

Thesis Opportunities AY25/26

Giacomo Boracchi, Politecnico di Milano, DEIB

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

Updated on July 2026

The Team

We are 3 faculties, 11 PhD students, 2 research assistant... and 20+ MSc students!



Giacomo Boracchi

Luca Magri

Federica Arrigoni

Michele Craighero

Edoardo Peretti

Roberto Basla

Rakshith Madhavan



Andrea Ferraris

Diego Martin

Luca Alessandrini

Andrea Marelli

Carlo Sgaravatti

Stefano Bertolasi

Angelo Iacoella

*Francesco
Scroccarello*

Computer Vision Research

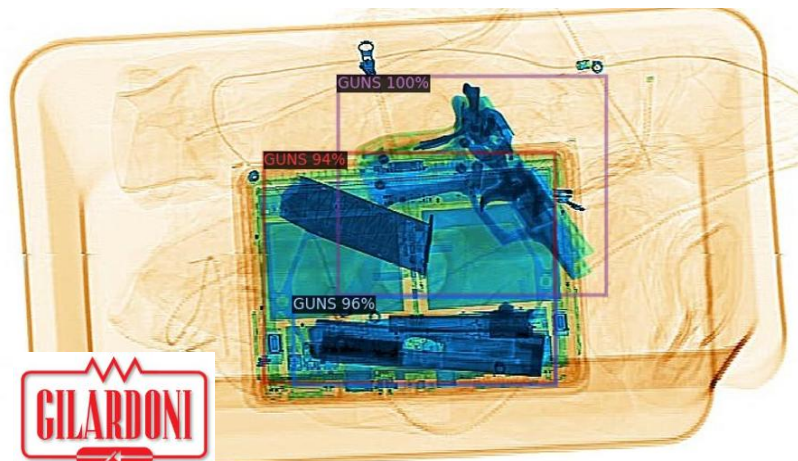
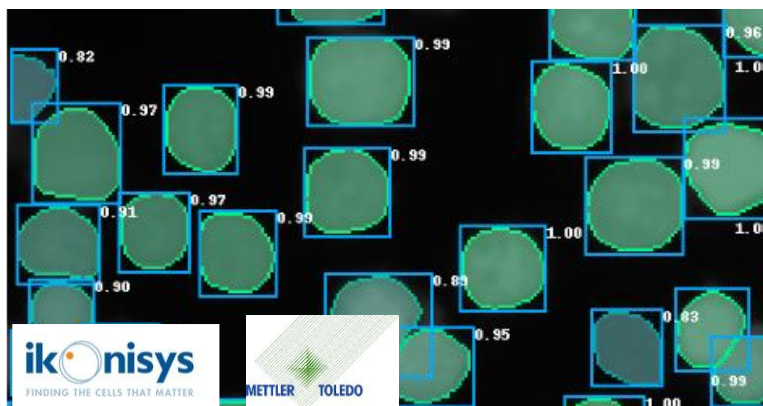
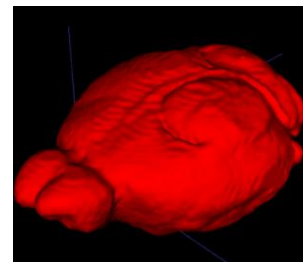
Giacomo Boracchi, Luca Magri, Federica Arrigoni



3 faculties
11 PhD students

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.



