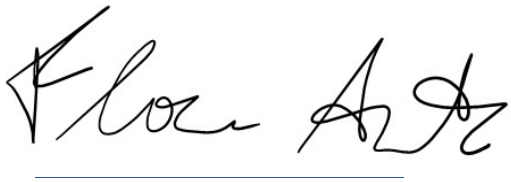
PhD in Information Technology and Electrical Engineering
Università degli Studi di Napoli Federico II

PhD Student: Claudio Ciano

Cycle: 39

Training and Research Activities Report

Year: First



Tutor: prof. Flora Amato

Co-Tutor: Andreas Gerndt

Date: December 11, 2024

Training and Research Activities Report

PhD in Information Technology and Electrical Engineering

Cycle: **Author:**

1. Information:

- **PhD student: Claudio Ciano**
- **DR number: n.a.**
- **Date of birth: 18.03.1993**
- **Master Science degree: Data Science** **University: Federico II di Napoli**
- **Doctoral Cycle: 39**
- **Scholarship type: no scholarship**
- **Tutor: Flora Amato**
- **Co-tutor: Andreas Gerndt**

2. Study and training activities:

Activity	Type[1]	Hours	Credits	Dates	Organizer	Certificate[2]
Wissensaustauschworkshop on Machine Learning (WAW)	**Workshop**	**20**	**4**	**13.11.23**	**DLR**	**N**
EIDWT-2024	**Conference**	**16**	**3.2**	**21.02.24**	**University of Naples "Federico II"**	**Y**
Text Mining	**Course**		**6**	**2.07.24**	**F. Amato**	**Y**
Information System and Business Intelligence	**Course**		**6**	**20.12.24**	**F. Amato (exam must be taken yet)**	**N**

1) Courses, Seminar, Doctoral School, Research, Tutorship
2) Choose: Y or N

2.1. Study and training activities - credits earned

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1		**7.2**	**5**		**12.2**
Bimonth 2			**7**		**7**
Bimonth 3			**6.4**		**6.4**
Bimonth 4	**6**				**6**
Bimonth 5			**6.4**		**6.4**
Bimonth 6			**6.4**		**6.4**
Total	**6**	**7.2**	**31.2**	**0**	
Expected	**30 - 70**	**10 - 30**	**80 - 140**	**0 – 4.8**	

3. Research activity:

This project seeks to address the critical challenge of cognitive overload and inefficiencies in the design processes of Concurrent Engineering. While Concurrent Engineering has significantly advanced over traditional sequential methodologies by enabling multidisciplinary teams to work in parallel, it often relies on tools that force users to adapt their workflows, creating integration bottlenecks and increasing cognitive strain. To overcome these limitations, this research proposes a paradigm shift: moving from "humans adapting to technology" to "technology adapting to humans." By leveraging advanced technologies—such as large language models (LLMs) and speech-to-text systems—this study aims to develop a system capable of dynamically building and refining a knowledge base from textual and vocal inputs. Key functionalities include contextual extraction, content refinement, and cognitive load minimization, providing seamless integration into existing workflows. The study's practical significance will be demonstrated through two key applications: automatic requirements extraction and validation, and automatic integration with Model-Based Systems Engineering (MBSE) tools. These applications will showcase the potential for reducing delays, eliminating redundancies, and enhancing collaboration in Concurrent Engineering Facilities. By addressing these challenges, this research aims to establish a new foundation for human-centric design processes.

For more details, please have a look to the exposé.

4. Research products:

Scientific:

- *Finalization of research exposé: the exposé should accompany this document.*
- *Submission of "Exploring the Potential of Large Language Models for Automated Requirement Derivation in Concurrent Engineering Facilities" to AINA 2025 conference, Barcelona.*

Technical: Installation of Llama3 LLM on the organization's cluster + server-client interfaces for parallel processing of queries.

5. Conferences and seminars attended

WAW9 Machine learning is a DLR internal workshop about state-of-the-art machine learning models and methodologies: attended on 13.11.23 in Ulm, Germany.
12-th International Conference on Emerging Internet, Data and Web Technologies (EIDWT-2024) is a conference dedicated to the dissemination of original contributions related to practices, theories and concepts of emerging Data and Web technologies.

6. Activity abroad:

I work at DLR (German Aerospace Center) in the group of Modeling and Simulation. My activities range from the implementation of basis software for space missions to the support in the concurrent engineering facility as MBSE developer.
DLR supports me in my not-project-related activities as PhD candidate throughout my whole PhD cycle, financing papers' submissions, providing technical infrastructure, networking through seminars and workshops.
As a DLR employee, I must live in Germany for more than 6 months. This year I spent around 7 months abroad in the periods 1.01.24-22.06.24 and 10.09.24-16.10.24.

7. Activity in partner companies:

Same as in Research activities.

8. Tutorship

As the PhD exposè has been finalized, I am interviewing possible candidates for master thesis at DLR under my supervision, although there are no hours to report for the actual tutorship.