

Christos Tzagkarakis

Curriculum Vitae

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Summary

I am a research scientist specializing in Machine Learning, Signal Processing, and Data Analysis, with a solid foundation in Computer Science and Applied Mathematics. My work encompasses innovative applications of AI, signal processing, and data-driven technologies, tackling complex challenges across diverse domains. I am dedicated to staying at the cutting edge of technological and scientific advancements, using state-of-the-art methods to address real-world problems. Throughout my career, I have consistently demonstrated the ability to design and implement advanced algorithms that lead to breakthroughs in machine learning, signal processing, and data-driven technologies. My contributions are published in top-tier conferences, journals, and patents. I thrive in interdisciplinary team settings, delivering impactful solutions across academic, industrial, and startup environments.

Experience

8/2025–Present **Research Associate**, [Foundation for Research & Technology - Hellas, Greece](#).

I work on probabilistic time series forecasting for decision-making under uncertainty within [TwinODIS](#), a Horizon Europe project that combines Artificial Intelligence and Operations Research for Decision Intelligence Systems. My contribution sits within the project's multi-energy systems application, with a focus on electricity price forecasting.

Key Contributions:

- Benchmark probabilistic electricity price forecasting models across distinct market regimes.
- Establish when conformal prediction improves interval calibration over natively probabilistic forecasters.
- Evaluate forecasts with proper scoring rules and calibration diagnostics.

10/2024–Present **AI Quant**, [Thira Labs](#).

As an AI Quant, I develop machine learning and deep learning models for financial time series alongside classical statistical methods, selecting between them according to the signal-to-noise regime of the problem. My work runs from alpha signal construction through backtesting and out-of-sample evaluation to integration into production systems.

Key Responsibilities:

- Develop deep learning architectures for sequential data, ensemble and gradient-based machine learning methods, and classical statistical time series models for predictive signal research across global, multi-asset markets.
- Construct and evaluate alpha signals on noisy, non-stationary financial series, covering feature design and signal combination.
- Design backtesting and out-of-sample evaluation procedures, with attention to overfitting and lookahead bias.
- Integrate validated research into production systems using Python, Keras and TensorFlow.

10/2024–09/2025 **Senior Signal Processing & AI Engineer**, [BreezeLabs, Switzerland](#).

In this role, I designed and developed algorithms to analyze breathing patterns in athletes, with a focus on running performance. Applying AI and signal processing techniques, I transformed data from earbud microphones into insights used to support athletic performance. My work centred on breathing signal analysis using deep learning models.

Key Responsibilities:

- Developed algorithms for analyzing breathing patterns in athletes, with an emphasis on running performance.
- Applied AI and signal processing techniques to convert earbud microphone data into performance insights.
- Conducted research and development in breathing rate estimation by developing audio embedding solutions and exploring transformer-based deep learning models.
- Used Keras, TensorFlow and PyTorch for deep learning model development, alongside signal processing techniques for audio feature extraction and analysis.

