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NGUYEN T. HUNG

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

Education

Sep. 2016–Present **PhD 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

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

At the European Embedded Control Institute (EECI)

Distributed control and computation	*with Stephen Morse, at TU Berlin, 2017*
Nonlinear system	*with Hassan Khalil, at Paris Supelec, 2018*
Nonlinear model predictive control	*with Frank Algower, at IIT Madras, 2017*

Research experience

2016–Present **PhD-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. 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.
- Develope an MPC framework for simultaneous target localization and tracking for the case of multipe targets and multiple trackers.
- Develop a cooperative distributed estimation and control strategy for range-based simultaneous target localization and pursuit.

Software: Matlab/ROS/Python/C++
Hardware: Medusa *underwater robots*

2012–2015 **PG-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 pilot plant.

Tools: Matlab / PCI Card interface/ Gaseous pilot plant

2010–2012 **Research engineer**, *Schneider Electric automation design center, HCMUT*.
Study and develop a redundancy solution for a distributed industrial network control system.

- Develope a solution for Programable Logic Controller (PLC) redundancy based on Unity Pro software and Premium PLC of Schneider Electric
- Integrate the PLC redundancy solution with SCADA Citect redundancy

Software: SCADA Citect, Several PLC IDEs
Hardware: PLC Schneider, PLC Siemen, Remote I/O, Inverter, Industrial network

Teaching experience

2018 **Teaching assistant**, *IST Lisbon*.
Ph.D courses: Nonlinear Optimization with Joao Xavier, Spring semester.

2013-2015 **Teaching assistant and lab instructor**, *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, Introuduction to Control Engineering.

2010-2012 **Trainner**, *Schneider Electric Automation Design Center*.
Industrial courses for Schneider's customers in Vietnam and Combodia: PLC Twido, PLC Premium, SCADA Citect, Unity Pro, Industrial Network (Modbus TCP/IP, Modbus RTU, CANopen).

Software experience

MATLAB/Simulink, C++, Python, ROS, Linux, Git, Latex

Hand-on experience

Microcontrollers, Programable Logic Controller (PLC), Inverter, PCI cards, HMI, industrial network (CAN, Modbus RTU, Modbus TCP/IP)

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 Examplary 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. download

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. 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, 2020. 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, to appear. download

C5. J. Quintas, **Nguyen T. Hung**, et al., "AUV path planning, navigation, and control using geophysical data," OCEANS 2019 - Marseille, Marseille, France, 2019. download

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. download

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. download.

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. download

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. download