



Simona Onori

Assistant Professor of Energy Resources Engineering and, by courtesy, of Electrical Engineering

Bio

BIO

Simona Onori received her Laurea Degree, *summa cum laude*, (Electrical and Computer Engineering) in 2003, her M.S. (Electrical Engineering) in 2004, her Ph.D. (Control Engineering) in 2007, from University of Rome 'Tor Vergata', University of New Mexico, Albuquerque, USA, and University of Rome 'Tor Vergata', respectively.

She is an Assistant Professor at Stanford University in Energy Resources Engineering, and Director of the Stanford Energy Control Lab since 2017. Previously, she was an Assistant Professor at Clemson University-International Center for Automotive Research (CU-ICAR) from 2013 to 2017 where she also held a courtesy appointment in Electrical Engineering. In 2007 she held a control research position at Thales-Alenia Space, in Rome, Italy where she worked on developing control algorithms for satellite control attitude stability. She was a Research Scientist with the Center for Automotive Research and lecturer in the Mechanical Engineering Department at The Ohio State from 2007 until 2013.

She held visiting professor positions at the University of Trento (2014, Italy), Beijing Institute of Technology (2015, China), and University of Orleans (2016, France) and she is a distinguished visiting professor at PSG College of Technology (2018, India).

She is the recipient of the 2019 Award for Excellence from the Board of Trustees, Clemson University, 2018 Global Innovation Contest by LGChem, 2018 Ralph R. Teeter Educational Award, by the Society of Automotive Engineers, 2017 NSF CAREER award, 2017 Clemson University College of Engineering and Science Dean's Faculty Fellows Award, 2017 Clemson University Esin Gulari Leadership & Service Award, 2016 Energy Leadership Award in the category Emerging Leader (for the Carolinas), the 2015 Innovision Award (South Carolina), and 2012 Lumley Interdisciplinary Research, 2011 Outstanding Technology Team Award, TechColumbus. She was Chair of the IEEE CSS Technical Committee of Automotive Controls from 2015-2017, she is vice-chair of the IFAC TC on Automotive Control TC7.1 since 2015, and associate editor of the SAE International Journal of Alternative Powertrains since 2012 and IEEE Intelligent Vehicle Transactions since 2019. She has co-authored a book, 2 book chapters and more than 120 peer-reviewed papers on hybrid electric vehicles simulation, optimization and control, estimation and control of electrochemical processes and catalytic conversion devices, such as batteries and after-treatment devices.

ACADEMIC APPOINTMENTS

- Assistant Professor, Energy Resources Engineering
- Assistant Professor (By courtesy), Electrical Engineering

ADMINISTRATIVE APPOINTMENTS

- Assistant Professor, Department of Energy Resources Engineering, Stanford University, (2017- present)
- Visiting Professor, PRISME, University of Orléans, (2016-2016)
- Invited Lecturer, National Engineering Lab for Electric Vehicles School of Mechanical Engineering, Beijing Institute of Technology, (2015-2015)
- Assistant Professor of Electrical and Computer Engineering (Joint Appointment), Clemson University, (2014-2017)

- Visiting Professor, Industrial Engineering Department, University of Trento, Italy, (2014-2014)
- Assistant Professor of Automotive Engineering, Clemson University, (2013-2017)
- Research Scientist, Senior Research Associate, Lecturer, Research Associate, The Ohio State University, (2009-2013)
- Postdoctoral Fellow, The Ohio State University, (2007-2008)
- Control Engineer, Orbit and Attitude Spacecraft Control Division, Thales-Alenia Space, Italy, (2007-2007)

