

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.**, 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*.
- 2 **Ádám, Z., Lopez-Miguel, Ignacio D.**, Mavridou, A., Pressburger, T., Beś, M., Blanco Viñuela, E., ... Fernández Adiego, B. (2023). From Natural Language Requirements to the Verification of Programmable Logic Controllers: Integrating FRET into PLCverif. In *NASA Formal Methods - 15th International Symposium, NFM 2023*.
- 3 **Lopez-Miguel, Ignacio D.** (2023). Stop at red? Engineering meets ethics. In *International Conference on Computer Ethics, CEPE 2023*.

- 4 **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)*.
- 5 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*.
- 6 **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*.
- 7 **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, L^AT_EX, 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