

Research engineer in control and robotics systems

Overview

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

Experienced in implementing guidance, navigation, and control algorithms with real single and networked multiple robotics systems.

Experienced in coordinating small teams to work on R&D projects in control and robotics.

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 Supélec, 2018

Nonlinear model predictive control

with Frank Algorner, at IIT Madras, 2017

Research experience

- 2016–Present **PhD work**, *ISR/IST, Lisbon, Portugal and (visiting) AMOS center, NTNU, Trondheim, Norway.*
Working on several EU research projects such as EUMR, WIMUST, OCEANTECH, contributing to development of algorithms for motion planning, 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 Schneider 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 autonomous 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, 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, 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](#)