PERIVALLON

with Prof. Piero Fraternali

Computer Vision Research

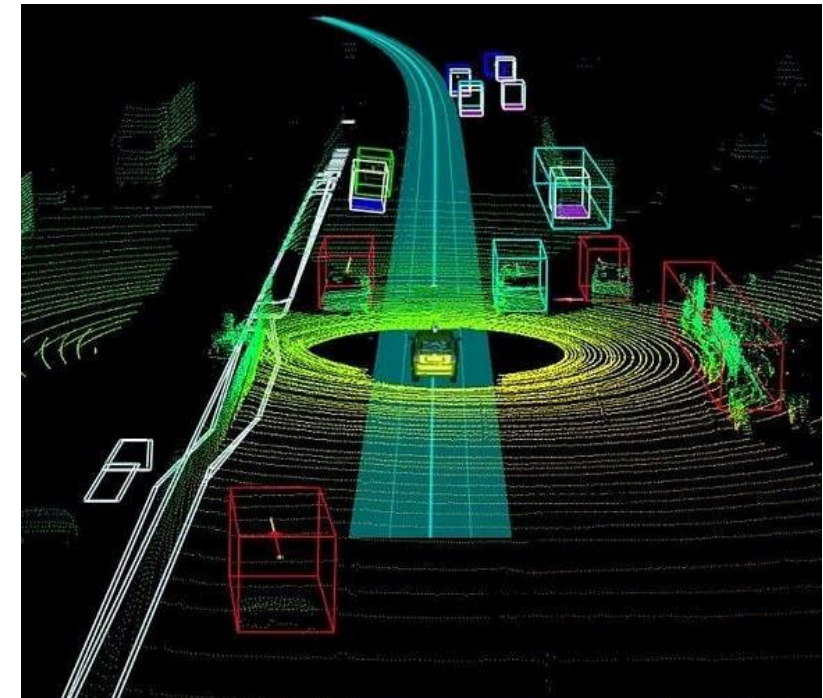
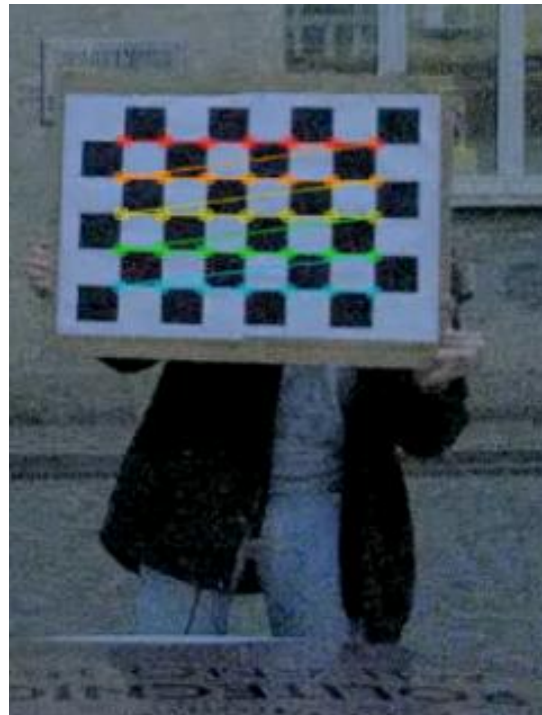
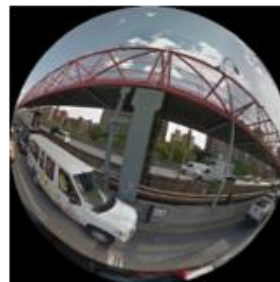
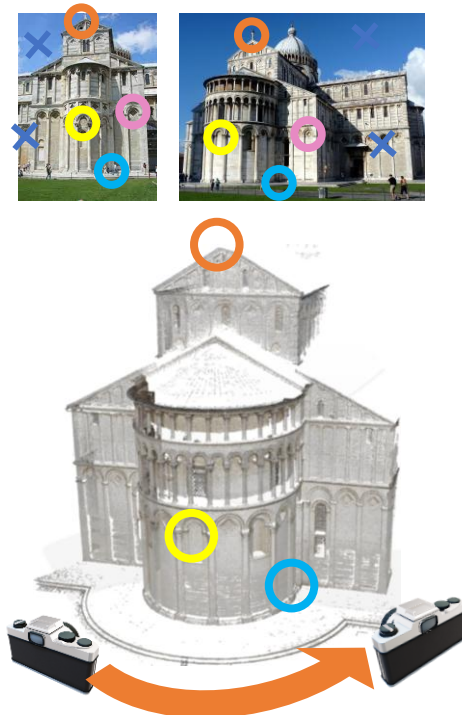
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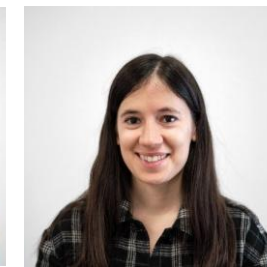
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- **3D Vision:** 3D Reconstruction, Calibration (Conventional / Event Cameras, X-ray, LiDar, hybrid systems), Vision for Autonomous Driving, 6DOF Pose Estimation, Foundational Research, Robust Model Fitting, Quantum Computer Vision.



Computer Vision Research

Giacomo Boracchi, Luca Magri, Federica Arrigoni

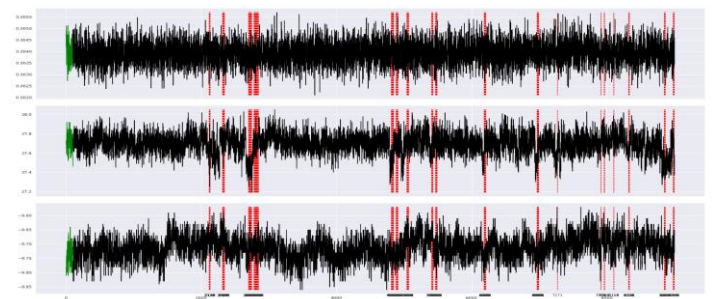
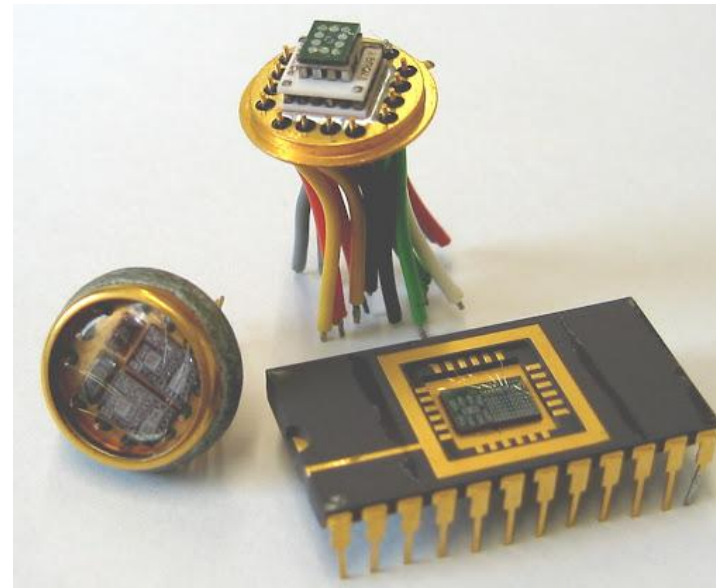
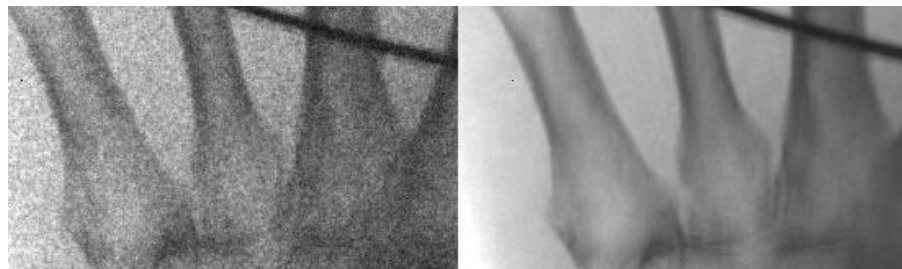
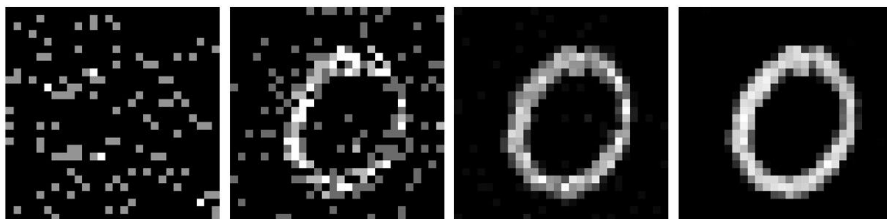


