

# Allan Gurwicz

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## RESEARCH INTERESTS

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Interpretable machine learning and surrogate modeling for safe and efficient subsurface energy decision-making. Emphasis on uncertainty quantification and risk assessment with demonstrated applications from reservoir engineering to geological CO<sub>2</sub> storage.

## EDUCATION

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### Texas A&M University

College Station, TX

*Ph.D. in Industrial Engineering (Operations Research)*

Aug 2021 – Expected May/Aug 2026

- Advisors: Drs. David Huckleberry Gutman and Eduardo Gildin.
- Transferred from Texas Tech University with Dr. Gutman's research group in Fall 2023.

### Pontifical Catholic University of Rio de Janeiro

Rio de Janeiro, Brazil

*Master of Electrical Engineering (Decision Support Methods)*

Mar 2018 – Jan 2020

- Advisor: Dr. Marco Aurélio Cavalcanti Pacheco. Co-advisors: Drs. Ana Carolina Alves Abreu and Smith Washington Arauco Canchumuni.
- Thesis: "Deep Generative Models for Reservoir Data: An Application in Smart Wells". <https://doi.org/10.17771/PUCRio.acad.48317>.

### Pontifical Catholic University of Rio de Janeiro

Rio de Janeiro, Brazil

*Bachelor of Petroleum Engineering*

Mar 2013 – Dec 2017

- Minor in Entrepreneurship.

## PUBLICATIONS

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### JOURNAL ARTICLES

**Gurwicz, A.**, Chen, J., Gutman, D. H., Gildin, E. (2025). Assessing Risk in Long-term CO<sub>2</sub> Storage Under Uncertainty via Survival Analysis-based Surrogates. *SPE Journal* 30 (05): 2837–2854. <https://doi.org/10.2118/220737-PA>.

### CONFERENCE PAPERS (\* denotes presenting author)

**Gurwicz, A.\***, Gutman, D. H., Gildin, E. (2026). Advancing Surrogate Modeling For CO<sub>2</sub> Storage Risk Through Cutting-edge Survival Analysis-driven AI. *Accepted to International Petroleum Technology Conference (IPTC) Summit on AI for the Energy Industry*, Dubai, UAE.

Endres, L.\*, **Gurwicz, A.**, Pansare, O., Akindele, O., Mada, H., Jones, J., Cheng, C., Mukkirwar, R. (2025). Transient Dynamics Simulation Platform For PDC, Roller Cone, And Hybrid Bits Utilizing Discrete Geometry. *Accepted to Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC)*, Abu Dhabi, UAE.

**Gurwicz, A.\***, Chen, J., Gutman, D. H., Gildin, E. (2024). Assessing Risk in Long-term CO<sub>2</sub> Storage Under Uncertainty via Survival Analysis-based Surrogates. *Annual Technical Conference and Exhibition (ATCE)*, New Orleans, LA, USA. <https://doi.org/10.2118/220737-MS>.

**Gurwicz, A.\***, Canchumuni, S. A., Pacheco, M. A. C. (2019). Smart Well Data Generation via Boundary-Seeking Deep Convolutional Generative Adversarial Networks. *International Conference on Artificial Intelligence and Soft Computing (ICAISC)*, Zakopane, Poland. [https://doi.org/10.1007/978-3-030-20912-4\\_7](https://doi.org/10.1007/978-3-030-20912-4_7).

Calvette, T., **Gurwicz, A.\***, Abreu, A. C., Pacheco, M. A. C. (2019). Forecasting Smart Well Production via Deep Learning and Data Driven Optimization. *Offshore Technology Conference (OTC) Brasil*, Rio de Janeiro, Brazil. <https://doi.org/10.4043/29861-MS>.

Nunes, A., da Conceição, L., Mendoza, L. F., de Mello Jr., H. D.\*, **Gurwicz, A.**, Figueiredo, K. (2019). LSTM Networks and Box-Jenkins Models Applied to Load Forecasting for a Southeastern Brazil Giant Energy Consumer (in Portuguese). *Brazilian Congress on Computational Intelligence (CBIC)*, Belém, Brazil. <https://doi.org/10.21528/CBIC2019-100>.

da Silva, M., dos Santos, P., Mendoza, L. F., de Mello Jr., H. D.\*, **Gurwicz, A.** (2019). Hourly Load Forecasting as a Parameter for a Short-Term Pricing and Hydrothermal Dispatch Model (in Portuguese). *Brazilian Congress on Computational Intelligence (CBIC)*, Belém, Brazil. <https://doi.org/10.21528/CBIC2019-96>.

