



National Ph.D. Program in Autonomous Systems (DAUSY)
<http://dausy.poliba.it>

Prof. Engr. **Mariagrazia DOTOLI** (mariagrazia.dotoli@poliba.it)

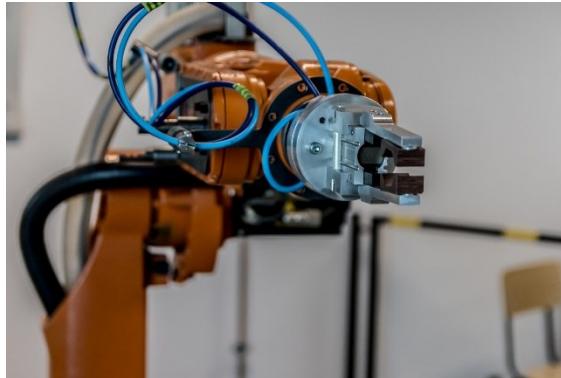
Full Professor in Automation at the Department of Electrical and Information Engineering (DEI)
Politecnico di Bari

Coordinator of the National Ph.D. Program in **Autonomous Systems (DAUSY)**

Introduction to Autonomous Systems

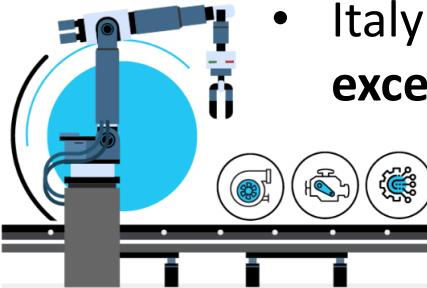
What are Autonomous Systems?

- One of the enabling technologies of the digital transition is **Autonomous Systems (AS)**.
- **AS are systems capable of automatically achieving a given goal without the intervention of a human operator.**
- AS are capable of **learning and independently performing decision-making tasks**.
- AS are becoming the **leading drive of technologies** such as industry 4.0, autonomous vehicles, drones, smart grids, precision agriculture.



Introduction to Autonomous Systems

Why a National PhD Program on AS?



- Italy is an **industrial and technological excellence**.
- Italy is **one of the worlds' most automated countries**:

<https://www.controldesign.com/motion/robotics/news/1296842/ifr-identifies-top-10-most-automated-countries>

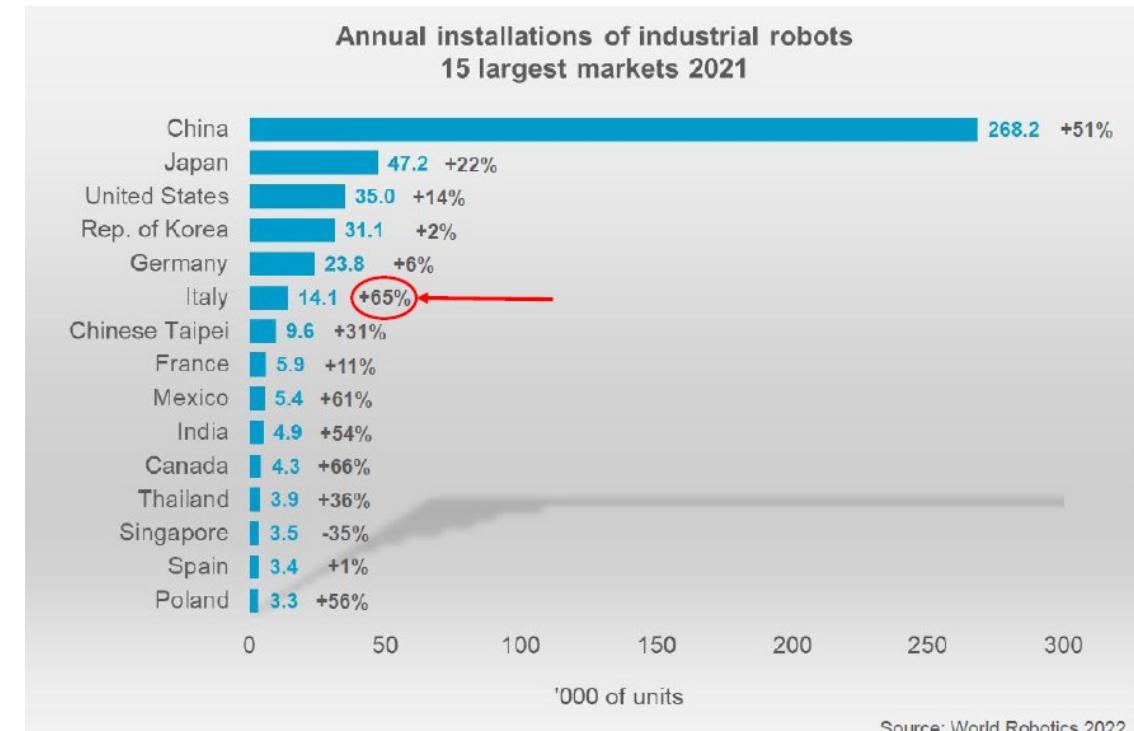
- **Italian research excellence:**
Key roles in European associations & networks.
Leadership in scientific associations:



INTERNATIONAL FEDERATION
OF AUTOMATIC CONTROL



IEEE
SMC
Systems, Man, and Cybernetics Society



The DAUSY National Ph.D. Program

What is DAUSY?

