Allan Gurwicz

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Research Interests

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_2 storage.

Education

Texas A&M University College Station, TX

Ph.D. in Industrial Engineering (Operations Research) 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 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

Journal Articles

Gurwicz, A., Chen, J., Gutman, D. H., Gildin, E. (2025). Assessing Risk in Long-term CO_2 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.*, 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_2 Storage. *Accepted to SPE Latin American and Caribbean Petroleum Engineering Conference (LACPEC)*, Rio de Janeiro, Brazil.

Gurwicz, A.*, Gutman, D. H., Gildin, E. (2026). Advancing Surrogate Modeling for CO_2 Storage Risk Through Cutting-edge Survival Analysis-driven AI. *International Petroleum Technology Conference (IPTC) Summit on AI for the Energy Industry*, Dubai, UAE. `https://doi.org/10.2523/IPTC-25222-MS`.

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_2 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`.

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

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

Crisman Institute for Petroleum Research $103,310

Assessing Risk in Long-term CO_2 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

1st Place, *ISEN Poster Competition* operations research and data science track. Mar 2025

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

2nd Place, *Data Science Convention* poster competition. Mar 2025

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

1st 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

Texas A&M University College Station, TX

Grader Spring 2025

- Graded assignments 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* module in the Business Intelligence Master extension program.
- Guest lecturer in the *Python for Data Analysis* short course.

Professional Experience

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 Sep 2021 – Aug 2023

- Engaged with General Motors to model and optimize assembly line throughput via statistical methods and machine learning.
- Constructed a large-scale, high-volume dataset by leveraging SQL and developing custom web scrapers, informed by insights gained through on-site visits, enabling robust and domain-relevant model training.
- Optimized code to satisfy runtime requirements, later integrated into production-grade pilots in assembly plants.

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 end-to-end development of production-grade software to optimize subsea production systems, from initial design through deployment. Designed and implemented a tailored genetic algorithm coupled to various multiphase-flow simulators, complemented by an intuitive, user-friendly interface deployed on client premises. Project part of Petrobras grant no. ANP 21225–8.

Applied Computational Intelligence Laboratory, PUC-Rio Rio de Janeiro, Brazil

Intern May 2017 – Dec 2017

- 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

Assessing Risk in Long-term CO_2 Storage Under Uncertainty via Survival Analysis-based Surrogates

- *Crisman Institute for Petroleum Research meeting*, Texas A&M University. Nov 2025
- *Computational Reservoir Engineering Consortium meeting*, Texas A&M University. Mar 2025
- *INFORMS Student Chapter seminar*, Texas Tech University. Feb 2025

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

- *Artificial Intelligence Applied to the Oil & Gas Industry seminar*, Brazilian Association of Petroleum Geologists. Nov 2020

Optimization of Offshore Oil and Gas Production Systems During Design Phase

- *Artificial Intelligence Applied to the Oil & Gas Industry seminar*, Brazilian Association of Petroleum Geologists. Nov 2019

Skills

· Python · MATLAB · Bash & Batch Scripting · LaTeX · CMG · Gurobi · Git · Docker · Windows/macOS/Linux

Professional Affiliations

· Society of Petroleum Engineers (**SPE**) · Society for Industrial and Applied Mathematics (**SIAM**)
· Institute for Operations Research and the Management Sciences (**INFORMS**) · American Chemical Society (**ACS**)

References

Dr. Eduardo Gildin, Professor, Rob L. Adams '40 Professor, Associate Department Head and Graduate Program Director
Harold Vance Department of Petroleum Engineering, Texas A&M University
egildin@tamu.edu | 3116 TAMU Ste. 401T, College Station, TX 77843

Dr. David Huckleberry Gutman, Assistant Professor
Wm Michael Barnes '64 Department of Industrial & Systems Engineering, Texas A&M University
dhgutman@tamu.edu | 3131 TAMU Ste. 4075, College Station, TX 77843

Dr. Lance Endres, Managing Subject Matter Expert of Digitalization, Automation, and Interpretation
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