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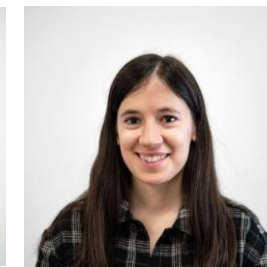
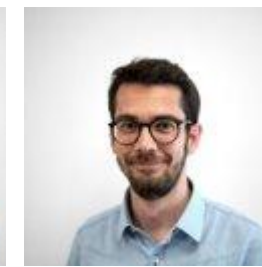
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5 mlux: mean count 0.13 40 mlux: mean count 0.37 320 mlux: mean count 2.28 2560 mlux: mean count 17.44



Computer Vision Research

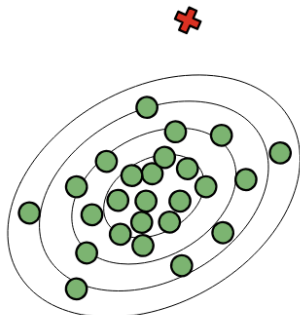
Giacomo Boracchi, Luca Magri, Federica Arrigoni



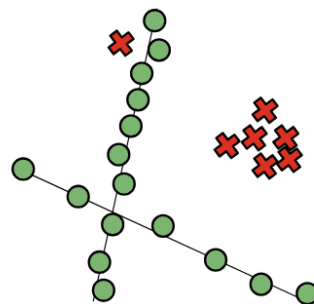
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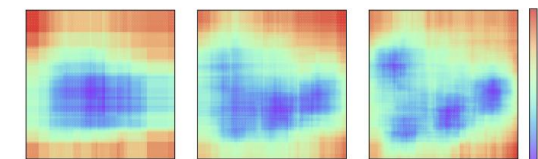
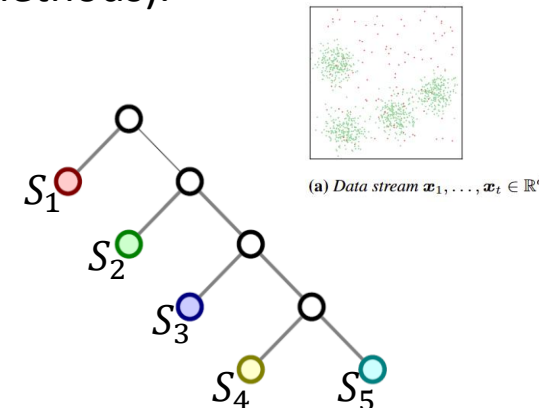
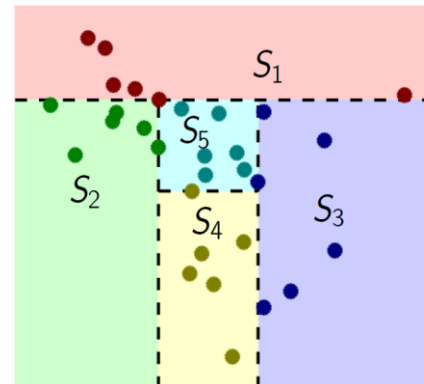
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- **Change and Anomaly Detection:** Design of change-detection tests for high-dimensional data (QuantTree), Sequential Monitoring, Datastream Mining, Anomaly Detection (tree based methods).



(a) Density.



(b) Structure.

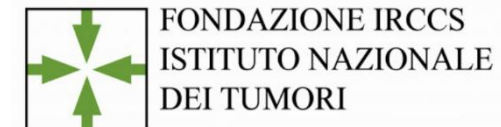


(b) Anomaly scores s at different time instants t , from left to right.

