

Ignacio David Lopez Miguel

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Professional experience

- 2020 — 2022 **Formal Verification Engineer**, CERN *Geneva, Switzerland*
- Development and maintenance of the tool PLCverif to formally verify PLC programs.
- Optimization of model-checking algorithms.
- 2017 — 2019 **Model Validation Specialist**, Deutsche Bank *Frankfurt am Main, Germany*
- Validation of machine-learning models for credit scoring, including analyses such as assumption validation, sensitivity testing, robustness checks, and bias assessment
- Validation of models for credit scoring of enterprises based on textual natural language.
- Participation in Data Science competitions.
- 2015 — 2017 **Quantitative Consultant**, GMS Management Solutions SL *Madrid, Spain, and London, UK*
- Development of supervised and unsupervised machine-learning models for banks.
- Design and development of VBA-based prototypes to automate processes.
- 2015 — 2015 **Research Engineer**, Ifak e.V *Magdeburg, Germany*
- Analysis of empirical data to characterize fluids via acoustic waves.

Education

- 2022 — present **Ph.D. Logic in Computer Science**, TU Wien *Vienna, Austria*
- Explanation of black-box machine-learning models via rule learning.
- Rule-guided deep reinforcement learning (neuro-symbolic AI).
- 2024 — 2024 **Visiting researcher**, National Institute of Informatics *Tokyo, Japan*
- Logic reasoning with answer set programming.
- Ethical AI applied to autonomous driving cars, including reasoning about norms.
- 2019 — 2021 **M.Sc. Artificial Intelligence**, Int. Univ. Menendez Pelayo GPA: 9.5/10 *Online, Spain*
- Including a course on deep learning applied to visual information.
- 2016 — present **B.Sc. Mathematics**, National Univ. of Distance Education GPA: 8.7/10 *Online, Spain*
- Including courses on algebra, probability, and optimization.
- 2015 — 2017 **M.Sc. Business Consulting**, ICADE Business School GPA: 8.4/10 *Madrid, Spain*
Thesis title: *Machine Learning Applied to Credit Scoring*.
- 2011 — 2015 **B.Sc. Ind. Electronics & Automation Eng.**, Univ. Valladolid GPA: 8.7/10 *Valladolid, Spain*
- Including a course on classical computer vision.

Skills

- Languages **Spanish** (mother tongue), **English** (fluent), **German** (intermediate), **French** (basic).
- Technical skills **Python** (Pandas, Scikit-learn, TensorFlow,...), **Java**, **C**, **R**, **SQL**, **VBA**, **Git**, **Microsoft 365**
- Soft skills **Teamwork and collaboration**, **problem-solving**, **adaptability and flexibility**, **stress management**, **proactive approach**, **fast learning**.

Selected Research Publications

- 1 **Lopez-Miguel, I. D.**, Adiego, F. et al. (2025). Formal Verification of PLCs as a Service: A CERN-GSI Safety-Critical Case Study. In *17th NASA Formal Methods Symposium*.
- 2 Tappler, M., **Lopez-Miguel, I. D.** et al. (2025). Rule-Guided Reinforcement Learning Policy Evaluation and Improvement. In *34th International Joint Conference on Artificial Intelligence*.
- 3 Soldà, D., **Lopez-Miguel, I. D.** et al. (2023). Progression for Monitoring in Temporal ASP. In *26th European Conference on Artificial Intelligence*.
- 4 **Lopez-Miguel, I. D.** et al. (2023). Verification of neural networks meets PLC code: An LHC cooling tower control system at CERN. In *24th Int. Conf. on Engineering Applications of Neural Networks*.
- 5 Ádám, Z., **Lopez-Miguel, I. D.** et al. (2023). From Natural Language Requirements to the Verification of PLCs: Integrating FRET into PLCverif. In *15th NASA Formal Methods Symposium*.

References

Borja Fernandez Adiego, Automation Engineer at CERN

Juan A. Rodriguez-Aguilar, Research Professor at Artificial Intelligence Research Institute (IIIA-CSIC)

Jean-Charles Tournier, Software Engineer at CERN and Lecturer at EPFL

Martin Tappler, Postdoc at TU Wien