- 5/2023–07/2024 **Career Break.**
I took a planned career break during this period.
- 9/2022–04/2023 **AI Data Scientist (Contractor), [Oculus Technologies LLC, U.A.E.](#)**
I developed machine learning and deep learning models for social media trend analysis and network traffic analysis.
Key Contributions:
- Designed machine learning algorithms to monitor and detect significant events on Twitter.
 - Developed models to identify users from network traffic patterns.
 - Deployed deep learning classification models for mobile device identification.
- 5/2021–09/2022 **Applied AI Research Scientist (Contractor), [Focal Point sprl, Belgium](#).**
I led the development of machine learning models for cybersecurity risk assessment, applied to threats and vulnerabilities in healthcare IT infrastructures.
Key Contributions:
- Designed and implemented machine learning models to assess threats and vulnerabilities in healthcare systems, supporting real-time risk management.
 - Coordinated the company's research direction on machine learning methods for cybersecurity risk assessment.
- 2/2018–8/2022 **Research Associate, [Foundation for Research & Technology - Hellas, Greece](#).**
As a Research Associate, I contributed to the EU projects [SEMIoTICS](#), [CyberSANE](#), [AI4HEALTHSEC](#) and [MARVEL](#), covering IoT security, cybersecurity for critical infrastructures, AI for healthcare security, and multi-modal data analytics for smart cities.
Key Contributions:
- Led research in time series forecasting for IoT environments using low-footprint methods.
 - Developed attack detection methods for IoT networks based on lightweight sparse representation.
 - Conducted research in sound processing and classification using dictionary learning.
 - Applied large language models and machine learning to predictive analytics in healthcare data.
 - Designed explainable machine learning models for bot detection on social media.
 - Supervised bachelor and doctoral students.
- 9/2015–8/2017 **Post-doctoral Researcher, [Delft University of Technology, The Netherlands](#).**
I contributed to research projects with Google and Huawei Technologies, focused on acoustic source localization, source separation, and distributed audio systems.
Key Contributions:
- Led Google's project on acoustic source localization, designing and evaluating compressive sensing algorithms for wideband source localization and separation.
 - Presented the work in an invited lecture at the Chrome/YouTube research conference at Google's headquarters in Mountain View, and contributed to a Google patent.
 - Implemented a graph-based room geometry estimation algorithm for Huawei's project on distributed audio signal processing.
 - Developed a room geometry estimation demo presented at Huawei's research centre in Munich, which secured a further round of project funding.
- 7/2010–5/2014 **Research Assistant, [Foundation for Research & Technology - Hellas, Greece](#).**
I worked on projects funded by the Greek General Secretariat for Research and Technology, developing algorithms for distributed sensor systems and audio communication.
Key Contributions:
- Developed signal processing algorithms as part of the [DISFER](#) project on distributed sensor systems for emergency response.
 - Developed sparse signal modeling algorithms applied to speech processing.
 - Implemented and optimized algorithms for stream processing systems, contributing to the [EU-MESH](#) project.
 - Developed multi-channel audio encoding and transmission algorithms.

Education

- PhD degree** [Department of Computer Science, University of Crete](#), 2014, GPA: 9.33/10
Thesis: "Sparse and low-rank techniques for robust speaker recognition and missing-feature reconstruction". Supervisor: [Assoc. Prof. Athanasios Mouchtaris](#).
- BSc degree** [Department of Mathematics, University of Crete](#), 2014, GPA: 7.33/10
- MSc degree** [Department of Computer Science, University of Crete](#), 2007, GPA: 9.71/10

Thesis: “Multichannel audio modeling and coding for immersive audio based on the sinusoidal model”. Supervisor: Prof. Panagiotis Tsakalides.

BSc degree [Department of Computer Science, University of Crete](#), 2005, GPA: 8.00/10

Diploma Thesis: “Musical genre classification using statistical processing methods”.

Skills & Expertise

Programming Languages.

- Python, Matlab, C, C++, SQL

Machine Learning & Deep Learning.

- TensorFlow, Keras, PyTorch, Scikit-learn, Pandas, NumPy, SciPy, Matplotlib, Seaborn

Forecasting & Uncertainty Quantification.

- Probabilistic Time Series Forecasting, Conformal Prediction, Uncertainty Quantification, Forecast Calibration, Proper Scoring Rules, Electricity Price Forecasting

Quantitative Finance.

- Alpha Signal Construction, Backtesting, Out-of-Sample Evaluation, Financial Time Series Modelling

Statistical & Signal Processing Methods.

- Statistical Signal Processing, Time Series Analysis, Estimation Theory, Sparse Representation, Dictionary Learning, Compressed Sensing, Matrix Completion, Anomaly Detection, Speech & Audio Processing, Explainable Machine Learning

Tools & Development.

- Git, LaTeX, Jupyter Notebooks, RESTful API Design, Linux

Organizational & Social Skills.

- Project coordination and delivery within multidisciplinary teams; communication of technical work to both technical and non-technical stakeholders.

Distinctions

- First in class (with highest GPA): Master's programme, Department of Computer Science.
- Fifth in class (with highest GPA): Bachelor's programme, Department of Computer Science.

Teaching

Teaching Assistant, [Department of Computer Science, University of Crete](#).