Research collaborations



ISTITUTO DI RICERCHE
FARMACOLOGICHE
MARIO NEGRI · IRCCS



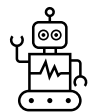
Research collaborations



ISTITUTO DI RICERCHE
FARMACOLOGICHE
MARIO NEGRI · IRCCS



Our Industrial Reach



Industry 4.0



Medical



Security



Environmental

Deep Learning for
Visual Recognition



EssilorLuxottica



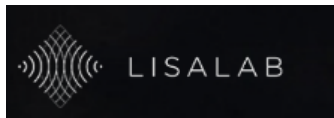
Computer Vision and
Pattern Recognition



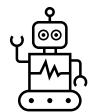
Image Processing and
Analysis



HUAWEI



Our Industrial Reach



Industry 4.0



Medical



Security



Environmental

Deep Learning for
Visual Recognition



ML cube

NOKIA



EssilorLuxottica



Computer Vision and
Pattern Recognition



.Cleafy

WE-WEAR
the future of fashion



HUAWEI

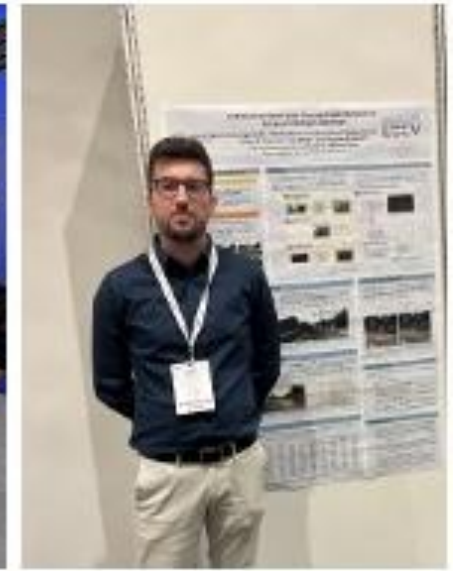
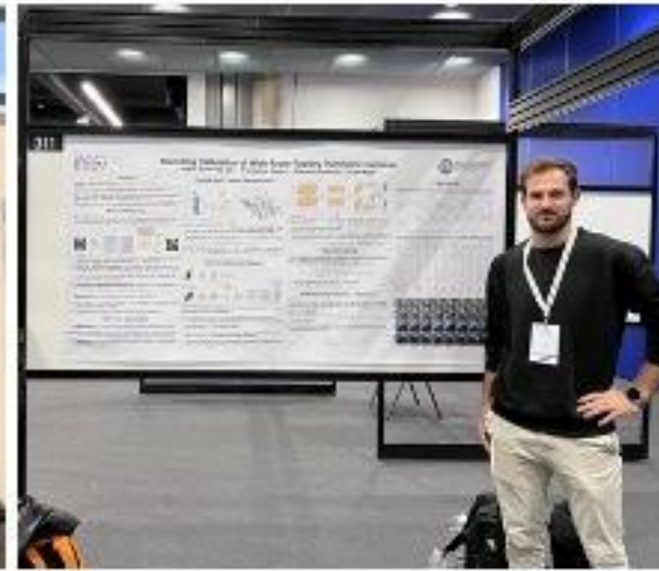
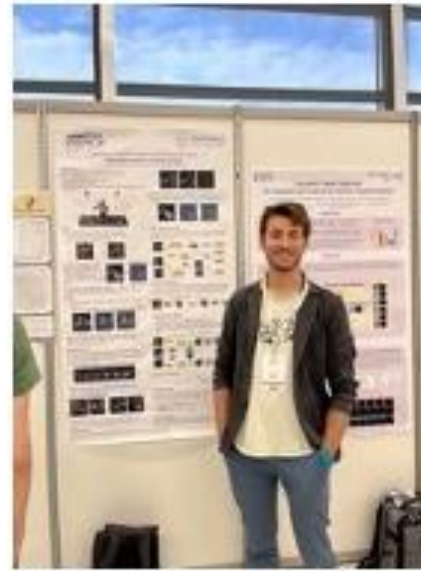


Image Processing and
Analysis

Thesis Types

3 Thesis Types

1. **Academic Thesis**
2. Thesis on **projects**
3. **Internships**



In all the cases:

- we do **research** (when possible, we aim at a publication!)
- we shoot at a **full thesis** (up to 7 points, the range is $[-1, 7]$)



Academic Thesis

- Explore a **new research challenges**,
- Investigate new brave ideas, **together with a PhD student of ours**

What you'll do:

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

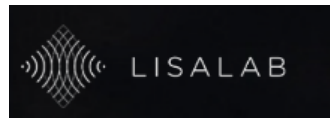
Iterate this procedure multiple times.



Thesis on Research Projects

As before, in addition you'll

- Be directly **involved in all the project activities**, including meetings, research planning, reporting, presentations to **partners**.
- Business trip to the company
- Need to grant 100% commitment



Choosing the right thesis



Pick a topic that excites you!

You'll be working on it for quite a while, passion will keep you going!

- Expect 9-12 months of work
- Show enthusiasm and commitment
- Be talented and dependable
- Let us know if you want to pursue a PhD after your thesis

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It's normal not to have everything clear from the start

Uncertainty is part of research, it's how discovery begins!



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Uncertainty is part of research, it's how discovery begins!

- Thesis is an **opportunity** to learn a new topic
- Read a lot of papers
- Implement lot of ideas
- Be **rigorous** in analyzing results
- Study the **problem**, not just develop code
- Develop solid **expertises** and **skills**



The thesis journey is like moving through a jungle

You clear the path step by step.

