Georgios Kontogiannis

Ph.D. Candidate [Google Scholar]
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Research Interests

- Digital Signal Processing and Deep Learning for respiratory sound analysis.
- Deep generative modeling for synthesizing clinically meaningful audio sounds.
- Mitigating domain shift and heterogeneity in medical sound datasets.
- Trustworthy, robust, and deployment-aware machine learning in real-world healthcare systems.
- Graph-based information retrieval systems.

Education

University of Patras Rio, Greece
Ph.D. Candidate, Department of Computer Engineering and Informatics Sep 2023 – present

- Advisor: Prof. Sotiris Nikoletseas
- Research focus: audio processing and algorithms development for respiratory sound analysis, multimodal AI modeling integrating digital and biological biomarkers, deep generative modeling for medical audio samples, robust and patient-centric diagnostic pipelines for edge-deployed clinical applications.

University of Patras Rio, Greece
MSci., Department of Computer Engineering and Informatics Sep 2018 – Jul 2023

- Advisor: Prof. Christos Makris
- Thesis: **A Study on Improvement of Graph-based Information Retrieval Models through Machine and Deep Learning Techniques**
- GPA: 7.81/10 — *Very Good* (Greek national scale: 5.0 pass, 8.5 Excellent, 10.0 maximum; equivalent to 78.1%)

Academic Research Experience

CTI Diophantus — EN (POLLA) PLO Project, ML Researcher | Patras Feb 2026 – present

- Research contract with the Computer Technology Institute and Press "Diophantus" (CTI), developing ML/DL systems to optimize the nationwide school textbook distribution ecosystem under Greece's new multiple-textbook policy.
- Development of predictive models for student population, textbook demand, and inventory forecasting; school clustering by textbook selection patterns; simulation of logistics and what-if supply-chain scenarios; integration of developed tools into the Publications Directorate IT infrastructure.
- Scientific Coordinator: Dr. Christos Manolopoulos

EU Horizon Research Project — SynAir-G, Research Scientist | University of Patras Sep 2022 – present

- *Disrupting Noxious Synergies of Indoor Air Pollutants and their Impact in Childhood Health and Wellbeing, using Advanced Intelligent Multisensing and Green Interventions* (Grant Agreement No. 101057271).
- Investigation of synergistic interactions between indoor air quality metrics and physiological signals from wearable devices using multivariate and temporal causal models.
- Scientific Coordinator: Prof. Nikos Papadopoulos

Industrial Research Experience

Pfizer CDI — EyeAI Research Project, Research Scientist | University of Patras Jan 2024 – Oct 2025

- Externally funded Pfizer Collaborative Development Initiative (CDI) contract awarded to the University of Patras.
- Supervised dataset curation, annotation workflows, and quality control for ocular imaging.
- Developed an attention-gated UNet++ architecture for automatic sclera segmentation from smartphone-captured eye images.
- Quantized and deployed the model on-device for real-time smartphone inference (TensorFlow Lite / ONNX).

Pfizer CDI — Voice-Based Diagnostics (VBD-2), Research Scientist | University of Patras Jan 2023 – Sep 2024

- Designed and deployed smartphone-based cough detection and disease analysis pipeline for continuous passive respiratory screening, for real-time processing.
- Designed and deployed an end-to-end on-device AI pipeline processing 10-second tracheal and chest-wall auscultation recordings via the built-in microphone, with percussive noise removal and frequency-spectrum correction to mitigate domain shift across auscultation sites and microphone devices, for asthma and COPD detection.
- Developed a ResNet-34 classifier with a probabilistic voting mechanism for robust and explainable disease identification; developed deep generative models for cough and lung sound synthesis to address training data scarcity.

Pfizer CDI — Voice-Based Diagnostics (VBD-1), Research Scientist | University of Patras Jan 2022 – Aug 2023

- Developed cough detection algorithms and abnormal–normal lung sound classifiers deployed for real-time smartphone inference using the built-in microphone.