- Prepared teaching material for lectures and discussion sessions.
- Corrected and evaluated exams/homeworks for the following courses: Calculus I, Pattern Recognition, Applied Mathematics for Engineers, Digital Audio Processing, Applied Stochastic Processes, Statistical Signal Processing, Multimedia Technologies, Introduction to Probability Theory

Teaching Assistant, [Hellenic Mediterranean University](#).

- Coordinated and prepared teaching material for lab/hands-on sessions.
- Managed the following courses: Introduction to Informatics I – Department of Social Work, Introduction to Informatics II – Department of Social Work, Speech and Audio Processing – Department of Applied Informatics & Multimedia

Grants & Scholarships

<i>PhD Scholarship</i>	Foundation for Research & Technology - Hellas, Institute of Computer Science (7/2010–5/2014)
<i>MSc Scholarship</i>	Foundation for Research & Technology - Hellas, Institute of Computer Science (7/2005–9/2007)
<i>BSc Scholarship</i>	Foundation for Research & Technology - Hellas, Institute of Computer Science (7/2003–9/2003, 7/2004–6/2005)

Patents

W. B. Kleijn, J. Skoglund and C. Tzagkarakis, “Joint Wideband Source Localization and Acquisition Based on a Grid-Shift Approach”, US Patent, US 2020/0120419 A1, April 16, 2020.

Spoken Languages

Fluent in English

Native in Greek

Activities & Interests

frame drum percussionist, hiking, photography

Professional Service

Reviewer	IEEE Transactions on Audio, Speech and Language Processing Journal of Electrical and Computer Engineering (EURASIP) European Signal Processing Conference (EUSIPCO) IEEE International Workshop on Multimedia Signal Processing IEEE Symposium on Computers and Communications (ISCC) International Conference on Digital Signal Processing (DSP) International Conference on Information, Intelligence, Systems and Applications (IISA) World Congress on Information and Communication Technologies (WICT) International World Wide Web Conference (WWW) USENIX Security Symposium International Conference on Applied Cryptography and Network Security (ACNS)
Poster Evaluation Committee	womENCourage 2017 (4th ACM-W Europe Celebration of Women in Computing, Barcelona, Spain, September 2017) womENCourage 2016 (3rd ACM-W Europe Celebration of Women in Computing, Linz, Austria, September 2016)

Publication Record

- 28 publications in refereed international conferences and journals
- H-index 10, 487 citations (as of August 2026)
- Conferences: ICASSP, EUSIPCO, ICWSM (AAAI sponsored), BIBE, WASPAA, GloTS, SPARS, HELORS, SETN
- Journals: IEEE TASLP, MDPI IJMS, MDPI Sensors, Elsevier SI
- Over 20 co-authors

Invited Talks, Workshops, Seminars

Invited Talk	TwinODIS Workshop, FORTH-ICS, Heraklion, Greece, "Uncertainty quantification as decision-making: Lessons from a cryptocurrency trading system", June 2026.
Invited Talk	IBM Research, Zurich, "IoT challenges: Sparsity at the rescue", February 2021.
Invited Talk	Chrome/Youtube Research Conference, Mountain View, CA, August 2016.
Poster Presentation	Spring School on Sparse Representations and Compressed Sensing, Ilmenau, Germany, April 2016.
Poster Presentation	Google's 1st European Doctoral Workshop on Speech Technology, London, UK, April 2014.
Attendance	IEEE Winter School on Speech and Audio Processing for Immersive Environments and Future Interfaces, FORTH, Heraklion, Crete, Greece, January 2012.

Scientific & Research Publications

Google Scholar: <https://scholar.google.com/citations?user=0EoHjMUA AAAAJ>

Book Chapters

1. A. Mouchtaris, C. Tzagkarakis and P. Tsakalides, "Low Bitrate Coding of Spot Audio Signals for Interactive and Immersive Audio Applications", *New Directions in Intelligent Interactive Multimedia*, ISBN: 978-3-540-68126-7, Springer, 2008.

Peer-reviewed Journals

2. S. Silvestri, S. Islam, S. Papastergiou, C. Tzagkarakis, M. Ciampi, "A Machine Learning Approach for the NLP-Based Analysis of Cyber Threats and Vulnerabilities of the Healthcare Ecosystem", *MDPI Sensors (Special Issue Intelligent Systems for Clinical Care and Remote Patient Monitoring)*, Vol. 23 (2), Jan. 2023.