There's no single route, everyone should find their own way!



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To be successful

- Have a big sense of initiative
- Be creative
- Put a constant effort on the thesis work
- It's an iterative process: study-implement-validate-discuss

You are not alone

Thesis work: you are part of a team!

Thesis choice: We'll help you choosing **choose the thesis that best fits your background and expertise! That's a win-win condition**



You are not alone

Thesis work: you are part of a team!

Thesis choice: We'll help you choosing **choose the thesis that best fits your background and expertise! That's a win-win condition**

- You will be supervised by us /co-supervised by a PhD student
- Receive feedback from your nicely prepared updates
- In-person meeting to brainstorm with us
- You are welcome to take part of our Lab life
- We offer general guidance on «how to address thesis work» see:
<https://magrilu.github.io/tht/>

Thesis and exams

- Start your thesis only when you are ready: if you still have too many exams, **consider joining the next thesis presentation** instead.
- Once you begin, you are expected to stay **engaged and constantly work at your thesis**.
- **You cannot completely disappear**, even though you can agree some short pause / slow down due to: Lectures, Exam sessions, Work obligations, Other major commitments...
- **Be sure you can dedicate the time and energies your thesis deserves.**



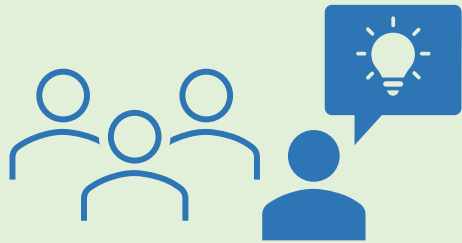
The legend of the phantom student with too many exams left, disappeared and reappeared just a few days before the deadline claiming to graduate

Applying for a Thesis

What to do

1. Now

Come and talk to us!



2. Before

Read some material
related to the topics you
are interested in.

Write us if you need
further information /
materials



3. Application

Fill in the form!
Select your first options.

Deadline: **27 July**



4. After

We'll get in touch with
you, and start the
assignment process



1. Now

Check the thesis titles at this

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



Thesis and Stage Opportunities February 2026: list

- List and Description of Thesis Opportunities
- Thesis will be presented in **February 23rd 2026** in Room G1 at 14:00
- Form to apply for a thesis, February 2026 call.
- Thesis "How To", some guidelines
- Thesis Hall of fame, some example of thesis in our group

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!



2. Before applying



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

Remember the **correct mindset**:

- **Don't worry** if there is some background missing. This is 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** your topic, and **like the people** you'll work with!
- Consider this might be your first (only) research experience.



3. Application

Fill in the form <https://forms.gle/C5XhTjFoCLaPeaQM8>
(also linked in my homepage)

specifying

- 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.
- Any **information you deem relevant** for working on that specific thesis.
- Successful **projects** and your **programming expertise**.
- A short **motivation** paragraph.



Application

Are these thesis your "first option"? By first option we mean that if you get assigned a "first option" thesis, you do not have to consider any other thesis opportunity and you like to accept this. *

- ☐ Yes, any thesis I have selected is a first option for me
- ☐ Yes, but only for the thesis I have entered as a first, not the second or third
- ☐ Yes, but only for the thesis I have entered as a first or second, not the third
- ☐ No, I need to check other opportunities before making my decision
- ☐ Help me in choosing the right thesis



Application



First option:

- This means it's your top-choice thesis.
- If assigned, you're ready to start and don't need to explore other options.
- For us, it's a plus, and we prioritize first options.

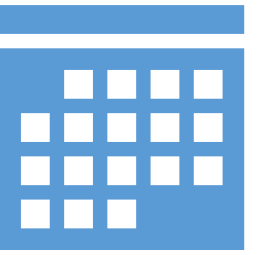
Need to check other opportunities:

- This is perfectly legitimate. It's important for us to know if you're considering other options.

Help me find a thesis:

- This means you're unsure and request our assistance in finding the best thesis that aligns with your interests and background.

3. Deadline



We will start meeting students and assigning thesis on a rolling-basis

- We will start contacting candidates since next week.
- You will receive an email from us to schedule a meeting (possibly in person, but if not possible online).
- You are welcome to write us email for enquiring

We plan closing the form on 27th July

4. After the application



We'll get in touch with you to

- have a meeting
- and (shortly) assign a thesis proposal

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

We will organize a “kick-off meeting” for all the new students during the first week of October, but you are encouraged to start working at your thesis with your advisor before that date.

Have a look at our “Thesis hall of fame”



You can find executive summaries and thesis slides of students that graduated with us

... that webpage is still growing!

Thesis Hall of Fame

Here you can find some particularly worthy theses, some of which have been then evolved into papers published at Workshops, Conferences and Journals.