PATENTS

Carroll, D. J., Wiley, C. A., Danda, S. R. K., Jeet, V., Remutula, P., Clark, K. A., Morrow, M., Gutman, D. H., **Gurwicz, A.**, Fernandes, G. L. N. Systems and Methods for Identifying and Alerting of Footprint Over-Cycle Risks on Multi-Product General Assembly Lines. *Patent filed Mar 2023 and published Sep 2024 under no. US 2024/0308781 A1. Pending.*

Carroll, D. J., Wiley, C. A., Jeet, V., Finnin, A., Clark, K. A., Morrow, M., Gutman, D. H., Chen, L., **Gurwicz, A.**, Fernandes, G. L. N., Zaman, M., Nguyen, N. Methods for Simulating Conveyor Cycles on Multi-Product General Assembly Lines. *Patent filed Mar 2023 and published Sep 2024 under no. US 2024/0311730 A1. Pending.*

WORKING PAPERS

**Gurwicz, A.**, Abreu, A. C. A., Gutman, D. H., Gildin, E., Pacheco, M. A. C. (2025). AI-backed Multi-objective Optimization With Survival Analysis Proxies For Geological CO<sub>2</sub> Storage. *In preparation for submission to Computers & Geosciences.*

Cardoso, I., **Gurwicz, A.**, Validi, H., Gutman, D. H. (2025). Solving the Substitution-tolerant Subgraph Isomorphism Problem. *In preparation for submission to INFORMS Journal on Optimization.*

FUNDING EXPERIENCE

<b>Crisman Institute for Petroleum Research</b>	\$103,310
<i>Assessing Risk in Long-term CO<sub>2</sub> Storage Under Uncertainty via Survival Analysis-based Surrogates</i>	Sep 2025 – Sep 2027
<ul style="list-style-type: none"> <li>• Pls: Dr. Eduardo Gildin and Dr. David Huckleberry Gutman.</li> <li>• Grant based on the industrialization of Gurwicz et al. (2024) and Gurwicz et al. (2025).</li> <li>• Formulated core idea and wrote baseline draft.</li> </ul>	

ACADEMIC AWARDS

<b>1<sup>st</sup> Place</b> , <i>ISEN Poster Competition</i> operations research and data science track.	Mar 2025
<ul style="list-style-type: none"> <li>• Organized by the INFORMS Student Chapter at Texas A&amp;M University.</li> </ul>	
<b>2<sup>nd</sup> Place</b> , <i>Data Science Convention</i> poster competition.	Mar 2025
<ul style="list-style-type: none"> <li>• Organized by the Society of Petroleum Engineers Gulf Coast Section data analytics study group.</li> </ul>	
<b>1<sup>st</sup> Place</b> , <i>Zorich's Reliability Workshop</i> poster competition.	Sep 2024
<ul style="list-style-type: none"> <li>• Hosted by the Departments of Statistics and Industrial &amp; Systems Engineering at Texas A&amp;M University.</li> </ul>	
<b>Fellowship</b> , Brazilian National Council for Scientific and Technological Development.	Mar 2018 – Jul 2019
<ul style="list-style-type: none"> <li>• Awarded for master's program at PUC-Rio.</li> </ul>	
<b>Academic Excellence</b> , <i>Introduction to Petroleum Engineering</i> undergraduate course.	Jul 2013
<ul style="list-style-type: none"> <li>• Awarded for best-ranked class project at PUC-Rio.</li> </ul>	

## TEACHING EXPERIENCE

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### Texas A&M University

College Station, TX

Grader

Spring 2025

- Graded homeworks and provided detailed feedback for Dr. Eduardo Gildin's PETE 656, "Advanced Numerical Methods for Reservoir Simulation", with 20 enrolled graduate students.

### Texas A&M University

College Station, TX

Workshop Instructor

Dec 2024

- Gave the *Introduction to Git and GitHub* workshop for petroleum engineering graduate students.

### Pontifical Catholic University of Rio de Janeiro, Extension Courses

Rio de Janeiro, Brazil

Lecturer

2020 – 2021

- Co-advisor for the final projects "*Multi-objective Optimization of Oil Well Production Control using Genetic Algorithms*" and "*Optimization of Service Call Queues to Minimize Contractual Penalties*" in the Business Intelligence Master extension program.
- Created and taught the *Git and GitHub for Portfolio Creation* course in the Business Intelligence Master extension program, with 130+ enrolled students.
- Guest lecturer in the *Python for Data Analysis* short course.

