

Summary

- Principal Research Scientist with the AI Innovation Team at **Red Hat** and Research Affiliate at **MIT MechE**, working at the intersection of AI and engineering.
- Specializing in Generative AI, Generative Optimization, and Probabilistic Modeling, with a specific focus on **Inference-Time Scaling**, **Test-Time Adaptation**, **Vision-Language Alignment**, and **Few-Shot Generation**.
- Leading research on Probabilistic Inference to develop efficient, grounded Foundation Models tailored for data-constrained engineering domains.

Experience

Principal Research Scientist, Red Hat

Boston, Massachusetts, USA

June 2025 - Present

- AI Innovation Team
 - Probabilistic Inference for Vision and Language Models
 - Inference-Time Scaling and Reasoning for LLMs
 - **its-hub** Development and vLLM Gateway Integration
 - Context Optimization for AgentOps

Research Affiliate, Massachusetts Institute of Technology

Cambridge, Massachusetts, USA

Jan 2026 - Present

- DeCoDE Lab. Department of Mechanical Engineering
 - Inference-Time Scaling for Constrained Generative Design
 - Iterative Self-Training for CAD Program Synthesis

Applied Scientist, Amazon

Seattle, Washington, USA

April 2024 - June 2025

- Home Innovation and GenAI Team
 - Grounded Vision-Language Models
 - Evaluation for Text-to-Image Models (CVPR)
 - Detection and Ranking Algorithms for Amazon Visual Shopping
 - Subject-Driven Generative Models for AI Creative Studio

Visiting Researcher, UCL Centre for Artificial Intelligence

London, UK

Jan 2024 - March 2024

- Host: David Barber
 - Multi-Resolution Convolutional Models for Long Sequences (NeurIPS)
 - Bayesian Inference for Language Models

PhD Internships and Collaborations

- **Researcher** (PhD Intern), Microsoft Research Cambridge, MA, USA, *Jun 2023 - Sept 2023*
 - ML and Statistics Group. Hosts: David Alvarez Melis, Nicolo Fusi
 - Dynamic Vocabulary Augmentation for LLMs
- **Research Collaborator**, MIT-IBM AI Lab Cambridge, MA, USA, *Jan 2023 - June 2023*
 - Model Alignment Team. Host: Akash Srivastava
 - Generative Models for Systems with Constraints (NeurIPS)
 - Aligning Language Models with Negative Data

- Specialized Language Models for Enterprise Domains
 - **Research Scientist** (PhD Intern), IBM Research Zurich, Switzerland, *Jun 2022 - Nov 2022*
 - Accelerated Discovery Team. Hosts: Matteo Manica, Teodoro Laino
 - Multitask Language Models for Text and Chemistry (ICML)
 - Open-source library GT4SD for conditional generative models
 - **Applied Scientist** (PhD Intern), Amazon Science Cambridge & London, UK, *Jul 2021 - Oct 2021*
 - Alexa Team. Hosts: Yunlong Jiao, Emine Yilmaz
 - Domain Agnostic Subpopulation Generalisation
- Research Engineer, NNAISENSE** Lugano, Switzerland
Jan 2019 - Jan 2020
- Deep Learning Team. Managers: Christian Osendorfer, Jonathan Masci
 - Structured Latent Variable Models
 - NeuralODE Algorithms for High-Range Event Camera Streams
- Co-Founder, SecretAIry (formerly GAIa)** Rome, Italy
July 2017 - Jan 2019
- Chatbots to enhance Workplace Communication
 - Selected among 100+ startups to join the EnLabs Incubator

