

NGUYEN T. HUNG

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PhD candidate in control and robotics, emphasis on control and navigation of single and networked multiple cooperative mobile robots/autonomous vehicles

Education

- Sep. 2016–Present **Ph.D. candidate**, *Institute for Systems and Robotics (ISR), Instituto Superior Tecnico (IST), University of Lisbon, Portugal.*
- April 2015 **M.S. in Electrical and Electronics Engineering**, *University Technology Petronas (UTP), Malaysia.*
- April 2010 **B.S. in Electrical and Electronics Engineering**, *Ho Chi Minh City University Technology (HCMUT), Viet Nam.*

Background

During the PhD program, I had great opportunities to take the following courses to build my background in control, estimation, optimization, and network science:

At IST Lisbon

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| Nonlinear control | <i>with Antonio Pascoal, at IST Lisbon, 2018</i> |
| Nonlinear optimization | <i>with Joao Xavier, at IST Lisbon, 2017</i> |
| Network science: models and distributed algorithms | <i>with Joao Xavier, at IST Lisbon, 2016</i> |
| Dynamical system and optimization | <i>with Joao Lemos, at IST Lisbon, 2017</i> |
| Estimation and classification | <i>with Jorge Marques, at IST Lisbon, 2017</i> |

At the European Embedded Control Institute (EECI)

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| Distributed control and computation | <i>with Stephen Morse, at TU Berlin, 2017</i> |
| Nonlinear system | <i>with Hassan Khalil, at Paris Supélec, 2018</i> |
| Nonlinear model predictive control | <i>with Frank Allgower, at IIT Madras, 2017</i> |
| Numerical optimal control | <i>with Sebastien Gros, at NTNU, Trondheim, 2018</i> |

Research experience

2016–Present **Researcher**, *ISR/IST, Lisbon and AMOS center, NTNU, Trondheim.*

Working on several EU projects such as MARINEUAS, WIMUST, with focus on navigation, guidance and control of multiple autonomous vehicles.

- Cooperative path following of multiple autonomous vehicles with event triggered communications. Develop a theoretical framework and implement real tests with marine autonomous vehicles developed by DSOR lab, ISR/IST Lisbon.
- Develop a framework for consensus/coordination/synchronization of a nonlinear multi agent system with event triggered control and communications.
- Develop an MPC framework for simultaneous target localization and tracking for the case of multiple targets and multiple trackers.

Matlab/Python/ROS environments

- 2012–2015 **Researcher**, *EE department, UTP*.
Modelling, system identification and control of process plants.
- Develop black-box models (ARX, neuro-fuzzy) for a lab-scaled air pilot plant.
 - Develop control strategies (PID/MPC) for the air pilot plant. Implement the controllers with real air plant.
- Matlab environment/ PCI Card interface*
- 2010–2012 **Research assistant**, *Schneider Electric automation design center, HCMUT*.
Study and develop a redundancy solution for a distributed network control system.
- Develop a solution for Programmable Logic Controller (PLC) redundancy based on Unity Pro software and Premium PLC of Schneider Electric
 - Integrate the PLC redundancy solution with SCADA Citect redundancy
- SCADA Citect, Unity Pro environment*

Teaching experience

- 2018 **Teaching assistant**, *IST Lisbon*.
Ph.D courses: Nonlinear Optimization with Joao Xavier, Spring semester.
- 2013-2015 **Teaching assistant**, *UTP*.
Undergraduate courses: Plant Process Control System, Industrial Automation Control System, and Modern Control Engineering.
- 2010-2012 **Lab instructor**, *Automatic control department, HCMUT*.
Undergraduate courses: Industrial Network, Introduction to Control Engineering.
- 2010-2012 **Trainer**, *Schneider Electric Automation Design Center*.
Industrial courses for Schneider's customers in Vietnam and Cambodia: PLC Twido, PLC Premium, SCADA Citect, Unity Pro, Industrial Network (Modbus TCP/IP, ModbusRTU, CANopen).

Computer skills

Experienced with: MATLAB/Simulink, C++, Python, ROS, Linux, Git.

Awards/Honors

- 2016-2018 Marie-Curie Early Stage Researcher Fellowship, awarded by the *EU commission*.
- 2013-2015 Master scholarship, awarded by *UTP*.
- 2011 First runner up for a "control and automation solution for saving energy in university campus", awarded by *Schneider Electric of South-East Asia*.
- 2011-2012 Exemplary young lecturer, awarded by *HCMUT*.
- 2005 Third place in selection of national gifted student in Physics, awarded by the *Ministry of Education of Viet Nam*.

Languages

Vietnamese	Native
English	Proficient
Portuguese	Basic

Selected publications

Journals:

- J3. **Nguyen T. Hung**, Antonio M. Pascoal, "Consensus/synchronization of networked nonlinear multiple agent systems with event-triggered communications", *International Journal of Control*, 2020.

- J2. **Nguyen T. Hung**, Antonio M. Pascoal, Tor A. Johansen, "Cooperative path following of constrained autonomous vehicles with model predictive control and event-triggered communications", International Journal of Robust Nonlinear Control, 2020; 30: 2644– 2670. [download](#)
- J1. **Nguyen T. Hung**, N. Crasta, David Moreno-Salinas, António M. Pascoal, Tor A. Johansen, "Range-based target localization and pursuit with autonomous vehicles: An approach using posterior CRLB and model predictive control", Robotics and Autonomous Systems, Volume 132, 2020, 103608, ISSN 0921-8890. [download](#)

Book chapters:

- B1. Francisco C. Rego, **Nguyen T. Hung**, Colin N. Jones, Antonio M. Pascoal and A. Pedro Aguiar, Chapter 8: "Cooperative Path- Following Control with Logic-Based Communications: Theory and Practice", Navigation and Control of Autonomous Marine Vehicles, IET books, 2019. [download](#)

Conferences:

- C6. **Nguyen T. Hung**, Antonio M. Pascoal, "range-based navigation and target localization: observability analysis and guidelines for motion planning", IFAC2020
- C5. J. Quintas, **Nguyen T. Hung**, et al., "AUV path planning, navigation, and control using geophysical data," OCEANS 2019 - Marseille, Marseille, France, 2019, pp. 1-9, doi: 10.1109/OCEANSE.2019.8867535.
- C4. **Nguyen T. Hung**, F. C. Rego and A. M. Pascoal, "Event-Triggered Communications for the Synchronization of Nonlinear Multi Agent Systems on Weight-Balanced Digraphs," 2019 18th European Control Conference (ECC), Naples, Italy, 2019, pp. 2713-2718, doi: 10.23919/ECC.2019.8796277.
- C3. **Nguyen T. Hung**, F. Rego, N. Crasta, Antonio Pascoal, "Input-Constrained Path Following for Autonomous Marine Vehicles with a Global Region of Attraction", The 11th IFAC Conference on Control Applications in Marine Systems, Robotics, and Vehicles–CAMS 2018, Opatija, Croatia.
- C2. **Nguyen T. Hung**, Antonio Pascoal, "Cooperative Path Following of Autonomous Vehicles with Model Predictive Control and Event Triggered Communications", 6th IFAC Conference on Nonlinear Model Predictive Control, Wisconsin, USA, 2018.
- C1. Francisco C. Rego, **Nguyen T. Hung**, Antonio Pascoal, "Cooperative Path Following of Autonomous Marine Vehicles: Theory and Experiments", IEEE OES Autonomous Underwater Vehicle, Porto, Portugal, 2018.