

DR. -ING. ROBERTO ROCCHETTA

Name Surname: Roberto Rocchetta

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Nationality: Italian

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OVERVIEW

My name is Roberto Rocchetta, I am a **post-doctoral researcher at the Technical University of Eindhoven** working on collaborative projects with Signify, BMW, Philips, and the department of mathematics and computer science. I hold a master of science in Energy engineering from the University of Bologna, a master of research in decision-making under risk and uncertainty, and a Ph.D. in reliability engineering, uncertainty quantification, and computer science from the University of Liverpool. My Ph.D. degree, awarded for my thesis "Robust computational methods for resilience, reliability and vulnerability analysis of power grids", dealt with several important aspects of uncertainty quantification and optimization of complex systems and critical infrastructures. After my Ph.D., and before joining TU/e, I worked in the USA in a collaborative project with the National Institute of Aerospace (NIA) and NASA Langley. There I started developing my new and independent line of research on hybrid (data-driven & model-based) decision making under uncertainty for reliability optimization and analysis. **I am the first author of more than 10 peer-reviewed journal articles and 15 conference papers.** My works generated a notable impact within the research community and, despite being relatively new (2018-2021), already gathered **more than 450 citations** (google scholar) and an **h-index of 8 on Scopus**. Please refer to the publications and personal web pages for more details. My research, **expertise, and knowledge** are highly **multidisciplinary**. This facilitates the cross-fertilization of ideas, generates interesting synergies within the department, and supports knowledge transfer and learning. I have expertise in **networks modelling**, vulnerability risk and **resilience analysis**, **survival** and **reliability theory**, energy systems and engineering, **probability and statistical learning** theory, stochastic optimization, and machine learning.

WORK EXPERIENCES, VISITING, AND INTERSHIPS

Postdoc , TU/Eindhoven & Signify, Department for mathematics and computer science, Statistics, NL. <i>Focus on LEDs reliability, survival analysis, and design of experiments.</i>	1-09-2021	Present
Postdoc , TU/Eindhoven & Philips, Department for mathematics and computer science, Security, NL. <i>Focus on AI and machine learning for MRI maintenance optimization.</i>	15-10-2019	1-09-2021
Research Scholar , NIA, and NASA Langley, Hampton, VA, USA. <i>Focus on mathematical modelling, data-driven reliability, and robustness optimization.</i>	15-01-2019	15-10-2019
Internship , within ARAMIS start-up, Milan, IT. <i>Focus on Reinforcement Learning for maintenance optimization.</i>	2017/2018	6 months
Visiting Ph.D. candidate , Energy Science Center ETH, Zurich, SW.	2017	2 months
Visiting Ph.D. candidate , 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

HONOURS AND AWARDS

Humboldt Research Fellowship Award: for Postdoctoral Researchers (decision pending, 2022-2023)

Best poster award: Bronze medal (ISIPTA conference 2021).

Best paper award: in the top 10 at the postdoc best paper award ceremony (TU/Eindhoven internal).

Best challenge score: innovation challenge "Health management in changing environments" (ESREL conference 2020).

First Prize: for the solution "Monte Carlo approach to compute the success probability of sending objects to the Moon" to the challenge problem (Math. Competitive Game 2017).

Second Prize: challenge problem 'Uncertainties in GPS Positioning' (Math. Competitive Game 2016).

Best image of risk: third place at the best Image of Risk Competition, ESREL conference 2017, Portoroz, Slovenia.

Presentation award: best presentation (co-author) at the NAFEMS world congress 2015.

PERSONAL GRANTS, CONSORTIUMS, AND RESEARCH PROJECTS

- **Personal grant, Alexander von Humboldt**, Value: 60 [k€]
- **Collaborative grant**, Eureka AI 2021, DAISy project Value 4 [M€] I helped with the submission and later abandoned the call due to a change of department position.
- **Postdoctoral grant**, within the project Daytime ITEA 3 (2019-2022), grant 17030, Project Value: 11 [M€]

- **Scholarship grant** Master of research and PhD (2015-2019), Liverpool, EPSRC and ESRC Centre for Doctoral Training on Quantification and Management of Risk & Uncertainty in Complex Systems & Environments Grant No. (EP/L015927/1) Project Value 4,156,383 [£]
- **Scholarship:** Mater Thesis Abroad (2012/2013), at Ecole Centrale de Paris, Project Value: 3.1 [k€]

