

# Allan Gurwicz

agurwicz.github.io | linkedin.com/in/agurwicz | agurwicz@tamu.edu | +1 (806) 589-7950

## 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

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

College Station, TX

Aug 2021 – Expected 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

*Master of Electrical Engineering (Decision Support Methods)*

Rio de Janeiro, Brazil

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

*Bachelor of Petroleum Engineering*

Rio de Janeiro, Brazil

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. *Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC)*, Abu Dhabi, UAE. <https://doi.org/10.2118/228999-MS>.

**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. *SPE 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. (2026). Survival Analysis-powered AI In Risk-aware Data-driven Multi-objective Optimization For Geological CO<sub>2</sub> Storage. *Submitted to SPE Latin American and Caribbean Petroleum Engineering Conference (LACPEC)*.

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

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### Cisman Institute for Petroleum Research

\$103,310

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

Sep 2025 – Aug 2027

- PIs: Drs. Eduardo Gildin and David Huckleberry Gutman.
- Grant based on the industrialization of Gurwicz et al. (2024) and Gurwicz et al. (2025).
- Formulated core idea and wrote baseline draft.

## ACADEMIC AWARDS

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**1<sup>st</sup> Place**, *ISEN Poster Competition* operations research and data science track.

Mar 2025

- Organized by the INFORMS Student Chapter at Texas A&M University.

**2<sup>nd</sup> Place**, *Data Science Convention* poster competition.

Mar 2025

- Organized by the Society of Petroleum Engineers Gulf Coast Section data analytics study group.

**1<sup>st</sup> Place**, *Zorich's Reliability Workshop* poster competition.

Sep 2024

- Hosted by the Departments of Statistics and Industrial & Systems Engineering at Texas A&M University.

**Fellowship**, Brazilian National Council for Scientific and Technological Development.

Mar 2018 – Jul 2019

- Awarded for master's program at PUC-Rio.

**Academic Excellence**, *Introduction to Petroleum Engineering* undergraduate course.

Jul 2013

- Awarded for best-ranked class project at PUC-Rio.

## TEACHING EXPERIENCE

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|---|------------------------|
| <b>Texas A&amp;M University</b>   | College Station, TX    |
| <i>Grader</i>   | Spring 2025            |
| <ul style="list-style-type: none"><li>Graded assignments and provided detailed feedback for Dr. Eduardo Gildin's PETE 656, <i>Advanced Numerical Methods for Reservoir Simulation</i>, with 20 enrolled graduate students.</li></ul>  |                        |
| <b>Texas A&amp;M University</b>   | College Station, TX    |
| <i>Workshop Instructor</i>  | Dec 2024               |
| <ul style="list-style-type: none"><li>Gave the <i>Introduction to Git and GitHub</i> workshop for petroleum engineering graduate students.</li></ul>  |                        |
| <b>Pontifical Catholic University of Rio de Janeiro, Extension Courses</b>  | Rio de Janeiro, Brazil |
| <i>Lecturer</i>   | 2020 – 2021            |
| <ul style="list-style-type: none"><li>Co-advisor for the final projects "<i>Multi-objective Optimization of Oil Well Production Control using Genetic Algorithms</i>" and "<i>Optimization of Service Call Queues to Minimize Contractual Penalties</i>" in the Business Intelligence Master extension program.</li><li>Created and taught the <i>Git and GitHub for Portfolio Creation</i> module in the Business Intelligence Master extension program.</li><li>Guest lecturer in the <i>Python for Data Analysis</i> short course.</li></ul> |                        |

## PROFESSIONAL EXPERIENCE

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| <b>Industrial &amp; Systems Engineering and Petroleum Engineering, Texas A&amp;M University</b>   | College Station, TX                        |
| <i>Research Assistant</i>   | Sep 2023 – Present                         |
| <ul style="list-style-type: none"><li>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%.</li></ul>  |  |
| <b>CNPC USA</b>   | Houston, TX                                |
| <i>Research Intern</i>  | Jun 2025 – Aug 2025<br>Jun 2024 – Aug 2024 |
| <ul style="list-style-type: none"><li>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.</li><li>Engineered and simulated bit profiles embodying key design decisions, facilitating insight into dynamics and whirl behavior in advanced drill bit configurations.</li><li>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.</li></ul> |  |
| <b>Industrial, Manufacturing &amp; Systems Engineering, Texas Tech University</b>   | Lubbock, TX                                |
| <i>Research Assistant</i>   | Aug 2021 – Aug 2023                        |
| <ul style="list-style-type: none"><li>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.</li></ul>  |  |
| <b>Applied Computational Intelligence Laboratory, PUC-Rio</b>   | Rio de Janeiro, Brazil                     |
| <i>Researcher</i>   | Mar 2018 – Jul 2021                        |
| <ul style="list-style-type: none"><li>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.</li><li>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.</li></ul>  |  |

