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# MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2025 EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

Nova University of Lisbon

#### **RESEARCH GROUP AND URL**

Center for Technology and Systems (https://cts.uninova.pt/researchareas.html)

## SUPERVISOR (NAME AND E-MAIL)

Prof. Daniel Silvestre (dsilvestre@fct.unl.pt)

#### SHORT CV OF THE SUPERVISOR

Dr. Daniel Silvestre received his B.Sc. in Computer Networks in 2008 from the Instituto Superior Técnico (IST), University of Lisbon, Portugal, and an M.Sc. in Advanced Computing in 2009 from the Imperial College London, United Kingdom. In 2017, Dr. Silvestre got his Ph.D. (with the highest honors) in Electrical and Computer Engineering from the former university. Dr. Daniel Silvestre holds a tenured Assistant Professor position with the School of Science and Technology of the NOVA University of Lisbon. Since 2017, he has participated in 4 projects and has written 3 successful project proposals (2 for the University of Macau and 1 for FCT) considered for funding totaling around 840k €, with a finished FCT project PCIF/MPG/0156/2019 – FirePuma dealing with sensor fusion of crowdsourced data and trajectory design to increase the likelihood of an early forest fire detection. All the indicators from FirePuma surpassed the initial proposal with the highlights being the publication of 15 journal papers and 19 MSc thesis. He has conducted research in nonlinear optimization, Fault Detection and Isolation in dynamical systems and networked control systems leading to the publication of 1 book chapter, 27 papers in Q1 journals (14 being in venues over the 92th percentile) and 28 conference papers with visibility in the control community denoted by 718 citations in Google Scholar (564 since 2020), an h-index of 15, Associate Editor for the Control Systems Society of IEEE and invitation to serve as session Chair in multiple American Control Conference and IEEE Control Decision Conference.

## **5 SELECTED PUBLICATIONS**

- D. Silvestre, "Constrained Convex Generators: A Tool Suitable for Set-Based Estimation With Range and Bearing Measurements," in IEEE Control Systems Letters, vol. 6, pp. 1610-1615, 2022, doi: 10.1109/LCSYS.2021.3129729.
- D. Silvestre, J. Hespanha and C. Silvestre, "Fast Desynchronization Algorithms for Decentralized Medium Access Control Based on Iterative Linear Equation Solvers," in IEEE Transactions on Automatic Control, vol. 67, no. 11, pp. 6219-6226, Nov. 2022, doi: 10.1109/TAC.2021.3130888.
- Ramos, G., Silvestre, D., & Silvestre, C. (2020). General resilient consensus algorithms. *International Journal of Control*, 95(6), 1482–1496. <u>https://doi.org/10.1080/00207179.2020.1861331</u>
- Daniel Silvestre, Paulo Rosa, João P. Hespanha, Carlos Silvestre, Stochastic and deterministic fault detection for randomized gossip algorithms, Automatica, Volume 78, 2017, Pages 46-60, ISSN 0005-1098, <u>https://doi.org/10.1016/j.automatica.2016.12.011</u>.
- D. Silvestre, J. P. Hespanha and C. Silvestre, "Broadcast and Gossip Stochastic Average Consensus Algorithms in Directed Topologies," in IEEE Transactions on Control of Network Systems, vol. 6, no. 2, pp. 474-486, June 2019, doi: 10.1109/TCNS.2018.2839341.

**PROJECT TITLE AND SHORT DESCRIPTION** 





**Set-valued Estimation using CCGs to certify Neural Networks and Nonlinear Systems** – Based on the 1<sup>st</sup> and 4<sup>th</sup> selected publications, the candidate can work on validation of nonlinear or nonconvex techniques through the use of Constrained Convex Generators (CCGs). This is a current research effort to be applied to the certification of spacecraft launchers in the initial phase of launch. A similar problem is present in the certification of security for cyber-physical systems with hard constraints on the state that must be enforced by the controller.

**Controller Design using CLFs and CBFs for real-time operations** – the project also encapsulates the design of controllers using Control Lyapunov Functions (CLFs) and Control Barrier Functions (CBFs) based on the constraints found using the sensor data. This family of controllers should be able to be solved in real-time and will be an optimized nonlinear controller for constrained nonlinear systems.

**Fault-tolerant Controllers using Reputation Systems** – a last task of the project will be the incorporation of reputation-based scores on the sensor data to decide which constraints are necessary from those that arise from faults. The controllers will be robust to faults through the adaptation of the CBFs to Robust CBFs.

# SCIENTIFIC AREA WHERE THE PROJECT FITS BEST

Information Science and Engineering (ENG)