

Thesis Opportunities AY24/25

Giacomo Boracchi, Politecnico di Milano, DEIB

<https://boracchi.faculty.polimi.it/>

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The Team

We are 3 faculties, 10 PhD students, 1 Research Assistant... and 20+ MSc students!



Giacomo Boracchi



Luca Magri



Federica Arrigoni



*Riccardo
Margheritti*



Michele Craighero



Edoardo Peretti



Roberto Basla



Andrea Diecidue



*Rakshith
Madhavan*



Andrea Ferraris



Diego Martin



Luca Alessandrini



*Andrea
Marelli*



Carlo Sgaravatti

Computer Vision Research

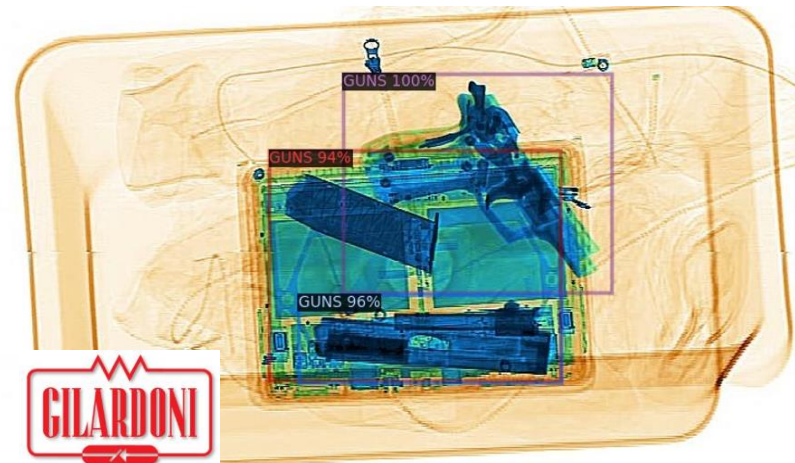
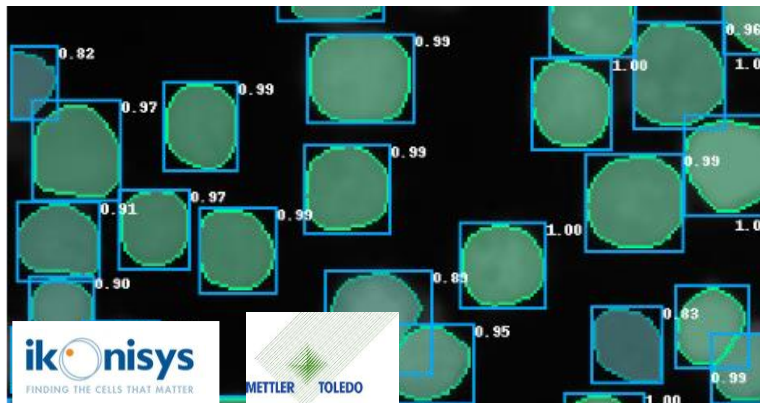
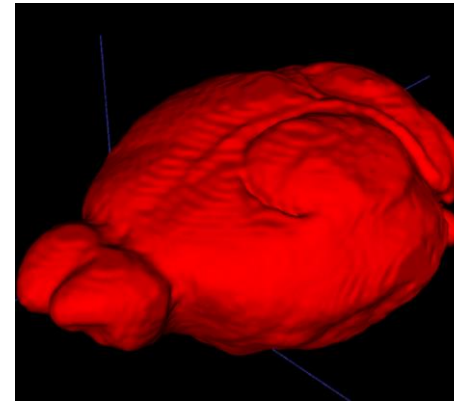
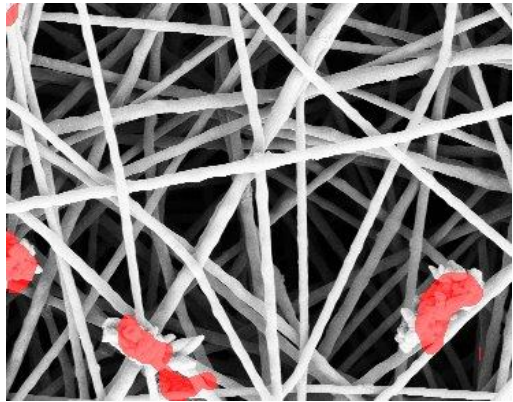
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3 faculties
10 PhD students
4 Research Assistants

Research themes and relevant projects:

