Èric Pairet Artau

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Personal Statement

I am currently a PhD Candidate at the University of Edinburgh and Heriot-Watt University. I combine my PhD with a Research Assistant position in the ORCA Hub programme and providing robotic consultancy services to the industry. Prior to this, I occupied the roles of researcher and engineer at the Computer Vision and Robotics Institute (ViCOROB) at the University of Girona, Spain, where I developed and deployed robotic perception, control and navigation solutions on autonomous underwater vehicles. Also, I led a multidisciplinary team of 8 researchers and students to the 2017 European Robotics League - Emergency Service Robots. Before joining academia, I was consulting and working in the field of industrial automation. I have recently been awarded the Spanish early academic and research career distinction.

My research interests are in the development of motion planning, machine learning and computer vision tools to solve autonomous navigation and manipulation problems in robotics. I consider myself to be a hardworking person, an enthusiastic and quick learner, and a true team player. My experience extends to both theoretical and in-field robotics research and development, as well as engineering and project management in industry. A collection of some of my previous and ongoing projects is available in my online portfolio.

Education

University of Edinburgh and Heriot-Watt University — Edinburgh, UK
PhD Robotics and Autonomous Systems — *2018 - present*

- Thesis: Methods for Motion Planning in Unknown and Familiar Environments.
- Supervisors: Prof. Yvan Petillot and Prof. Michael Mistry.
- Sponsor: Competitive doctoral training scholarship from the Engineering and Physical Sciences Research Council (EPSRC) alongside personally secured grants to support my research and dissemination.

MSc Robotics and Autonomous Systems (with Honours) — *2017 - 2018*

- Thesis: Learning and Generalisation of Primitive Skills for Robust Dual-arm Manipulation.
- Supervisors: Dr. Frank Broz and Prof. Michael Mistry.
- Sponsor: Competitive training scholarship from the Engineering and Physical Sciences Research Council (EPSRC).

University of Burgundy, University of Girona and Heriot-Watt University — France; Spain; UK
MSc Computer Vision and Robotics (with Honours) — *2015 - 2017*

- Thesis: Uncertainty-based Online Mapping and Motion Planning for Marine Robotics Guidance.
- Supervisors: Dr. Morteza Lahijanian (University of Oxford), Dr. Juan David Hernández and Dr. Marc Carreras.
- Sponsor: Competitive Erasmus Mundus scholarship from the European Education, Audiovisual and Culture Executive Agency (EACEA), and Fundació Catalunya - La Pedrera scholarship from the Bank of Catalonia.

University of Girona — Girona, Spain
BEng Electronic and Automation Engineering (with National Distinction) — *2011 - 2015*

- Undergraduate thesis: Integration of Fins to the SPARUS II AUV for its Control in Five DOFs. Awarded two prizes.
- Supervisor: Dr. Marc Carreras.

Academic and Industrial Experience

Edinburgh Centre for Robotics — Edinburgh, UK
Research Assistant · Offshore and Robotics for Certification Assets (ORCA Hub) — *2017 - present*

- Research on motion planning strategies for manipulators and aerial, terrestrial and maritime mobile base robots.
- Development of a digital-twin simulator to support research on human-robot interaction and swarm robotics.

Rice University — Houston, TX, USA
Visiting Scholar · Kavraki Lab — *2019 - 2020*

- Development of an experience-based motion planner for robotic manipulators. Collaboration with Prof. Lydia Kavraki.

Computer Vision and Robotics Institute (ViCOROB) Girona, Spain
Research Assistant · Underwater Vision and Robotics Research Centre (CIRS) *2016 - 2017*

- Design and development of algorithms for motion planning online under kinodynamic and probabilistic constraints.
- Software development and contribution to the AUV control architecture COLA2.

Mechatronics Engineer · Underwater Vision and Robotics Research Centre (CIRS) *2014 - 2016*

- Development and deployment of unified control architectures with fins for stable and efficient underwater navigation.
- Design and manufacture of hardware, development of firmware and execution of mechatronics tasks on underwater robots.

University of Girona Girona, Spain
Laboratory Assistant · Department of Computer Science, Applied Mathematics and Statistics (IMAE) *2013 - 2014*

- Preparation of teaching material for undergraduate engineering statistics courses at the University of Girona.