- The **Doctoral program (Ph.D.) in AUtonomous SYstems (DAUSY)** <http://dausy.poliba.it/> is a newly funded national program aiming at providing high-profile skills, as well as rigorous research training, to prepare PhD students and become versatile professionals and knowledgeable researchers while cooperating in a nation-wide network with international visibility.
- The major focus will be on Automation Engineering, together with its connections to Theoretical and Applied Mechanics, Optimization, Communication Systems, Information Theory, Machine Learning, Computing, Mathematics, and Signal Processing.
- DAUSY will establish a **doctoral school with critical mass and quality** to systematize the expertise on Autonomous Systems (AS) distributed in the country and involve **students from Italy and worldwide in an international academic and industrial setting**.



The DAUSY National Ph.D. Program

Mission

- The DAUSY initiative was promoted by **SIDRA (the Italian Society of Professors and Researchers in Automation)**



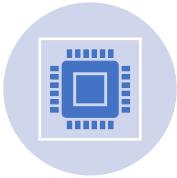
Objectives:

- Promote **technology transfer** especially in emerging industrial sectors for the use of autonomous systems.
- **Involve the industry** in directing research lines (win-win scientific excellence versus technology transfer).
- Promote **internship periods in companies** for Ph.D. students.
- Promote both **scientific and managerial skills** to facilitate the evolution of technologies towards mature solutions for the industry.
- Foster the **entrepreneurship** of Ph.D. students by envisaging the creation of innovative start-ups.

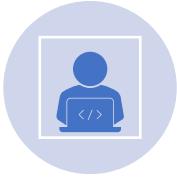
Main research directions of DAUSY



Design and develop AS, with applications to **smart manufacturing, autonomous vehicles, smart grids, robotics, and many more engineering fields**.



Develop smart control algorithms (e.g., *AI-enabled control, data-driven control, vision-based control*) for **smart AS environments such as smart cities, autonomous vehicles and mobile robots, smart grids, sustainable mobility systems, smart buildings, and smart homes**.



Develop testing platforms for emerging techniques to **advance engineering AS applications** (e.g., *cyber-physical systems, digital twin techniques*).



Design automated and high-performance industrial systems, studying issues related to **distributed control and supervision for systems composed of networks of sensors, actuators, and collaborative robots**.

