Università degli Studi di Napoli Federico II

PhD program in

Information Technology and Electrical Engineering

PhD Student: Salvatore Tessitore

Cycle: XXXV

Training and Research Activities Report

Academic year: 2020-21 - PhD Year: Second

Salvatore Tessitore

Tutors: **Prof. Leopoldo Angrisani…**

Prof. Annalisa Liccardo

Date: October 21, 2021

Training and Research Activities Report

PhD program in Information Technology and Electrical Engineering

PhD student: **Cycle: XXXV**

1. Information:

- **PhD student:Salvatore Tessitore** **PhD Cycle: XXXV**
- **DR number: DR993883**
- **Date of birth: 26/11/1992**
- **Master Science degree: Electrical Engineering** **University: Federico II "Napoli"**
- **Scholarship type: no scholarship**
- **Tutor: Angrisani Leopoldo**
- **Co-tutor: Liccardo Annalisa; Giannuzzi Giorgio Maria (Terna Rete Italia)**

2. Study and training activities:

Activity	Type[1]	Hours	Credits	Dates	Organizer	Certificate[2]
MSc course, Laboratorio di Misure	Course		6	26/01/2021	Prof. Schiano Lo Moriello Rosario,	Y
MSc course, Statistical data analysis for science and engineering research	Course		4	19/04/2021	Prof. Roberto Pietrantuono	Y
Battery Management Systems	Seminar	2	0.4	30/03/2021	Prof. Francesco Bonavolontà	Y
Dai mainframe all'IoT: una retrospettiva sull'evoluzione delle architetture di calcolo	Seminar	2	0.4	08/03/2021	Prof. Antonino Mazzeo	N
IIT ENEA TECH; Dove Andiamo Domani "deep tech"	Seminar	1	0.2	26/04/2021	ENEA	N
Artificial Intelligence and 5G combined with holographic technology: a new perspective for remote health monitoring	Seminar	2	0.4	27/04/2021	Dr. Pietro Ferraro,Dr. Pasquale Memmolo	N
Distributional Semantics Methods: How Linguistic	Seminar	1.5	0.3	28/04/2021	Picariello lecture	N

features can improve the semantic representation						
Electrification 2021 – Project Work	**Seminar**	**0.6**	**3**	**29/04/2021**	**AEA srk - Loccioni**	**Y**
Eguaglianza di genere a bilancio	**Seminar**	**0.4**	**2**	**13/05/2021**	**Federica Web Learning**	**Y**
Measuring food system	**Seminar**	**0.2**	**1**	**11/05/2021**	**Prof.essa Angela Albarosa Rivellese**	**Y**
Diabete autoimmune dell'adulto	**Seminar**	**0.2**	**1**	**17/06/2021**	**Prof.essa Angela Albarosa Rivellese**	**Y**
Ethics of quantification	**Seminar**	**0.4**	**2**	**26/05/2021**	**Picariello lecture**	**N**
End-to-End Optimization of Augmented Experience Services over Cloud-Intregrated 5G Networks	**Seminar**	**0.8**	**4**	**28/04/2021**	**Dr. Jaime Llorca**	**N**
Introduction to Underwater Robotics	**Seminar**	**0.4**	**2**	**18/05/2021**	**Prof. Gianluca Antonelli**	**Y**
Ablazione a radiofrequenza e mappaggio elettroanatomico	**Seminar**	**0.3**	**1.5**	**27/05/2021**	**Prof. Giuseppe Ruello**	**Y**
Short and ultrashort, high voltage electric pulses for biological and medical application	**Seminar**	**0.3**	**1.5**	**13/05/2021**	**Prof. Giuseppe Ruello**	**Y**
L'avvincente storia degli acceleratori	**Seminar**	**0.3**	**1.5**	**14/05/2021**	**Prof. Giuseppe Ruello**	**Y**
Introduzione alle applicazioni della RM in medicina	**Seminar**	**0.3**	**1.5**	**04/06/2021**	**Prof. Giuseppe Ruello**	**Y**
Amino acids in the mirror: Enigmatic role of D-aspartate	**Seminar**	**0.3**	**1.5**	**17/06/2021**	**Prof. Francesco Errico**	**Y**

