DR. -ING. ROBERTO ROCCHETTA

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OVERVIEW

Roberto Rocchetta is a researcher at the University of Applied Sciences and Arts of Southern Switzerland in the Intelligent Energy Systems group and member of the **of ESRA European Safety and Reliability Association**. Previously, he worked at the Technical University of Eindhoven (TU/e), and the National Institute of Aerospace (NIA) in collaboration with Philips and NASA Langley Research Centres. He holds a **PhD in Reliability Engineering and System Safety** and a Master of Research in **Decision-Making Under Risk and Uncertainty** from the University of Liverpool, along with a Master's in Energy Engineering from the University of Bologna. His research intersects reliability theory, statistics, machine learning, and energy systems. Roberto has a solid academic and industrial network through collaborations with notable organizations such as Philips, NASA, TU/e, ETH Zurich, and Politecnico di Milano. He is the first author and co-author of over 30 publications, including several high-impact journals, accumulating around 1,000 citations and an h-index of over 14. His expertise includes simulation-based analysis of power transmission systems, reliability analysis, probabilistic risk assessments, and risk-constrained programming. He is also experienced in statistical learning theory, including compression-based learning and PAC learning theory, as well as machine learning approaches such as reinforcement learning, behavioural cloning, and anomaly detection. His expertise has been applied across various fields of engineering, including power transmission, electric transportation and mobility, health management, structural engineering, and mechanical engineering. For more information, refer to his publications and personal web pages.

WORK EXPERIENCES, VISITING, AND INTERNSHIPS

Researcher, SUPSI-DACD, CH. Intelligent energy systems group. *Focus on stochastic optimization and Reinforcement learning for electric mobility & distributed energy resources.*	1-10-2022	Present
Postdoc, TU/Eindhoven & Signify, Department for mathematics and computer science, Statistics, NL. *Focus on LEDs reliability, survival analysis, and design of experiments.*	1-09-2021	1-10-2022
Postdoc, TU/Eindhoven & Philips, Security, NL. *AI and ML for MRI maintenance optimization.*	15-10-2019	1-09-2021
Research Scholar, NIA, and NASA Langley, VA, USA. D*ata-driven reliability optimization.*	15-01-2019	15-10-2019
Internship, ARAMIS srl, Milan, IT. O*n Reinforcement Learning for maintenance optimization.*	2017/2018	6 months
Visiting Ph.D. Energy Science Center ETH, Zurich, CH.	2017	2 months
Visiting Ph.D. Laboratory of signal and risk analysis, Milan Polytechnic, IT	2016/17	3 months
Master thesis, Ecole Centrale de Paris, Paris, FR.	2013	6 months

EDUCATION

Ph.D. at Institute for Risk and Uncertainty, University of Liverpool, UK	2015-2018/19
Master of Research Decision-Making Under Risk and Uncertainty, Liverpool, UK	2014-2015
Bachelor and Master, Energy Engineering University of Bologna, IT	2008-2014

PERSONAL GRANTS AND RESEARCH PROJECTS

- **PROPER-Grids,** Value: 300 [kCHF], (2023-2024) under review at the SFOE.
- **Personal fellowship grant Alexander von Humboldt**, (2022) Value: 60 [k€]. (Offer declined to accept a different position)
- **Collaborative grant** Eureka AI call (2022-2025), DAIsy project Value 4 [M€]. (Collaborated in the draft writing)
- **Postdoctoral grant,** within the project Daytime ITEA-3 (2019-2022), grant 17030, Project Value: 11 [M€]
- **Scholarship grant** Master of research and Ph.D. (2015-2019), Liverpool, EPSRC and ESRC Centre for Doctoral Grant No. (EP/L015927/1) Project Value 4,156 [k£]
- **Scholarship:** Mater Thesis Abroad (2012/2013), at Ecole Centrale de Paris, Project Value: 3.1 [k€]

PEER-REVIEWED JOURNAL PUBLICATIONS

[1] **R. Rocchetta**, E. Perrone, A. Di Bucchianico, P. Dersin, "*A survey on optimal accelerated testing for LED reliability assessment*", Microelectronics Reliability, Vol 157, 115399, https://doi.org/10.1016/j.microrel.2024.115399 **IF: 1.6, Citations: -**

[2] Katharina Proksch. et al. "*Personalised Health Monitoring for Early Disease Detection",* Mathematics in Industry Reports 2023 **IF: -, Citations: -**

