Willian T. Lunardi

AI Research Scientist at TII

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Education

University of Luxembourg — Luxembourg
Ph.D. in Computer Science (with Highest Distinction & Thesis Award) — 2016 – 2020

Pontifical Catholic University of Rio Grande do Sul — RS, Brazil
M.Sc. in Computer Science — 2014 – 2016

University of Passo Fundo — RS, Brazil
B.Sc. in Computer Science — 2010 – 2014

Professional Experience

Research Scientist — Jun 2021 – Present
Technology Innovation Institute — Abu Dhabi, UAE

Principal Researcher — Jan 2023 – Present

- Drove research in AI safety, image segmentation, graph regression, out-of-distribution (OOD) detection, and anomaly detection, with emphasis on developing novel models and advancing the state of the art.
- Worked closely with academic partners on joint research projects, shaping technical direction, co-authoring publications, and aligning efforts with a shared long-term vision.
- Built and deployed ML systems that translated research into practical applications.

Senior Researcher — Jun 2021 – Jan 2023

- Conducted research in OOD detection, anomaly detection, and AI safety.
- Worked on significant projects such as:
  - Designing contrastive learning methods to enhance in-distribution representation learning.
  - Implementing adversarial training techniques for robust anomaly detection.
  - Developing hyperspherical models for voice verification.
- Optimized machine learning models for deployment on resource-constrained devices.
- Collaborated with cross-disciplinary teams to design and implement AI systems.

Research Associate — Jun 2020 – Jun 2021
University of Luxembourg — Luxembourg

- Researched neural combinatorial optimization to address complex logistical and industrial optimization challenges.
- Developed predictive maintenance models that enhanced fault detection accuracy and efficiency.
- Collaborated with industry partners to translate research into practical solutions for optimization/maintenance.

Doctoral Researcher — Jun 2016 – Jun 2020
University of Luxembourg — Luxembourg

- Developed advanced combinatorial optimization models for complex scheduling and logistics problems, including neural optimization methods.
- Published in top-tier journals and conferences, contributing novel approaches in optimization/operations research.
- Applied research in collaboration with academia and industry, delivering practical solutions.

Technical Skills

Languages: Python, C++, Javascript, C#, and Java.
Libraries and Frameworks: PyTorch, Transformers, PyTorch Geometric, Torchaudio, Torchvision, PyTorch Lightning, Scikit-learn, SciPy, Numpy, Pandas, tsai, Matplotlib, Plotly, Seaborn, Albumentations, Optuna.
Others: OpenMP, Boost (C++), Unity 3D (C#), p5js (JS), processing (Java).

Additional Information

Dual Citizenship: Brazil and Italy.
Languages: Portuguese (native), English (fluent).
Relocation: Open to relocation globally.

Selected Publications

[2025] **W. T. Lunardi**, A. Banabila, D. Herzalla, *et al.*, "Contrastive Representation Modeling for Anomaly Detection," in *European Conference on Artificial Intelligence (ECAI)*, 2025.

[2025] D. Herzalla, **W. T. Lunardi**, and M. Andreoni, "Graph Neural Networks for Jamming Source Localization," in *Machine Learning and Knowledge Discovery in Databases (ECML PKDD)*, Equal contribution by first and second authors., 2025.

[2025] G. Gebrehans, N. Ilyas, K. Eledlebi, *et al.*, "Generative Adversarial Networks for Dynamic Malware Behavior: A Comprehensive Review, Categorization, and Analysis," *IEEE Transactions on Artificial Intelligence*, 2025.

[2025] X. Tan, J. Sundar, R. Bruzzone, *et al.*, "Secure Safety Filter: Towards Safe Flight Control under Sensor Attacks," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025.

[2025] H. Wang, Z. Yang, S. Park, *et al.*, "SoundBoost: Effective RCA and Attack Detection for UAV via Acoustic Side-Channel," in *IEEE/IFIP International Conference on Dependable Systems*, 2025.

[2024] M. Andreoni, **W. T. Lunardi**, G. Lawton, *et al.*, "Enhancing Autonomous System Security and Resilience with Generative AI: A Comprehensive Survey," *IEEE Access*, 2024.

[2024] A. S. Ali, G. Singh, **W. T. Lunardi**, *et al.*, "RF Jamming Dataset: A Wireless Spectral Scan Approach for Malicious Interference Detection," *IEEE Communications Magazine*, 2024.

[2023] **W. T. Lunardi**, M. A. Lopez, and J.-P. Giacalone, "ARCADE: Adversarially Regularized Convolutional Autoencoder for Network Anomaly Detection," *IEEE Transactions on Network and Service Management, Special Issue on Machine Learning and Artificial Intelligence*, vol. 20, no. 2, pp. 1305–1318, 2023, [URL].

[2023] M. Gallacher, M. A. Sankar, **W. T. Lunardi**, *et al.*, "Towards speaker identification on resource-constrained embedded devices," in *Proceedings of the ACM Conference on Embedded Networked Sensor Systems*, 2023, [URL].

[2023] D. Herzalla, **W. T. Lunardi**, and M. Andreoni, "TII-SSRC-23 Dataset: Typological Exploration of Diverse Traffic Patterns for Intrusion Detection," *IEEE Access*, 2023, [URL].