- ★ Francesco Azzoni, *Deep Monocular Autocalibration of Radially Symmetric Wide-Angle Cameras*. [executive summary](#), [slides](#), published at ECCV 2024.
- ★ Andrea Marelli, *Temporal consistent CAMs for weakly supervised video segmentation in Waste Sorting*. [executive summary](#), [slides](#), published at the Industrial Vision Workshop hosted at ECCV 2024.
- ★ Carlo Sgaravatti, *A Multimodal Hybrid Late-Cascade Fusion Network for Enhanced 3D Object Detection*. [thesis article](#), [slides](#), published at the Industrial Vision Workshop hosted at ECCV 2024.
- ★ Olmo Michelangelo Notarianni, *Change Detection in Multivariate data streams: Online Analysis with Kernel-QuantTree*. [executive summary](#), [slides](#), published at the Advanced Analytics and Learning on Temporal Data Workshop at ECML 2024.
- ★ Fiore Amarù, Michele Alziati, *Ensemble clustering via synchronized relabelling*. [executive summary](#), [slides](#), published at Pattern Recognition Letters, August 2024.
- ★ Matteo Farina, *Quantum Multi-Model Fitting*. [poster](#), published at CVPR 2023.
- ★ Andrea Porfiri Dal Cin, *Synchronization of Group-labelled Multi-graphs*. [slides](#), published at ICCV 2022.

Other theses to have a look at:

- ★ Alessandrini, *Desc-V Desupervision in Camouflaged Videos*. [executive summary](#), [slides](#).

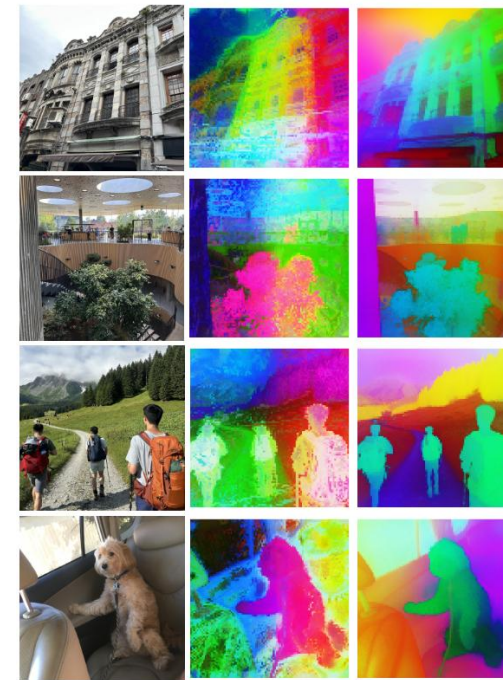
<https://magrilu.github.io/thof/>

Thesis list

Deep Learning for Computer Vision

DL1. Representation Decoupling, Predictive Learning, and Masked Modeling for Multimodal Self-Supervised Learning

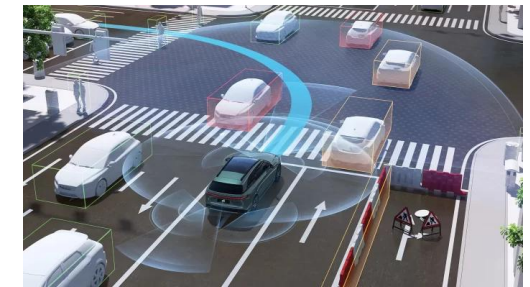
DL2. Future-Aware Trajectory Planning with Predictive Latent World Models for Camera-Only End2End Autonomous Driving



Image

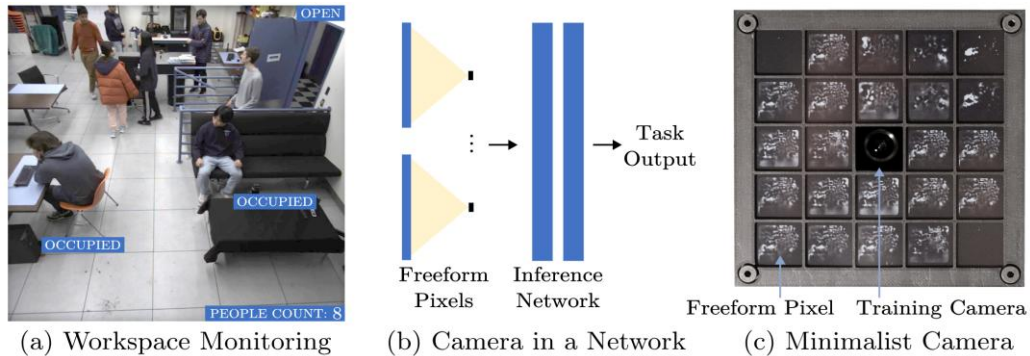
DINOv2-L

DINOv3-L

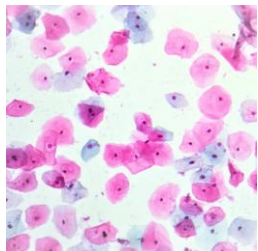


Deep Learning for Computer Vision

DL3. Deep-learning models for Minimalist Vision in Single-Photon Cameras



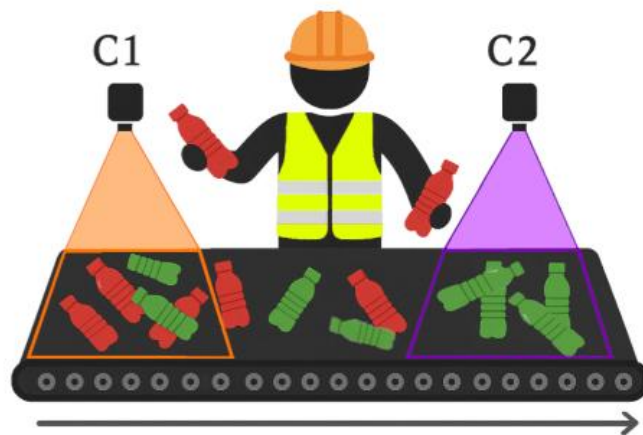
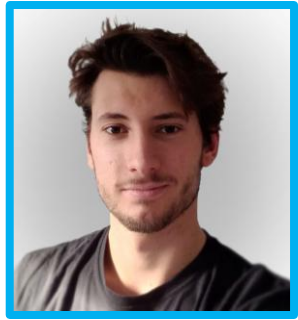
DL5. Composition of annotated datasets for cytology images



