PERSONAL INFORMATION

Stefano Leonori

WORK EXPERIENCE

2019-2020

Postdoc

at Ce.R.S.I.Te.S (Research Center for Sustainable and Innovative Technologies) of University of Rome ”La Sapienza” - Polo Pontino.
Topic of my research:” Application of machine learning techniques for microgrids energy management system modelling”.

Main activities:

- Publication of a software on "Adaptive Neuro Fuzzy Inference System Synthesis by Clustering Techniques"' (https://gitlab.com/labcoin/anfis-toolbox),
- Energy Management System Design and optimization for a prosumer nanogrid and Battery Management System Design by Neural Networks for a regional (POR) project named MOdular Smart Energy System (MOSES) (https://www.bragamoro.com/it/progetto-moses-pr-1.html),
- Counseling activities as smartgrid expert for IMPREME group.

Minor activities: Innovation Manager, member of the POMOS (Sustainable Mobility Research Cente) research team at Cisterna di Latina, Professor Assistant and master students supervisor, writing and reviewing of scientific papers in the field of smartgrids and sustainable mobility.

RESEARCH ACTIVITY

2015-2019

PhD in ICT

In the last decades, several governments are implementing different energy policies to encompass a sustainable energy future. These policies promote the increasing use of Renewable Energies Sources (RESs), electric vehicles and the application of demand response programs. However, the increasing penetration of distributed RESs and fast charging stations, since are characterized by stochastic and intermittent behaviours, requires a modernization of the whole electric distribution infrastructure for a better control and management of power transients, energy flows oscillations and bidirectionalities. The installation of grid-connected Microgrids (MGs) can be a suitable solution for a bottom-up modernization of the distribution grid into a smart grid. MGs are defined as ”groups of interconnected loads and distributed energy resources that act as a single controllable entity with respect to the grid”. Their realization requires the equipment of energy storage devices, power converters and ICT infrastructures able to efficiently monitor, control and manage the MG energy flows including the energy exchanged with the grid by means of the design of a suitable Energy Management System (EMS).
My research activity has been centred on the application of machine learning techniques for the synthesis of a MG EMS. The EMS here formulated is in charge to define in real time how to distribute the MG energy flows. For EMS design, fuzzy systems have been preferred over other possibilities since rule based inferential systems, other than being featured by low computational cost, allow a better interpretation of the overall decision rule. During my PhD, different algorithms for data driven FIS synthesis have been investigated, relying on Computational Intelligence techniques, and in particular exploiting a hybrid evolutionary-fuzzy approach. Results have been compared with (optimal) benchmark solutions computed by assuming to know a priori the whole time series of the loads and energy generation.

EDUCATION AND TRAINING

2015-2019

PhD in ICT

University of Rome La Sapienza, via Eudossiana 18, 00184, Rome, Italy

- Thesis: Machine Learning Techniques for Microgrid Energy Management System Modelling and Design.
- Tutor & Co-Tutor Prof. Fabio Massimo Frattale Mascioli & Prof. Antonello Rizzi.
- Feb.-Aug. 2017 Visiting Scholar at the Center for Automotive Research-Ohio State University (OH-USA) under the supervision of Prof. Giorgio Rizzoni.

2012-2014

Master's degree in Energy Engineering - Renewable Energy Sources

University of Rome La Sapienza, via Eudossiana 18, 00184, Rome, Italy

- Thesis: "Energy Management of an Electric Vehicle: Control System Design with Fuzzy Logic for the Power Flows Managing". Tutor: Prof. Fabio Giulii Capponi, vote: 110/110 summa cum laude.

2008-2012

Bachelor's degree in Energy Engineering

University of Rome La Sapienza, via Eudossiana 18, 00184, Rome, Italy

- Thesis: "Experimental Evaluation of Tars Inside a Steam Reforming Process". Tutor: Prof. Vincenzo Naso, vote: 104/110.

PERSONAL SKILLS

Mother tongue(s): italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1

Computer skills: Microsoft Office, Matlab, Simulink, Simscape, Matpower, Octave, C, Python, Keras, AutoCAD, Xfoil, Code Composer Studio, Dialux, Comsol, Solid Edge, LaTeX, Tikz, Fuzzy Logic, Evolutionary Algorithms, Clustering, Neural Networks, Prediction, Classification.