Self-employed Banyoles, Spain
Consultation and Development of Electrical and Automation Installations *2009 - 2014*

- Full-cycle project management and execution for machinery automation, renewable energy and electrical installations.

Aplicacions Elèctriques (AETech) Salt, Spain
Industrial Automation Engineer · Department of Automation and Control *2013*

- Program PLCs, configure HMI systems and develop a tool for the management of industrial automation projects.

Automatismes Girona (AUGI, S.L.) Palol de Revardit, Spain
Industrial Automation Technician · Workshop and External Installations Team *2008 - 2011*

- Install and maintain industrial automated systems. Wire up automation control stations. Mechanise small structures.

CLIFEL S.A. Banyoles, Spain
Electrical Technician · External Installations Team *2007 - 2008*

- Install, repair and maintain installations of electricity, domestic water and gas in housing, offices, shops and small industry.

Secured Grants and Contract Funding

SICSA Early Career Researcher Fund 2019
EPSRC Early Career Researcher Fund 2019
IEEE IROS Travel Fund 2019
SICSA Travel Fund 2019
SICSA Travel Fund 2018
SICSA Winter School Fund 2018
Doctoral Training Scholarship 2017
European Erasmus Mundus Scholarship 2015
Fundació Catalunya - La Pedrera Scholarship 2015
Innovation and Technological Transfer Fund 2014
Research Training Scholarship 2014
Research Training Scholarship 2013

Awards and Achievements

National (Spain) Early Academic and Research Career Distinction 2019
Best ARQ Paper Award: TAROS 2019 2019
Best Overall Paper Award Finalist: TAROS 2019 2019
Task and Functional Benchmark Distinction as UdG's team leader in the 2017 ERL Emergency Service 2018
1st Prize in the IIT Winter School on Humanoid Robot Programming. Role: team leader 2018
Three 1st prizes in the European Robotics League Emergency Service. Role: UdG's team leader 2017
MXB Award for Outstanding BSc thesis 2017
Premis Patronat for Outstanding BSc thesis 2016
Three 1st and two special prizes in the euRathlon competition. Role: UdG's control architecture engineer 2015
Four 1st prizes in the euRathlon competition. Role: UdG's mechatronics engineer 2014

Academic Leadership

Seminars and Invited Talks

- Invited speaker at the University of Colorado Boulder, US. Seminar on motion planning under uncertainty. 2020.
- Commencement speaker at the graduation ceremony of the polytechnic school at University of Girona, Spain. 2019.
- Invited speaker at the 2018 European Robotics Forum. Presentation on the UdG team approach to the 2017 European Robotics League Emergency Service Robots competition.
- Selected speaker to disseminate the research on motion planning during the 2017 VIBOT day, Spain.

Outreach and Engagement

- Demonstration "Decentralised Task Allocation and Planning for Heterogeneous AUVs" at the 2020 ICAPS in Nancy (virtual), France.
- Demonstration "Task Allocation and Planning for Offshore Mission Automation" at the 2020 ICAPS in Nancy (virtual), France.
- ORCA Hub stand at the 2019 Summer Science Exhibition organised by the Royal Society in London, UK.
- Edinburgh Centre for Robotics stand at the 2018 TEDx Glasgow event, UK.
- Member of the Edinburgh Centre for Robotics team outreaching at the 2018 Science Festival held in Edinburgh, UK.
- Assistant at the 2017 Educational Workshop on Underwater Robotics, Girona, Spain.
- Demonstrator of the SPARUS II AUV at the 2017 European Marine Robotics and Applications held in Girona, Spain.
- Member of the organising team of the 2014 Summer School on underwater robotics held in Sevilla, Spain.

Competitions

- Team leader of the winning team at the 2018 IIT Winter School on Humanoid Robot Programming.
- Team leader of the winning team at the 2017 ERL Emergency Service Robots competition.
- Control architecture engineer of the winning team at the 2015 euRathlon competition.
- Mechatronics engineer of the winning team at the 2014 euRathlon competition.

Relevant Skills

Languages: English (fluent), Spanish (mother tongue) and Catalan (mother tongue).

Software: C/C++, Python, MATLAB, Visual Basic and LaTeX. Git revision development control.

