

Daniel Pastor

ROBOTICS ENGINEER

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Summary

Broad experience in applying estimation and control techniques for robotic applications involving algorithm development, software implementation and hardware prototyping. My current interest is efficient control techniques using modern learning methods. Currently finishing a PhD at Caltech, estimated graduation June 2020.

Education

California Institute of Technology

DOCTOR OF PHILOSOPHY IN SPACE ENGINEERING

Pasadena, USA

Sept. 2015 - PRESENT

- Thesis: Learning Aerodynamic Interactions for Quadrotors, advisor: Joel Burdick, PhD
- Development of Data-Driven Spectral Methods for dynamics systems, applied to multirotor landing
- Development of a miniature pressure-sensor array to enhance multirotor control algorithms

Cranfield University

MASTER OF SCIENCE IN AUTONOMOUS VEHICLE DYNAMICS & CONTROL

Cranfield, UK

Sept. 2013 - Aug. 2014

- Thesis: Visual Odometry in Hardware. Analysis of the performance of computer vision techniques for very agile platforms. Development of SLAM framework OFLAAM, presented at ICUAS'15, advisor: Hyo Shin, PhD
- Group Project: Flight Tests using BAE Jetstream 31

Universidad Politécnica de Madrid (UPM)

BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING

Madrid, Spain

Sept. 2008 - Aug. 2014

- Group Project: Low-orbit satellite control using gravity gradient

Research Experience

Jet Propulsion Laboratory (JPL)

AFFILIATE

Pasadena, USA

July 2015 - PRESENT

- Heterogeneous Sensor Fusion via Confidence-rich 3D Grid Mapping for the Subterranean (SubT) Challenge
- Design of a Ballistically-Launched Foldable Multirotor, SQUID
- Verification of open-source Visual Inertial algorithms for Mars Helicopter mission

Space Dynamics Group, UPM

GNC ENGINEER

Madrid, Spain

Sept. 2014 - Aug. 2015

- Analysis of the navigation and control techniques for contact-less space debris removal mission LEOSWEEP

Tokyo Tech Institute of Technology, Okuma Laboratory

SOFTWARE ENGINEER TRAINEE

Tokyo, Japan

June. 2013 - Aug. 2013

- Development of a simulation model for gossamer structures (solar sails with booms and membranes)
- Upgrade existing solar sail model to handle generic meshes for easy layout modification

Applied Physics Department at ETSIA, UPM

SOFTWARE ENGINEER TRAINEE

Madrid, Spain

Feb. 2013 - May. 2013

- Computer parallelization of plasma dynamics of Langmuir probe model with orbital speed
- Co-author of the patented software "Kilaps" (Kinetic LAngmuir Probe Software)

GMV

CONTROL ENGINEER TRAINEE

Tres Cantos, Spain

July. 2012 - August. 2012

- Development of the translational control model of ESA mission Lunar Lander using Robust Control techniques

Intelliglass

SOFTWARE ENGINEER TRAINEE

Madrid, Spain

Nov. 2011 - May. 2012

- Development of thermal simulator in buildings with active windows
- Integration of the window module into the rest of the building simulation framework

Skills

Programming

Python for hardware implementation using ROS and machine learning, C++ during Tokyo Tech internship, Fortran 2003 during Plasma Physics and Intelliglass internships, Matlab for quick prototyping

Languages

English, Spanish

Other Skills

Mechanical design using Solid Works, version control using GIT, PCB design using Eagle, interactive applications using Unity3D, Latex

Honors & Awards

- 2017 **Caltech Space Challenge 2017**, to design a Lunar Port concept
- 2014 **La Caixa Fellowship**, to study postgraduate studies in the US
- 2014 **Sir Arthur Clarke Award 2014**, with the team Cranspace for *Inspiration Mars* competition
- 2011 **Optimula contest 2nd Place**, by ETSII-UPM
- 2008 **Silver Medal**, XIX Spanish National Physics Olympiad
- 2008 **Scholarship Aula de Verano**, by UIMP (Universidad Internacional Menéndez Pelayo).

Selected Publications

- Daniel Pastor*, Carl Folkestad*, and Joel Burdick **Extended Dynamic Mode Decomposition with Learned Koopman Eigenfunctions for Prediction and Control**, ICRA 2020 [\[video\]](#)
- Daniel Pastor*, Carl Folkestad*, Igor Mezic, Ryan Mohr, Maria Fonoberova, and Joel Burdick **Episodic Koopman Learning of Nonlinear Robot Dynamics with Application to Fast Quadrotor Landing**, ACC 2020 [\[pdf\]](#)
- Amanda Bouman, Paul Nadan, Matthew Anderson, Daniel Pastor, Jacob Izraelevitz, Joel Burdick, and Brett Kennedy, **Design and Autonomous Stabilization of a Ballistically Launched Multirotor**, ICRA 2020 [\[pdf\]](#) [\[video\]](#)
- Daniel Pastor, Jacob Izraelevitz, Paul Nadan, Amanda Bouman, Joel Burdick, and Brett Kennedy, **Design of a Ballistically-Launched Foldable Multirotor**, International Conference on Intelligent Robots and Systems (IROS) 2019, Macao [\[pdf\]](#) [\[video\]](#)
- Daniel Pastor*, Eric Heiden*, Pradyumna Vyshnav, Aliakbar Aghamohammadi, **Heterogeneous Sensor Fusion via Confidence-rich 3D Grid Mapping: Application to Physical Robots**, International Conference of Experimental robotics (ISER) 2018, Buenos Aires [\[pdf\]](#)
- Daniel Pastor, Hyo S. Shin **Optical Flow Localization And Appearance Mapping (OFLAAM) For Long-term Navigation**, ICUAS'15, Denver [\[pdf\]](#)
- Gonzalo Sanchez-Arriaga, Daniel Pastor, **Direct Vlasov Simulations of Electron Attracting Cylindrical Langmuir Probes in Flowing Plasmas** Physics of Plasmas, 2014, vol. 21, no 7 073504 [\[pdf\]](#)