ALBERTO CARLEVARO

A passionate mathematician and computer scientist specializing in Trustworthy AI and Machine Learning for Science. With a Ph.D. in Computer Science from the University of Genoa and a master's in Applied Mathematics, my expertise spans Reliable Machine Learning, Uncertainty Quantification, and Physics-Informed Neural Networks (PINNs). I have experience as a visiting researcher at UC Berkeley (EECS) and currently manage industrial research projects in AI at Aitek S.p.A., while also serving as a research fellow at CNR-IEIIT. Proficient in Python and MATLAB.

CURRENT EMPLOYMENT

Research project manager at Aitek S.p.A. July 2024 - present

Researcher in the field of trustworthy artificial intelligence at IEIIT institute of the National Council of Research of Italy.

EDUCATION

PhD in Science and Technology for Electronic and Telecommunication Engineering,
Department of Electrical, Electronics and Telecommunications Engineering and Naval Architecture (DITEN) of the University of Genoa, Italy, **funded by** Institute of Electronics, Information Engineering and Telecommunications (IEIIT) of the National Council of Research of Italy (CNR) and Aitek S.p.A.. Nov. 2020 - Nov. 2023

Visiting Research Scholar in the **Department of Electrical Engineering and Computer Sciences (EECS) at University of California Berkeley** with Professor Alberto Luigi Sangiovanni Vincentelli. Apr. 2023 - May 2024

Master's degree in mathematics, University of Genoa, Italy Grade: 110/110 cum Laude, Mar. 2020

Thesis Titile: Mathematical Methods for Liquid Crystals: the Fréedericksz transition

Main Courses: Mathematical Analysis, Mathematical Physics, Numerical Computation.

Bachelor's degree in mathematics University of Genoa, Italy Grade: 103/110, Sep. 2017

Thesis Titile: Fractal Geometry: from the Topological Dimension to the Hausdorff Dimension.

Main Courses: Analysis and Analytic Geometry, Algebra and Topology.

Classical High School Diploma, Liceo Classico Statale Giuseppe Mazzini, Sampierdarena (Ge), Italy Grade: 100/100, 2014

MAIN PUBLICATIONS

Please check my personal page on Google Scholar.

Journals:

- A. Carlevaro, T. Alamo, F. Dabbene and M. Mongelli. **Probabilistic Safety Regions Via Finite Families of Adjustable Classifiers**. In IEEE Transactions on Neural Networks and Learning Systems (TNNLS), doi: 10.1109/TNNLS.2025.3568174.
- M. Lenatti, A. Carlevaro, A. Guergachi, K. Keshavjee, M. Mongelli and A. Paglialonga, **Estimation and Conformity Evaluation of Multi-Class Counterfactual Explanations for Chronic Disease Prevention**, in IEEE Journal of Biomedical and Health Informatics, doi: 10.1109/JBHI.2024.3492730.

- Carlevaro, A., Alamo, T., Dabbene, F., & Mongelli, M. (2024). **Conformal Predictions for Probabilistically Robust Scalable Machine Learning Classification** . arXiv preprint arXiv:2403.10368.

- Carlevaro, A., Lenatti, M., Paglialonga, A., & Mongelli, M. (2023). **Multi-Class Counterfactual Explanations using Support Vector Data Description**. IEEE Transactions on Artificial Intelligence.

- Sassu, Alberto and Motta, Jacopo and Deidda, Alessandro and Ghiani, Luca and Carlevaro, Alberto and Garibotto, Giovanni and Gambella, Filippo, **Artichoke Deep Learning Detection Network for Site-Specific Agrochemicals Uas Spraying**. Available at SSRN: `https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4272684`.

- M. Lenatti, A. Carlevaro, A. Guergachi, K. Keshavjee, M. Mongelli, A. Paglialonga **A novel method to derive personalized minimum viable recommendations for type 2 diabetes prevention based on counterfactual explanations**, in Plos One, vol. 17, issue 11, Published: November 17, 2022, doi: 10.1371/journal.pone.0272825.