5G: l'architettura, le applicazioni e la rete di accesso radio	**Seminar**	**0.4**	**2**	**08/06/2021**	**Prof. Nicola Pasquino**	**Y**
Synchronization in complex networks, hypergraphs and simplicial complexes	**Seminar**	**0.2**	**1**	**28/05/2021**	**Prof. Marco Coraggio**	**Y**
Strategie terapeutiche innovative in campo immunologico	**Seminar**	**0.3**	**1.5**	**20/05/2021**	**Prof Giuseppe Ruello**	**Y**
Risk assessment in real life: esperiences from the railway domain	**Seminar**	**0.3**	**1.5**	**26/05/2021**	**Prof. Valeria Vittorini**	**Y**
A stochastic first-order trust region method with inexact restoration for nonconvex optimization.	**Seminar**	**0.2**	**1**	**18/05/2021**	**Prof. Natasa Krejic University of Novi Sad, Serbia**	**Y**
Explicit numerical integrators that conserve energy or dissipate entropy	**Seminar**	**0.2**	**1**	**25/05/2021**	**David Ketcheson University of science and technology, Saudi Arabi**	**Y**
Scaled inexact and adaptive generalised FISTA for convex imaging problems	**Seminar**	**0.2**	**1**	**01/06/2021**	**Luca Calatroni, France**	**Y**
No equations, no variables, no space, no time: data and the modelling of complex system	**Seminar**	**0.2**	**1**	**15/06/2021**	**Yannis Kevrekidis, USA**	**Y**
PhD Excellent School "Italo Gorini" 2021	**Course**	**0.3**		**06-10/09/2021**	**GMEE**	**Y**

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	**0**	**0**	**5**	**0**	**5**
Bimonth 2	**6**	**0**	**5**	**0**	**11**
Bimonth 3	**4**	**2.3**	**10**	**0**	**16.3**
Bimonth 4	**0**	**5.1**	**5**	**0**	**10.1**
Bimonth 5	**0**	**0.8**	**10**	**0**	**10.8**
Bimonth 6	**3**	**0**	**10**	**0**	**13**
Total	**13**	**8.2**	**45**	**0**	
Expected	**30 - 70**	**10 - 30**	**80 - 140**	**0 – 4.8**	

3. Research activity:

My research activities have focused on the measurement of power system stability, defined as the ability of an electrical system to regain a new equilibrium condition following a disturbance, where the system is intact, except for voluntarily intervened protections.

In the current year, the focus is on the implementation of a benchmark to reproduce the real network monitoring system used by the European TSOs (Transmission System Operators) in order to test the inter-area oscillation estimation and analysis algorithms implemented during the first year of a PhD.

WAMS (Wide Area Measurement System) is the monitoring system of the European electricity grid, consisting of two fundamental components:

1) PMU (Phasor Measurement Unit), a data acquisition device that uses the GPS system to perform synchronized phasor measurements.

2) PDC (Phasor Data Concentrator), a device that acts as a collector of data from the PMUs, creating a single synchronized data output stream.

The results obtained in this second year have given the possibility to the Italian TSO to start studies, on a simulated system that is compliant to the real system, in order to improve the algorithms of estimation and detection of inter-area oscillations to implement the right corrective measures in a short time.

4. Research products

5. Conferences and seminars attended

A WAMS emulation framework for the characterization of measurement algorithms on electrical transmission networks; 2021 IEEE International Workshop on Metrology for Industry 4.0 and IoT, MetroInd 4.0 and IoT 2021, Virtual Online, 7 June 2021 through 9 June 2021

6. Periods abroad and/or in international research institutions

7. Tutorship

8. Plan for year three

- *Draft Title Thesis: Innovative measurement solutions based on 4.0 technologies for electricity transmission networks*
- *Structure of the Thesis:*
    1. *Introduction and problem definition*
    2. *State of the art analysis*
    3. *Proposed methodology*
    4. *Experimental analysis*
    5. *Presentation of results*
    6. *Conclusion and future perspectives*
- *During the first year of my PhD, following the exhaustive study of the state of art, I realized an algorithm for the estimation and characterization of inter-area oscillations. The knowledge acquired has allowed me during the second year to realize a benchmark to test and validate the above-mentioned algorithm.*
  The objective of the third year will be, after the validation of the algorithm obtained through the benchmark, its implementation on Terna's platforms.