Education

- PhD, Generative Machine Learning** Technical University of Denmark, Lyngby, Denmark
June 2020 - Dec 2023
- Few-Shot Generative Models (ICML)
 - Multitask Language Models for Conditional Molecule Generation (ICML)
 - Diffusion Models for Generative Engineering Design and Topology Optimization (NeurIPS)
 - Thesis: Learning Generative Models with Limited Data
 - Supervisor: Ole Winther; Co-supervisor: Søren Hauberg
- Visiting PhD Student, MIT School of Engineering** Cambridge, Massachusetts, USA
Jan 2023 - Sept 2023
- Constrained Diffusion Models for Engineering Design (NeurIPS & Patent)
 - Improving Generative Constraint Satisfaction using Invalid Designs (TMLR)
 - Evaluating Vision-Language Models for Engineering Tasks (Journal)
 - Research on LLM Agents for CAD design. Co-developer of `text2cad`.
 - Host: Faez Ahmed, DeCoDE Lab
- Master's Degree, Data Science** Sapienza University, Rome, Italy
Sept 2016 - Nov 2018
- Excellence Path & Summa Cum Laude
 - Thesis: Multimodal Learning for Scene Understanding
 - Supervisor: Aris Anagnostopoulos; External Supervisor: Boris Chidlovskii
- Visiting Graduate Student, NYU Tandon School of Engineering** NYC, New York, USA
Sept 2017 - Jan 2018
- Visualization and Data Analytics Research Center. Host: Enrico Bertini
 - Built an interactive entity retrieval tool to investigate 10M documents
- Master's Degree, Mechanical Engineering** Sapienza University, Rome, Italy
Sept 2014 - Jan 2017
- Summa Cum Laude
 - Thesis: Bubble Dynamics in Turbulent Shear Flows
 - Supervisor: Carlo Massimo Casciola; Co-supervisor: Paolo Gualtieri
- Bachelor's Degree, Mechanical Engineering** Sapienza University, Rome, Italy
Sept 2009 - May 2014
- Thesis: Rapid Prototyping of Metallic Manufacturing

Selected Publications & Patents

Bootstrapping Image-to-CAD Program Synthesis via Geometric Feedback <u>GIANNONE</u> , DORIS, NOBARI, XU, SRIVASTAVA, AHMED	under-review 2026
Mitigating Premature Exploitation in Particle-based Monte Carlo for ITS <u>GIANNONE</u> , XU, NAYAK, AWHAD, SUDALAIRAJ, XU, SRIVASTAVA	under-review 2025
Generative optimization models for machine learning <u>GIANNONE</u> , SRIVASTAVA, AHMED	US Patent (MIT & IBM) 2025
Feedback-Driven Vision-Language Alignment <u>GIANNONE</u> , LI, FENG, PEREVODCHIKOV, CHEN, MARTINEZ	under-review 2025
Be More Specific: Evaluating Object-centric Realism in Synthetic Images LIANG, CORNEANU, FENG, <u>GIANNONE</u> , MARTINEZ	CVPR 2025
Evaluating Vision-Language Models for Engineering Design Springer Artificial Intelligence Review PICARD, EDWARDS, DORIS, MANN, <u>GIANNONE</u> , ALAM, AHMED	 2025
NITO: Neural Implicit Fields for Resolution-free Topology Optimization NOBARI, REGENWETTER, <u>GIANNONE</u> , AHMED	TMLR 2025
Reparameterized Multi-Resolution Convolutions for Long Sequence Modelling CUNNINGHAM, <u>GIANNONE</u> , ZHANG, DEISENROTH	NeurIPS 2024
Constraining Generative Models for Engineering Design with Negative Data REGENWETTER, <u>GIANNONE</u> , SRIVASTAVA, GUTFREUND, AHMED	TMLR 2024
Aligning Optimization Trajectories with Diffusion Models <u>GIANNONE</u> , SRIVASTAVA, WINTHER, AHMED	NeurIPS 2023
Diffusing the Optimal Topology: A Generative Optimization Perspective <u>GIANNONE</u> , AHMED	IDETC23 2023
Unifying Molecular and Textual Representations via Multi-task LM CHRISTOFIDELLIS*, <u>GIANNONE</u> *, BORN, WINTHER, LAINO, MANICA	ICML 2023
Accelerating Material Design with GT4SD <i>GT4SD Team (Core Contributor)</i>	Nature npj Computational Materials 2023
Few-Shot Diffusion Models <u>GIANNONE</u> , NIELSEN, WINTHER	SBM@NeurIPS 2022
SCHA-VAE: Hierarchical Context Aggregation for Few-Shot Generation <u>GIANNONE</u> , WINTHER	ICML 2022
Method and apparatus for semantic segmentation and depth completion CHIDLOVSKII, <u>GIANNONE</u>	US Patent (NAVER) 2022
JM1: Worst-group Generalization by Group Interpolation <u>GIANNONE</u> , HAVRYLOV, MASSIAH, YILMAZ, JIAO	NeurIPS-W 2021
Hierarchical Few-Shot Generative Models <u>GIANNONE</u> , WINTHER	NeurIPS-W 2021
Transformation-aware Variational Autoencoders <u>GIANNONE</u> , SAREMI, MASCI, OSENDORFER	Technical Report 2020
Input-filtering NeuralODEs for spiking data <u>GIANNONE</u> , ANOOSHEH, QUAGLINO, D'ORO, MASCI, GALLIERI	NeurIPS-W 2020
\mathcal{T}-VAE: No Representation without Transformation <u>GIANNONE</u> , MASCI, OSENDORFER	NeurIPS-W 2019
Learning Common Representation from RGB and Depth Images <u>GIANNONE</u> , CHIDLOVSKII	CVPR-W 2019