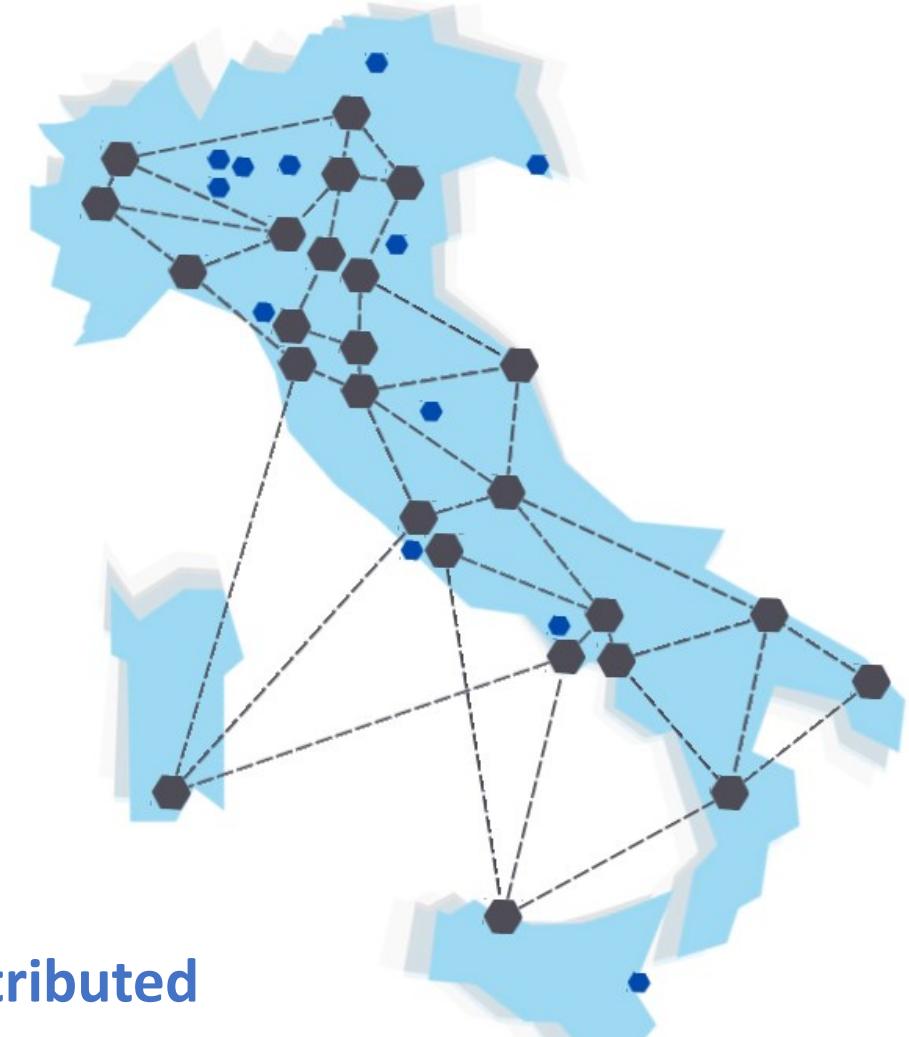


Design and operation of AS to guarantee their reliability and security, ensuring their proper functioning even under uncertainty (robustness), **monitoring and predicting failures, ensuring that confidentiality and privacy requirements are not violated**, countering both physical and cyberattacks, and designing secure processes in environments where automated and human systems interact.

General information on DAUSY

- **Politecnico di Bari (Poliba)** - Administrative headquarters.
- **29*** participating institutions (PUBLIC UNIVERSITIES).
- **+15*** partners institutions (PUBLIC UNIVERSITIES and RESEARCH CENTERS).
- **53*** Italian and **25*** foreign professors and researchers.

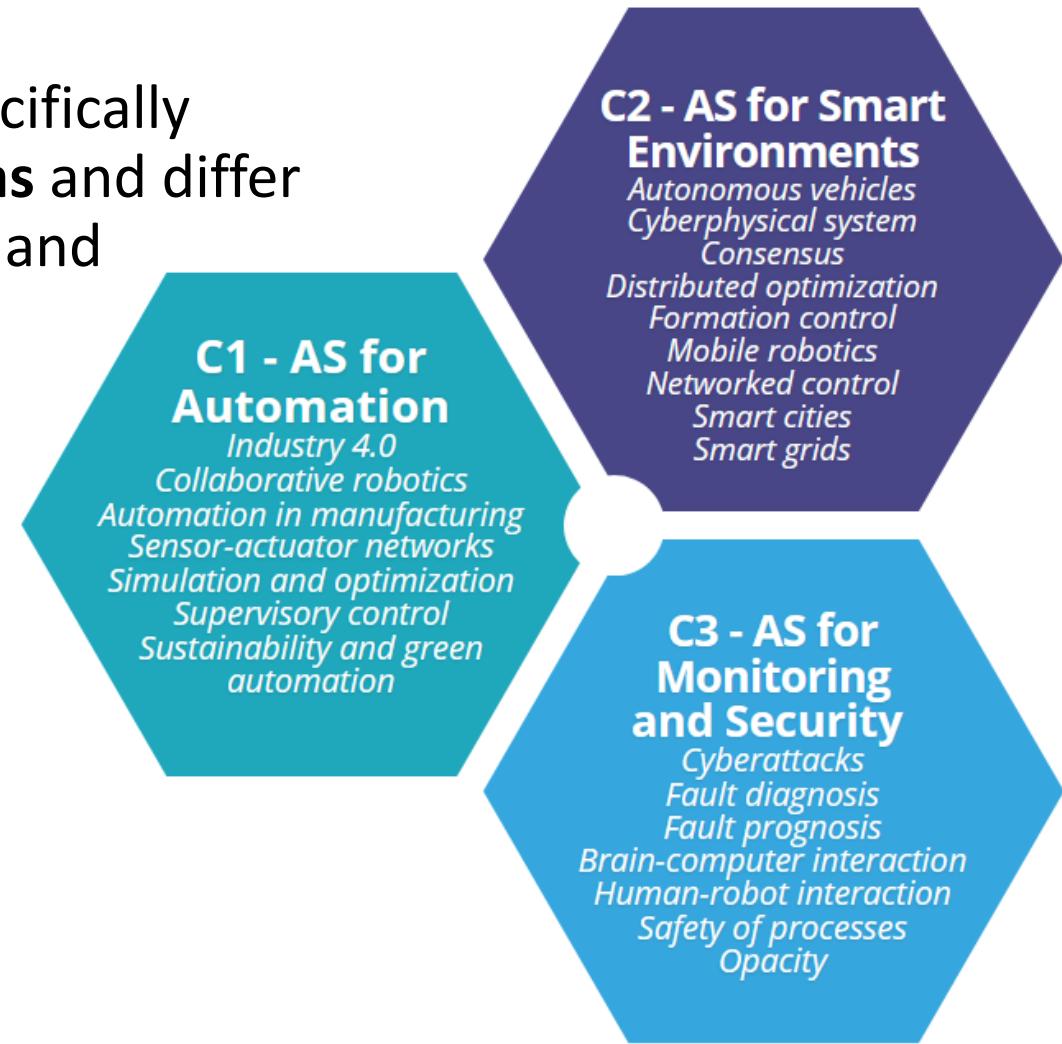
* Updated to the 39th cycle



The network is uniformly distributed throughout Italy!