Clinical & Institutional Collaborations

University General Hospital of Patras — Department of Internal Medicine, Research Scientist | Rio Nov 2025 – present

- Supervised dataset curation, annotation workflows, and quality control for respiratory infection data (audio and imaging).
- Multimodal deep-learning research combining paired lung sound recordings, chest X-rays, and inflammatory biomarkers for distinguishing bacterial vs. viral pneumonia and identifying clinically meaningful audio biomarkers.
- Development of mobile and web-based clinical data acquisition tools for in-hospital deployment.
- Clinical collaborator: Prof. Dr. Dimitris Velissaris

University General Hospital of Patras — Department of Internal Medicine, Research Scientist | Rio Jan 2024 – present

- Supervised curation, annotation, and quality control of ocular images for jaundice assessment.
- Statistical and causal modeling of digital biomarkers and hematological indicators in patients diagnosed with jaundice.
- Study conducted under institutional ethics committee approval (University General Hospital of Patras IRB).
- Clinical collaborator: Prof. Dr. Dimitris Velissaris

Publications

Refereed Journal Articles

[C]: CONFERENCE
[J]: JOURNAL
[*]: FIRST AUTHOR
[†]: CORRESPONDING AUTHOR
[IP]: IN PRESS
[U]: UNDER REVIEW

[J3] **G. Kontogiannis**†*, P. Tzamalis, S. Nikoletseas, T. Karamanidou, and T. G. Stavropoulos, "On-device Cough Detection and Respiratory Disease Classification Enhanced by Generative Data Augmentation," *Computers in Biology and Medicine*, 2026. *(IF: 6.3)*

[J2] N.-R. Kalogeropoulos†, **G. Kontogiannis***, and C. Makris, "Spectral clustering and query expansion using embeddings on the graph-based extension of the set-based information retrieval model," *Expert Systems with Applications*, vol. 263, p. 125771, 2025. *(IF: 7.5)*

[J1] P. Kapetanidis, F. Kalioras, C. Tsakonas, P. Tzamalis†, **G. Kontogiannis**, T. Karamanidou, T. G. Stavropoulos, and S. Nikoletseas, "Respiratory diseases diagnosis using audio analysis and artificial intelligence: a systematic review," *Sensors*, vol. 24, no. 4, p. 1173, 2024. *(IF: 3.4)*

Refereed Conference Proceedings

[C2] **G. Kontogiannis**†*, P. Tzamalis, and S. Nikoletseas, "Metadata-Conditioned Audio Transformers for Adaptive Respiratory Sound Classification," in *Proc. 34th European Signal Processing Conference (EUSIPCO)*, **[IP]**, 2026.

[C1] **G. Kontogiannis**†*, P. Tzamalis, and S. Nikoletseas, "Exploring the Impact of Synthetic Data on Human Gesture Recognition Tasks Using GANs," in *Proc. 2024 20th International Conference on Distributed Computing in Smart Systems and the Internet of Things (DCOSS-IoT)*, pp. 384–391, IEEE, 2024.

Under Review

[U2] **G. Kontogiannis**†*, P. Tzamalis, D. Velissaris, and S. Nikoletseas, "AI-Based Jaundice Assessment from Ocular Images: A Structured Survey of Methods, Datasets, and Open Challenges," *Under Review*, Healthcare Informatics Research (Springer Nature), 2026. *(IF: 4.0)*

[U1] **G. Kontogiannis**†*, P. Tzamalis, S. Nikoletseas, T. Karamanidou, and T. G. Stavropoulos, "Transforming Smartphones into Stethoscopes: Edge AI for Asthma and COPD," *Under Review*, IEEE Journal of Biomedical and Health Informatics (JBHI), 2026. *(IF: 7.0)*

Grant Writing Experience

- **Pfizer CDI — Voice-Based Diagnostics (VBD-2)** 2023: Critically contributed to the research proposal (methodology, technical approach, and preliminary data) that secured the externally funded CDI contract with the University of Patras for smartphone-based respiratory disease monitoring.
- **Pfizer CDI — EyeAI Research Project** 2024: Critically contributed to the research proposal that secured the CDI contract for ocular biomarker analysis through computer vision methods, including system design and edge deployment strategy.

