Iñigo Martinez Lopez

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Education

Ph.D. in Applied Engineering @ UNIVERSITY OF NAVARRA – TECNUN SCHOOL OF ENGINEERING **2018 – 2022**

Subjects covered: *Time series analysis; Anomaly detection; Functional data analysis; Agent-based modeling; Differential geometry; Bayesian statistics; Data visualization; Data science methodologies.*

- Temporal transformers with diffeomorphic warping functions obtained by the integration of continuous piecewise velocity fields. Application to time series alignment and exact density estimation with normalizing flows.
- Scalable time series clustering under limited computational and time resources, using elastic functional data analysis.
- High-resolution discrete event agent-based simulations for complex large-scale systems.
- Data science methodologies for holistic team, project, and data management

M.Sc. in Industrial (Mech.) Engineering @ UNIVERSITY OF NAVARRA – TECNUN SCHOOL OF ENGINEERING **2015 – 2017**

GPA: 9,34 / 10; Summa cum laude.

Subjects covered: *Mechatronics and robotics; Engineering and product design; Modeling and simulation; Operations research; Manufacturing engineering; Control theory; Hydraulics and pneumatics.*

Master's thesis developed at the MIT Media Lab - City Science group

B.Sc. in Industrial Technologies @ UNIVERSITY OF NAVARRA – TECNUN SCHOOL OF ENGINEERING **2011 - 2015**

GPA: 9,47 / 10; Summa cum laude.

Subjects covered: *Multivariate calculus, linear algebra, complex analysis, differential equations; Statistics and probability; Mechanism & machine design; Strength of materials and solid mechanics; Thermodynamics, heat transfer; CAD-CAE-CAM; Fluid mechanics; Electrical Systems, Power Electronics*

Experience

Data Scientist @ VICOMTECH RESEARCH CENTER **Jun. 2019 – Present**

Data Intelligence for Industry, Energy and Environment

- Developed supervised and unsupervised machine learning models, including CNN, LSTM, Temporal Transformer, GraphCNN, Normalizing Flows (coupling flows & autoregressive).
- Worked on advanced data analytics and visualization tools for the developed models.
- Built ad-hoc agent-based simulations for multiple applications: control of shared autonomous micro-mobility, indoor air quality estimation and pandemic risk assessment.
- Led real-world machine learning projects and coordinated research with industrial sponsors, such as Repsol, Gestamp, GKN Driveline or Mahou San Miguel.

Data Scientist @ NEM, SIEMENS GAMESA RENEWABLE ENERGY **Jul. 2017 – May 2019**

Wind turbine data monitoring and failure prediction

- Engineered active and passive solutions to prevent predictive accuracy loss due to concept drift.
- Formulated predictive failure indicators based on data affinity between different assets using statistical analysis and comparative metrics.

Research Assistant and Master's Thesis @ MIT MEDIA LAB – CITY SCIENCE **Sept. 2016 - May 2017**

Persuasive Electric Vehicle (PEV); an autonomous three-wheeled vehicle for shared use

- Developed an active tilting system that enhanced user experience by increasing the stability in the curves and minimizing the perceived acceleration.
- Designed a robust control strategy and built a full scale-prototype that validated the design of the tilting system, which was controlled by odometer readings and a haptic drive-by-wire system.

Data Science Intern @ CEIT – IK4 RESEARCH ALLIANCE **Jun. 2015 - Aug. 2015**

Computational Biology: predictive biomarkers in breast cancer

- Used supervised learning methods to predict and diagnose the class of breast cancer.
- Evaluated and compared the performance of different machine learning models such as feed-forward neural nets, random forest, and support vector machines.

Head of Chassis Design @ TECNUN ELECTRIC FORMULA STUDENT **Sep. 2014 – Jun. 2016**

Student-led design, manufacturing, and assembly of an electric Formula SAE car.

- Management of the chassis team, responsible for the CAD design of the space frame chassis, finite element analysis optimization, and ensuring driver ergonomics and safety compliance.
- Car successfully passed the scrutineering in the Montmeló, Barcelona, Formula SAE competition

Student Intern @ NANOGUNE NANOMAGNETISM GROUP **Jul. 2014 – Sep. 2014**

Study of cobalt thin films with varying interatomic distances.

- Epitaxial growth of cobalt films with layer-by-layer ultra-high vacuum sputter deposition.
- Post-deposition structural characterization with X-ray diffraction techniques.
- Analyzed optical and magneto-optical properties with generalized magneto-optical ellipsometry.