Robotic libraries: ROS, OROCOS, YARP, OMPL, MoveIt and OpenCV.

Robotic platforms: Turtlebot, SPARUS II, Kuka, PR2, Fetch, Universal robots and Franka Emika Panda.

Automation programming: Labview, myRIO, PL7, Vijeo Designer, VijeoCitec and Stäubli Robotics Studio.

Mechatronics prototyping: Multissim, Ultiboard, Altium, Autocad and Blender.

Selected Publications

Please see Google Scholar or my website for a full list, and for links to the electronic version and media of the papers.

Journal Articles

Èric Pairet, Juan David Hernández, Marc Carreras, Yvan Petillot, and Morteza Lahijanian. "Online Mapping and Motion Planning under Uncertainty for Safe Navigation in Unknown Environments". In: *International Journal of Robotics Research* (2020). In preparation

Jonatan Scharff, Daniel Gonzalez, Juan David Hernández, **Èric Pairet**, and Yvan Petillot. "Online Path Planning with Kinematic Constraints in Unknown Environments". In: *Sensors* (2020). In preparation

Èric Pairet, Constantinos Chamzas, Yvan Petillot, and Lydia Kavraki. "Path Planning for Manipulation using Experience-driven Random Trees". In: *IEEE Robotics and Automation Letters* (2020). Under review

Paola Ardón, Maria Eugenia Cabrera, **Èric Pairet**, Ronald PA Petrick, Subramanian Ramamoorthy, Katrin S Lohan, and Maya Cakmak. "Affordance-Aware Handovers with Human Arm Mobility Constraints". In: *IEEE Robotics and Automation Letters* (2020). Under review

Paola Ardón, **Èric Pairet**, Katrin S Lohan, Subramanian Ramamoorthy, and Ronald PA Petrick. "Affordances in Robotic Tasks - A Survey". In: *IEEE Transactions on Robotics* (2020). Under review

Èric Pairet, Paola Ardón, Michael Mistry, and Yvan Petillot. "Learning Generalizable Coupling Terms for Obstacle Avoidance via Low-Dimensional Geometric Descriptors". In: *IEEE Robotics and Automation Letters* 4.4 (2019), pp. 3979–3986

Paola Ardón, **Èric Pairet**, Ronald PA Petrick, Subramanian Ramamoorthy, and Katrin S Lohan. "Learning Grasp Affordance Reasoning through Semantic Relations". In: *IEEE Robotics and Automation Letters* 4.4 (2019), pp. 4571–4578

Conference Proceedings

Paola Ardón, **Èric Pairet**, Yvan Petillot, Subramanian Ramamoorthy, Ronald PA Petrick, and Katrin S Lohan. "Self-Assessment of Grasp Affordance Transfer". In: *IEEE/RSJ International Conference on Intelligent Robots and Systems*. First two authors contributed equally to this work. IEEE. 2020

Yaniel Carreno, **Èric Pairet**, Yvan Petillot, and Ronald PA Petrick. "A Decentralised Strategy for Heterogeneous AUV Missions via Goal Distribution and Temporal Planning". In: *Proceedings of the International Conference on Automated Planning and Scheduling*. Vol. 30. 2020, pp. 431–439

Yaniel Carreno, **Èric Pairet**, Yvan Petillot, and Ronald PA Petrick. "Decentralised Task Allocation and Planning for Heterogeneous AUVs". In: *Proceedings of the International Conference on Automated Planning and Scheduling System Demonstration*. 2020

Yaniel Carreno, **Èric Pairet**, Paola Ardón, Yvan Petillot, and Ronald PA Petrick. "Task Allocation and Planning for Offshore Mission Automation". In: *Proceedings of the International Conference on Automated Planning and Scheduling System Demonstration*. 2020

Yaniel Carreno, **Èric Pairet**, Yvan Petillot, and Ronald PA Petrick. "Task Allocation Strategy for Heterogeneous Robot Teams in Offshore Missions". In: *Proceedings of the 19th International Conference on Autonomous Agents and MultiAgent Systems*. 2020, pp. 222–230