Driving licence: B

ADDITIONAL INFORMATION

Cursera

Deep Learning Certificate (5 courses):"'Through five interconnected courses, learners develop a profound knowledge of the hottest AI algorithms, mastering deep learning from its foundations (neural networks) to its industry applications (Computer Vision, Natural Language Processing, Speech Recognition, etc.)"'.

Peer reviewer

MDPI reviewer board member (https://www.mdpi.com/journal/energies/submission_reviewers). Peer Review activities for the following journals and conferences: IEEE Open Access, Energies, IEEE Transactions on Emerging Topics in Computational Intelligence, Engineering Reports, Applied on Soft Computing, Applied Energy, IEEE World Congress on Computational Intelligence 2018. For further information most of my reviews are reported on Publons. My ID: T-7712-2019.

Publications

- IJEPES, in press “Intelligent Energy Flow Management of a Nanogrid Fast Charging Station Equipped with Second Life Batteries’’, Stefano Leonori, Giorgio Rizzoni, F. M. Frattale Mascioli and Antonello Rizzi, International Journal of Electrical Power and Energy Systems.
- ASOC, 2020, “A Generalized Framework for ANFIS Synthesis Procedures by Clustering Techniques”, Stefano Leonori, Alessio Martino, Massimiliano Luzi, Antonello Rizzi and F. M. Frattale Mascioli, Applied Soft Computing. DOI: 10.1016/j.asoc.2020.106622.
- APEN, 2020, “Microgrid Energy Management Systems Design by Computational Intelligence Techniques”, Stefano Leonori, Alessio Martino, Antonello Rizzi and F. M. Frattale Mascioli, Applied Energy. DOI: 10.1016/j.apenergy.2020.115524.
- ASOC, Nov.2019, “Optimization strategies for Microgrid energy management systems by Genetic Algorithms”, Stefano Leonori, Maurizio Paschero, Antonello Rizzi and F. M. Frattale Mascioli. *DOI:* 10.1016/*j.asoc.*2019.105903.
- TETCI, June 2019 “ANFIS Microgrid Energy Management System Synthesis by Hyperplane Clustering Supported by Neurofuzzy Min-Max Classifier” Stefano Leonori, Alessio Martino, Antonello Rizzi and F. M. Frattale Mascioli, IEEE Transaction on Emerging Topics. *DOI:* 10.1109/*TETCI.*2018.2880815.
- WCCI, July 2018 “Microgrid Energy Management by ANFIS Supported by an ESN Based Prediction Algorithm” Stefano Leonori, Maurizio Paschero, Antonello Rizzi and F. M. Frattale Mascioli, WCCI 2018, Rio de Janeiro, Brazil. *DOI:* 10.1109/*IJCNN.*2018.8489018.
- WIRN, June 2017 “FIS Synthesis by Clustering for Microgrid Energy Management Systems” Stefano Leonori, Maurizio Paschero, Antonello Rizzi and F. M. Frattale Mascioli, WIRN 2017, Vietri sul Mare, Italy. //*doi.org*/10.1007/978 − 3 − 319 − 95098 − 36.
- IJCCI, Oct 2017 “ANFIS Synthesis by Clustering for Microgrids EMS Design” Stefano Leonori, Alessio Martino, Antonello Rizzi and F. M. Frattale Mascioli, IEEE-IJCCI 2016, Madeira, Portugal. *DOI:*10.5220/0006514903280337.
- FUZZ-IEEE.2017, Jul 2016 “An optimized microgrid energy management system based on FIS-MO-GA paradigm” Stefano Leonori, Maurizio Paschero, Antonello Rizzi and F. M. Frattale Mascioli, FUZZ-IEEE 2016, Napoli, Italy. *DOI:* 10.1109/*FUZZ-IEEE.*2017.8015438.
- IECON, Oct 2016 “Optimization of a Microgrid Energy Management System based on a Fuzzy Logic Controller” Stefano Leonori, Enrico De Santis, Antonello Rizzi and F.M. Frattale Mascioli, IEEE-IECON 2016, Firenze, Italy. *DOI:*10.1109/*IECON.*2016.7793965.
- WCCI, Aug 2016 “Multi Objective Optimization of a Fuzzy Logic Controller for Energy Management in Microgrids”, Stefano Leonori, Enrico De Santis, Antonello Rizzi and F. M. Frattale Mascioli, IEEE-WCCI 2016, Vancouver, Canada. 10.1109/*CEC.*2016.7743811.