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NGUYEN T. HUNG

PhD candidate in control and robotics, emphasis on guidance, navigation, and control of 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 experience: Matlab/C++/Python/ROS
Robot experience: 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.

Software experience: Matlab
Hardware experience: PCI Card interface/ Real 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 experience: SCADA Citect, Several PLC IDEs of Siemens, Schneider Electric
Hardware experience: 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:

J4. **Nguyen T. Hung**, Francisco Rego, Antonio M. Pascoal, "Cooperative distributed estimation and control of multiple autonomous vehicles for range-based underwater target localization and pursuit", under review at IEEE Transactions on Control Systems and Technology , download

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, Antonio 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