HONORS AND AWARDS

- PSG Distinguished Visiting Professor awarded by the Managing Trustee, PSG College of Technology, India (2017)
- College of Engineering and Science Dean's Faculty Fellows Award, (three-year award) (2017)
- Esin Gulari Leadership & Service Award College of Engineering, Computing and Applied Sciences, Clemson University (2017)
- NSF CAREER, National Science Foundation (2017)
- Energy Leadership Award in the category Emerging Leader, Energy Inc. Summit, Charlotte, NC, with recognition from U.S. Senator from NC, Thom Tillis (2016)
- Sustainability Award, InnoVision State of South Carolina, with recognition from U.S. Senator from South Carolina, Timothy E. Scott (2015)
- Senior Member, Institute of Electrical and Electronics Engineers (IEEE) (2015)
- Lumley Interdisciplinary Research Award, OSU College of Engineering (2012)
- Outstanding Technology Team Award, TechColumbus (2011)
- Outstanding Student Fellowship, University of Rome "Tor Vergata", Italy (1997-2000)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Associate Editor, SAE International Journal of Alternative Powertrains (2012 - present)
- Associate Editor, Frontiers Mechanical Engineering (2015 - present)
- Chair, Technical Committee on Automotive Controls, Institute of Electrical and Electronics Engineers Control Systems Society (IEEE CSS) (2015 - present)
- Vice Chair, Technical Committee on Automotive Control, International Federation of Automatic Control (IFAC) (2015 - present)
- Associate Editor of the Conference Editorial Board (CDC, ACC, CCTA), Institute of Electrical and Electronics Engineers Control System Society (IEEE CSS) (2014 - present)
- Associate Editor, Dynamic Systems and Control Conference, American Society of Mechanical Engineers (ASME) (2011 - 2016)
- Vice Chair, International Program Committee, IFAC Symposium on Advances in Automotive Control, Orleans, France 2019 (2017 - present)
- Registration Chair, 1st IEEE Conference on Control Technology and Applications August 27-30, 2017 (2017 - 2017)
- Program Chair, E-COSM'15 IFAC Workshop on Engine and Powertrain Control, Simulation and Modeling, Columbus, OH, 23 - 26 August 2015 (2015 - 2015)
- Editor, IFAC-PapersOnLine Proceedings Volume 48, Issue 15, Pages 1-470, 4th IFAC Workshop on Engine and Powertrain Control, Simulation and Modeling (E-COSM) (2015 - 2015)
- International Programs Chair, ASME 2015 Dynamic Systems and Control Conference, Columbus, OH, 28-30 October 2015 (2015 - 2015)
- Member, Automotive and Transportation Systems (ATS) Technical Committee, American Society of Mechanical Engineers (ASME) (2008 - present)
- Member, Technical Committee on Automotive Controls, Institute of Electrical and Electronics Engineers Control System Society (IEEE CSS) (2009 - present)
- Member, Technical Committee on Fault Detection, Supervision and Safety of Technical Processes, International Federation of Automatic Control (IFAC) (2009 - present)
- Member, Energy Systems Technical Committee, American Society of Mechanical Engineers (ASME) (2012 - present)
- Member, Technical Committee Automotive Control, International Federation of Automatic Control (IFAC) (2010 - present)
- Member, Society of Automotive Engineering (SAE) (2008 - present)
- Member, Institute of Electrical and Electronics Engineers (IEEE) (2009 - present)
- Member, American Society of Mechanical Engineering (ASME) (2009 - present)
- Member, International Federation of Automatic Control (2010 - present)

PROFESSIONAL EDUCATION

- Ph.D., University of Rome “Tor Vergata” , Control Engineering (2007)
- M.S., University of New Mexico , Electrical and Computer Engineering (2005)
- Laurea, University of Rome “Tor Vergata” , Information Technology and Electrical Engineering, summa cum laude (2003)

LINKS

- Stanford Energy Control Lab: <https://onorilab.stanford.edu/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Modeling, control and optimization of dynamic systems;

Model-based control in advanced propulsion systems;

Energy management control and optimization in HEVs and PHEVs;

Energy storage systems- Li-ion and PbA batteries, Supercapacitors;

Battery aging modeling, state of health estimation and life prediction for control;

Damage degradation modeling in interconnected systems

Teaching

COURSES

2021-22

- Electrochemical Energy Storage Systems: Modeling and Estimation: ENERGY 295 (Aut)
- Energy storage and conversion: Solar Cells, Fuel Cells, Batteries and Supercapacitors: ENERGY 293 (Spr)

2020-21

- ERE Master's Graduate Seminar: ENERGY 351 (Win)
- ERE PhD Graduate Seminar: ENERGY 352 (Win)
- Energy storage and conversion: Solar Cells, Fuel Cells, Batteries and Supercapacitors: ENERGY 293 (Spr)

2018-19

- ERE Master's Graduate Seminar: ENERGY 351 (Aut)
- ERE PhD Graduate Seminar: ENERGY 352 (Aut)
- Electrochemical Energy Storage Systems: Modeling and Estimation: ENERGY 295 (Spr)
- Energizing California: ENERGY 101A (Spr)
- Energy storage and conversion: Solar Cells, Fuel Cells, Batteries and Supercapacitors: EE 293, ENERGY 293 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Anthony Bombik, Sara Ha

Postdoctoral Faculty Sponsor

Gabriele Pozzato

Doctoral Dissertation Advisor (AC)

Anirudh Allam

Master's Program Advisor

Wenting MA, D'Arcy Seamon

Doctoral (Program)