3. V. Danilidou, S. Nikolakakis, D. Antonakaki, C. Tzagkarakis, D. Mavroidis, T. Kostoulas, S. Ioannidis, "Outcome Prediction in Critically-Ill Patients with Venous Thromboembolism and/or Cancer Using Machine Learning Algorithms: External Validation and Comparison with Scoring Systems", *MDPI International Journal of Molecular Sciences (Special Issue Artificial Intelligence in Biomarker Discovery)*, Vol. 23 (13), Jun. 2022.
4. A. Shevtsov, C. Tzagkarakis, D. Antonakaki and S. Ioannidis, "Explainable Machine Learning Pipeline for Twitter Bot Detection During the 2020 US Presidential Elections", *Elsevier Software Impacts*, Vol. 13 (100333), Jun. 2022.
5. A. Griffin, T. Hirvonen, C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "Single-channel and Multi-channel Sinusoidal Audio Coding Using Compressed Sensing", *IEEE Transactions on Audio, Speech and Language Processing*, Vol. 19 (5), pp. 1382-1395, Jul. 2011.
6. C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "A Multichannel Sinusoidal Model Applied to Spot Microphone Signals for Immersive Audio", *IEEE Transactions on Audio, Speech and Language Processing*, Vol. 17 (8), pp. 1483-1497, Nov. 2009.

Peer-reviewed Conference Proceedings

7. C. Tzagkarakis and R. Dekker, "When Does Conformalization Help? A Cross-Paradigm Analysis of Probabilistic Electricity Price Forecasting", in *14th EETN Conference on Artificial Intelligence (SETN '26)*, Chania, Greece, Sep. 9–11, 2026.
8. C. Tzagkarakis, K. Boerjan, E. Karakoyun, R. Dekker and G. Tzagkarakis, "A Comparative Evaluation of Probabilistic Electricity Price Forecasting Across Market Regimes", *10th International Symposium and 32nd National Conference on Operational Research (HELORS '25)*, Chania, Greece, Nov. 20–22, 2025.
9. C. Tzagkarakis, T. Palpanas and G. Tzagkarakis, "Efficient Pattern-Based Analysis of Network Flows in IoT Systems", *Digital Technologies for Future Cities Special Session, Proc. of International Balkan Conference on Communications and Networking (BalkanCom '25)*, Piraeus, Greece, Jul. 17–20, 2025.
10. C. Tzagkarakis, P. Charalampidis, S. Roubakis, A. Fragkiadakis and S. Ioannidis, "Evaluating Short-Term Forecasting of Multiple Time Series in IoT Environments", in *Edge-Fog-Cloud Machine Learning for Smart Cities Applications Special Session, Proc. of European Signal Processing Conference (EUSIPCO '22)*, Belgrade, Serbia, 29 Aug.–2 Sep., 2022.
11. A. Shevtsov, C. Tzagkarakis, D. Antonakaki and S. Ioannidis, "Identification of Twitter Bots Based on an Explainable Machine Learning Framework: The US 2020 Elections Case Study", in *Proc. of International AAAI Conference on Web and Social Media (ICWSM) 2022*.
12. V. Danilidou, D. Mavroidis, D. Antonakaki, A. Kanterakis, C. Tzagkarakis, T. Kostoulas and S. Ioannidis, "Big-data and Machine Learning Prediction of Early and Late Mortality in ICU Patients with Venous Thromboembolism and Comparison with Classic Scoring Systems", in *2021 International Society on Thrombosis and Haemostasis Congress (ISTH)*, Philadelphia, PA, Jul. 2021.
13. V. Danilidou, D. Antonakaki, C. Tzagkarakis, A. Kanterakis, V. Katos and T. Kostoulas, "Automated Mortality Prediction in Critically-ill Patients with Thrombosis using Machine Learning", in *2020 IEEE 20th International Conference on Bioinformatics and Bioengineering (BIBE)*, Cincinnati, OH, Oct. 2020.
14. C. Tzagkarakis, N. Stefanakis and G. Tzagkarakis, "Impact Sounds Classification for Interactive Applications via Discriminative Dictionary Learning", in *European Signal Processing Conference (EUSIPCO '19)*, A Coruña, Spain, Sep. 2–6, 2019.
15. C. Tzagkarakis, N. Petroulakis and S. Ioannidis, "Botnet Attack Detection at the IoT Edge Based on Sparse Representation", in *Global Internet of Things Summit (GloTS) '19*, Aarhus, Denmark, Jun. 17–21, 2019.
16. G. Hatzivasilis, N. Christodoulakis, C. Tzagkarakis, S. Ioannidis, K. Fysarakis, G. Demetriou and M. Panayiotou, "The CE-IoT Framework for Green ICT Organizations", in *1st International Workshop on Smart Circular Economy (SmaCE) '19*, Greece, May 30, 2019.
17. C. Tzagkarakis, W. B. Kleijn and J. Skoglund, "Joint Wideband Source Localization and Acquisition Based on a Grid-Shift Approach", in *Proc. of Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA '17)*, New Paltz, NY, Oct. 15–18, 2017.
18. C. Tzagkarakis, S. Becker and A. Mouchtaris, "Joint Low-Rank Representation and Matrix Completion Under a Singular Value Thresholding Framework", in *Proc. of European Signal Processing Conference (EUSIPCO '14)*, Lisbon, Portugal, Sep. 1–5, 2014.

