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## DORIS SÁEZ HUEICHAPAN

Full Professor, Department of Electrical Engineering, University of Chile

Date and Place of Birth: July 26th, 1971, Panguipulli, Chile

Identification (RUT/Passport): 8.952.312-5/F34559007

Address: Av. Tupper #2007, Santiago, Chile

Telephone: (56-2)-29784091

Email: [dsaez@ing.uchile.cl](mailto:dsaez@ing.uchile.cl) | Web site: <http://www.cec.uchile.cl/~dsaez/>

<https://publons.com/researcher/2854321/doris-saez/>

<https://orcid.org/0000-0001-8029-9871>

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### EDUCATION

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- Doctor in Engineering Sciences, Pontificia Universidad Católica de Chile, December 2000.
  - Master in Engineering Sciences, Pontificia Universidad Católica de Chile, August 1995.
  - Civil Engineering, Mayor in Electrical Engineering, Pontificia Universidad Católica de Chile, August 1995.
  - Bachelor in Engineering Sciences, Pontificia Universidad Católica de Chile, March 1993.
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### POSITIONS

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2018- Date	Full Professor, Department of Electrical Engineering, University of Chile.
2019- Date	Founding Member, Sub-directorate of Indigenous People, Faculty of Mathematical and Physical Sciences, University of Chile.
2010 – 2018	Associate Professor, Department of Electrical Engineering, University of Chile.
2003-2010	Assistant Professor, Department of Electrical Engineering, University of Chile.
1997 - Date	Faculty Member, Department of Electrical Engineering, University of Chile.

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### JOURNAL ASSOCIATE EDITOR

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2022- Date	Associate Editor <i>IEEE Electrification Magazine</i>
2020- 2022	Associate Editor <i>IEEE Transactions on Smart Grid</i>
2017 - 2020	Associate Editor <i>IEEE Control Systems Magazine</i>
2011 - 2019	Associate Editor <i>IEEE Transactions on Fuzzy Systems</i>
2012-2013	Associate Editor <i>Soft Computing</i>

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## AWARDS

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2022	In the ranking stanford's list world top 2% scientists, November 2022.
2018	Outstanding Woman in Energy, Ministry of Energy, March 2018.
2018	Recognition of 10 outstanding UC female engineers, Pontificia Universidad Católica de Chile, November 2018.
2009	MGA-IEEE Achievement Award. For increasing member engagement by implementing and developing an IEEE National Distinguished Lecturer Program in Chile, November 2009.

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## PARTICIPATION IN SCIENTIFIC SOCIETIES

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2011-2013	Chair of Chilean Chapter IEEE Computational Intelligence Society.
2009-2010	Vice-Chair of IEEE Chile Section.
2007-2008	Chair of IEEE Chile Section.
2008	Member of Ad Hoc Committee on IEEE as a Model Global Association.
2005 - Date	Senior Member IEEE.

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## PUBLICATIONS

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### ▪ BOOKS & BOOKS CHAPTERS

- [1] Núñez, A., Sáez, D., Cortés, C. “Hybrid Predictive Control for Dynamic Transport Problems”, Springer-Verlag London, Series Advances in Industrial Control, England, 2013, 172 Pages, ISBN-10: 1447143507 | ISBN-13: 978-1447143505.
- [2] Sáez, D., Cipriano, A., Ordys, A. “Optimization of Industrial Processes at Supervisory Level: Application to Control of Thermal Power Plants”. Springer-Verlag London, Series Advances in Industrial Control, England, 2002, 187 Pages. ISBN: 1852333863.
- [3] Sáez, D., Cipriano, A. “Supervisory Predictive Control of a Combined Cycle Thermal Power Plant”, Book Chapter “Thermal power plant simulation, monitor and control”, Edited by D. Flynn; IEE, The Institution of Electrical Engineering, 2003, United Kingdom, pp. 161-178, ISBN: 0 85296 419 6.
- [4] Universidad de Chile, “Cien propuestas para el país que queremos,” co-author of chapter “Medioambiente, cambio climático y biodiversidad”, 2021, doi: 10.34720/5H56-4676.