[2022] A. R. B. Nabila, E. K. Viegas, and **W. T. Lunardi**, "A Generative Adversarial Network-based Attack for Audio-based Condition Monitoring Systems," in *Proceedings of the IEEE Consumer Communications & Networking Conference*, 2022, [URL].

[2022] A. S. Ali, **W. T. Lunardi**, L. Bariah, *et al.*, "Deep Reinforcement Learning Based Anti-Jamming Using Clear Channel Assessment Information in a Cognitive Radio Environment," in *Proceedings of the IEEE International Conference on Advanced Communication Technologies and Networking*, 2022, [URL].

[2022] A. S. Ali, M. Baddeley, L. Bariah, *et al.*, "JamRF: Performance Analysis, Evaluation, and Implementation of RF Jamming Over Wi-Fi," *IEEE Access*, vol. 10, pp. 133 370–133 384, 2022, [URL].

[2022] A. S. Ali, M. Baddeley, L. Bariah, *et al.*, "Performance Analysis and Evaluation of RF Jamming in IoT Networks," in *Proceedings of the IEEE Global Communications Conference*, 2022, [URL].

[2021] **W. T. Lunardi**, E. G. Birgin, D. P. Ronconi, *et al.*, "Metaheuristics for the Online Printing Shop Scheduling Problem," *European Journal of Operational Research*, vol. 293, no. 2, pp. 419–441, 2021, [URL].

[2021] M. A. Lopez, M. Baddeley, **W. T. Lunardi**, *et al.*, "Towards Secure Wireless Mesh Networks for UAV Swarm Connectivity: Current Threats, Research, and Opportunities," in *Proceedings of the IEEE International Conference on Distributed Computing in Sensor Systems*, 2021, [URL].

[2020] **W. T. Lunardi**, E. G. Birgin, P. Laborie, *et al.*, "Mixed Integer Linear Programming and Constraint Programming Models for the Online Printing Shop Scheduling Problem," *Computers & Operations Research*, vol. 123, p. 105 020, 2020, [URL].

[2019] **W. T. Lunardi**, H. Voos, and L. H. Cherri, "An Effective Hybrid Imperialist Competitive Algorithm and Tabu Search for an Extended Flexible Job Shop Scheduling Problem," in *Proceedings of the ACM Symposium on Applied Computing*, 2019, [URL].

[2019] H. de Faria Jr, **W. T. Lunardi**, and H. Voos, "A Parallel Multi-Population Biased Random-Key Genetic Algorithm for Electric Distribution Network Reconfiguration," in *Proceedings of the ACM Genetic and Evolutionary Computation Conference*, 2019, [URL].

[2018] **W. T. Lunardi** and H. Voos, "An Extended Flexible Job Shop Scheduling Problem with Parallel Operations," *ACM SIGAPP Applied Computing Review*, vol. 18, no. 2, pp. 46–56, 2018, [URL].

[2018] **W. T. Lunardi**, H. Voos, and L. H. Cherri, "An Imperialist Competitive Algorithm for a Real-World Flexible Job Shop Scheduling Problem," in *Proceedings of the IEEE International Conference on Emerging Technologies & Factory Automation*, 2018, [URL].

[2018] **W. T. Lunardi**, L. H. Cherri, and H. Voos, "A Mathematical Model and a Firefly Algorithm for an Extended Flexible Job Shop Problem with Availability Constraints," in *Proceedings of the Springer International Conference on Artificial Intelligence and Soft Computing*, 2018, [URL].

[2018] **W. T. Lunardi** and H. Voos, "Comparative Study of Genetic and Discrete Firefly Algorithm for Combinatorial Optimization," in *Proceedings of the ACM Annual Symposium on Applied Computing*, 2018, [URL].

[2016] **W. T. Lunardi**, L. Amaral, S. Marczak, *et al.*, "Automated Decision Support IoT Framework," in *Proceedings of the IEEE International Conference on Emerging Technologies & Factory Automation*, 2016, [URL].

[2016] L. A. Amaral, E. De Matos, R. T. Tiburski, *et al.*, "Middleware Technology for IoT Systems: Challenges and Perspectives Toward 5G," in *Internet of Things (IoT) in 5G Mobile Technologies*. Springer, 2016, pp. 333–367, [URL].

[2015] E. de Matos, L. A. Amaral, R. Tiburski, *et al.*, "Context-Aware System for Information Services Provision in the Internet of Things," in *Proceedings of the IEEE Conference on Emerging Technologies & Factory Automation*, 2015, [URL].

[2015] **W. T. Lunardi**, E. de Matos, R. Tiburski, *et al.*, "Context-Based Search Engine for Industrial IoT: Discovery, Search, Selection, and Usage of Devices," in *Proceedings of the IEEE Conference on Emerging Technologies & Factory Automation*, 2015, [URL].

To Appear

[2025] M. Hull, H. Yang, P. Mehta, *et al.*, "3D Gaussian Splat Vulnerabilities," *arXiv preprint arXiv:2506.00280*, 2025.

[2025] M. Hull, H. Wang, M. Lau, *et al.*, "RenderBender: A Survey on Adversarial Attacks Using Differentiable Rendering," *arXiv preprint arXiv:2411.09749*, 2025.

[2025] M. Lau, H. Wang, A. Helbling, *et al.*, "Non-Robust Features are Not Always Useful in One-Class Classification," *arXiv preprint arXiv:2407.06372*, 2025.