David Robb, Muneeb Ahmad, Carlo Tiseo, Simona Aracri, Alistair C McConnell, Vincent Page, Christian Dondrup, Francisco Garcia, Hai Nguyen, **Èric Pairet**, Paola Ardón, Tushar Semwal, Hazel Taylor, Lindsay Wilson, David Lane, Helen Hastie, and Katrin S Lohan. "Robots in the Danger Zone: Exploring Public Perception through Engagement". In: *2020 15th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. IEEE. 2020, pp. 93–102

Èric Pairet, Paola Ardón, Michael Mistry, and Yvan Petillot. "Learning and Composing Primitive Skills for Dual-arm Manipulation". In: *Annual Conference Towards Autonomous Robotic Systems*. Advanced Robotics at Queen Mary (ARQ) best paper award. Springer. 2019, pp. 65–77

Paola Ardón, **Èric Pairet**, Ron Petrick, Subramanian Ramamoorthy, and Katrin Solveig Lohan. "Reasoning on Grasp-Action Affordances". In: *Annual Conference Towards Autonomous Robotic Systems*. Best paper award finalist. Springer. 2019, pp. 3–15

Èric Pairet, Paola Ardón, Xingkun Liu, José Lopes, Helen Hastie, and Katrin S Lohan. "A Digital Twin for Human-Robot Interaction". In: *2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. First two authors contributed equally to this work. IEEE. 2019, pp. 372–372

Èric Pairet, Paola Ardón, Frank Broz, Michael Mistry, and Yvan Petillot. "Learning and Generalisation of Primitives Skills Towards Robust Dual-arm Manipulation". In: *Proceedings of the AAAI Fall Symposium on Reasoning and Learning in Real-World Systems for Long-Term Autonomy*. AAAI Press. 2018, pp. 62–69

Paola Ardón, **Èric Pairet**, Subramanian Ramamoorthy, and Katrin Solveig Lohan. "Towards Robust Grasps: Using the Environment Semantics for Robotic Object Affordances". In: *Proceedings of the AAAI Fall Symposium on Reasoning and Learning in Real-World Systems for Long-Term Autonomy*. AAAI Press. 2018, pp. 5–12

Èric Pairet, Juan David Hernández, Morteza Lahijanian, and Marc Carreras. "Uncertainty-based Online Mapping and Motion Planning for Marine Robotics Guidance". In: *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2018, pp. 2367–2374

Juan David Hernández, Eduard Vidal, Guillem Vallicrosa, **Èric Pairet**, and Marc Carreras. "Simultaneous mapping and planning for autonomous underwater vehicles in unknown environments". In: *OCEANS 2015-Genova*. IEEE. 2015, pp. 1–6

Marc Carreras, Carles Candela, David Ribas, Narcís Palomeras, Lluís Magí, Angelos Mallios, Eduard Vidal, **Èric Pairet**, and Pere Ridao. "Testing SPARUS II AUV, an open platform for industrial, scientific and academic applications". In: *Instrumentation viewpoint* 18 (2015), pp. 54–55

Juan D Hernández, Guillem Vallicrosa, Eduard Vidal, **Èric Pairet**, Marc Carreras, and Pere Ridao. "On-line 3D Path Planning for Close-proximity Surveying with AUVs". In: *IFAC-PapersOnLine* 48.2 (2015), pp. 50–55

Theses and Editorial Works

Katrin Solveig Lohan, Muneeb Ahmad, Christian Dondrup, Paola Ardon, **Èric Pairet**, and Alessandro Vinciarelli. "Adapting Movements and Behaviour to Favour Communication in Human-Robot Interaction". In: *Springer Book on Modelling Human Motion*. Springer, Jan. 2020

Èric Pairet. "Learning and Generalisation of Primitive Skills for Robust Dual-arm Manipulation". Master Thesis. University of Edinburgh and Heriot-Watt University, Aug. 2018

Èric Pairet. "Uncertainty-based Online Mapping and Motion Planning for Marine Robotics Guidance". Master Thesis. University of Girona and University of Oxford, June 2017

Èric Pairet. "Integració de timons en el robot SPARUS II AUV pel control en cinc graus de llibertat". Bachelor Thesis. University of Girona, Sept. 2015

Maria Simón, **Èric Pairet**, and Pepus Daunis-I-Estadella. *Estadítica*. University of Girona, 2014