PhD in Information Technology and Electrical Engineering
Università degli Studi di Napoli Federico II

PhD Student: Gianmarco Pane

Cycle: XL

Training and Research Activities Report

Year: First

Tutor: prof. Stefania Santini

Co-Tutor: Dr. Simonepietro Canese

Date: October 24, 2025

1. Information:

- **PhD student: Gianmarco Pane**
- **DR number: DR999880**
- **Date of birth: 16/11/1999**
- **Master Science degree: Automation Engineering**
- **University: University Federico II of Naples**
- **Doctoral Cycle: XL**
- **Scholarship type: DM 630 - Stazione Zoologica Dohrn**
- **Tutor: Stefania Santini**
- **Co-tutor: Dr. Simonepietro Canese**

2. Study and training activities:

Activity	Type	Hours	Credits	Dates	Organizer	Certificate
Analyzing data in R	Seminar	6	1	6/11/2024	Dr. Cristina Tortora	Y
Introductory Course to Bioinformatics	Seminar	6	1	10-12/12/2024	Dr. Luca Ambrosino and Marco Miralto	Y
Using Deep Learning properly	Course	12	4	3-6-10-14-17-19/02/2025	Dr. Andrea Apicella	Y
How to boost your PhD	Course	18	5	08-15-22-28/01/2025 – 05-12/02/2025	Prof. Antigone Marino	Y
Can we rely on AI?	Seminar	1	0.2	16/01/2025	Prof. Paolo Rech	Y
Introduction to Python	Course	12	2	14-16-21-23-28-30/01/2025	Dr. Davide Salzano and Dr. Marco Coraggio	Y
Safety of highly automated driving systems	Seminar	1	0.2	23/04/2025	Prof. Árpád Török	Y
Tires and Motorcycles, from the Models to the Track	Seminar	4	0.8	30/04/2025	Eng. Raffaele Lamberti	Y
Matrix Analysis for Signal Processing with MATLAB Examples	Course	12	3	06-08-12-19-20-29/05/2025 - 03/06/2025	Dr. Massimo Rosamilia	Y

PhD Survival Strategies	**Seminar**	**1.5**	**0.3**	**30/05/2025**	**Prof. Gabriele Bavota**	**Y**
Trusted Execution Environments for QPUs	**Seminar**	**1**	**0.2**	**27/06/2025**	**Prof. Jakub Szefer**	**Y**
Big Data Architecture and Analytics	**Course**	**20**	**5**	**7-12-19-22-26-27-28/05/2025**	**prof. Giancarlo Sperlì**	**Y**
Innovation and Entrepreneurship	**Course**	**15**	**3**	**5-12-19-26/06/2025 - 23/07/2025**	**prof. P. Rippa**	**Y**
IEEE ITSS Italian Chapter Annual Meeting and PhD Award 2025	**Seminar**	**6**	**1**	**10/07/2025**	**Prof. C.Bifulco and prof. S.Santini**	**Y**
Cooperative and Non Cooperative Localization Systems	**Course**	**14**	**3**	**9-11-16-18-20-23-27/06/2025**	**Dr. Massimo Rosamilia**	**Y**
IEEE Authorship and Open Access Symposium: Tips and Best Practices to Get Published from IEEE Editors	**Seminar**	**1.5**	**0.3**	**15/10/2025**	**Dr. Anuradha Annaswamy**	**Y**

2.1. Study and training activities - credits earned

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1	**0**	**2**	**8**	**0**	**10**
Bimonth 2	**9**	**0.2**	**0.8**	**0**	**10**
Bimonth 3	**2**	**1**	**7**	**0**	**10**
Bimonth 4	**3**	**0.5**	**6.5**	**0**	**10**
Bimonth 5	**8**	**1**	**1**	**0**	**10**
Bimonth 6	**3**	**0.3**	**6.7**	**0**	**10**
Total	**25**	**5**	**30**	**0**	**60**
Expected	**30 - 70**	**10 - 30**	**80 - 140**	**0 – 4.8**	

3. Research activity:

During my first year of the PhD, I focused on the study and development of the hardware and software of the SeaDragon ROV (Remote Operated Vehicle) of the Stazione Zoologica Anton Dohrn, which is designed for deep-sea exploration. The long-term goal of this project is to transform the ROV into an Autonomous Underwater Vehicle (AUV), capable of performing precise, safe, and fully autonomous underwater missions without requiring constant human supervision.
My initial work involved improving the existing C++ code of the Arduino-based controller currently used on the SeaDragon ROV and studying the new hardware architecture planned for the next-generation vehicle, SeaDragon 2. This new platform will integrate an NVIDIA Jetson as the main controller, providing the computational resources needed for autonomy. In this context, I also worked with the scaled vehicle DAiSY Car [1], through which I studied and tested the use of ROS and Python—tools that will also be employed on the Jetson to achieve autonomous navigation on SeaDragon 2.
In parallel, I developed a simulator for underwater vehicles using MATLAB & Simulink, integrated with Unreal Engine for the graphical environment. The simulator will be extended to include model disturbances, sensor modelling, and visual data analysis modules for applications such as object detection, collision avoidance, and SLAM.
Finally, I studied and tested autonomous vehicle platooning frameworks [2] to investigate how their principles could be adapted to cooperative control strategies for underwater vehicles.

4. Research products:

[1] A. Coppola, A. Mungiello, G. Pane, A. Petrillo, and S. Santini, "On the virtual testing of adas in ccam environment via vehicle-in-the-loop framework", IFAC-PapersOnLine, vol. 59, no. 5, pp. 151–156, 2025, 11th IFAC Symposium on Advances in Automotive Control AAC 2025. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S2405896325004501 ***(Published)***

[2] D. Lui, G. Pane, A. Petrillo, and S. Santini, "Eco-Driving for Uncertain Nonlinear CAEVs Platoon via a Fully Distributed Adaptive Robust PID-based protocol", IEEE ITSC 2025 on November 18 – 21, 2025 in Gold Coast, Australia ***(Accepted)***

5. Conferences and seminars attended

IFAC 11TH SYMPOSIUM ON ADVANCES IN AUTOMOTIVE CONTROL:
Date: June 16th-18th 2025.
Location: Eindhoven, Netherlands
Presentation: "On the virtual testing of adas in ccam environment via vehicle-in-the-loop framework"

6. Activity abroad: *N/A*

7. Activity in partner companies: *N/A*

8. Tutorship: *N/A*