Publications

Martinez, I., Viles, E. and Olaizola, I., (2022). Closed-Form Diffeomorphic Transformations for Time Series Alignment. *International Conference on Machine Learning , ICML 2022, Baltimore, MD, USA.*

Martinez, I., Bruse, J. L., Florez-Tapia, A. M., Viles, E., & Olaizola, I. G. (2022). ArchABM: An agent-based simulator of human interaction with the built environment. CO2 and viral load analysis for indoor air quality. Building and Environment, 207, 108495.

Martinez, I., Otamendi, U., Olaizola, I., Solsona, R., Maiza, M., Viles, E., Fernandez, A., Arzúa, I., (2022). A novel method for error analysis in radiation thermometry with application to industrial furnaces. Measurement, 110646.

Sanchez, N. C., **Martinez, I.**, Pastor, L. A., & Larson, K. (2022). On the performance of shared autonomous bicycles: A simulation study. Communications in Transportation Research, 2, 100066.

Sanchez, N. C., **Martinez, I.**, Pastor, L. A., & Larson, K. (2022). On the simulation of shared autonomous micro-mobility. Communications in Transportation Research, 2, 100065.

Sánchez, N. C., **Martinez, I.**, Pastor, L. A., & Larson, K. (2021). Simulation study on the fleet performance of shared autonomous bicycles. arXiv preprint arXiv:2106.09694.

Otamendi, U., **Martinez, I.**, Quartulli, M., Olaizola, I. G., Viles, E., & Cambarau, W. (2021). Segmentation of cell-level anomalies in electroluminescence images of photovoltaic modules. Solar Energy, 220, 914-926.

Martinez, I., Viles, E., & Olaizola, I. G. (2021, December). A survey study of success factors in data science projects. In 2021 IEEE International Conference on Big Data (Big Data) (pp. 2313-2318). IEEE.

Martinez, I., Viles, E., & Olaizola, I. G. (2021). Data science methodologies: Current challenges and future approaches. Big Data Research, 24, 100183.

Martinez, I., Viles, E., & Cabrejas, I. (2018, October). Labeling drifts in a fault detection system for wind turbine maintenance. In International symposium on intelligent and distributed computing (pp. 145-156). Springer, Cham.

Academic Reviewer

- International Conference on Predictive APIs and Apps (PAPIs) - Boston 2017 , São Paulo 2017/2018/2019, London 2018
- Journal of Decision Systems (JDS), Taylor & Francis 2021
- PeerJ Computer Science, PeerJ 2021
- International Conference on Machine Learning, ICML 2022

Teaching and Mentorship

- Organizing committee International Conference on Predictive APIs and Apps (PAPIs) (2016 - 2020)
- Thesis supervisor for B.Sc. in Industrial Engineering: *Proposal for a taxonomy of professional profiles in data science* (2020). *Estimating the benefits of using organizational methodologies for data science projects* (2021)
- Teacher in Cosmos Academy: private teaching for Tecnun and Mondragon University students in computer science, electric systems, thermodynamics, heat transfer, strength of materials, electronics. Groups of 10 to 25 students. (2015-2020)
- Teaching Assistant: Strength of Materials II (B.Sc.) with Prof. Aitziber López, 2013; Electric Systems (B.Sc.) with Prof. Luis Fontán, 2014, Introductory Tecnun Course, 2012-2013.

Grants and Awards

- Best Paper Award - IDC 2018 International Symposium (2018)
- Best Use of Firebase/Google - HackMIT (2016)
- Santander Bank Scholarship (M.Sc.) - Santander Bank (2016-2017)
- Summa cum laude (B.Sc.) - Tecnun University of Navarra (2011-2015)
- Best academic record award (B.Sc.) - KutxaBank (2015)
- End of degree award for highest GPA (B.Sc.) - University of Navarra (2015)
- Award in Design & Engineering - Tecnun-Gaztempresa Competition (2011)

Skills

- **Code** R, Python, Julia, C++, CUDA, Matlab, Java, Processing, p5.
- **Data** PyTorch, Tensorflow, Keras, Scikit-Learn, Numpy, Pandas.
- **Web** Javascript, React, React-Native, Vue, WebGL, Node, Shiny.
- **Simulation** Simpy, GAMA, Simulink, Unity.
- **Maps** Qgis, Carto, Mapbox, Leaflet, deck.gl.
- **Graphics** Adobe CC, ggplot2, matplotlib, plotly
- **Fabrication** Laser cutter, Water Jet, 3D Printing, CNC
- **CAD CAE** SolidWorks, PTC Creo, AutoCAD, ANSYS
- **Languages** Spanish/Basque (native), English (C1), German (A1)