Awards & Scholarships

- University of Patras PhD Research Scholarship 2023 – 2025

Talks & Presentations

- **G. Kontogiannis**†*, P. Tzamalis, S. Nikoletseas, "Metadata-Conditioned Audio Transformers for Adaptive Respiratory Sound Classification," *EUSIPCO 2026* 2026
- **G. Kontogiannis**†*, P. Tzamalis, S. Nikoletseas, "Exploring the Impact of Synthetic Data on Human Gesture Recognition Tasks Using GANs," *DCOSS-IoT 2024* 2024

Teaching Experience

Guest Lecturer — Artificial Intelligence Algorithms and Applications for IoT | Rio Spring 2026

- University of Patras, Department of Computer Engineering & Informatics. Course coordinator: Prof. Sotiris Nikoletseas.
- Designed and delivered a six-lecture applied ML module for IoT time-series data, developing all materials from scratch: LaTeX slide decks with full mathematical derivations, Python demonstrations on real datasets, and a graded end-to-end project on the PAMAP2 activity recognition dataset.

Digital Electronics Laboratory, Lab Instructor | Computer Engineering & Informatics, University of Patras Feb 2022 – Jun 2022

- Instructed undergraduate students through hands-on digital circuit experiments: delivered in-lab theory sessions, guided experimental execution, and led result interpretation and critical analysis discussions.
- Supervisor: Dr. Georgios Oikonomou

Analog Electronics Laboratory, Lab Instructor | Computer Engineering & Informatics, University of Patras Sep 2021 – Jan 2022

- Instructed undergraduate students through hands-on analog circuit experiments: delivered in-lab theory sessions, guided experimental execution, and led result interpretation and critical analysis discussions.
- Supervisor: Dr. Georgios Oikonomou

Mentorship & Leadership

- Alexandros Vallatos, MSc — *Causal Artificial Intelligence in IoT Health Data*
- Miltiadis Mades, MSc — *Supervised Domain Adaptation Techniques for Classifying Pathological Respiratory Sounds*
- Chrisavgi Pateli, MSc — *Methods and Techniques for the Automatic Detection and Segmentation of the Respiratory Cycle from Lung Sound Signals*

Service

- Reviewer, IEEE Transactions on Biomedical Engineering (TBME): 2025

Server Manager — IoT Laboratory, Department of CEID | University of Patras 2023 – present

- Deployed and maintain the lab's ML experimentation infrastructure: containerized MLflow tracking server with PostgreSQL and MinIO backends using Docker Compose, exposed via Nginx reverse proxy.
- Administered Linux server environment including SSH access, user permissions, systemd services, and port forwarding; resolved multi-container networking and service binding issues.
- Hosted and maintained backend services for multiple IoT Laboratory web platforms, including web server configuration, reverse proxy routing, and continuous uptime management.

Technical Skills

- **Programming & Scripting:** Python, Java, C, C++, MATLAB, Bash
- **ML & Deep Learning:** Scikit-Learn, TensorFlow, PyTorch, Ajax, Hugging Face Transformers, TensorFlow Lite, ONNX, MLflow, Weights & Biases
- **Signal Processing & Vision:** librosa, OpenCV, NumPy, SciPy, Pandas, Matplotlib, Seaborn
- **DevOps & Infrastructure:** Docker, Docker Compose, Nginx, Systemd, Linux Server Administration
- **Mobile Development:** Flutter, Android SDK
- **Databases & Storage:** MySQL, PostgreSQL, Cassandra, MongoDB, Elasticsearch, MinIO
- **Development Tools:** LaTeX, Git, GitHub, Atlassian Suite

Spoken Languages

- Greek — Native
- English — Proficiency (Michigan ECPE)

References

- Available upon request.

Last updated 04/06/2026