Curricula

The Ph.D. is structured in **3 curricula** that specifically address **different topics and application areas** and differ and complement each other in technological and methodological terms.



Governance



Coordinator:

Prof. Mariagrazia DOTOLI, Politecnico di Bari

Email: mariagrazia.dotoli@poliba.it

More info at: <http://dausy.poliba.it/phd/people/>

- Full Professor in Automatic Control at Politecnico di Bari
- Senior Editor of the IEEE TRANS. ON AUTOMATION SCIENCE AND ENGINEERING
- Associate Editor of the IEEE TRANS. ON SYSTEMS, MAN, AND CYBERNETICS.
- General chair of the 2024 IEEE Conference on Automation Science and Engineering (CASE)
- General chair of 2021 29th Mediterranean Conference on Control and Automation
- Member of the International Program Committee of 80+ international conferences.
- Author of 270+ publications, h-index 36 in Scopus
- Expert evaluator of the European Commission since the 6th Framework Programme

Governance

Academic Board: C1 – AS for Automation



Curriculum Representative:

Prof. CAVALLO Alberto, Università degli Studi della Campania Luigi Vanvitelli

Email: alberto.cavall@unicampania.it

More info at: <http://dausy.poliba.it/phd/people/>



Curriculum Board Members*:

Name	Affiliation
ABENI Luca	Scuola Superiore Sant'Anna
ARIOLA Marco	Università degli Studi di Napoli Parthenope
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CARLI Raffaele	Politecnico di Bari
COLANERI Patrizio	Politecnico di Milano
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DABBENE Fabrizio	Consiglio Nazionale delle Ricerche
DELLI PRISCOLI Francesco	Università degli Studi di Roma "La Sapienza"
D'IPPOLITO Filippo	Università degli Studi di Palermo
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NOTARSTEFANO Giuseppe	Alma Mater Studiorum - Università di Bologna
PINAMONTI Andrea	Università degli Studi di Trento
VISIOLI Antonio	Università degli Studi di Brescia
ZACCARIAN Luca	Università degli Studi di Trento

* In red entries for the 39th cycle

Governance

Academic Board: C2 – AS for Smart Environments

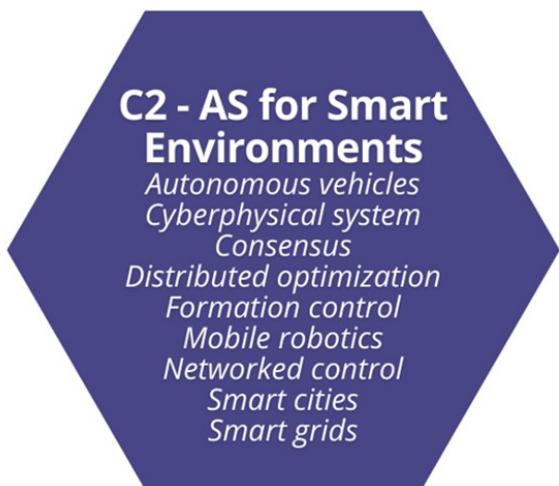


Curriculum Representative:

Prof. GIARRÈ Laura, Università di Modena e Reggio Emilia

Email: laura.giarre@unimore.it

More info at: <http://dausy.poliba.it/phd/people/>



Curriculum Board Members*:

Name	Affiliation
BEMPORAD Alberto	Scuola IMT Alti Studi Lucca
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CASAVOLA Alessandro	Università della Calabria
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DI GIORGIO Alessandro	Università degli Studi di Roma "La Sapienza"
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FALCONE Paolo	Università di Modena e Reggio Emilia
FERRARA Antonella	Università degli Studi di Pavia
FRANCESCHELLI Mauro	Università degli Studi di Cagliari
FRASCA Mattia	Università degli Studi di Catania
PARLANGELI Gianfranco	Università del Salento
SACONE Simona	Università degli Studi di Genova
SAVAGLIO Claudio	Università della Calabria
SCHENATO Luca	Università degli Studi di Padova
VALIGI Paolo	Università degli Studi di Perugia
VASCA Francesco	Università degli Studi del Sannio

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Governance

Academic Board: C3 – AS for Monitoring and Security

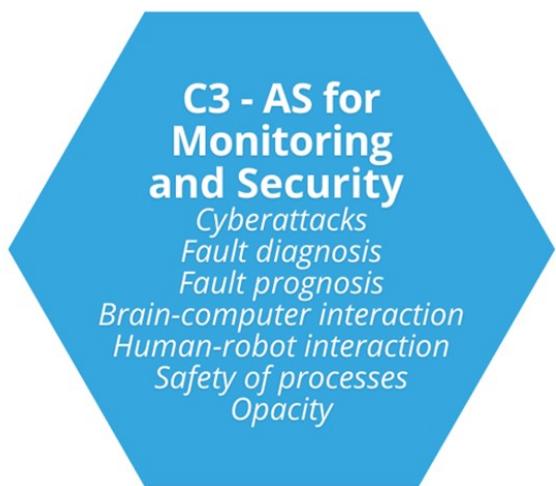


Curriculum Representative:

Prof. PASCUCCI Federica, Università degli Studi
Roma Tre

Email: federica.pascucci@uniroma3.it

More info at: <http://dausy.poliba.it/phd/people/>



Curriculum Board Members*:

Name	Affiliation
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DE SANTIS Elena	Università degli Studi dell'Aquila
DI BENEDETTO Maria Domenica	Università degli Studi dell'Aquila
FIORINI Paolo	Università degli studi di Verona
FREDDI Alessandro	Università Politecnica delle Marche
PALUMBO Pasquale	Università degli Studi di Milano Bicocca
PARISINI Thomas	Università degli Studi di Trieste
PIRO Giuseppe	Politecnico di Bari
POLLINI Lorenzo	Università di Pisa
SACILE Roberto	Università degli Studi di Genova
SIMANI Silvio	Università Degli Studi Di Ferrara
USAI Elio	Università degli Studi di Cagliari
VON ELLENRIEDER Karl Dietrich	Libera Università di Bolzano

* in red entries for the 39th cycle

Governance

The Ph.D. has an international scope, cooperating with numerous European and non-European universities.

Foreign members of the Board*:

Name	Affiliation	Curricula
ASTOLFI Daniele	UNIVERSITÉ CLAUDE BERNARD LYON 1	C3. AS FOR MONITORING AND SECURITY
BAMIEH Bassam	UNIVERSITY OF CALIFORNIA SANTA BARBARA	C2. AS FOR SMART ENVIRONMENTS
BAUSO Dario	UNIVERSITY OF GRONINGEN	C1. AS FOR AUTOMATION
BULLO Francesco	UNIVERSITY OF CALIFORNIA SANTA BARBARA	C2. AS FOR SMART ENVIRONMENTS
DAHLEH Munther	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	C1. AS FOR AUTOMATION
DALL'ANESE Emiliano	UNIVERSITY OF COLORADO BOULDER	C2. AS FOR SMART ENVIRONMENTS
DESCHUTTER Bart	DELFT UNIVERSITY OF TECHNOLOGY	C2. AS FOR SMART ENVIRONMENTS
DELLE MONACHE Maria Laura	UNIVERSITY OF CALIFORNIA BERKELEY	C2. AS FOR SMART ENVIRONMENTS
DEY Subhrakanti	UPPSALA UNIVERSITY	C2. AS FOR SMART ENVIRONMENTS
FRANCHI Antonio	UNIVERSITY OF TWENTE	C2. AS FOR SMART ENVIRONMENTS
GRAMMATICO Sergio	DELFT UNIVERSITY OF TECHNOLOGY	C2. AS FOR SMART ENVIRONMENTS
JOHANSSON Karl H.	ROYAL INSTITUTE OF TECHNOLOGY	C2. AS FOR SMART ENVIRONMENTS
LOIANNO Giuseppe	NYU TANDON SCHOOL OF ENGINEERING	C2. AS FOR SMART ENVIRONMENTS
MCLOONE Sean	QUEEN'S UNIVERSITY BELFAST	C1. AS FOR AUTOMATION
MORBIDI Fabio	UNIVERSITY OF PICARDIE JULES VERNE	C2. AS FOR SMART ENVIRONMENTS
PAPPAS George J.	UNIVERSITY OF PENNSYLVANIA	C2. AS FOR SMART ENVIRONMENTS
PORFIRI Maurizio	NYU TANDON SCHOOL OF ENGINEERING	C2. AS FOR SMART ENVIRONMENTS
QUEINNEC Isabelle	UNIVERSITÉ FÉDÉRALE TOULOUSE MIDI-PYRÉNÉES,	C1. AS FOR AUTOMATION
SASTRY Shankar	UNIVERSITY OF CALIFORNIA BERKELEY	C3. AS FOR MONITORING AND SECURITY
SERRANI Andrea	OHIO STATE UNIVERSITY	C3. AS FOR MONITORING AND SECURITY
SHORTEN Robert N.	IMPERIAL COLLEGE LONDON	C2. AS FOR SMART ENVIRONMENTS
STEFANOPOULOU Anna G.	UNIVERSITY OF MICHIGAN, ANN ARBOR	C1. AS FOR AUTOMATION
TARBOURIECH Sophie	UNIVERSITÉ FÉDÉRALE TOULOUSE MIDI-PYRÉNÉES	C1. AS FOR AUTOMATION
VALAVANIS Kimon P.	UNIVERSITY OF DENVER	C1. AS FOR AUTOMATION

* In red entries for the 39th cycle

Network of collaborations

Companies and research centers that are co-financing or hosting Ph.D. scholarships.