- I. Vaccari, A. Carlevaro, S. Narteni, E. Cambiaso and M. Mongelli, **eXplainable and Reliable Against Adversarial Machine Learning in Data Analytics**, in IEEE Access, vol. 10, pp. 83949-83970, 2022, doi: 10.1109/ACCESS.2022.3197299.

- A. Carlevaro, M. Lenatti, A. Paglialonga and M. Mongelli, **Counterfactual Building and Evaluation via eXplainable Support Vector Data Description**, in IEEE Access, vol. 10, pp. 60849-60861, 2022, doi: 10.1109/ACCESS.2022.3180026.

- A. Carlevaro and M. Mongelli, **A New SVDD Approach to Reliable and eXplainable AI**, in IEEE Intelligent Systems, doi: 10.1109/MIS.2021.3123669.

Conferences:

- Alberto Carlevaro, Luca Oneto, Massimo Massa, Davide Anguita, Fabio Roli; **Fair Conformal Prediction for Individuals and Subgroups in Natural and Adversarial Settings: Theoretical Guarantees and Impossibility Results**. Proceedings of the Fifteenth Symposium on Conformal and Probabilistic Prediction with Applications, PMLR 329:761-792

- Sara Narteni, Alberto Carlevaro, Fabrizio Dabbene, Maurizio Mongelli; **Risk-Averse Evaluation of Conformal Scores through Conditional Value-at-Risk**. Proceedings of the Fifteenth Symposium on Conformal and Probabilistic Prediction with Applications, PMLR 329:463-485

- A. Carlevaro, L. Oneto, D. Anguita, F. Roli. **Provably Efficient and Robust Conformal Prediction under a Realistic Threat Model**. Proceedings of Machine Learning Research, 2025. Conference on Conformal Prediction with Application 2025 (COPA25).

- **A probabilistic scaling approach to conformal predictions in binary image classification.** Alberto Carlevaro, Sara Narteni, Fabrizio Dabbene, Teodoro Alamo, Maurizio Mongelli Proceedings of the Thirteenth Symposium on Conformal and Probabilistic Prediction with Applications, PMLR 230:28-43, 2024.

- J. Motta, A. Sassu, A. Deidda, L. Ghiani, A. Carlevaro, F. Gambella, G. Garibotto, **A Deep Learning Artichoke Plants Identification Approach for Site-Specific UAV Spraying**, 12th International AIIA Conference: September 19-22, 2022 Palermo - Italy

- I. Vaccari, A. Carlevaro, S. Narteni, E. Cambiaso and M. Mongelli, **On The Detection Of Adversarial Attacks Through Reliable AI**, IEEE INFOCOM 2022 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS), 2022, pp. 1-6, doi: 10.1109/INFOCOMWKSHPS54753.2022.9797955.

- Marta Lenatti, Alberto Carlevaro, Karim Keshavjee, Aziz Guergachi, Alessia Paglialonga, Maurizio Mongelli, **Characterization of Type 2 Diabetes using Counterfactuals and Explainable AI**, 32nd Medical Informatics Europe Conference (MIE2022), May 27th - 30th 2022, Nice.

- Carlevaro A., Mongelli M. (2021) **Reliable AI Through SVDD and Rule Extraction**. In: Holzinger A., Kieseberg P., Tjoa A.M., Weippl E. (eds) Machine Learning and Knowledge Extraction. CD-MAKE 2021. Lecture

Notes in Computer Science, vol 12844. Springer, Cham. https://doi.org/10.1007/978-3-030-84060-0-10

- Maurizio Mongelli Alberto Carlevaro, Marta Lenatti, Martina Mammarella, Marco Muselli, Sara Narteni, Vanessa Orani, Alessia Paglialonga, Fabrizio Dabbene (2022) **eXplainable and Reliable AI Approaches to Trustworthy AI**, II Convegno Nazionale CINI sull'Intelligenza Artificiale (Ital-IA 2022).

- Mongelli M. Paglialonga A., Lenatti M., Orani V., Carlevaro A., Narteni S., Museli M., Dabbene F., **AI & Health: Methods and Applications**, II Convegno Nazionale CINI sull'Intelligenza Artificiale (Ital-IA 2022).