## ▪ ISI JOURNAL ARTICLES

- [1] C. Ahumada, L. Tarisciotti, D. Sepúlveda and **D. Sáez**, "Torsional Vibrations Reduction in More Electric Ships Propellers Using Model Predictive Control," in *IEEE Transactions on Industry Applications*, 2024, doi: 10.1109/TIA.2024.3471974.
- [2] O. Cartagena, F. Trovò, and **D. Sáez**, "A multivariate approach for fuzzy prediction interval design and its application for a climatization system forecasting," *Expert Systems with Applications*, vol. 255. Elsevier BV, p. 124715, Dec. 2024. doi: 10.1016/j.eswa.2024.124715.
- [3] J. Ocaranza, **D. Sáez**, L. Daniele, and C. Ahumada, "Energy-water management system based on robust predictive control for open-field cultivation," *Science of The Total Environment*, vol. 946. Elsevier BV, p. 174241, Oct. 2024. doi: 10.1016/j.scitotenv.2024.174241.
- [4] Morales, R., Marín. L., Roje, T., Caquilpan, V., **Sáez, D.**, Nuñez, A., Microgrid planning based on computational intelligence methods for rural communities: A case study in the José Painecura Mapuche community, Chile, *Expert Systems with Applications*, Volume 235, 2024, 121179, ISSN 0957-4174, <https://doi.org/10.1016/j.eswa.2023.121179>.
- [5] O. Cartagena, F. Trovò, M. Roveri and **D. Sáez**, "Evolving Fuzzy Prediction Intervals in Nonstationary Environments," in *IEEE Transactions on Emerging Topics in Computational Intelligence*, vol. 8, no. 1, pp. 903-916, Feb. 2024, doi: 10.1109/TETCI.2023.3296486.
- [6] S. Parra and **D. Sáez**, "Deep learning prediction intervals based on selective joint supervision," *Applied Intelligence*, vol. 53, no. 19. Springer Science and Business Media LLC, pp. 21706–21722, Jun. 09, 2023. doi: 10.1007/s10489-023-04610-8.
- [7] R. A. Labra Mocarquer, C. Basáez Villagrán, **D. Sáez** Hueichapan, and C. Rodríguez-Seeger, "Proyecto Piwkeyewün: Lineamientos para el co-diseño de sistemas de cultivo vegetal tecnológico indígena," *Estudios Avanzados*, no. 39. University of Santiago of Chile, pp. 145–169, Dec. 20, 2023. doi: 10.35588/estudav.v0i39.5731.
- [8] Cartagena, O., Ožbot, M., **Sáez, D.**, Škrjanc, I. Evolving fuzzy prediction interval for fault detection in a heat exchanger, *Applied Soft Computing*, Volume 145, 2023, 110625, ISSN 1568-4946, <https://doi.org/10.1016/j.asoc.2023.110625>.
- [9] R. Bustos, L. G. Marín, A. Navas-Fonseca, L. Reyes-Chamorro, and **D. Sáez**, "Hierarchical energy management system for multi-microgrid coordination with demand-side management," *Applied Energy*, vol. 342. Elsevier BV, p. 121145, Jul. 2023. doi: 10.1016/j.apenergy.2023.121145.
- [10] A. Navas-Fonseca, C. Burgos-Mellado, J. S. Gómez, E. Espina, J. Llanos, **D. Sáez**, M. Sumner, D. E. Olivares "Distributed predictive secondary control with soft constraints for optimal dispatch in hybrid AC/DC microgrids," in *IEEE Transactions on Smart Grid*, doi: 10.1109/TSG.2023.3261569.
- [11] E. Espina, R. J. Cárdenas-Dobson, J. W. Simpson-Porco, M. Kazerani and **D. Sáez**, "A Consensus-Based Distributed Secondary Control Optimization Strategy for Hybrid Microgrids," in *IEEE Transactions on Smart Grid*, vol. 14, no. 6, pp. 4242-4255, Nov. 2023, doi: 10.1109/TSG.2023.3263107.
- [12] Endo, A.; Parra, S.; Cartagena, O.; **Sáez, D.**; Muñoz, C.; Huircan, J.I. Energy–Water Management System Based on MPC for a Greenhouse in a Mapuche Indigenous Community. *Appl. Sci.* 2023, 13, 4734. <https://doi.org/10.3390/app13084734>.
- [13] S. Parra, **D. Sáez**, Deep Learning Prediction Intervals based on Selective Joint Supervision, *Applied Intelligence*, 53, 21706–21722 (2023). <https://doi.org/10.1007/s10489-023-04610-8>.
- [14] E. Rute-Luengo, A. Navas-Fonseca, J. Gómez, E. Espina, C. Burgos-Mellado, **D. Sáez**, M. Sumner, D. Muñoz-Carpintero "Distributed Model-based Predictive Secondary Control for