19. C. Tzagkarakis and A. Mouchtaris, "Reconstruction of Missing Features Based on a Low-Rank Assumption for Robust Speaker Identification", **invited paper** in *Proc. of International Conference on Information, Intelligence, Systems and Applications (IISA 2014)*, Chania, Greece, Jul. 7–9, 2014.
20. C. Tzagkarakis and A. Mouchtaris, "Sparsity Based Robust Speaker Identification Using a Discriminative Dictionary Learning Approach", in *Proc. of European Signal Processing Conference (EUSIPCO '13)*, Marrakech, Morocco, Sep. 9–13, 2013.
21. C. Tzagkarakis and A. Mouchtaris, "Robust Speaker Identification Using Matrix Completion Under a Missing Data Imputation Framework", in *Proc. Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS '13)*, Lausanne, Switzerland, Jul. 8–11, 2013.
22. C. Tzagkarakis and A. Mouchtaris, "Robust Text-Independent Speaker Identification Using Short Test and Training Sessions", in *Proc. of European Signal Processing Conference (EUSIPCO '10)*, Aalborg, Denmark, Aug. 23–27, 2010.
23. A. Griffin, C. Tzagkarakis, T. Hirvonen, A. Mouchtaris and P. Tsakalides, "Exploiting the Sparsity of the Sinusoidal Model Using Compressed Sensing for Audio Coding", in *Proc. Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS '09)*, Saint-Malo, France, Apr. 6–9, 2009.
24. C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "Modeling and Coding of Spot Microphone Signals for Immersive Audio Based on the Sinusoidal Model", in *Proc. of European Signal Processing Conference (EUSIPCO '08)*, Lausanne, Switzerland, Aug. 25–29, 2008.
25. C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "Low Bitrate Coding of Spot Audio Signals for Interactive and Immersive Audio Applications", in *Proc. International Symposium on Intelligent Interactive Multimedia Systems and Services, Piraeus, Greece*, Jul. 9–11, 2008.
26. C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "Modeling Spot Microphone Signals Using the Sinusoidal Plus Noise Approach", in *Proc. of Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA '07)*, New Paltz, NY, Oct. 21–24, 2007.
27. C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "Sinusoidal Modeling of Spot Microphone Signals Based on Noise Transplantation for Multichannel Audio Coding", in *Proc. of European Signal Processing Conference (EUSIPCO '07)*, Poznan, Poland, Sep. 3–7, 2007.
28. C. Tzagkarakis, A. Mouchtaris and P. Tsakalides, "Musical Genre Classification via Generalized Gaussian and Alpha-Stable Modeling", in *Proc. of International Conference on Acoustics, Speech, and Signal Processing (ICASSP '06)*, Toulouse, France, May 14–19, 2006.