Laboratoire d'Informatique (LIX),
École Polytechnique,
Institute Polytechnique de Paris.

PhD position on "Graph-Guided Multimodal Generation and Control" in the Computer Science Department of Ecole Polytechnique, France.

Modern generative models, such as diffusion models [1], have achieved remarkable success in synthesizing realistic and high-fidelity multimodal content, including images, videos, and audio. Beyond generic data generation, recent research has increasingly focused on how to guide and control these models for fine-grained and versatile applications, such as image and video editing. Despite their strong ability to achieve semantic alignment—e.g., generating images that match a given text prompt—these models still face significant challenges in understanding and manipulating the structural aspects of their outputs. This often includes spatial layout consistency, object compositionality, and scene-level reasoning, which are crucial for real-world applications ranging from personalized media creation to scientific visualization and robotics.

Recent advances in graph representation learning and, in particular, graph neural networks (GNNs) have led to great success in both discriminative and generative tasks in domains including pharmacological research, logistics applications, social network analysis and recommendation. Graphs serve as faithful representations of underlying discrete data structures and therefore, are often productive abstractions of real-world data that traditional grid-based representations struggle to express with the same specificity and efficiency. Despite these conceptual advantages, the use of GNNs in multimodal generative pipelines remains relatively underexplored. In particular, there exists a promising opportunity to leverage graph priors and message-passing reasoning mechanisms to enhance the structural fidelity and control of generated outputs.

This PhD project will explore the integration of graph representations and graph neural networks (GNNs) into modern generative modeling pipelines. It is furthermore envisioned that the chosen candidate will collaborate with our colleagues at Ericsson Research to test the potential of our developed methods in industrial applications and gain experience in industrial research.

In this context, we seek candidates with strong experience in a subset of the following (or closely related) topics:

- Graph Representation and Graph Neural Networks;
- Generative Models (e.g., diffusion/flow-based models);
- Computer Vision and Multimodal Learning (e.g., text to image/video generation and understanding).

Candidates are expected to meet the following requirements:

- a Masters degree in either Computer Science, Mathematics, or similar;
- analytical skills and creative thinking with a hard working attitude;
- very good programming skills (Python).

Ideally candidates also demonstrate the following:

- strong mathematical background (including Probability, Statistics and Linear Algebra);
- Machine Learning and Deep Learning skills (architecture design and optimisation, good understanding of Graph Neural Networks, Generative Models, and Computer Vision);
- prior research experience and publications at top-tier venues (e.g., NeurIPS, ICLR, ICML, CVPR, ECCV, ICCV) are considered a strong plus.

Funding

The project will be funded in the context of an ANR research grant. Funding is available for 36 months (the expected duration of a PhD), with the possibility of a small extension.

Applications

Interested candidates should send an application email to both Prof. Ye Zhu (ye.zhu@polytechnique.edu) and Prof. Johannes Lutzeyer (johannes.lutzeyer@polytechnique.edu) by **16 January 2026** (or ideally, much sooner), with the email subject line: "PhD Application for GMGen 2026 – Your Name – Current Affiliation".

- a cover letter including a brief presentation of their academic record and motivation as well as relevant skills and experience.
- a full CV with detailed grading information for the acquired degrees.

We will interview candidates on a rolling basis and will aim to fill this position as soon as possible. The ideal scenario would be that the chosen candidate joins us on an internship position in April/May 2026 to spend several months with us, leading up to the PhD starting in September 2026.

Location

Successful candidates will be based at Ecole Polytechnique located in Palaiseau, Paris area, France; specifically in the Computer Science Laboratory (LIX). The project will be co-supervised by Ye Zhu and Johannes Lutzeyer.

This position would require you to work from our offices in the Computer Science Laboratory of École Polytechnique in the broader area of Paris (a-priori no remote work component is planned). École Polytechnique is the premier engineering University of France and a founding member of the recently established Institut Polytechnique de Paris (which entered the international rankings in high positions). Famous scientists (including Nobel prize recipients) and industrial leaders are alumni of the school, offering an exceptional environment for research in the fast growing excellence pole of Saclay, hosting a rich ecosystem of industrial and academic research centres a few kilometres south of Paris. Additionally, it offers ample computing and recreation resources and facilities on the University campus. The research group, in which you would be integrated, has already had significant impact in local and international research and industrial activities with several high-impact publications and successful industrial projects.

We look forward to hearing from you,

Ye Zhu
Website, Google Scholar

Johannes Lutzeyer
Website, Google Scholar

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