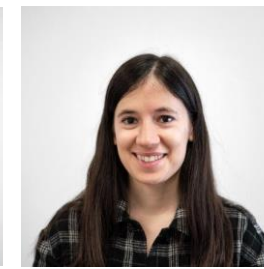
- **Deep Learning for Visual Recognition:** Object Detection and Segmentation (CCD, SPAD, X-ray, 2D/3D Medical, Aerial Images), Anomaly Detection (images, signals), Learning under limited supervision.



with Prof. Piero Fraternali

Computer Vision Research

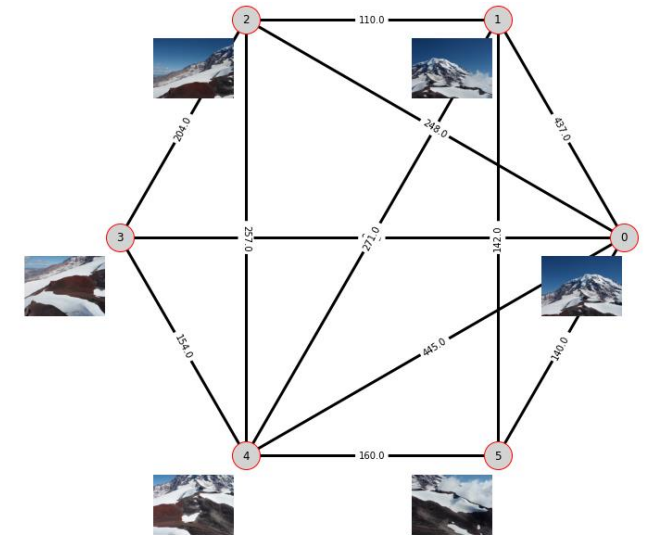
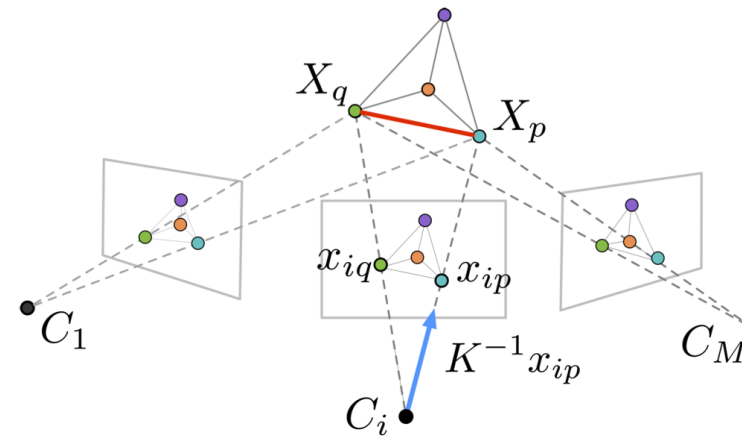
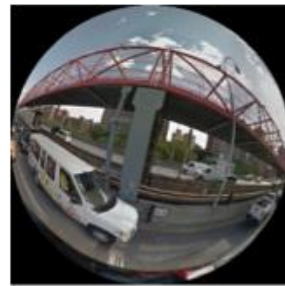
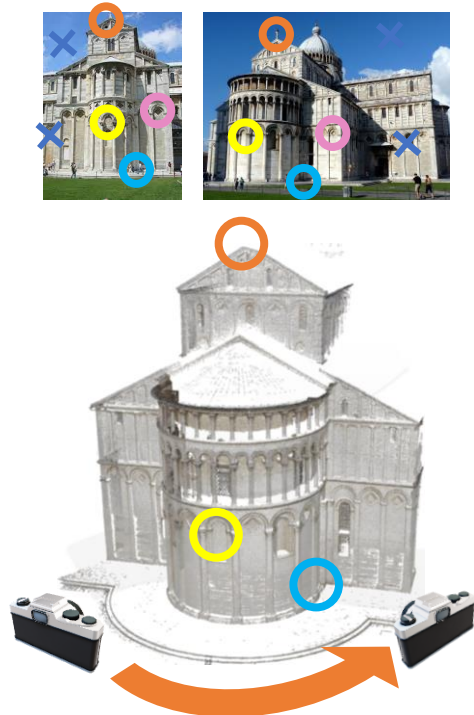
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- **Multi-view Geometry:** 3D Reconstruction, Calibration (Conventional / Event Cameras, X-ray, LiDar, hybrid systems), 6DOF Pose Estimation, Foundational Research.