GitHub

- `https://github.com/AlbiCarle`

Dataset

`Adversarial Machine Learning Dataset,https://www.kaggle.com/datasets/cnrieiit/adversarial-machine-learning-dataset`.

Under submission or current works

Exact characterization of ϵ-Safe Decision Regions for exponential family distributions and Multi Cost SVM approximation. Under submission to JMLR.

EDITORIAL AND ACADEMIC SERVICE

- COPA 2026 : 15th Symposium on Conformal and Probabilistic Prediction with Applications
  - **Editor**, Proceedings of Machine Learning Research, Volume 329 Fifteenth Symposium on Conformal and Probabilistic Prediction with Applications (COPA 2026), Mölndal, Sweden, 2–4 September 2026. Editors: Ernst Ahlberg, Ulf Johansson, Henrik Boström, Alberto Carlevaro, Johan Hallberg Szabadváry, Lars Carlsson.
  - Program Chair, COPA 2026.
  - Program Committee Member, COPA 2025, Royal Holloway, University of London.
  - Session Chair, COPA 2026, Session #9: Multi-Label Prediction & Mondrian Regressors.

RESEARCH PROJECTS

I have actively participated in the following research projects (and others are ongoing).

- **NexTArc** (2025-2028).
- **PROACTIF** (2025-2028).
- **ShapeFuture** (2024-2027).
- **REXASI-PRO**, Horizon 2020 (October 2022 - 2025).
  - I am currently working on WP2 - Requirements for the development of a reliable and explainable AI framework. In addition, I am working on defining the functional architecture of the project's use cases (which have as their final goal the development of a fully autonomous wheelchair) and related risk analysis.
- **More Than This**, POR Liguria 2019. (October 2019 - May 2022)
  - I worked on the extraction of data from the Genoa subway simulator (implemented by STAM srl) and implemented a classical and original machine learning algorithm for the prediction of train waiting platform crowding. In addition, I created a questionnaire on the goodness of fit of the results obtained from the model that will be used as a statistical benchmark for a future publication on AI techniques for smart cities.

- **Comp4Drones**, Horizon 2020. (October 2019 - September 2022)
  - In this project, I actively worked on both the implementation and exploitation of the results. In particular, I contributed to the definition of an object detector (a feature pyramid network, a special type of convolutional neural network) for detection of artichoke plants from a UAV spraying drone. The results obtained, in collaboration with other researchers, were published in the 12th AIIA International Conference and in the Smart Agriculture technology Journal published by Elsevier.
- **NextPerception**, Horizon 2020 (May 2020 - April 2023).
  - I worked on extracting and labeling data and writing materials for some of the project deliverables.
- **Fractal**, Horizon 2020 (September 2021 - August 2023).
  - I worked on extracting and labeling data and writing materials for some of the project deliverables.
- **CASTORE**, (2020-2021).
  - This was the first project I worked on. I followed it from the data acquisition part, working directly with the use case provider and all the other partners. I managed the data, doing statistical analysis on the relationship between the port of Genoa and the vehicular traffic in its proximity. Then I built an autoregressive model, later made explainable, based on the extracted data (both from the port and city traffic) for predicting bus inter-arrival times at bus stops of interest (30 rule based models) working in the perimeter area of the port.

WORK EXPERIENCE

Aitek S.p.a., Genova (Italy) November 2020 - November 2023
PhD student

- As a PhD student I work as AI developer in Deep Learning models for video content analysis.
- Participation in KDT, ECSEL and other "Calls for Proposals" events.
- Managing funded research: writing European and MiSe projects, attending project meetings, and writing deliverables.

CNR-IEIIT, Genoa (Italy) June 2020 - November 2023
PhD student

- From June 2020 to November 2020 as research fellow and then as PhD student.
- ML techniques for safe cooperating cyber-physical systems, trustworthiness AI, eXplainable AI, counterfactual eXplanation, robust ML.
- Project management activities and contribution to the organisation of project proposals.

Teaching Tutor, University of Genoa (Italy) a.y. 2018, 2019, 2020, 2021, 2022, 2023

- Tutor for the bachelor's degree in Mathematics in the subjects of Mathematical Analysis I, Algebra I and Linear Algebra and Analytical Geometry.