Muhammad Aadil Khan, Kevin Moy

Publications

PUBLICATIONS

- **Offline Multiobjective Optimization for Fast Charging and Reduced Degradation in Lithium-ion Battery Cells using Electrochemical Dynamics** *IEEE Control Systems Letters*
Lam, F., Allam, A., Joe, W., Choi, Y., Onori, S.
2020
- **Online Capacity Estimation for Lithium-Ion Battery Cells via an Electrochemical Model-Based Adaptive Interconnected Observer** *IEEE Transactions on Control Systems Technology*
Allam, A., Onori, S.
2020: 16
- **Design and experimental validation of a physics-based oxygen storage — thermal model for three way catalyst including aging** *Control Engineering Practice*
Sabatini, S., Gelmini, S., Hoffman, M. A., Onori, S.
2017; 68: 89-101
- **Transient Power Optimization of an Organic Rankine Cycle Waste Heat Recovery System for Heavy-Duty Diesel Engine Applications** *SAE International Journal of Alternative Powertrains*
Xu, B., Yebi, A., Onori, S., Filipi, Z., Liu, X., Shutty, J., Ansel, P., Hoffman, M.
2017; 6 (1)
- **Transient dynamic modeling and validation of an organic Rankine cycle waste heat recovery system for heavy duty diesel engine applications** *Applied Energy*
Xu, B., Rathod, D., Kulkarni, S., Yebi, A., Filipi, Z., Onori, S., Hoffman, M.
2017; 205: 260-279
- **Model Predictive Control of an Organic Rankine Cycle System** *Energy Procedia*
Liu, X., Yebi, A., Ansel, P., Shutty, J., Xu, B., Hoffman, M., Onori, S.
2017; 129: 184-191
- **Determining Three-Way Catalyst Age Using Differential Lambda Signal Response** *SAE International Journal of Engines*
Rathod, D., Hoffman, M. A., Onori, S.
2017; 10 (3)
- **Synthesis and Experimental Validation of Battery Aging Test Profiles Based on Real-World Duty Cycles for 48V Mild Hybrid Vehicles** *IEEE Transactions on Vehicular Technology*
Liu, Z., Onori, S., IVANCO, A.
2017
- **Nonlinear model predictive air path control for turbocharged SI engines with low pressure EGR and a continuous surge valve** *American Control Conference 2017*
Zhu, Q., Koli, R., Feng, L., Onori, S., Prucka, R.
2017: 4741–46
- **Development and experimental validation of a Dual Extended Kalman Filter for three way catalytic converter** *American Control Conference 2017*
Gelmini, S., Sabatini, S., Hoffman, M. A., Onori, S.
2017: 5386–91
- **Multiscale modeling approach to determine effective lithium-ion transport properties** *American Control Conference 2017*

- Arunachalam, A., Korneev, S., Battiato, I., Onori, S.
2017: 92–97
- **Multi-channel physics-based modeling and experimental validation of an uncoated Gasoline Particulate Filter in clean operating conditions** *American Control Conference 2017*
Pozzato, G., Hoffman, M. A., Onori, S.
2017: 5392–5539
 - **Estimation and Predictive Control of a Parallel Evaporator Diesel Engine Waste Heat Recovery System** *IEEE Transactions on Control Systems Technology*
Yebi, A., Xu, B., Liu, X., Shutty, J., Anshel, P., Onori, S., Hoffman, M.
2017
 - **Electrochemical Model-Based State of Charge and Capacity Estimation for a Composite Electrode Lithium-Ion Battery** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Bartlett, A., Marcicki, J., Onori, S., Rizzoni, G., Yang, X. G., Miller, T.
2016; 24 (2): 384-399
 - **A control-oriented cycle-life model for hybrid electric vehicle lithium ion batteries** *ENERGY*
Suri, G., Onori, S.
2016; 96: 644-653
 - **Energy Management Design in Hybrid Electric Vehicles: A Novel Optimality and Stability Framework** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Mura, R., Utkin, V., Onori, S.
2015; 23 (4): 1292-1307
 - **Adaptive Pontryagin's Minimum Principle supervisory controller design for the plug-in hybrid GM Chevrolet Volt** *APPLIED ENERGY*
Onori, S., Tribioli, L.
2015; 147: 224-234
 - **A control-oriented lithium-ion battery pack model for plug-in hybrid electric vehicle cycle-life studies and system design with consideration of health management** *JOURNAL OF POWER SOURCES*
Cordoba-Arenas, A., Onori, S., Rizzoni, G.
2015; 279: 791-808
 - **Capacity and power fade cycle-life model for plug-in hybrid electric vehicle lithium-ion battery cells containing blended spinel and layered-oxide positive electrodes** *JOURNAL OF POWER SOURCES*
Cordoba-Arenas, A., Onori, S., Guezennec, Y., Rizzoni, G.
2015; 278: 473-483
 - **On Veracity of Macroscopic Lithium-Ion Battery Models** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*
Arunachalam, H., Onori, S., Battiato, I.
2015; 162 (10): A1940-A1951
 - **Energy Management of Hybrid Electric Vehicles: 15 Years of Development at the Ohio State University** *OIL & GAS SCIENCE AND TECHNOLOGY-REVUE D IFP ENERGIES NOUVELLES*
Rizzoni, G., Onori, S.
2015; 70 (1): 41-54
 - **Cloud-Based Velocity Profile Optimization for Everyday Driving: A Dynamic-Programming-Based Solution** *IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS*
Ozatay, E., Onori, S., Wollaeger, J., Ozguner, U., Rizzoni, G., Filev, D., Michelini, J., Di Cairano, S.
2014; 15 (6): 2491-2505
 - **Insight into the HEV/PHEV optimal control solution based on a new tuning method** *CONTROL ENGINEERING PRACTICE*
Guardiola, C., Pla, B., Onori, S., Rizzoni, G.
2014; 29: 247-256
 - **A control benchmark on the energy management of a plug-in hybrid electric vehicle** *CONTROL ENGINEERING PRACTICE*
Sciarretta, A., Serrao, L., Dewangan, P. C., Tona, P., Bergshoeff, E. N., Bordons, C., Charmpa, L., Elbert, P., Eriksson, L., Hofman, T., Hubacher, M., Isenegger, R., Lacandía, et al

