

PERSONAL INFORMATION **Andrea Wrona**

## SHORT BIO

I graduated with honors both in Computer and Control Engineering (Bachelor Degree) in October, 2018 and in Control Engineering (Master Degree) in October, 2020 at University of Rome “La Sapienza”, together with the achievement of the diploma of Excellence. Since November 2020, winner of a scholarship, I have been attending the PhD Program in Control, Bio-engineering and Operations Research at the same university. My research topics rely on: nonlinear control, control of telecommunication and energy networks, Reinforcement Learning and Deep Learning applied to decision-making systems.

## EDUCATION

2020–Present **PhD in Automatic Control, Bio-engineering and Operations Research**

University of Rome “La Sapienza”

Curriculum: Automatic Control

Supervisor: Alessandro Di Giorgio

PhD Courses:

- SIDRA 2022 PhD Summer School, July 2022, Bertinoro (FC). Held by Prof. Andrea Serrani and Francesco Bullo;
- La scrittura tecnico–scientifica, February 2022, Rome (RM). Held by Prof. Emilio Matriccioni;
- SIDRA 2021 PhD Summer School, July 2021, Bertinoro (FC). Held by Prof. Giacomo Como, Fabio Fagnani, Antonio Bicchi, Alessandro De Luca, Bruno Siciliano, Cosimo Della Santina, Stanislao Grazioso;
- EECI Multi-Agent Distributed Optimization and Learning over Wireless Networks, June 2021. Held remotely by Prof. Luca Schenato and Ruggero Carli, Università di Padova.
- Numerical Methods for Optimal Control, May 2021. Held remotely by Prof. Mario Zanon, IMT School of Advanced Studies;
- Model Predictive Control, April 2021. Held remotely by Prof. Alberto Bemporad, IMT School of Advanced Studies.

2018–2020 **Master of Science in Control Engineering**

University of Rome “La Sapienza”

**110 cum laude/110**

I completed my master studies with a comprehensive average of 29.91/30. In february, 2020 I have been admitted to the Students Honors Program, reserved to the most valuable students. The matter of the Program is: networked systems and consensus dynamics. The Master thesis concerned the active debris removal problem and space manipulator systems modeling and control, with particular focus on the dynamic couplings between the base platform and the robotic arm.

2019 **Trieste NEXT**

In September, 2019 I joined the scientific research festival “Trieste NEXT”, held in the Italian city of Trieste. I attended three visits to industrial and medical companies in the Friuli Venezia Giulia region and eleven conferences on Artificial Intelligence and Big Data.

2019 **TESP Robotics**

Tohoku University, Sendai, Japan

In May, 2019, after succeeding in an internal selection in my University, I have been admitted to the Summer School organized by the Tohoku University in Sendai, Japan. The program took place from July, 26 to August, 12 in Sendai. During these days I joined the Space Robotics Laboratory, working on a project involving autonomous navigation through obstacles of a wheeled mobile robot.

**2015–2018 Bachelor's Degree in Computer and Control Engineering**

University of Rome "La Sapienza"

**110 cum laude/110**

With a total of 9 *laudes*, I joined the Students Honors Program, reserved for the most deserving student. As bachelor thesis I have developed a deep study and analysis of power systems, with focus on voltage control.

**2010–2015 Classical High School**

Liceo Scientifico–Classico Giuseppe Stampacchia, Tricase (LE)

**100/100**

I participated to Latin and ancient Greek *certamina* at local and national level and also to mathematical and physical contests, qualifying at the national final of the Mathematical Games at the Bocconi University (Milan).

**RESEARCH AND WORK EXPERIENCE**

July 2022 – Present

**Researcher in CADUCEO**

Italian project funded by Ministero dello Sviluppo Economico (MISE)

The research activity was primarily aimed at the study and development of the state of the art relating to the three case studies that characterize the CADUCEO project from a clinical point of view, namely:

1. Eosinophilic esophagitis, chronic immune-mediated disease of the esophagus;
2. Inflammatory bowel disease (IBD), such as Crohn's disease, ulcerative colitis and Inflammatory Bowel Disease (IBD). These are the family of diseases affecting the intestinal tract, triggered by abnormal immune responses;
3. Portal hypertension, which is liver disease characterized by high pressure in the portal vein, often caused by cirrhosis of the liver.

These pathologies have been studied in relation to the recent developments brought by the use of artificial intelligence techniques for the purpose of automatic detection and classification of the pathology itself. The second phase of the research activity fell precisely on the study of data augmentation, i.e. the family of artificial intelligence techniques that make it possible to increase a database of available data, a crucial aspect in a clinical setting, in which little data is often available to train a neural network. The research activity has therefore laid the foundations for the development of the CADUCEO project within the perimeter of the case studies defined therein, with the aim of overcoming the state of the art both in terms of data increment techniques and in terms of concerns the problem of automatic detection of pathologies.

January 2022 – Present

**Researcher in HyDEMO**

HydRON-Demonstration System (DS) PHASE A/B1" in following shortened in HyDEMO. Contract 1550007580, funding 100000 €.

Development of DRL-based control algorithms for the switching problem in communication networks.

March 2021 – Present

**Participation in EU Info Days and Brokerage Events**

Contacts with leading companies and universities in the fields of health, telecommunications, transport, energy and agriculture for the formation of consortia which have the ultimate goal of submitting a project proposal to the European Commission.