Public administrations:

- ARST – Trasporti Regionali della Sardegna S.p.A.
- ENEA - Smart Cities and Communities Laboratory
- IEIIT-CNR, Torino

Companies:

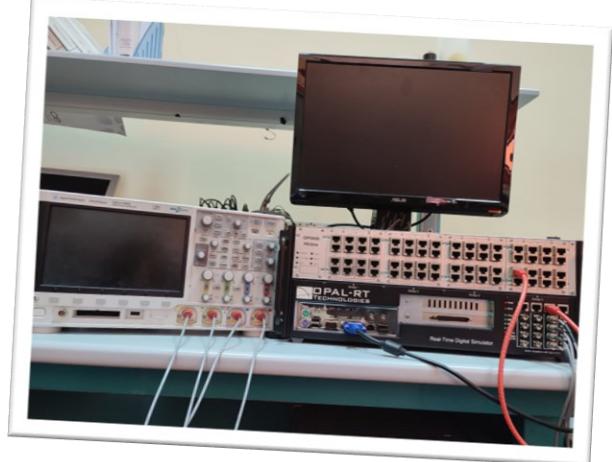
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| • BluHub | • G-Nous Tech S.r.l | • Northrop Grumman Italia S.p.A. | • DEDEM S.p.A. |
| • Comau S.p.A. | • ICAM S.r.l. | • STAM S.r.l. | • Aitek S.p.A. |
| • GlaxoSmithKline S.p.A. | • Isotta Fraschini Motori S.p.A. | • Schnell S.p.A. | • <i>more to come...</i> |
| • Thales Alenia Space Italia S.p.A | • E80 Group S.p.A. | • MIDAC S.p.A. | |



* In red entries for the 39th cycle

Equipment and laboratories

The Ph.D. program benefits from **laboratories belonging to the numerous research groups** of the universities involved in the Ph.D. program and their international, national and local collaborations.



Program overview – upcoming 39th cycle

Degree awarded: **Ph.D. in Autonomous Systems**

Language: **English**

Program length: **Three years full-time (in presence)**

Location: **20+ universities**

Starting date: **November 1, 2023**

Funding: **40+ fully paid scholarships**



Benefits for Ph.D. Candidates:

- A meaningful job in a **dynamic and ambitious Ph.D. program** with the possibility to present your work at international conferences.
- Enrolment at **prestigious universities and research centers** in Italy, with options for research visits to national industrial companies and international research centers or universities.
- **Full-time employment** for 3 years.
- A gross monthly **salary and benefits** (such as pension contributions, maternity leave, and unemployment benefits).

Scholarships

Scholarships for the **2022/25** and the **2023/26** triennium are determined as follows:

- **Net scholarship for research periods in Italy:**
about **1200 €/month**.
- **Net scholarship for research periods abroad:**
about **1800 €/month**.
- **Research budget 20 % (total in the 3 years)*:**
about **12000 €**.
- **Almost tax-free**:**
120-160 €/year.

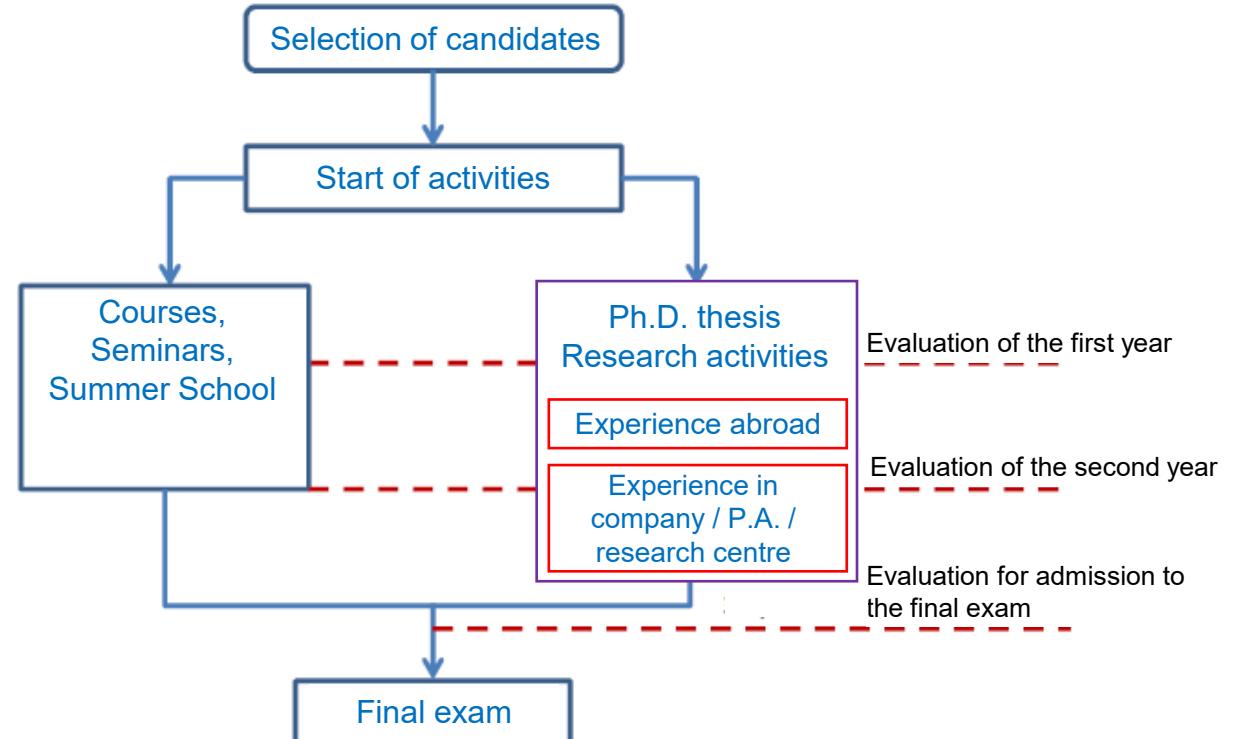
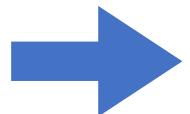