Projects & Open Source

its-hub: A Python library for inference-time scaling	2025
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- Contributor.
- Inference-Time Scaling for Language Models.
- Focus on Mathematical Reasoning.
- Contributed Entropic Particle Filtering algorithms and new benchmark.

Text2CAD: Democratizing Engineering Design. Prompt by Prompt.

2023

- Co-Lead.
- DesignX. Team of engineers and researchers based at MIT and Caltech.
- Generative tool that allows users to create CAD models using natural language prompts.
- The tool is designed to be user-friendly and accessible to non-experts, enabling a wide range of users to quickly create complex CAD models without the need for specialized training.

GT4SD: Generative Toolkit for Scientific Discovery

2022

- Core Contributor.
- Library leveraging conditional generative models for accelerated discovery.
- Work on Diffusion Models for images and 3D molecule conformation. The GFlowNet framework. Property Prediction module. Public Hub for model upload. Training Pipelines. Documentation. Tutorials. Testing. CI/CD. Server and Client API. Docker Images for CPU and GPU.

Grants & Awards

GPU Grant, LUMI-G, EuroHPC

PI, Efficient Pre-training of Large Generative Models for Constrained Design

Copenhagen, Denmark

Nov 2023

Grant, Otto Mønsted's Foundation

Research Grant

Copenhagen, Denmark

Dec 2022

Grant, Independent Research Fund Denmark

DFF PhD Grant

Lyngby, Denmark

Jun 2020

Grant, Perception as Generative Reasoning

Awarded Complimentary Conference Registration by DeepMind

NeurIPS 2019

Oct 2019

Grant, Pi School

Full Tuition for the School of AI (3% acceptance rate)

Rome, Italy

Oct 2018

Certificate of Award, Tsinghua University

Prize for Outstanding Accomplishments, Deep Learning Summer School

Beijing, China

Aug 2018

1st Pick, Excellence Path, Master's Degree, Data Science

Admission based on the First year's Academic Performance

Rome, Italy

Mar 2018

Participation in the School for Advanced Studies

Academic Service

Reviewer

Conference: ICML19, ICCV19, AAAI20, ICML21 (top 10%), AISTATS21, ICML22, NeurIPS22, CVPR23, NeurIPS23, ICML24, ICLR25, CVPR25, NeurIPS25, ICLR26, ICML26

Journal: TPAMI, TMLR

Workshop: NeurIPS-IBW20, NeurIPS-MetaLearn21, ICML-DeployableGenAI23, ACL-LanguageMolecules24

Teaching

Teaching: Deep Learning (DTU 02456), Bayesian Machine Learning (DTU 02477), Advanced Machine Learning (DTU 02460)

Supervision: two special courses (9 months), two master's thesis (6+6 months), 18 final projects

Talks

Algorithmic Methods for Data Mining (Sapienza University), Bayesian Reading Group (DTU), MLLS Center (KU), UCL-NLP (UCL), Amazon Alexa (Cambridge), DeCoDE Lab (MIT)

Volunteering

PAISS18, NeurIPS18, ELLIS Unit Copenhagen, MLLS

Skills

Languages

- Python (proficient); R, Matlab (good knowledge); C, Java, JavaScript (basic knowledge)

Research

- Accelerate, HF Transformers, LaTeX, NLTK, OpenCV, PyTorch, SpaCy, TensorFlow, verl

Software

- AWS, CVX, Docker/podman, FastAPI, Git, GitHub Actions, Gradio, Linux, MinIO, MongoDB, MySQL, Travis, vLLM, LangGraph, LangFlow, Langfuse, Cline, Cursor, OpenRouter