Ignacio D. Lopez-Miguel, M.Sc.

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Education

2022 – present **Ph.D. Logic in Computer Science, TU Wien**.
Applying logic reasoning to machine learning-based systems. It includes reinforcement learning, answer set programming, runtime verification, and ethical AI.

2019 – 2021 **M.Sc. Artificial Intelligence Research, Menendez Pelayo Univ. (UIMP)**. GPA: *9.5/10*.
Thesis title: *Simplification of Numeric Variables for PLC Model Checking.*

2016 – present **B.Sc. Mathematics, National University of Distance Education (UNED)**. GPA: *8.7/10*.

2015 – 2017 **M.Sc. Business Consulting, ICADE Business School**. GPA: *8.4/10*.
Thesis title: *Machine Learning Applied to Credit Scoring*.

2011 – 2015 **B.Sc. Ind. Electronics and Automation Eng., Valladolid University**. GPA: *8.7/10*.
Thesis title: *Guided acoustic wave's phase and group velocity at low frequencies in fluid-filled elastic pipes*.

Employment History

2020 – 2022 **Formal Verification Engineer,** CERN *Geneva, Switzerland*
- Development and usage of the tool PLCverif to automatically formally verify PLC code.
- Eclipse ecosystem with Java and Xtext.
- Research work to optimize model-checking algorithms for programs containing complex data types.

2017 – 2019 **Model Validation Specialist,** Deutsche Bank *Frankfurt am Main, Germany*
- Validation of Machine Learning models to estimate credit score by performing different analyses, such as assumptions validation, sensitivity, robustness, and back-testing.
- Validation of Natural Language Processing model for credit scoring of enterprises.
- Development of Machine Learning challenger models.
- Participation in Data Science competitions.

2015 – 2017 **Quantitative Consultant,** Management Solutions *Madrid, Spain, and London, UK*
- Design and development of tools in VBA to automate processes.
- Analysis of Hadoop-based ecosystem to integrate it in a data lake.

2015 – 2015 **Research Engineer,** Ifak e.V *Magdeburg, Germany*
- Experimental research in order to characterize fluids via acoustic waves.

2014 – 2015 **LEGO Robotics Teacher,** San Jose School *Valladolid, Spain*
- Teaching students aged from 10 to 14 how to program and build LEGO robots.

Research Publications

1. **Lopez-Miguel, Ignacio D.**, Fernandez Adiego, B., Blanco Viñuela, E., Salinas, M., & Betz, C. (2023). Working Together for Safer Systems: A Collaboration Model for Verification of PLC Code. In *19th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS).*

2. Soldà, D., **Lopez-Miguel, Ignacio D.**, Bartocci, E., & Eiter, T. (2023). Progression for Monitoring in Temporal ASP. In *26th European Conference on Artificial Intelligence (ECAI).*

3. **Lopez-Miguel, Ignacio D.**, Fernández Adiego, B., Ghawash, F., & Blanco Viñuela, E. (2023). Verification of neural networks meets PLC code: An LHC cooling tower control system at CERN. In *24th International Conference on Engineering Applications of Neural Networks.*

4. Ádám, Z., **Lopez-Miguel, Ignacio D.**, Mavridou, A., Pressburger, T., Bęś, M., Blanco Viñuela, E., … Fernández Adiego, B. (2023a). From Natural Language Requirements to the Verification of Programmable Logic Controllers: Integrating FRET into PLCverif. In *NASA Formal Methods - 15th International Symposium, NFM 2023*.

5. Ádám, Z., **Lopez-Miguel, Ignacio D.**, Mavridou, A., Pressburger, T., Bęś, M., Blanco Viñuela, E., … Fernández Adiego, B. (2023b). Automated verification of programmable logic controller programs against structured natural language requirements. ().

6. **Lopez-Miguel, Ignacio D.** (2023). Stop at red? Engineering meets ethics. In *International Conference on Computer Ethics, CEPE 2023*.

7. **Lopez-Miguel, Ignacio D.**, Fernandez Adiego, B., Tournier, J.-C., Rodriguez-Aguilar, J. A., & Blanco Viñuela, E. (2021). Simplification of Numeric Variables for PLC Model Checking. In *19th ACM-IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE'21)*.

8. Fernandez Adiego, B., **Lopez-Miguel, Ignacio D.**, & Tournier, J.-C. (2021). Applying model checking to highly-configurable safety critical software: the SPS-PPS PLC program. In *ICALEPCS'21*.

9. **Lopez-Miguel, Ignacio D.**, Tournier, J.-C., & Fernandez Adiego, B. (2021). PLCverif: status of a formal verification tool for Programmable Logic Controller. In *ICALEPCS'21*.

10. **Lopez-Miguel, Ignacio D.** (2021). Survey on Big Data Preprocessing Techniques. In *XOVETIC'21*.

Skills

Languages — Spanish (mother tongue), English (fluent), German (intermediate), French (basic).

Coding — Python, Java, C, R, SQL, VBA, LaTeX, NuSMV

References

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

Borja Fernandez Adiego, Automation Engineer at CERN

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

Ezio Bartocci, Full Professor at TU Wien