[3] **R. Rocchetta**, Z. Zhan, W. D. van Driel, A. Di Bucchianico, "*Uncertainty analysis and interval prediction of LEDs lifetimes",* RESS, Vol 242, pp 109715, 2024, https://doi.org/10.1016/j.ress.2023.109715 **IF: 9.4, Citations: 2**

[4] **R. Rocchetta**, A. Mey, F. A. Oliehoek, *"A Survey on Scenario Theory, Complexity, and Compression-Based Learning and Generalization*", IEEE Transactions on Neural Networks and Learning Systems, 2023. 10.1109/TNNLS.2023.3308828 **IF: 10.2, Citations: 1**

[5] O. Cangul, **R. Rocchetta**, E. Patelli, M. Fahrioglu, "*Optimal allocation and sizing of decentralized solar photovoltaic generators using unit financial impact indicator*", Sustainability, Vol 15, 2023. **IF: 3.3, Citations: 1**

[6] **Roberto Rocchetta**, Qi Gao, Dimitrios Mavroeidis, Milan Petkovic*, "A robust model selection framework for fault detection and system health monitoring with limited failure examples: Heterogeneous data fusion and formal sensitivity bounds*", Engineering Applications of Artificial Intelligence, Vol 114, 2022, 105140, https://doi.org/10.1016/j.engappai.2022.105140 **IF: 7.5, Citations: 14**

[7] **R. Rocchetta**, "*Enhancing the resilience of critical infrastructures: a statistical analysis on spectral clustering and vulnerability metrics for power networks*", RSER, Vol 159, 2022, https://doi.org/10.1016/j.rser.2022.112185 **IF: 16.3, Citations: 31**

[8] W. Zhao, C. Dang, **R. Rocchetta**, M. Valdebenito, D. Moens*, "Enriching stochastic model updating: An efficient Bayesian approach using the Bray-Curtis distance and an adaptive binning algorithm",* MSSP, 2022, https://doi.org/10.1016/j.ymssp.2022.108889, **IF: 7.9, Citations: 7**

[9] A. Gray, A. Wimbush, M. De Angelis, P. O. Hristov, E. Miralles-Dolz, D. Calleja, **R. Rocchetta**, *"From inference to design: A comprehensive framework for uncertainty quantification in engineering with limited information",* Mechanical Systems and Signal Processing journal MSSP, Vol 165, 2022, 108210, https://doi.org/10.1016/j.ymssp.2021.108210 **IF: 8.93, Citations: 40**

[10] **R. Rocchetta**, *Luis G. Crespo, "A scenario optimization approach to reliability-based and risk-based design: soft-constrained modulation of failure probability bounds",* RESS, 2021, https://doi.org/10.1016/j.ress.2021.107900 **IF: 9.4, Citations: 19**

[11] **R. Rocchetta**, Qi Gao, Milan Petkovic, "*Soft-constrained interval predictor models and epistemic reliability intervals: a new tool for uncertainty quantification with limited experimental data",* MSSP, Vol 161, 2021, https://doi.org/10.1016/j.ymssp.2021.107973 **IF: 7.9, Citations: 14**

[12] **R. Rocchetta**, E. Patelli, "*A Post-Contingency Power Flow Emulator for Generalized Probabilistic Risks Assessment of Power Grids",* RESS, Vol 197, May 2020, 106817, https://doi.org/10.1016/j.ress.2020.106817 **IF: 7.24, Citations: 20**

[13] **R. Rocchetta**, Luis G. Crespo, Sean P. Kenny, "*A scenario optimization approach to reliability-based design*", RESS, Vol 196, 2020, https://doi.org/10.1016/j.ress.2019.106755 **IF: 9.4, Citations: 27**

[14] **R. Rocchetta**, et al., "*A Reinforcement Learning Framework for Optimal Operation and Maintenance of Power Grids",* Applied Energy, Vol 241, Pp 291-301, 2019, https://doi.org/10.1016/j.apenergy.2019.03.027 **IF: 10.1, Citations: 217**

[15] **R. Rocchetta**, E. Patelli, E. Zio, "*A Power-Flow Emulator Approach for Resilience Assessment of Repairable Power Grids subject to Weather-Induced Failures and Data Deficiency",* Applied Energy, Vol 210, pp 339-350, 2018, https://doi.org/10.1016/j.apenergy.2017.10.126 **IF: 10.1, Citations: 87**

