

# Gaetano Saurio

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## Research Vision

- Ph.D. Researcher aiming for a **Research Scientist** role to leverage **Computer Vision** and **Multi-modal Deep Learning** for environmental intelligence.

My focus is on developing **scalable, engineering-grade AI pipelines** that bridge the gap between academic theory and industrial application.

Building on recent work at **MIT Senseable City Lab**, I specialize in applying Geometric Deep Learning and Remote Sensing to solve complex challenges at the intersection of **Urban Computing** and **Nature**.

## Employment History







- May 2025 – Oct 2025 **Visiting Researcher**, MIT Senseable City Lab (Cambridge, USA).  
Supervisor: Prof. Carlo Ratti.
  - Engineered a **Multi-View Deep Learning pipeline** (PyTorch) fusing aerial multispectral data with Street View imagery across 4 major metropolises (Boston, Dubai, Amsterdam, LA).
  - Developed a custom **Late Fusion architecture** (ResNet-18 backbone) that solves the "nadir blind spot", achieving **89% accuracy** in tree health assessment.
  - Implemented large-scale inference using **ADE20K** semantic segmentation to quantify the trade-off between urban cooling efficiency and water consumption.
  - Tech Stack:** PyTorch, Rasterio, GeoPandas, WandB, Docker.
- 2016 – Present **Tenured Computer Science Teacher**, Italian Ministry of Education.  
Leading advanced CS courses and evening classes for adult education.
- 2021 **Freelance Corporate Trainer**, Leonardo.  
Delivered specialized technical training for corporate teams.
- 2018 – 2019 **Big Data Developer/Consultant**, Rughia & As. for Team System.

## Technical Proficiency

- Deep Learning Eng. **Frameworks:** PyTorch (Advanced: Custom Layers, DDP), TensorFlow, Keras.  
**Architectures:** CNNs (ResNet, EfficientNet), Transformers (ViT), GNNs (Geometric Deep Learning), Semantic Segmentation (U-Net, DeepLabV3).  
**Ops & Tools:** WandB (Tracking), Docker (Containerization), Git workflows.
- Data & Dev **Languages:** Python 3.x (Optimization, Typing), SQL, Bash Scripting,  $\LaTeX$ .  
**Geospatial AI:** Rasterio, GDAL, QGIS, GeoPandas (Handling massive satellite datasets).  
**Math Focus:** Linear Algebra, Stochastic Processes, Optimization Dynamics.


## Selected Projects & Publications

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- Under Review     **A Multi-View Deep Learning Framework for Urban Tree Health Assessment via Fusion of Aerial Multispectral and Street-Level RGB Imagery.**  
Submitted to *Urban Forestry & Urban Greening (Elsevier)*.  
**Contribution:** Developed a **Late Fusion** deep learning pipeline integrating drone multispectral data with Google Street View imagery to correct “nadir blind spots” in tree health assessment. Achieved 89% accuracy using PyTorch.
-  **Exploring the Cooling Power of Trees Using Computer Vision.**  
Submitted to *Nature Portfolio Journal*.  
**Contribution:** Led a large-scale analysis (4 cities, 2000+ trees) using thermal and RGB imagery. Applied **Semantic Segmentation** (ADE20K) to isolate canopy thermal signatures and modeled the trade-off between water consumption and cooling efficiency.
- 2025             **Towards rigorous dataset quality standards for deep learning tasks in precision agriculture: A case study exploration.**  
*Smart Agricultural Technology*, Elsevier (Vol. 10, 100721).  
Authors: A. Carraro, **G. Saurio**, F. Marinello.  
Focus on data-centric AI and dataset quality metrics for robust deep learning models.
-  **Micrographia in Parkinson’s Disease: Automatic Recognition through Artificial Intelligence.**  
*Movement Disorders Clinical Practice*.  
Authors: F. Asci, **G. Saurio**, et al.  
Application of AI for automated medical diagnosis, demonstrating cross-domain expertise.
- 2023             **ArcheoWeedNet: Weed Classification in the Parco Archeologico del Colosseo.**  
*Int. Conf. on Image Analysis and Processing (ICIAP)*, Springer.  
Authors: **G. Saurio**, M. Muscas, I. Spinelli, et al.  
Applied Computer Vision for heritage conservation in a complex real-world environment.
-  **Convolutional neural networks for the detection of esca disease complex in asymptomatic grapevine leaves.**  
*Int. Conf. on Image Analysis and Processing (ICIAP)*, Springer.  
Authors: A. Carraro, **G. Saurio**, et al.  
Early disease detection using CNNs.

## Education

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- 2022 – 2026     **Ph.D. in Data Science**, Sapienza University of Rome.  
Thesis: *Deep Urban Plant Understanding: Multimodal AI for Environmental Sensing*.  
Focus: **Geometric Deep Learning** on Urban Graphs, **Multimodal Fusion** (RGB + Thermal) & Computer Vision for resilience.  
Supervisor: **Prof. Simone Scardapane**. Co-supervisor: **Prof. Francesco Marinello**.  
Research supported by PNRR/AGRITECH (National Center for Agritech Technology).

## Education (continued)

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- 2017 – 2020    **3 postgraduate Specializations in EdTech & AI Innovation.**  
Obtained Master's degrees from G. Fortunato Univ. and e-campus Univ..  
Research focus: *The Future of School: AI and Virtual Reality* and *Artificial Intelligence and Autism*.
- 2015    **M.Sc. in Computer Science**, Federico II University of Naples.  
Specialization in Robotics. Graduation Grade: 107/110.

## Miscellaneous Experience

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### Invited Talks & Keynotes

- 2026    **Invited Speaker**, *RE-LEAF AND FUTURE CITY Symposium*, Palazzo delle Esposizioni, Rome.  
Talk: "Beyond Greenery Scanner: Multi-perspective Urban Tree Health Monitoring via Deep Fusion".  
Co-organized by the Italian Ministry of Environment (MASE), Carabinieri Forestry Command (CUFAA), Roma Capitale, and MIT Senseable City Lab.
- 2025    **Speaker & Firestarter**, *La Biennale di Venezia* (Architecture).  
Talk: "Beyond Greenery Scanner: Multi-perspective Urban Tree Health Monitoring".  
Selected as "Firestarter" for the *Senseable World – Visual Sensing* session by Curator Prof. Carlo Ratti.
- Guest Lecturer**, *MIT Department of Urban Studies and Planning (DUSP)*.  
Delivered the lecture: "Urban Heat Islands in Rome: A Data Science Perspective" for the *Digital City Design Workshop* (11.320).

### Certifications & Schools

- 2024    **IV Mediterranean Machine Learning Summer School**. Bicocca University of Milan.
- 2023    **School on GNN and Explainable AI**. University of Liverpool (UK).  
**III Mediterranean ML Summer School**. Thessaloniki (Greece).
- 2022    **II Mediterranean ML Summer School**. Bicocca University of Milan.  
**Deep Learning Specialization**. Andrew Ng (Coursera).
- 2019    **Machine Learning**. Stanford (Coursera).

### Projects & Maker Activities

- 2015 – 2018    **Maker-Inventor**, Poommarobot.  
Designed and prototyped educational robots and IoT devices based on Arduino/Raspberry Pi.

### Personal Interests

- MacrophyLLa**: Guitarist and singer-songwriter.
- Volunteering**: Active support for refugees, environmental causes, and animal shelters.