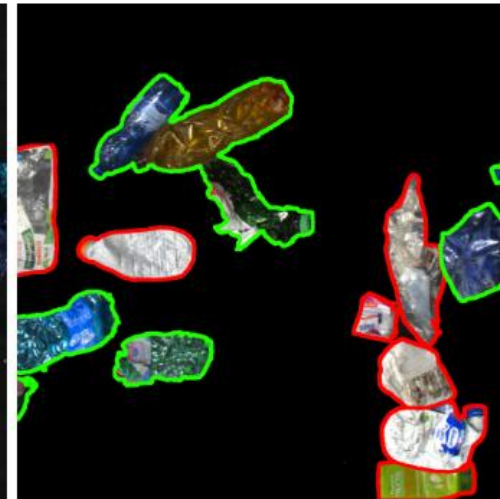
Deep Learning for Computer Vision

DL4. Self-Supervised Object Re-Identification in Industrial Quality Control

How can we reliably re-identify and track objects in chaotic industrial streams, such as waste sorting, where items are constantly shifting? This thesis tackles unsupervised object re-identification in dynamic industrial video through instance-aware feature matching that survives occlusions and human interventions.



Before



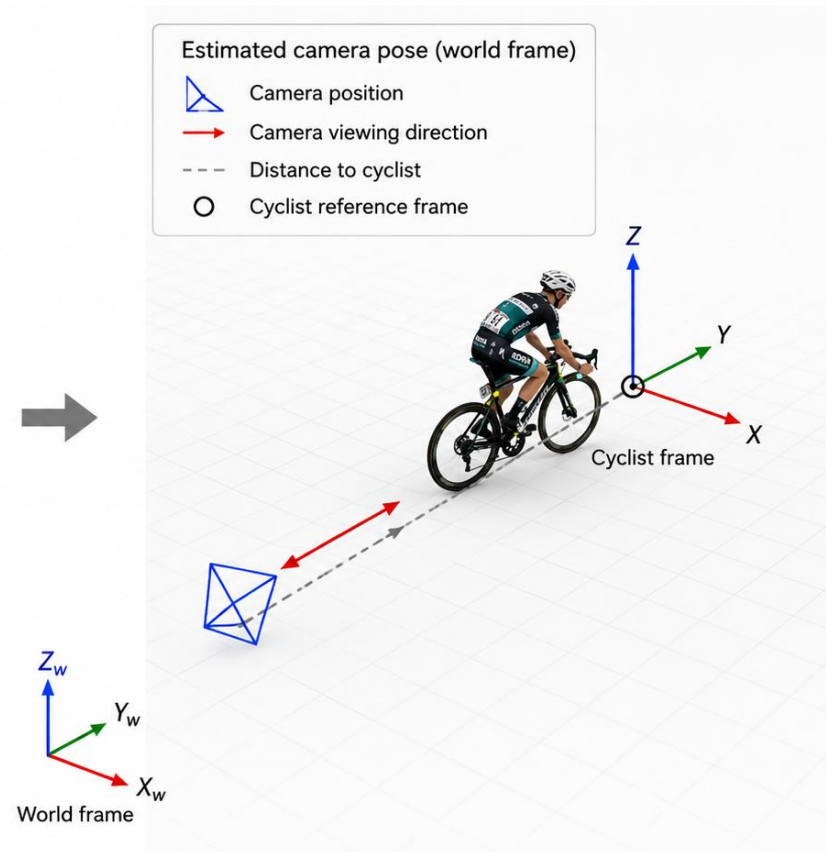
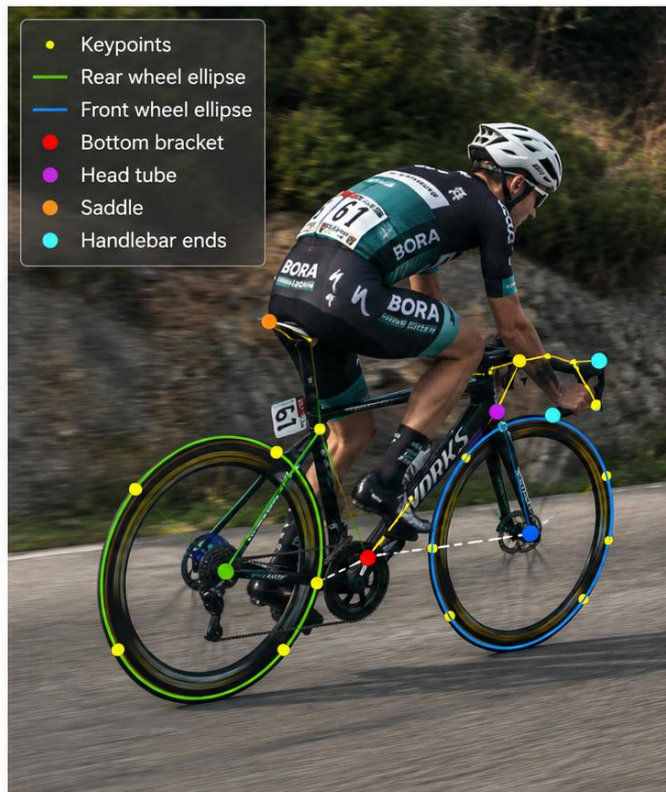
Keep - Remove