2014; 29: 287-298

- **An optimal regulation strategy with disturbance rejection for energy management of hybrid electric vehicles** *AUTOMATICA*
Sampathnarayanan, B., Onori, S., Yurkovich, S.
2014; 50 (1): 128-140
- **Modeling and experimental validation of a Hybridized Energy Storage System for automotive applications** *JOURNAL OF POWER SOURCES*
Fiorenti, S., Guanetti, J., Guezennec, Y., Onori, S.
2013; 241: 112-120
- **Modelling and control of a brake system for an extended range electric vehicle equipped with axle motors** *INTERNATIONAL JOURNAL OF VEHICLE DESIGN*
Bayar, K., Biasini, R., Onori, S., Rizzoni, G.
2012; 58 (2-4): 399-426
- **A Comparative Analysis of Energy Management Strategies for Hybrid Electric Vehicles** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Serrao, L., Onori, S., Rizzoni, G.
2011; 133 (3)
- **MODEL-BASED FAULT DIAGNOSIS FOR NIMH** *PROCEEDINGS OF THE ASME DYNAMIC SYSTEMS AND CONTROL CONFERENCE 2008, PTS A AND B*
Suozzo, C., Onori, S., Rizzoni, G.
2009: 1349-1355
- **EXPERIMENTAL CALIBRATION AND VALIDATION OF FAULT DIAGNOSIS AND PROGNOSIS ALGORITHMS FOR AUTOMOTIVE ELECTRIC POWER GENERATION AND STORAGE SYSTEM** *PROCEEDINGS OF THE ASME DYNAMIC SYSTEMS AND CONTROL CONFERENCE 2008, PTS A AND B*
Li, W., Suozzo, C., Onori, S., Rizzoni, G., Salman, M. A., Zhang, F.
2009: 1317-1324
- **ECMS as a realization of Pontryagin's minimum principle for HEV control** *2009 AMERICAN CONTROL CONFERENCE, VOLS 1-9*
Serrao, L., Onori, S., Rizzoni, G.
2009: 3964-3969
- **HIERARCHICAL DIAGNOSIS & PROGNOSIS STRATEGY FOR ELECTRICAL POWER GENERATION AND STORAGE SYSTEM** *PROCEEDINGS OF THE ASME DYNAMIC SYSTEMS AND CONTROL CONFERENCE 2008, PTS A AND B*
Bologna, L., Guerini, I., Onori, S., Rizzoni, G., Salman, M. A., Zhang, F.
2009: 1301-1308
- **Nonlinear scheduled control for linear systems subject to saturation with application to anti-windup control** *PROCEEDINGS OF THE 46TH IEEE CONFERENCE ON DECISION AND CONTROL, VOLS 1-14*
Galeani, S., Onori, S., Zaccarian, L.
2007: 4191-4196
- **Further results on static linear anti-windup design for control systems subject to magnitude and rate saturation** *PROCEEDINGS OF THE 45TH IEEE CONFERENCE ON DECISION AND CONTROL, VOLS 1-14*
Galeani, S., Onori, S., Teel, A. R., Zaccarian, L.
2006: 6376-6376
- **Finite Time Stability design via feedback linearization** *2005 44TH IEEE CONFERENCE ON DECISION AND CONTROL & EUROPEAN CONTROL CONFERENCE, VOLS 1-8*
Onori, S., Dorato, P., Galeani, S., Abdallah, C. T.
2005: 4915-4920