

Iñigo Martinez Lopez

inigomlap@gmail.com / <https://inigo.tech/>

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

Research 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 (2022). Adaptive segmentation of photovoltaic cell defects in electroluminescence images. *Journal of Transactions on Industrial Informatics (in review)*

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)