Computer Vision Research

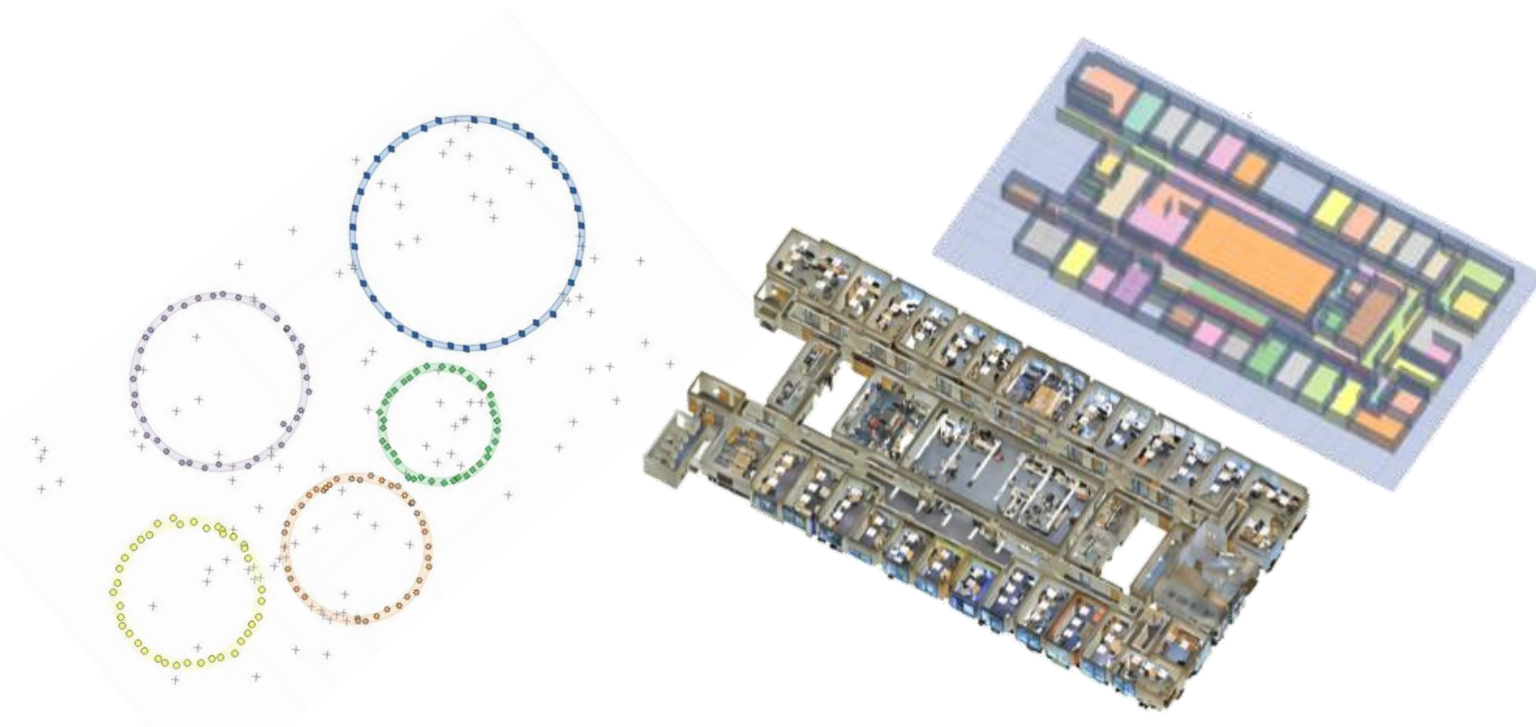
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Computer Vision Research