Associazione Festival della Scienza, Genoa (Italy) Oct. 24 - Nov. 4 2019

- Worked as a scientific animator on the occasion of the seventeenth edition of the science festival in Genoa, that promotes through exhibitions, debates, installations scientific knowledge for all types of audiences.

GSCV, Valbrevenna (GE) (Italy) seasonal work (2014 - 2020)

- Worked as a lifeguard at a municipal outdoor water pool.

PERSONAL SKILLS

Languages

Mother tongue Italian

other languages English (C1) **Social skills**

- Excellent ability to relate and communicate with people clearly and accurately acquired through participation in project meetings.
- Excellent ability to work in group, acquired both during the school experience (projects and reports) and through participation in European projects drafting.
- Good ability to manage and organize groups of people also derived from experience as a Scout leader. **Mathematical and Engineering skills**
- Good theoretical and practical knowledge in:
    1. Conformal Prediction
    2. Black-box Machine Learning algorithms, as Neural Network (NN) and Support Vector Data Description (SVDD).
    3. Mathematical analysis, convex analysis, statistical methods, learning theory.
    4. Intelligible Analytics methods, as Logic Learning Machine and Decision Tree.
    5. Counterfactual eXplanations.
    6. Robust machine learning.
    7. Deep Learning techniques in smart agriculture.
- Good ability to analyse sensitive data.
- Good knowledge of IoT systems.
- Good teaching and learning skills. **Other skills**
- Limited knowledge in FPGA boards.
- Very good knowledge of Microsoft Office and the Windows Operating System.
- Car equipped (B license).
- Lifeguard and first-aid responder certification (CPR/AED, American Heart Association)
- Competitive swimmer at Nuotatori Rivarolesi s.s.d. (2005 - 2014) and at Nuotatori Genovesi s.s.d. (2015 - Present)

TECHNICAL STRENGTHS

Languages	Python, R, Matlab, C and C++
Technologies	Rulex , Tensorflow, Keras, Latex, OpenFoam
Tools	Jupyter, Colab, PyCharm, Latex

CERTIFICATIONS

- Cambridge English: C1 Advanced (CAE)
- Cambridge English: B2 First (FCE)
- Cambridge English: B1 Preliminary (PET)
- ECDL

REVIEWS

I have been a reviewer for several scientific journals, such as IEEE Access, IEEE Intelligent Systems, PMLR, JMLR, and Springer Nature. Please see my profile on Web of Science https://www.webofscience.com/wos/author/record/2472385.

AWARDS

- Ranked 1st in the national competitive exam for teaching in Italian high schools (Classes A027 - Mathematics and Physics) and teaching qualification. July, 2025
- Winner of the 3rd edition of "Certamen Ligusticum" in the Greek test, https://www.istruzioneliguria.it/vincitori-del-certamen-ligusticum-2014/. March 3, 2014

OTHER ACTIVITIES

- Program Chair COPA26 conference (https://copa-conference.com/).
- Lecturer in the seminar of the series "Thursday Meetings - special session 'Youth of IEIIT' ", organized by CNR-IEIIT on the topic "Countermeasures against adversarial machine learning based on eXplainable and Reliable Artificial Intelligence". April 13, 2023
- Lecturer in the 4th edition of the "Cyber-Physical Systems Summer School", http://www.cpsschool.eu/wp-content/uploads/2022/09/poster_Carlevaro.pdf. September 19-23, 2022
- Lecturer of the course "Strategies for Telecommunications" in the Master of Science in Modeling, Engineering and Strategies of Operations and Systems (STRATEGOS), http://www.simulationteam.com/strategos/program.html. May 11,2022
- Member of the CNR-IEIIT Journal Club held by Professor Fabrizio Dabbene of the Politecnico di Torino. The Journal Club is an informal club composed by professors and PhD students where artcles regarding novelties in Artificial Intelligence are predented and discussed.
- AGESCI scoutmaster (2018 - Present)
    - I also served with the BSA (Boys Scouts of America, Berkeley's Troop 6), in the 2023-2024 season.