PEER-REVIEWED JOURNAL PUBLICATIONS

- [1] **Roberto Rocchetta**, "Enhancing the resilience of critical infrastructures: a statistical analysis on spectral clustering and vulnerability metrics for power networks", Renewable and Sustainable Energy Reviews, Volume 159, 2022, <https://doi.org/10.1016/j.rser.2022.112185> IF: 14.982, Citations:-,
- [2] 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: 6.823, Citations:-
- [3] 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", special issue NASA challenge on optimization under uncertainty, Mech. Sys. and Signal Proces., Volume 165, 15 February 2022, 108210, <https://doi.org/10.1016/j.ymssp.2021.108210> IF: 6.823, Citations: -
- [4] **R. Rocchetta**, Luis G. Crespo, "A scenario optimization approach to reliability-based and risk-based design: soft-constrained modulation of failure probability bounds", Reliability Engineering & System Safety, <https://doi.org/10.1016/j.res.2021.107900> IF: 6.188, Citations: 2
- [5] **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", Mechanical Systems and Signal Processing, Volume 161, 2021, <https://doi.org/10.1016/j.ymssp.2021.107973> IF: 6.823, Citations: 1
- [6] **R. Rocchetta**, E. Patelli, "A Post-Contingency Power Flow Emulator for Generalized Probabilistic Risks Assessment of Power Grids", Reliability Engineering & System Safety, Volume 197, May 2020, 106817, <https://doi.org/10.1016/j.res.2020.106817> IF: 6.188, Citations: 8
- [7] **Roberto Rocchetta**, Luis G. Crespo, Sean P. Kenny, "A scenario optimization approach to reliability-based design", Reliability Engineering & System Safety, Volume 196, 2020, <https://doi.org/10.1016/j.res.2019.106755> IF: 6.188, Citations: 10
- [8] **R. Rocchetta**, M. Compare, L. Bellani, E. Patelli, E. Zio, "A Reinforcement Learning Framework for Optimal Operation and Maintenance of Power Grids", Applied Energy, Volume 241, Pp 291-301, 2019, <https://doi.org/10.1016/j.apenergy.2019.03.027> IF: 9.746, Citations: 66
- [9] **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, Volume 210, 15, pp 339-350, 2018, <https://doi.org/10.1016/j.apenergy.2017.10.126> IF: 9.746, Citations: 44
- [10] **R. Rocchetta**, E. Patelli, "Assessment of Power Grid Vulnerabilities Accounting for Stochastic Loads and Model Imprecision", International Journal for Electrical Power & Energy Systems, Volume 98, pp 219-232, 2018, <https://doi.org/10.1016/j.ijepes.2017.11.047> IF: 4.630, Citations: 28
- [11] **R. Rocchetta**, E. Patelli, M. Broggi, Q. Huchet, "On-Line Bayesian Model Updating for Structural Health Monitoring", Mechanical Systems and Signal Processing, Volume 103, 174 - 195, 2018, <https://doi.org/10.1016/j.ymssp.2017.10.015>. IF: 6.823, Citations: 48
- [12] **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: 5.129, Citations: 23
- [13] **R. Rocchetta**, Y.F. Li and E. Zio, "Risk Assessment and Risk-Cost Optimization of Distributed Generation Systems Considering Extreme Weather Conditions", Reliability Engineering and System Safety, Volume 136, pp 47 - 61, 2015, <https://doi.org/10.1016/j.res.2014.11.013>. IF: 6.188, Citations: 62

JOURNAL/WORKING PAPERS (TENTATIVE TITLES)

- [1] R. Rocchetta, M. Petkovic, Q. Gao, Mavroeidis, Dimitrios, "Robust selection of system fault detection models via heterogeneous data fusion, system structure-function, and formal sensitivity bounds.", (Under review EAAI)
- [2] R. Rocchetta, M. Petkovic, Q. Gao, "Generalization Error Bounds for Soft-constrained Convex Optimization Programs: application to Interval Predictor Models", (ICCOSAR 2022 submitted)
- [3] Ozcel Cangul; Roberto Rocchetta, E. Patelli, Murat Fahrioglu, "Optimal allocation and sizing of distributed solar PV generators: Unit financial impact indicator", (internal review)
- [4] Ozcel Cangul; Roberto Rocchetta, E. Patelli, Murat Fahrioglu, "A new framework for the sustainable and safe integration of photovoltaic generators and energy storage systems in electric power grids", (internal review)
- [5] R. Rocchetta, A. Mey, F. A. Oliehoek "Exploring the link between learnability via compression and complexity and scenario decision-making theory: the case of Support Vector Machine classifiers", (internal review)
- [6] M. De Angelis, R. Rocchetta, A. Gray, S. Ferson, "Dependency modeling, uncertainty propagation and support vector models with statistical guarantees", (internal review)
- [7] E. Congeduti, R. Rocchetta, F. A. Oliehoek, "A framework for learning localized Influence for multi-agents policy optimization". (internal review)