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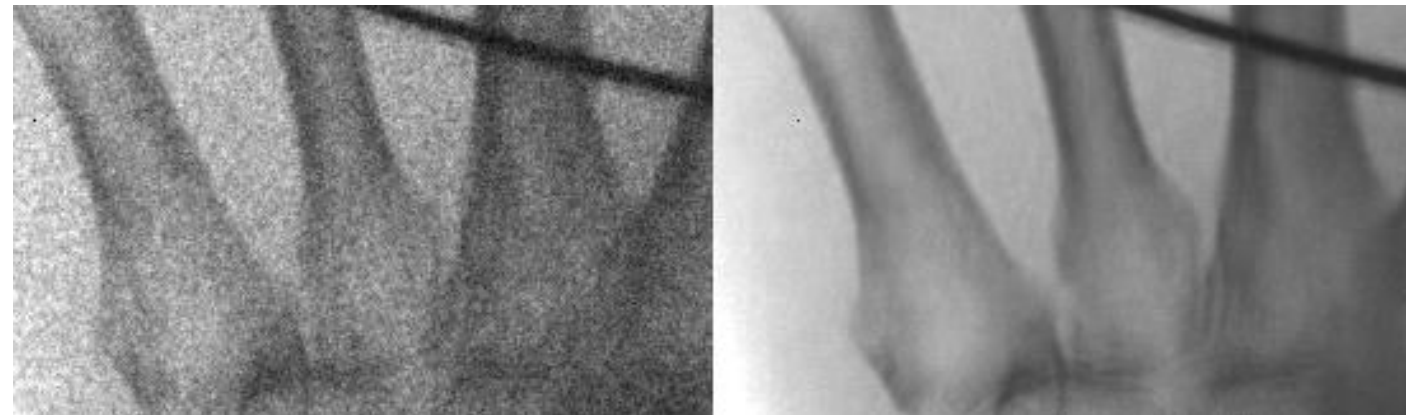
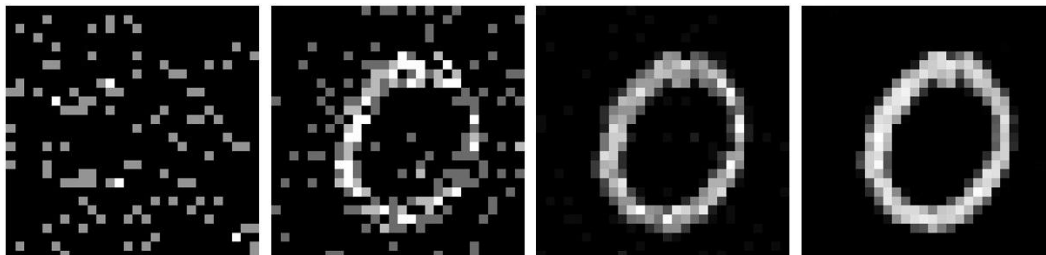


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- **Pattern Recognition:** Clustering, Robust Model Fitting (Scan2BIM, Template Detection), Quantum Computer Vision.
- **Image/Signal Processing and Analysis:** Image Enhancement and Restoration (X-ray, CCD, SPAD), Change and Outlier Detection (Optical fiber signals)

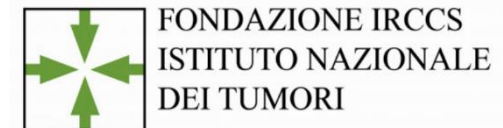
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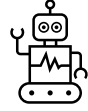
Research collaboration



ISTITUTO DI RICERCHE FARMACOLOGICHE MARIO NEGRI · IRCCS



Our Industrial Reach



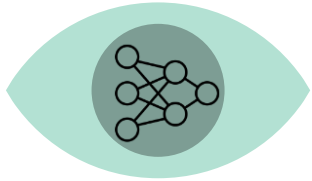
Industry 4.0



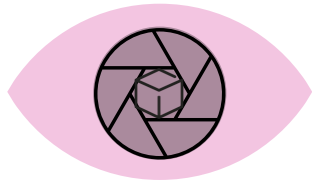
Medical



Security



Deep Learning for
Visual Recognition



Computer Vision and
Pattern Recognition



.Cleafy



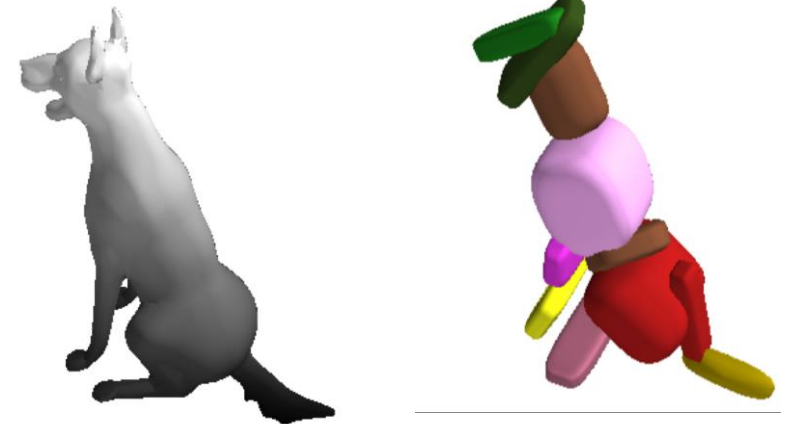
Image Processing
and Analysis



EU / National Funded projects

AI for Port Management (National): Combining traffic simulation and ML to design optimal traffic policies

GeoPride: Geometric Primitive Decomposition to model 3D world



Joining us for a Thesis

Thesis Types

There are three types of thesis

- Academic Research Thesis
- Thesis on research projects
- (Internships)

Most of our thesis are research thesis.

We shoot at a full thesis up to 7 points.

Academic Research Thesis

Join us to work on a challenging research problem!