[16] **R. Rocchetta**, E. Patelli, "*Assessment of Power Grid Vulnerabilities Accounting for Stochastic Loads and Model Imprecision*", IJEPES, Vol 98, pp 219-232, 2018, https://doi.org/10.1016/j.ijepes.2017.11.047 **IF: 5.0, Citations: 63**

[17] **R. Rocchetta,** E. Patelli, M. Broggi, Q. Huchet, *"On-Line Bayesian Model Updating for Structural Health Monitoring",* MSSP, Vol 103, 174 - 195, 2018, https://doi.org/10.1016/j.ymssp.2017.10.015 **IF: 7.9, Citations: 118**

[18] **R. Rocchetta**, E. Patelli, M. Broggi*, "Do we have enough data? Robust reliability via uncertainty quantification*", Applied Mathematical Modelling, Volume 54, pp 710-721, 2018, https://doi.org/10.1016/j.apm.2017.10.020 **IF: 4.4, Citations: 43**

[19] **R. Rocchetta,** Y.F. Li and E. Zio, "*Risk Assessment and Risk-Cost Optimization of Distributed Generation Systems Considering Extreme Weather Conditions",* RESS, Vol 136, pp 47 - 61, 2015, https://doi.org/10.1016/j.ress.2014.11.013 **IF: 9.4, Citations: 120**

PEER-REVIEWED CONFERENCE PUBLICATIONS

[1] **R. Rocchetta**, L. Nespoli, V. Medici, D. Raoofsheibani, B. Gjorgiev, G. Sansavini, *"Risk Informed Operational Planning Of Power Transmission Grids: Overview Of Recent Developments" European Safety Conference,* ESREL 2024, *link*

[2] P. Dersin, **R. Rocchetta,** "*Confidence intervals for RUL: a new approach based on time transformation and reliability theory ",* ESREL 2023 *link*

[3] **R. Rocchetta**, S. Basso, L. Nespoli, M. Derboni, V. Medici, M. Salani, "*Rule-based deep reinforcement learning for optimal control of electrical batteries in an energy community*", ESREL 2023 link

[4] **R. Rocchetta,** Z. Zhao, A. Di Bucchianico, "*Prediction of the Luminous Flux Degradation of Light Emitting Diodes with an Interval Regressions Model ",* ESREL 2022 *link*

[5] Wang, Chenxing, Lechang Yang, **R. Rocchetta**, *"Bayesian Information Fusion for Imprecise Probabilistic Models with Different Types of Information."* 3rd International Conference on System Reliability and Safety Engineering (SRSE). IEEE, 2021.

[6] **R. Rocchetta,** "*New probabilistic guarantees on the accuracy of Extreme Learning Machines: an application to decision-making in a reliability context",* ESREL conference, September 2021 link

[7] M. De Angelis, **R. Rocchetta**, A. Gray, S. Ferson, *"Constructing consonant predictive beliefs from data with scenario theory*", International Symposium on Imprecise Probabilities ISIPTA: Theories and Applications*, July 2021 link*

[8] A. Gray, A. Wimbush, **R. Rocchetta**, M. De Angelis, P. O. Hristov, E. Miralles-Dolz, D. Calleja, "*Bayesian calibration and probability bounds analysis: solution to the Nasa 2020 UQ challenge on optimization under uncertainty",* ESREL-PSAM Conferences, 2020 link

[9] **R. Rocchetta**, M. Petkovic, Q. Gao, "*Scenario-based Generalization bound for Anomaly Detection Support Vector Machine Ensembles*" , Proceedings of the 30th ESREL and the 15th PSAM Conferences, 2020 link

[10] **R. Rocchetta**, L. G. Crespo, "*An empirical approach to reliability-based design using scenario optimization",* Proceedings of the 30th ESREL and the 15th PSAM Conferences, 2020 link

[11] **R. Rocchetta**, L. G. Crespo, S. P Kenny *"Solution of the benchmark control problem by scenario optimization"* ASME 2019 Dynamic Systems and Control Conference, DSCC , link

[12] E. Patelli, S. Tolo, H. George-Williams, J. Sadeghi, **R. Rocchetta**, M. de Angelis, M. Broggi *"OpenCossan 2.0: an efficient computational toolbox for risk, reliability and resilience analysis",* Proceedings of the joint ICVRAM ISUMA UNCERTAINTIES conference, 2018. link

[13] **R. Rocchetta**, M. Compare, E. Patelli, L. Bellani, E. Zio, *"A reinforcement learning framework for optimisation of power grid operations and maintenance",* 8th international workshop on reliable engineering computing, REC 2018, Liverpool, UK, Jully, 2018. link