- Hybrid AC/DC Microgrids," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 11, no. 1, pp. 627-642, Feb. 2023, doi: 10.1109/JESTPE.2022.3157979.
- [15] D. Köbrich, L. G. Marín, D. Muñoz-Carpintero, C. Ahumada, **D. Sáez**, M. Sumner, G. Jiménez-Estévez "A robust distributed energy management system for the coordinated operation of rural multi-microgrids," *International Journal of Energy Research*, August 2022. <https://doi.org/10.1002/er.8502>.
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## **PROJECTS**

**Funding programs from CONICYT Chilean National Commission for Scientific and Technological Research:**

**FONDECYT: National Fund for Scientific and Technological Development**

**FONDEF: Scientific and Technological Development Support Fund**

**FONDEQUIP: Scientific and Technological Equipment Program**

**FONDAP: Fund for Research Centers in Priority Areas**

**FONDART: National Fund for Cultural Development and the Arts**

**PIA: Associative Research Program**

**ATE: Research Rings Competition in Specific Thematic Areas**

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1. Principal Investigator **IDEA** project ID24I10010 "Design and Implementation of an IoT/Renewable Technology Prototype with an Intercultural Approach for Indigenous Rural Schools"
  2. Principal Investigator **FONDECYT** project 1220507 "Distributed Predictive Control Strategies based on Evolving Prediction Intervals for Energy-Water Microgrids".
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3. Principal Researcher, Instituto Sistemas Complejos de Ingeniería (ISCI) ANID PIA AFB230002, 2022-Date
  4. Principal Investigator ANID ATE 230035 “Sea Harbour Operation with Renewable Energies (SHORE)”.
  5. Co-Investigator **FONDECYT** project 1221392 “Enhanced Control Flexibility of Modular Multilevel Converters through Continuous Set Model Predictive Control”.
  6. Co-Investigator **FONDECYT** project 1210031 “A Hidden-Markov-Model-based Failure Prognostic Framework for Real-time Prognostic Decision Making”, 2021-2024.
  7. Co-Investigator, **FONDART** project 576104, “Participatory Design for the Creation of a University Cultivation System” *Warriache*, 2021.
  8. Co-Investigator, **FONDEF** ID19I10363, “Open expert system for supporting the water resources management through low-cost real-time monitoring of surface and groundwater”, 2020-2021.
  9. Principal Investigator, **FONDECYT** Project 1170683 “Robust Distributed Predictive Control Strategies for the Coordination of Hybrid AC and DC Microgrids”, 2017-2020.
  10. Co-Investigator, **FONDECYT** Project 1170044: “Prognostics Performance Metrics based on Bayesian Cràmer-Rao Lower Bounds”, 2017-2020.
  11. Co-Investigator, **FONDEQUIP** Project EQM160122 “Equipment for the Emulation and Testing of Energy Storage Systems”, 2016-2017.
  12. Co-Investigator, **International Cooperation** Project REDES150083 “Control Strategies and Hardware Topologies for the Operation of Energy Storage System in Microgrids”, Academic link AC3E UTFSM-U. of Waterloo, 2016-2017.
  13. Principal Investigator, **FONDEF** Project 14I10063 “Design and Implementation of an Experimental Prototype of Microgrid for Mapuche Communities”, 2015-2018.
  14. Director, Project from **Ministry of Energy**, Chile “Solar-Wind Energy Supply ‘Nehuen Kurruf Ka Antu’ for Community meeting place José Paineicura”, 2015-2016.
  15. Sub-director, **FONDEF** Project VIU14E075 “Development of a Real-time Estimator for the Energy Available of Battery Banks in Volcanic Monitoring Stations”, 2015-2016.