* The research budget can be used for registrations for on-site and online conferences; photocopies; posters; textbooks; computers and related equipment; expenses for publishing publications and language course.

** Taxes are calculated based on the Italian ISEE (Equivalent Financial Situation Index).

Course structure

- The course lasts 3 years-180 ECTS, including any period of study and research abroad and internships in public/ private institutions.
- General planning of activities



NOTE – MINIMUM REQUIREMENT FOR ADMISSION TO FINAL EXAM:

The Ph.D. student is co-author of 1 (3) scientific articles in an international journal (in proceedings of international conferences) indexed in Scopus or ISI/Web of Science databases.

Teaching course catalogue

The course catalogue of the DAUSY Ph.D. program includes courses offered in international, national, and local doctoral schools, offering a unique educational network: <http://dausy.poliba.it/phd/teaching-course-catalogue/>.

Ph.D. students must carry out didact activities of 36-60 ECTS credit points (out of the total 180 ECTS necessary to complete the PhD) among:

- International Graduate School in Control
- SIDRA Doctoral School
- Local Courses
- Seminars
- Workshops
- Ph.D. Research Seminars

Courses will be organized **centrally** and **in presence** (International Graduate School in Control, SIDRA Doctoral School, local courses) or in a **hybrid mode** (Seminars Workshops, Research Seminars) in order to:

- Allow students to choose freely the best learning mode
- Let students to belong to a nation-wide and international network of contacts in AS

Requirements

- Language requirements

- If English is not your native language, you need to demonstrate a degree of proficiency corresponding, at least, to the B2 level of the Common European Framework of Reference for Languages (CEFR).
- Knowledge of Italian is preferred but not required.

- Specific requirements

- Candidates must hold an M.Sc. Degree (degree completed before October 31st), preferably in Systems and Control, Electrical Engineering, Artificial intelligence (AI), Mechanical Engineering, or related subjects. Moreover, candidates should fit the following profile:
- Being a talented and enthusiastic young researcher;
- Strong background in control and automation;
- Strong academic background and rich experience in engineering systems, embedded systems, and system design;
- Good programming skills in MATLAB/Simulink and/or Python;
- Being a team player with excellent communication and cooperation skills, in a dynamic and multi-disciplinary project-driven environment;
- Creativity and ambition, hard-working and persistent mindset;
- Ability to independently organize your work;
- Good scientific writing skills.

More information: <http://dausy.poliba.it/phd/application/>



Pag. 20

Application procedure

Multiple application rounds are held per year, the next two call will be published around at the:

- beginning of June 2023
 - late August 2023
- ... stay tuned**

All the information regarding the application are available at the following pages:

- <http://dausy.poliba.it/phd/application>
- <https://www.poliba.it/it/dottorati-di-ricerca>

PhD available positions – 39th cycle (1/3)

Research topic	University / Company	Contact
Control and monitoring of secure and distributed Cyber-Physical Systems through the Digital Twin paradigm	Politecnico di Bari	giuseppe.piro@poliba.it
Autonomous systems for guided endoscopic navigation and theranostics	Politecnico di Bari	vitoantonio.bevilacqua@poliba.it
Distributed control of networked smart energy systems	Politecnico di Bari	mariagrazia.dotoli@poliba.it , raffaele.carli@poliba.it
Robotic systems for minimally invasive and interventional surgery	Politecnico di Bari	vitoantonio.bevilacqua@poliba.it
Platforms for optimization and control of Drone-as-a-service in logistics	Politecnico di Bari	mariagrazia.dotoli@poliba.it , raffaele.carli@poliba.it
Autonomous navigation systems	Politecnico di Bari	saverio.mascolo@poliba.it
Algorithms for management and control of mobile agent fleets for logistics 4.0	Politecnico di Bari E80 Group SpA	mariagrazia.dotoli@poliba.it
Data fusion for indoor localization system based on UWB technologies	Politecnico di Bari / E80 Group SpA	nicola.cordeschi@poliba.it
Optimal design of localization infrastructure for industrial AGVs	Politecnico di Bari / E80 Group SpA	nicola.cordeschi@poliba.it , raffaele.carli@poliba.it
Decision and control techniques for autonomous smart systems applied to precision agriculture	Politecnico di Bari / G-Nous Tech Srl	mariagrazia.dotoli@poliba.it
Intelligent systems for robotic path planning in industrial processes	Politecnico di Bari / COMAU SpA	mariagrazia.dotoli@poliba.it
Optimization and control strategies for power management of marine hybrid propulsion systems	Politecnico di Bari / Isotta Fraschini Motori SpA	mariagrazia.dotoli@poliba.it , raffaele.carli@poliba.it
Controllo Intelligente per una Collaborazione Uomo-Robot Sicura ed Efficiente in Magazzini Automatizzati	Politecnico di Bari / ICAM Srl	mariagrazia.dotoli@poliba.it , raffaele.carli@poliba.it
Digital Driven Diagnostics, prognostics and therapeutics for sustainable Health care	Politecnico di Bari / Project D34Health	vitoantonio.bevilacqua@poliba.it