PEER-REVIEWED CONFERENCE PUBLICATIONS

- [1] Wang, Chenxing, Lechang Yang, and **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.
- [2] **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](#)
- [3] 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](#)
- [4] 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", Proceedings of the 30th ESREL and the 15th PSAM Conferences, 2020 [link](#)
- [5] **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](#)
- [6] **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](#)
- [7] **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](#)
- [8] 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](#)
- [9] **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, July, 2018. [link](#)
- [10] **R. Rocchetta**, E. Patelli, "Stochastic Analysis and Reliability-Cost Optimization of Distributed Generators and Air Source Heat Pumps", to be presented at the 2nd International Conference on System Reliability and Safety, ICSRS, 2017, [link](#)
- [11] **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](#)
- [12] **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](#)
- [13] **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](#)
- [14] **R. Rocchetta**, E. Patelli, "Imprecise Probabilistic Framework for Power Grids Risk Assessment and Sensitivity Analysis", European Safety and Reliability Conference, ESREL, Glasgow 2016.
- [15] **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](#)
- [16] **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.

PHD AND MASTER THESES

1. Rocchetta Roberto, "Computational Frameworks for Power Grid Reliability, Vulnerability and Resilience Analysis", PhD thesis, University of Liverpool. <https://livrepository.liverpool.ac.uk/3034529/>
2. Rocchetta Roberto, "Robust Probabilistic Risk/Safety Analysis of Complex Systems and Critical Infrastructures" <https://cgi.csc.liv.ac.uk/~sven/RobertoRocchettaMRes.pdf>

PERSONAL WEB PAGES



[TU/Eindhoven Web Page](#)



[GitHub Web Page](#)



[Google Scholar profile](#)

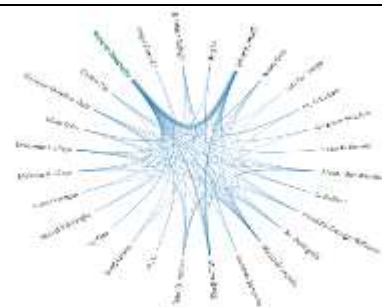
PROFESSIONAL ACTIVITIES, SEMINAR, TEACHING, AND EDITORIAL WORK

- Teacher/Tutoring: Survival and Reliability Analysis (TU/Eindhoven, Bachelor program, 2021)
- Invited speaker: Julia Interval workshop (12/2021)
- Topic Board Editor for the journal Mathematics, MDPI
- Technical committee: International Symposium on Reliability Engineering and Risk Management, 2022, Hannover, GER
- Session Chair: uncertain systems and robustness at the Dynamic Systems and Control Conference 2019, Grand Summit Hotel, Park City, Utah, USA
- Seminar: March-13-2019 | 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 local: 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 50kEuro (Dutch research council)
- Reviewer for the journal Applied Energy, Elsevier
- Reviewer for the International Journal of Electrical Power & Energy Systems, Elsevier
- Reviewer for the journal Mechanical Systems and Signal Processing, Elsevier
- Reviewer for the journal Reliability engineering and system safety, Elsevier
- Reviewer for the journal Engineering Reports, Wiley
- Reviewer for the IET Generation, Transmission & Distribution, Wiley
- Reviewer for the journal Energies, MDPI
- Reviewer for the journal Mathematics, MDPI
- European Safety and Reliability Association, Newsletter ESRA September 2019

ACADEMIC NETWORK, ADVISORS AND REFEREES (SELECTED)

1. Prof. Dr. Alessandro Di Bucchianico, TU/Eindhoven, postdoc collaborator
2. Prof. Dr. Edoardo Patelli, Strathclyde university, former Ph.D, supervisor edoardo.patelli@strath.ac.uk
3. Dr. Luis G. Crespo, former colleague at NASA Langley Research Center, luis.g.crespo@nasa.gov
4. Prof. Dr. Milan Petkovic, project coordinator at TU/e and Philips, m.petkovic@tue.nl
5. Prof. Dr. Ing- Enrico Zio, Polytechnic Milan and Mines ParisTech, enrico.zio@polimi.it
6. Prof. Dr. Ing- Giovanni Sansavini, ETH Zurich, sansavig@ethz.ch
7. Prof. Dr. Ing- Michael Beer, Leibniz University Hannover, beer@bauinf.uni-hannover.de
8. 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)

SOFTWARE KNOWLEDGE

- **Data analysis, simulation and modelling:** MATLAB, Python, Julia, R, VSCode.
- **Data base, data management:** Vertica, SQL.
- **Energy systems and multi-physics simulation:** MatPower, COMSOL Multiphysics
- **High Performance computing.**
- **Writing, Visualization, Editing:** LaTeX, JabRef, Mendely, Office, Slack, 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; .