We are looking for someone to:

- Continue a research line we have started,
- Investigate new brave ideas,
- Explore a new research challenges and propose new ideas

What you'll do:

i) brainstorm, ii) read papers, iii) discuss with us, iv) implement codes, v) run experiments, vi) analyze results.

Iterate the process multiple times.

Thesis on Research Projects

Help us out in our research projects! We often need help in carrying on project activities. We are looking for someone to:

- Be directly involved in all the project activities, including meetings, research planning, reporting, presentations to partners.
- Work under our strict supervision.
- Grant 100% commitment.

Project activities are «on top» of research activities that are equivalent to those of an academic research thesis.

What we do offer

- Our supervision + co-supervision by a (brilliant) PhD student / colleague of ours
- Our proposals are often meant for thesis $[-1, 7]$ points, disregarding whether it is academic/project/internship
- An opportunity to learn a new topic and develop solid expertises and skills

What we do offer

General guidance on «how to address thesis work»

- Thesis management
- How to prepare the Related work
- How to Formulate your Research Problem
- Thesis / Executive Summary Preparation
- Thesis Presentation

Please, have a look here: <https://magrilu.github.io/tht/>

Every now and then we organize meetings to illustrate ongoing research activities

What we do require

Our MSc students need to:

- Show enthusiasm and committment
- Be talented and dependable,
- Be rigourous in studying, put special care in analyzing results,
- Have a big sense of initiative,
- Be willing to learn and to brainstorm with us
- Be willing to study papers, not just develop codes,
- Put a constant effort on the thesis work,
- Give frequent and nicely prepared updates
- Expect 9 – 12 months work,

Thesis and exams

Some thesis require 100% commitment

- You cannot postpone the thesis start, and
- You cannot disappear...

... because of

- Lectures
- exam sessions
- employment duties or other relevant commitment

Please, consider coming to September presentation, if you are not able to grant the right commitment.

What we do appreciate

We know this is not always possible... but we prefer

- Meeting in person
- Students taking part to our lab life

If you feel like a brilliant candidate...

... and you are considering

- Having your thesis work submitted for publication
- Pursuing a PhD related on our research topics...

Just let us know! We will do our best to make sure you will have a clear idea about this after your thesis

Have a look at our “Thesis hall of fame”

<https://magrilu.github.io/thof/>

You can find executive summaries and thesis slides for students that graduated under our guidance.

.. That webpage is still growing!

Applying for a Thesis

What to do now

Check the thesis titles here (link on my website):

<https://boracchi.faculty.polimi.it/ThesisOpportunities.html>

Come and talk to us to know about the thesis opportunities you are interested in:

- This is very important for you, you'll make a more informed application to the thesis.
- This is very important for us, we might already have an idea on who is the right champion for the thesis!
- Remember to introduce yourself!

What to do before applying

- Read some material related to the thesis topic
- Write us if you need further information / materials

The correct mindset:

- Don't worry if there is some background missing. This is rather standard and it's easy to catch up, studying materials we provide. Let us know what your background is, we will consider whether you are suited or not.
- Nobody knows everything about their thesis before starting. This is not like the exam session.
- ... but consider you'll need to know everything about your thesis before graduating 😊.
- Therefore, you need to be interested in your topic, and like the people you'll work with!
- Consider this might be your first (only) research experience.

How to apply for a thesis

Once you are convinced of doing the thesis with us:

Fill in the form <https://forms.gle/isew6sPHMbBYcWba7>

Remember to tell us:

- Which thesis are you interested in and which are «**first options**»
- What is your background, which courses you have passed that are inherent to the thesis you selected.
- Mention also:
 - any information you deem relevant for working on that specific thesis.
 - successful projects and your programming expertise.
- A short motivation paragraph.

Deadline to apply for a thesis

We will start thesis assignment on next Monday 23rd.

To be eligible for a thesis, submit your proposal over the weekend at latest, even though we will start contacting candidates to talk with even this week.

You will receive an email from us to schedule a meeting (possibly in person, but if not possible online) right after the deadline.

Before the deadline, you are welcome to write us email for enquiring

The form will close on Wednesday 25th

After having submitted your application

We'll get in touch with you to

- have a meeting
- and (typically later) assign a thesis proposal

We will start from students entering “first options” and having an excellent match with our expectation

Thesis work is expected to start in early October with a “general meeting”, even though you might start studying before that date.

Thesis List

Overall

There are quite a few thesis proposals

- 22 on Academic Research
- 4 on Project Research

We are not going to open more than 10-15 thesis (we couldn't make it!), only thesis with motivated and brilliant candidates will be activated.