PhD available positions – 39th cycle (2/3)

Research topic	University / Company	Contact
Multirobot planning and control for human-robot interaction and cooperation in the manufacturing sector	Università degli Studi di Trento	daniele.fontanelli@unitn.it
Risk-aware control of aerial cargo drones	Libera Università di Bolzano	Karl.vonellenrieder@unibz.it
Advanced estimation methods via Kalman filters, resonator gyroscopes and machine learning	Università di Roma Tor Vergata / Northrop Grumman Italia	mario.sassano@uniroma2.it
Stability and safety of platoons of interconnected vehicles	Università dell'Aquila	elena.desantis@univaq.it
Identification, modeling, and optimization of a sustainable urban transportation network.	Università di Parma	luca.consolini@unipr.it
Advanced control strategies with applications to sustainable bioprocesses	Università di Brescia	antonio.visioli@unibs.it
Security for Industrial Internet of Things	Università degli Studi Roma Tre	federica.pascucci@uniroma3.it , Graziana.cavone@uniroma3.it
Modeling of complex humans-involved systems and control of disastrous outcomes	Politecnico di Torino	giuseppe.calafiore@polito.it
Real-time optimization with application to autonomous systems	Università del Sannio	vasca@unisannio.it
Reinforcement Learning Algorithms for Contact-Rich Manipulation Tasks	Università di Padova	alberto.dallalibera@unipd.it , carlirug@dei.unipd.it
Integrating Swarm Sensors for Distributed Monitoring and Agent Based Modeling for Environmental Systems Control	Universita' di Siena	chiara.mocenni@unisi.it
Control methods for smart networks	Univ. Roma "La Sapienza"	digiorgio@diag.uniroma1.it
Satellite technologies for autonomous systems and decision support	Univ. Roma "La Sapienza" / Telespazio Spa	giuseppe@diag.uniroma1.it
New techniques for analysis, design and control of chaotic dynamics	Università di Catania	mattia.frasca@dieei.unict.it

PhD available positions – 39th cycle (3/3)

Research topic	University / Company	Contact
Robotics and artificial intelligence in agriculture	Università di Verona	riccardo.muradore@univr.it
Model-based and data-driven learning and control techniques for increasing reliability and safety of an autonomous system in uncertain and hazardous environments	Università del Salento	gianfranco.parlangeli@unisalento.it
Edge AI-enabled Internet of Things systems for smart environments	Università della Calabria	csavaglio@dimes.unical.it
Optimization and control techniques for energy management systems	Università di Palermo	filippo.dippolito@unipa.it
Modelling, control and optimisation of electrical smart grids	Università della Campania Luigi Vanvitelli	alberto.cavallo@unicampania.it
Safety-driven mixed model- and learning-based motion planning and control of autonomous systems	Università di Modena e Reggio Emilia	falcone@unimore.it
Management and automation systems for energy management in buildings and industrial processes	Università di Cagliari / STAM Srl	eusai@diee.unica.it
Teoria del controllo e ottimizzazione per fenomeni evolutivi.	Università degli Studi di Trento	andrea.pinamonti@unitn.it
Model-based condition monitoring, fault diagnosis and control of autonomous systems	Università Politecnica delle Marche	s.longhi@staff.univpm.it
Self diagnosis and total fault prediction solutions based on data and signals in autonomous machines for structural steel processing	Università Politecnica delle Marche / Schnell SpA	s.longhi@staff.univpm.it
Intelligent algorithms for the management of stationary storage systems	Università Politecnica delle Marche / MIDAC SpA	a.freddi@staff.univpm.it
Multi-agent distributed coordination for workforce management with privacy by design	Università di Cagliari / DEDEM SpA	mauro.franceschelli@diee.unica.it
Data analysis and planning for smart mobility schemes	Università di Genova / Aitek S.p.A.	simona.sacone@unige.it
Autonomous Vehicles Fleet Management using Artificial Intelligence	Università di Pisa	lorenzo.pollini@unipi.it

More to come...



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Full Professor in Automation at the Department of Electrical and Information Engineering (DEI)
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