November 2020 – Present

**Researcher in VADUS**

Virtual Access and Digitalization for Unreachable Sites (VADUS). IAP-5G for L'ART Thematic Call: Cultural Heritage. ESA Contract 4000132720/20/NL/AF, funding 785300 €.

Design of Multi-RAT algorithms based on optimal control, Q-Learning and DRL for the network selection and resource allocation in heterogeneous networks with mobile VR/AR applications rebuilding cultural sites not open to visitors.

November 2020 – January 2022 **Researcher in ARIES**

Advanced multi-Rat Integrated multi-sensors solution for Emergency prevention, detection and response operationS (ARIES). IAP 5G for L'ART Feasibility Study in response to the ITT ESA AO10064 - Law Enforcement and Emergency Response - Area L'Aquila/the Abruzzo Region. ESA Contract 4000133127/20/NL/AF, funding 200000 €.

Development of Multi-RAT algorithms based on optimal control for the communication between ground sensors and drone-based access points for forest fires' monitoring and early intervention strategies.

November 2020 – Present **Researcher for the Consortium for the Research in Automation and Telecommunications (CRAT)**

Personal activities related to procurement and drafting of several project proposals for the Horizon Europe Program, ESA 5G Programs, IPCEI Salute, PNRR, Contratti di sviluppo MISE.

2019 – 2021 **Writer for Close-Up Engineering**

Scientific dissemination activities on mathematics and physics, with more than 30 articles written on various blogs belonging to the online magazine "Close-Up Engineering".

REVIEWER EXPERIENCE

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April 2022 – Present **Control Engineering Practice**

October 2022 **American Control Conference - San Diego 2023**

TEACHING

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June 2021 – Present **Assistant Lecturer**

- **Fondamenti di Automatica.** Bachelor's Degree in Electrical Engineering, University of Rome "La Sapienza", course code: 1015384, ECTS: 9. Course practitioner;
- **Control of Autonomous Multi-Agent Systems.** Master in Control Engineering, University of Rome "La Sapienza", course code: 1041427, ECTS: 3. Seminars on Deep Reinforcement Learning algorithms for network selection and resource allocation in heterogeneous networks;
- **Control of Communications and Energy Networks.** Master in Control Engineering, University of Rome "La Sapienza", course code: 1041429, ECTS: 6. Four seminars on ARIES, VADUS HyDEMO research activities;
- **Controlli Automatici.** Bachelor in Computer and Control Engineering, University of Rome "La Sapienza", course code: 1021946, ECTS: 9. Seminars on data driven control techniques based on Reinforcement Learning with application on 5G communication networks.

March 2021 – Present **Assistant Supervisor**

I am serving as an assistant supervisor of 5 Bachelor Theses and 2 Student Honors Program's related activities.

SCHOLARSHIPS AND CERTIFICATES

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2015 – 2020 **Bonus Studenti Meritevoli "La Sapienza"**

2017 **CLAD: Certificate LabVIEW Associate Developer**

Certification obtained by National Instruments on December, 2017, after attending a practical course at the University of Rome "La Sapienza" during the Bachelor's Degree.

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**PERSONAL SKILLS**

**Mother tongue** Italian

**Languages** In-depth knowledge of English language, both in written and in oral form. In order to improve my language skills I attended for two consecutive years summer schools in Liverpool and Birmingham. During these study trips I was admitted to the B2-level class.

**Computer skills**

- in-depth knowledge of Windows, Unix-like and Mac OS
- advanced expertise with Microsoft Office programs
- MATLAB, Python, LabVIEW expert
- experience with C, C++, Java

**Organizational / managerial skills** Since the beginning of my PhD Program I have been organizing meetings and calls with industrial and non-industrial partners to channeling strategies on research projects.

**Driving license** A1, B.

**Attitudes** Accurate, precise, with a remarkable ability in problem solving and strong attitude to team-working. I am always looking for new stimuli and goals to pursue.

**Interests and Hobbies** I love traveling, discovering new places and new cultures. I am addicted to the scientific discoverers, in particular the novelties in the mathematical and physical fields. While reading, I prefer the classics of Latin and ancient Greek literature, in particular the comedies. I am also interested in cinema, especially in dramatic movies. In my spare time I enjoy swimming, playing chess and football. I have been cultivating my passion for the acoustic guitar for many years.

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**PUBLICATIONS**

- [1] Tantucci, A., **Wrona, A.**, & Pietrabissa, A. (in press). Precise Orbit Determination on LEO Satellite Using Pseudorange and Pseudorange-Rate Measurements . *In 2023 30th Mediterranean Conference on Control and Automation (MED) - IEEE.*
- [2] Giuseppi, A., Pio Lo Porto, L., **Wrona, A.**, & Menegatti, D. (in press). Landslide Susceptibility Prediction from Satellite Data through an Intelligent System Based on Deep Learning. *In 2023 30th Mediterranean Conference on Control and Automation (MED) - IEEE.*
- [3] **Wrona, A.**, De Santis, E., Delli Priscoli F., & Lavacca F. G. (in press). An Intelligent Ground Station Selection Algorithm in Satellite Optical Communications Via Deep Learning. *In 2023 30th Mediterranean Conference on Control and Automation (MED) - IEEE.*
- [4] **Wrona, A.** et al. (submitted). An Intelligent Deep Reinforcement Learning Framework for Medical Image Classification. *IEEE Access.*

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**PERSONAL DATA**

I hereby authorize the use of my personal data in accordance to the GDPR 679/16 - "European regulation on the protection of personal data" and the Italian Legislative Decree no. 196 dated 30/06/2003.

Rome, July 24, 2023