  16. Principal Investigator, **FONDECYT** Project 1140775 “Design of Robust Predictive Control Strategies for the Operation of Microgrids with High Penetration of Renewable Energy”, 2014-2016.
  17. Principal Investigator, **FONDECYT** Project 1110047 “Hybrid Fuzzy Predictive Control for Renewable Energy Plants”, 2011-2013.
  18. Co-investigator, **FONDECYT** Project 1100239 “Advanced Modelling and Optimization of Dynamic Transport Systems”, 2010-2013.
  19. Principal Investigator, **FONDEQUIP** Project EQM130058 “Microgrid Emulator for Design and Validation of Novel Control Strategies”, 2013-2014.
  20. Co-Investigator, **FONDEQUIP** Project EQM120111 “Equipment for Research in Hybrid Generation Systems”, 2013.
  21. Principal Investigator, **International Cooperation** Project REDES130053 “Control Strategies for Micro-grids with High Penetration of Renewable Energy”, U. Nottingham- Centre of Energy, U. Chile, 2013-2014.
  22. Co-Investigator, **International Cooperation** Project REDES130029 “Control and Management of Energy Storage Systems for Traction and Distributed Generation”, U. Waterloo – Centre of Energy, U. Chile, 2013-2014.
  23. Principal Investigator, **International Cooperation** Project REDENERG-0003 “Sustainability for Intelligent Micro-grids”, U. Waterloo – Centre of Energy, U. Chile, 2012-2013.
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24. Co-Investigator, **International Cooperation** Project REDENERG-0002 “Efficient applications of Lithium batteries to traction, renewable energies and energy storage”, U. Nottingham– Centre of Energy, U. Chile, 2012-2013.
  25. Associate Investigator, **FONDAP** Solar Energy Research Center, 2013-2018.
  26. Principal Researcher, Complex Engineering Systems Institute, **Millennium Science Initiative** ICM: P-05-004-F, **CONICYT**: FBO16, 2011-2020.
  27. Associate Investigator, Anillo-Bicentenario Project ACT32. **CONICYT** “Intelligent Real-Time Control for Integrated Transit Systems”. 2006-2010.
  28. Principal Investigator, **FONDECYT** Project 1061156 “Design of Predictive Control Strategies Based on Fuzzy Hybrid Modeling”, 2006-2008.
  29. Principal Investigator, **International Cooperation FONDECYT** Project 7070293 “Design of Predictive Control Strategies Based on Fuzzy Hybrid Modeling”, 2006.
  30. Principal Investigator, **FONDECYT** Project 1040698 “Hybrid Predictive Control Systems with Continuous and Discrete Variables”, 2004 -2006.
  31. Principal Investigator, **International Cooperation FONDECYT** Project 7040146 “Hybrid Predictive Control Systems with Continuous and Discrete Variables”. 2005.
  32. Investigator. **EPSRC Engineering and Physical Sciences Research Council** Project “Towards Multiple-model Based Learning Control Paradigms for Complex Systems”, 2003 – 2004.
  33. Principal Investigator, DI N°12-03/14-2 Project, **University of Chile**, “Design of Supervisory Control Strategies for Non-linear Multivariate Systems and their Application to Thermal Power Plants”. 2004 – 2006.
  34. Principal Investigator, FCFM Project, **University of Chile** “Design of Optimal Supervisory Control Strategies for Multivariate Nonlinear Systems”, 2003.
  35. Principal Investigator, **FONDECYT** Project 4000026 “Stability of Optimized Supervisory Control Systems considering a Fixed Regulatory Level”. 2000-2002.
  36. Principal Investigator, **FONDECYT** Project 2980029 “Design of Predictive Control Strategies based on Nonlinear Models and their Application to the Control of Thermal Power Plants”, 1998 – 2000.

