

PhD scholarship

Research title

Energy-efficient architectures for embedded AI in space

Start date and duration

PhD program start date: Nov. 1, 2026. A pre-doctoral scholarship may be available for earlier start. The doctoral program has duration of 3 years, with possible extension of up to 1 year.

Supervisors

Main supervisor: Enrico Magli (Politecnico di Torino), www.ipl.polito.it/staff/enrico-magli
Co-supervisors: to be defined (at least one)

Research Environment

This opening is for a PhD scholarship at Politecnico di Torino (Italy), Department of Electronics and Telecommunications, www.polito.it

The research will be conducted in the Image Processing and Learning (IPL) group,

<http://www.ipl.polito.it/>

The IPL group conducts cutting-edge research in the field of machine learning and deep learning methodologies for image and video processing, with applications to satellite image processing and computer vision. The research lab provides an exceptional setting for research, professional development, and collaborative opportunities within a young and friendly research environment. It is located in Torino, a charming city in north-western Italy, near the Alps and ideal for skiing and hiking.

Position Description and Research Plan

The European Research Council (ERC) funds frontier research projects having leading scientists as investigators. This PhD scholarship is in the framework of the ERC Advanced Grant project “IntelliSwarm”, with Prof. E. Magli as principal investigator. The project starts on June 1, 2026 and will last for 5 years; it aims to advance the use of AI in space through the development of methodologies for distributed imaging using satellite swarms, with computations performed directly onboard the satellites.

Specifically, the research activity will address the development of a new generation of fast and energy-efficient neural networks for embedded devices based on co-design of processing operations and numerical representation, to be employed for onboard processing and inference on satellites. Instead of simply decreasing complexity via reduction of the number of parameters, the goal is to construct new layers that work well under very limited-precision quantization of parameters and activations, e.g. ternary quantization. The activity will address low-precision convolutions and activation functions, low-precision parameter normalizations, simplified attention mechanisms, and the related regularizations and schedules for the training process. Attention mechanisms will receive significant effort as they are particularly important toward inference accuracy. This work has a strong methodological component and we aim to publish the results in the top-level conferences in the field of deep learning and computer vision, and/or the top-level journals in the field of signal processing.

Keywords: onboard/edge AI, ternary quantization, low-complexity attention, state-space models, energy efficiency, inverse problems, multi-view imaging, satellite swarms.

Required Qualifications

We seek highly motivated and creative individuals who are excited to perform scientific research in AI and its applications, are goal-oriented and capable of working independently and collaboratively in a fast-paced research setting.

Suitable candidates must meet the following requirements:

- Recent MSc (or equivalent) degree in computer science, mathematics, communications or adjacent areas.
- Background in machine learning, including strong programming skills in Python and knowledge of the main frameworks for implementation of neural networks (PyTorch, TensorFlow)
- Very good understanding of mathematics
- Fluent in spoken and written English.

What We Offer

- A stimulating and collaborative research environment, with the ambition to perform high-impact work to be published in top-level venues.
- Access to high-performance computing resources and advanced research infrastructure.
- Participation to an elite ERC project providing a great environment and facilities for scientific research, as well as financial support for traveling to international conferences, workshops, and winter/summer schools.
- Optionally, possibility to perform the PhD in the framework of the ELLIS PhD program (www.ellis.eu), with a minimum 6-month stay at a secondary foreign institution with a local co-supervisor.

The salary will be based on the PhD scholarship at Politecnico di Torino, which will be augmented with an extra net salary of 5000 €/year, leading to a net monthly salary of 1800 €.

How To Apply

Please send the following material by email to enrico.magli@polito.it:

- CV (including publications, if applicable)
- Motivation Letter (max.1 page)
- Academic transcripts (Bachelor's and Master's degrees)
- Contact information of at least two referees.

This announcement does not constitute a formal admission or hiring procedure. The principal investigator will review the received applications and may decide to proceed with a formal selection process. Please note that the award of PhD scholarships at Politecnico di Torino is subject to the official PhD programme admission rules; the selected candidate will be contacted with details on the formal application to the PhD programme.