[14] **R. Rocchetta**, E. Patelli, *"Stochastic Analysis and Reliability-Cost Optimization of Distributed Generators and Air Source Heat Pumps",* International Conference on System Reliability and Safety, ICSRS, 2017, link

[15] **R. Rocchetta**, E. Patelli, *"An Efficient Framework for Reliability Assessment of Power Networks Installing Renewable Generators and Subject to Parametric P-box Uncertainty",* Proceedings of the 27th ESREL conference, link

[16] **R. Rocchetta**, E. Patelli, "*Power Grid Robustness to Severe Failures: Topological and Flow Based Metrics Comparison",* European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS, Crete 2016, pp. 6121-6135. link

[17] **R. Rocchetta**, E. Patelli, M. Broggi, Q. Huchet, *"On Bayesian Approaches for Real-Time Crack Detection",* ESREL conference proceedings, Zurich 2015, pp 1929-1936. link

[18] **R. Rocchetta**, E. Patelli, "*Imprecise Probabilistic Framework for Power Grids Risk Assessment and Sensitivity Analysis",* European Safety and Reliability Conference, ESREL, Glasgow 2016.

[19] **R. Rocchetta**, E. Patelli, M. Broggi, *"Efficient Epistemic-Aleatory Uncertainty Quantification: Application to the NAFEMS Challenge Problem",* NAFEMS World Congress, San Diego, California, USA 21-24 June 2015. link

[20] **R. Rocchetta**, E. Patelli, *"A Simulation-Based Probabilistic Risk Assessment of Electric Vehicles Control Strategies Accounting Renewable Energy Sources",* International Probabilistic Workshop, IPW Liverpool, UK, 4-6 November 2015, pp. 183-198.

WORKING PAPERS

[1] O. Cangul; R. Rocchetta, E. Patelli, M. Fahrioglu, "*Assessing the sustainability and safety integration of photovoltaic generators and energy storage systems in electric power grids*", pending submission.

[2] R. Rocchetta, et al. "*Optimization of Mobility Incentives in Electric Vehicle Car Sharing Systems: A Reinforcement Learning Framework" submitted to Sustainable Cities and Society*

[3] P. Dersin and R. Rocchetta, "*Uncertainty bounds on RUL via an analytical time transformation approach" submitted to RESS*

[4] E. Congeduti, R. Rocchetta, F. A. Oliehoek, "Influence Learning in Complex Systems". Under review as submission to TMLR journal.

HONOURS AND AWARDS

- **Reviewer of the year,** *awarded by the ASME society for the service to the ASCE-ASME Journal of Risk and Uncertainty Part B*
- **Job offers**, research position on "*Power grid cascading simulation*", at the Luxembourg research institute LIST.
- **Postdoc Research Fellowship,** "*Alexander von Humboldt foundation*", kindly declined due to more appealing job offers.
- **Postdoctoral job offers,** "*Uncertainty in AI*", at Oxford Brookes and TU/Delft with topic.
- **Best poster award,** 3rd place at the ISIPTA conference 2021.
- **Best paper award,** the top 10 at the *"Postdoctoral award ceremony",* TU/Eindhoven internal prize.
- **Best score,** at the innovation challenge "*Health management in changing environments*", ESREL conference 2020.
- **Best image of risk**, 3rd place at the best *Image of Risk Competition*, ESREL conference 2017, Portoroz, Slovenia
- **First prize,** "An *MC approach to compute the success probability of sending objects to the Moon*", Math. Competitive Game 2016.
- **Second prize,** *"Uncertainties in GPS Positioning*", Math. Competitive Game 2016.
- **Presentation award:** best presentation (co-author) at the NAFEMS world congress 2015.

THESIS

- **R. Rocchetta**, "*Computational Frameworks for Power Grid Reliability, Vulnerability and Resilience Analysis*", PhD thesis, University of Liverpool. link to publication
- **R. Rocchetta**, "*Robust Probabilistic Risk/Safety Analysis of Complex Systems and Critical Infrastructures*", MRes, link to publication

TEACHING AND SUPERVISION

- ***Teacher/Tutoring:*** *Survival and Reliability Analysis (TU/Eindhoven, Bachelor program, 2021)*
- ***Master Student*****:** *van der Putten, J. J. 2021* "*Data mining in ECG data to predict patient deterioration in low resource settings* link to thesis
- ***Master Student*****:** *Coverage of lifetime confidence bounds for highly censored, and few Weibull distributed data, Jongerius, S. C. (Author). 31 Aug 2022,* link to thesis