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## STUDENTS

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### ▪ **PhD. THESIS ADVISOR**

- 8 graduate students
1. Luis Jiménez, “Energy Management System with Demand Side Management based on Robust Model Predictive Control Strategies for Seaport Microgrids”. Ph. D in Electrical Engineering, U. Chile. (Start on 2025)
  2. Álvaro Endo, “Fuzzy Modelling of Nonlinear Systems”. Ph. D in Electrical Engineering, U. Chile (2024 - Date)
  3. Javier Ocaranza, “Improving sustainability by studying water availability, quality, and pumping coordination in energy-water management systems”. Ph. D in Electrical Engineering, U. Chile (2023 - Date)
  4. Oscar Cartagena, “Fuzzy Interval Modelling and Control”. Ph. D in Electrical Engineering, U. Chile. Graduated 2024.
  5. Alex Navas, “Predictive Control Strategies for EMS & DSM of Microgrids” Double degree Ph. D in Electrical Engineering, U. Chile – U. Nottingham. Graduated 2022.



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6. Jacqueline Llanos, “Design of Control Strategies for Microgrids including Congestion”, Ph. D in Electrical Engineering, U. Chile. Graduated 2020.
  7. Juan Sebastián Gómez, “Distributed Predictive Secondary Control Strategies for Microgrids”, Ph. D in Electrical Engineering, U. Chile. Graduated 2020.
  8. Claudio Burgos, “Control Strategies for Improving Power Quality and Stability Evaluation in Microgrids” Double degree Ph. D in Electrical Engineering, U. Chile – U. Nottingham. Graduated in 2019.
  9. Luis Marín, “Hierarchical Energy Management System Based on Fuzzy Prediction Intervals for Operation and Coordination of Microgrids”, Ph. D in Electrical Engineering, U. Chile. Graduated in 2018.
  10. Carolina Ponce, “Design of Fuzzy Predictive Control Strategies for Combined Cycle Power Plants with Integrated Solar Collectors”, Ph. D in Electrical Engineering, U. Chile. Graduated in 2014.
  11. Freddy Milla, “Design of Non-linear Predictive Control Strategies for the Operation of Dynamic Public Transport Systems”, Ph. D in Electrical Engineering, U. Chile. Graduated in 2012.
  12. Alfredo Núñez, “Design of Hybrid Predictive Control Strategies for Optimization of Operational Processes in Dynamic Transport Systems”, Ph. D in Electrical Engineering, U. Chile. Graduated in 2009.

- **MASTER THESIS ADVISOR**

- 27 graduate students (2024: 2, 2023: 2, 2022: 3, 2021: 2, 2020: 1, 2019: 1, 2017: 2, 2016: 4, 2013: 3, 2012: 2, 2011: 2, 2010: 2, 2009: 1, 2007: 3, 2005: 1).

- **UNDERGRADUATE FINAL PROJECT ADVISOR**

- 37 undergraduate (2023: 2, 2022: 1, 2019: 1, 2018: 1, 2017: 2, 2016: 5, 2015: 2, 2013: 5, 2012: 1, 2011: 2, 2010: 2, 2009: 1, 2007: 4, 2006: 2, 2005: 2, 2004: 3, 2003: 1).

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## TEACHING

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Below is the list of courses that I have taught since 2001:

- EL4004 Principles of System Control (undergraduate course).
  - EL4105 Advanced Control of Systems (undergraduate course).
  - EL5205 Advanced Control Laboratory (undergraduate course).
  - EL7012 Intelligent Control (graduate course).
  - EL7025 Intelligent Control for Transport Dynamic Systems (graduate course).
  - EL7027 Seminar on Automatic Control (graduate course).
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