NGUYEN T. HUNG

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PhD candidate in control and robotics, expected to complete by June 2021

Overview

Strong background in control and robotics area with a proven track record from theory, designing, to implementation (have publications in high-quality journals/confs in control and robotics such as IEEE TCST, RAS, IJRNC, IJC, IFAC).

Experienced in implementing planing, guidance, navigation, and control algorithms for real networked multiple robots.

Participated in several EU-funded research projects in networked multiple marine robots.

Experienced in leading and setting up of a research lab in networked industrial control systems.

Presented research work at several events organized by control and robotics communities in US, EU, and Asia.

Experienced in supervising undergraduate and master students on topics in control and robotics.

Education

June 2021 **PhD candidate in Electrical and Computer Engineering**, *Tecnico Lisboa (IST)*, Portugal.
Advisor: Prof. Antonio M. Pascoal.

April 2015 **M.S. of Research in Electrical Engineering**, *University Technology Petronas (UTP)*, Malaysia.
Advisor: Prof. Idris Ismail.

April 2010 **B.S. in Electrical 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 (transcript)

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 work**, *ISR/IST, Lisbon, Portugal and (visiting) AMOS center, NTNU, Trondheim, Norway*.
Have been working on several EU research projects such as EUMR, WIMUST, OCEANTECH, contributing to development of algorithms for motion planing, guidance, navigation, and control of multiple robots.

- Develop several cooperative path following algorithms for coordination control of multiple robots.
- Develop an MPC framework for simultaneous target localization and tracking using autonomous vehicles.
- Develop a cooperative distributed estimation and control strategy for range-based simultaneous target localization and pursuit using multiple robots.
- Develop a framework for consensus/synchronization of nonlinear multi-agent systems with event-triggered communication mechanisms.
- Implemented the algorithms developed above and tested with real autonomous underwater vehicles.

Software used: Matlab/C++/Python/ROS
Robot used: MEDUSA underwater robots, developed by IST Lisbon

2012–2015 **Research engineer**, *EE department, UTP*.
Modelling, system identification, and control of process plants.

- Develop black-box models (ARX, state-space, neuro-fuzzy) for a real lab-scaled gaseous pilot plant.
- Develop and implement control strategies (PID/MPC) for the real gaseous pilot plant.

Software used: Matlab/Simulink
Hardware used: 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.

- Design and setup a research and training lab in industrial network control system based on the instruments of Scheneider Electric.
- Develop a solution for Programmable Logic Controller (PLC) redundancy based on Unity Pro software and Premium PLC of Schneider Electric

Software used: SCADA Citect, Several PLC IDEs of Siemens, Schneider Electric
Hardware used: PLC Schneider, PLC Siemen, Remote I/O, Industrial network (CAN, Modbus)

Teaching and supervision experience

2018-present **Supervision assistant**, *IST Lisbon*.
Supervise master's thesis students on several topics in motion planning, guidance, navigation, and control of multiple autonomus vehicles.

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: 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, Casadi, CVX

Hand-on experience

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

Awards/Honors

2019-current Research scholarship, awarded by *IST Lisbon*.

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:

J5. **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", conditionally accepted with minor revision at IEEE Transactions on Control Systems and Technology. download

J4. **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

J3. **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

J2. **Nguyen T. Hung**, Antonio M. Pascoal, "Consensus/synchronization of networked nonlinear multiple agent systems with event-triggered communications", International Journal of Control, 2020. download

J1. **Nguyen T. Hung** and DSOR team, "Theory, simulations, and experiments of path following guidance strategies for autonomous vehicles: Part I", to be submitted. 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