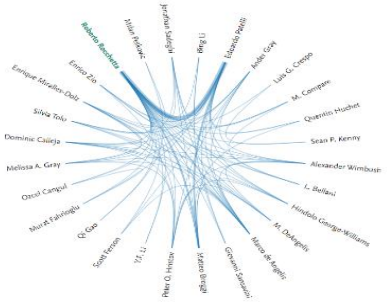
OTHER PROFESSIONAL ACTIVITIES (SEMINAR, KEYNOTE, EDITORIAL WORK)

- Member of ESRA European Safety and Reliability Association
- Session chair at ESREL 2023, 2024
- Invited keynote session ICSRS 2022 and 2023
- Invited speaker: Julia-reach and Julia Interval workshop (12/2021) youtube link 1 youtube link 2
- Topic Board Editor for the journal Mathematics, MDPI
- Session Chair: uncertain systems and robustness at the DSCC 2019, Grand Summit Hotel, Park City, Utah, USA
- Seminar Accounting for Uncertainty Caused by Lack of Data and Conflicting Knowledge. Robust Reliability via Uncertainty Quantification, National Institute for aerospace (NIA), Hampton, Virginia, USA
- Technical committee, International Workshop on Reliable Engineering Computing 2018 Liverpool, UK
- Poster: COSSAN X software for uncertainty quantification, international conference SIAM UQ 2016, EPFL Lausanne
- Reviewer for NOW micro grants (Dutch research council)
- Reviewer for the journals "Applied Energy and International Journal of Electrical Power & Energy Systems"; "Reliability Engineering and System Safety"; "Mechanical Systems and Signal Processing"; "Advances in Aerospace Engineering" (Elsevier)
- Reviewer for the journals "Engineering Reports", "Risk analysis", and "IET Generation, Transmission & Distribution" (Wiley)

- Reviewer for the journal “Mathematics” and “Energies” (MDPI)
- Reviewer of the “ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems” (ASCE)
- European Safety and Reliability Association, Newsletter ESRA September 2019

ACADEMIC NETWORK, ADVISORS AND REFEREES (SELECTED)

1. **Prof. Vasco Medici, Dr. Lorenzo Nespoli**, SUPSI, collaborators vasco.medici@supsi.ch
2. **Prof. Dr. Alessandro Di Bucchianico**, TU/Einghoven, postdoc collaborator a.d.bucchianico@tue.nl
3. **Prof. Dr. Edoardo Patelli**, Strathclyde university, former Ph.D, supervisor edoardo.patelli@strath.ac.uk
4. **Dr. Luis G. Crespo,** former collaborator at NASA Langley Research Center, luis.g.crespo@nasa.gov
5. **Prof. Dr. Milan Petkovic,** project coordinator at TU/e and Philips, m.petkovic@tue.nl
6. **Prof. Dr. Ing- Enrico Zio**, Polytechnic Milan and Mines ParisTech, enrico.zio@poilimi.it
7. **Prof. Dr. Ing- Giovanni Sansavini**, ETH Zurich, sansavig@ethz.ch
8. **Prof. Dr. Ing- Michael Beer**, Leibniz University Hannover, beer@bauinf.uni-hannover.de
9. **Prof Dr. Scott Ferson**, Chair in risk and uncertainty, Liverpool, Scott.Ferson@liverpool.ac.uk



LANGUAGE

Italian	Mother tongue
English (IELTS & Cambridge Certificates)	Working proficiency
Dutch	Just started (A1)
Spanish	Basic conversational skills (A1-A2)
French	Basic conversational skills (A1-A2)

WEB PAGES

Research Gate GitHub Web Page Google Scholar profile

SOFTWARE KNOWLEDGE

- **Data analysis, simulation, and modelling**: MATLAB, Python, Julia, R-Studio, VSCode, Pycharm.
- **Data base, data management**: Vertica, SQL.
- **Energy system simulation**: Matpower
- **Writing, Visualization, Editing, Management**: Notion, Slack, Overleaf, LaTeX, JabRef, Mendeley, Office, Inkscape.

KEY WORDS, RESEARCH INTERESTS

Imprecise probability theory, Uncertainty Quantification; Energy Systems, Complex and Dynamic Systems and Networks, Resilience, Reliability, Vulnerability and Risk, Stochastic Optimization, Machine Learning, Reliability Based Design, assessment of lack of data situations, Power grids, Generalization bounds; .