrated SYstem of Systems streNgthening tEchnical and logistical capacities to ensure better Response to emerGencies by synergIStically addrEssing First Responders capability gaps (EU HORIZON-CL3-2022-DRS-01-07)**, European Commission, Total Budget: €722,093.00.
Role: robotics engineer responsible for the flying robots and integration between walking, flying and snake robots. Marsupial deployment design and development. Main point of contact for NTNU.
Further details: `http://www.autonomousrobotslab.com/projects.html`
Project Website: `https://www.synergise-project.eu/`

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 Underground 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/`

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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`

Student Supervision/Co-supervision

2024 **Øyvind Taksdal Stubhaug**, *Modelling and control of a two-rotor coaxial swash-plateless micro aerial vehicle*, Master Thesis, NTNU.

Adrian Stokdal Opheim, *VTOL aircraft design and control based on swashplateless rotor actuation*, Master Thesis, NTNU.

Sondre Holth Rognlien, *Marsupial Walking and Flying Robotic Systems*, Master Thesis, NTNU.

2023 **Håvard Brenne**, *Design, Modeling, Control and Integration of Thrust Vectoring Rotors in Micro Aerial Vehicles*, Master Thesis, NTNU.

Theodor Forgaard, *Navigation Policy for a Tiny Drone using Deep Reinforcement Learning*, Master Thesis, NTNU.

2022 **Jørgen Mikal Benum**, *Data-driven MPC*, Master Thesis, NTNU.

Patrick Nitschke, *Reinforcement Learning for Autonomous Exploration of Cluttered Environments using Collision-resilient Aerial Robots*, Master Thesis, NTNU.

2021 **Oskar Gjesdal Veggeland**, *Real-time Vision-Aided Inertial Navigation for Vertical Take-Off and Landing Unmanned Aerial Vehicles During Critical Flight Stages*, Master Thesis, NTNU.

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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Open Source Contribution

- GBplanner2
  Graph-based subterranean exploration path planning using aerial and legged robots
- Blackfly Nodelet
  ROS driver for Blackfly cameras
- 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
Russian	Basic

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