## PROFESSIONAL EXPERIENCE

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### Industrial & Systems Engineering and Petroleum Engineering, Texas A&M University

College Station, TX

Research Assistant

Sep 2023 – Present

- Created machine learning methodology for long-term risk assessment in CCS with interpretable surrogates, achieving 500× training speedup compared to CMG's GEM with prediction errors around 2%.

### CNPC USA

Houston, TX

Research Intern

Jun 2025 – Aug 2025

Jun 2024 – Aug 2024

- Developed an optimization framework to match drill bit simulations to laboratory tests without repeated, expensive simulator runs, reducing weight-on-bit error from 68% to 5% on unseen data.
- Engineered and simulated bit profiles embodying key design decisions, facilitating insight into dynamics and whirl behavior in advanced drill bit configurations.
- Advanced development of a drilling dynamics research tool, enabling seamless analysis of simulator, laboratory and field sensor data. Streamlined installation, reducing user effort by more than 80% and leveraged Pythonic solutions to eliminate repeated work.

### Industrial, Manufacturing & Systems Engineering, Texas Tech University

Lubbock, TX

Research Assistant

Aug 2021 – Aug 2023

- Engaged with General Motors to model and optimize assembly line throughput via statistical methods and machine learning, leading to pilot program in the General Motors Wentzville Assembly plant.

### Applied Computational Intelligence Laboratory, PUC-Rio

Rio de Janeiro, Brazil

Researcher

Mar 2018 – Jul 2021

- Conceived a GAN-LSTM coupled simulator surrogate in the context of reservoir optimization and value of information and flexibility brought by smart wells, reducing prediction error from 19% to 10% on the OLYMPUS benchmark. Project part of Petrobras grant no. ANP 19783–0.
- Spearheaded introduction of deep learning and explainable AI into industry-established workflows for subsea object detection. Project part of Petrobras grant no. ANP 21914–7.

- Managed development of production-grade software from the ground up to optimize subsea production systems using genetic algorithms. Project part of Petrobras grant no. ANP 21225–8.

## **Applied Computational Intelligence Laboratory, PUC-Rio**

Rio de Janeiro, Brazil

*Intern*

May 2017 – Feb 2018

- Carried out translation and formatting of technical papers in oil & gas and AI domains.

## **RBNA Consult**

Rio de Janeiro, Brazil

*Consultant*

Nov 2017

- Participated in the valuation of two Petrobras rigs, implementing discounted cash flow analysis to determine appropriate sale values. Benchmarked against rig market research to ensure price accuracy, with final purchase prices aligning to indicated ranges.

## **National Agency of Petroleum, Natural Gas and Biofuels**

Rio de Janeiro, Brazil

*Intern*

Oct 2016 – Apr 2017

- Analyzed oil & gas fields' cash flow, development plans and related documents, with close contact to operator companies.

## INVITED TALKS

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### ***Survival Analysis Framework for CO<sub>2</sub> Risk Assessment***

Mar 2025

- *Computational Reservoir Engineering Consortium Meeting* at Texas A&M University.

### ***Assessing Risk in Long-term CO<sub>2</sub> Storage Under Uncertainty via Survival Analysis-based Surrogates***

Feb 2025

- *INFORMS Student Chapter Seminar* at Texas Tech University.

### ***A Smart-Well-Centered Investigation into Deep Generative Models for Reservoir Data***

Nov 2020

- *2<sup>nd</sup> Seminar of Artificial Intelligence Applied to the Oil & Gas Industry* at the Brazilian Association of Petroleum Geologists.

### ***Optimization of Offshore Oil and Gas Production Systems During Design Phase***

Nov 2019

- *1<sup>st</sup> Seminar of Artificial Intelligence Applied to the Oil & Gas Industry* at the Brazilian Association of Petroleum Geologists.

## SKILLS

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• Python • MATLAB • Bash & Batch Scripting •  $\LaTeX$  • CMG • Gurobi • Git • Docker • Windows/macOS/Linux

## PROFESSIONAL AFFILIATIONS

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• Society of Petroleum Engineers (SPE) • Society for Industrial and Applied Mathematics (SIAM)

## REFERENCES

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Available on request.