After

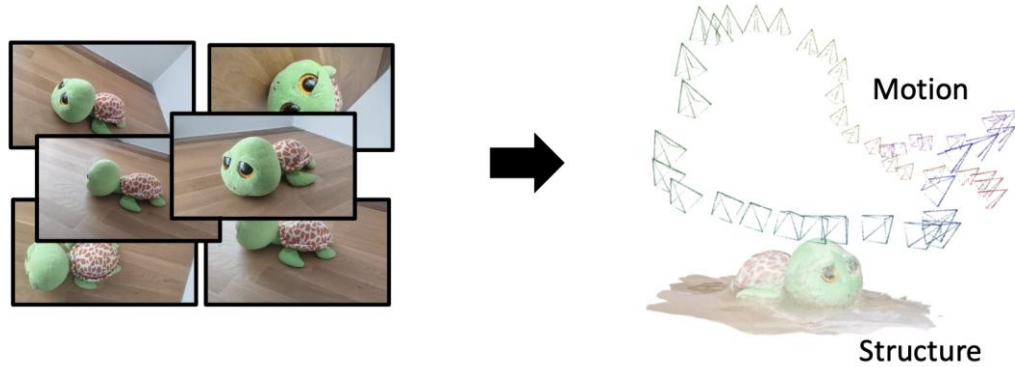
Geometric Computer Vision

G1. Camera calibration from Bicycle Geometry



Geometric Computer Vision

G2. 3D reconstruction under a simplified camera model



G3. Can a camera calibrate itself? From three-view geometry to controlled camera rotations.



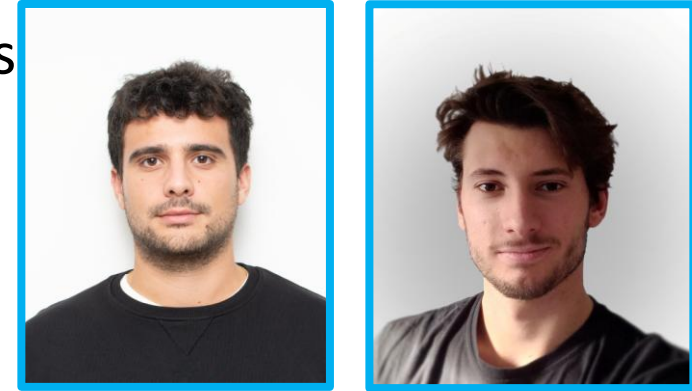
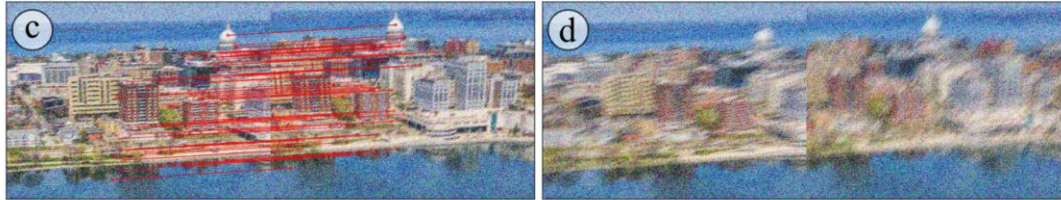
Image processing

IP1. Graph-based image registration for Single-Photon Cameras

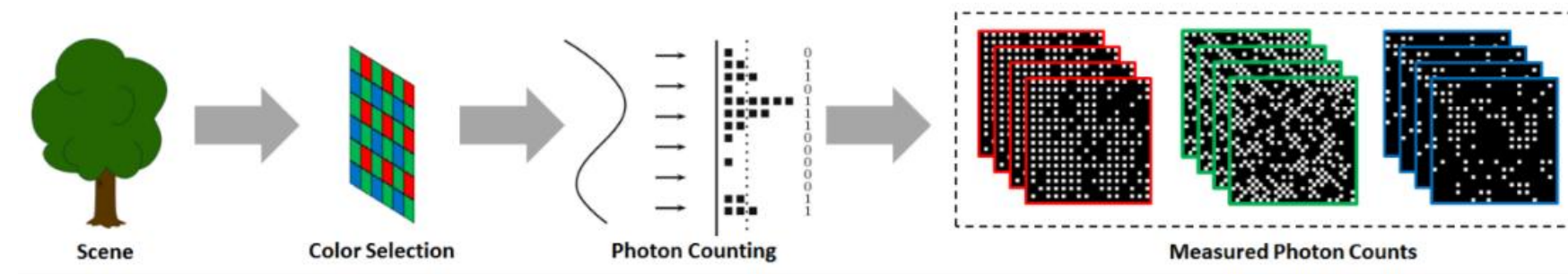
Low Noise, Low Blur (230 matches) Low Noise, High Blur (16 matches)



High Noise, Low Blur (74 matches) High Noise, High Blur (0 matches)

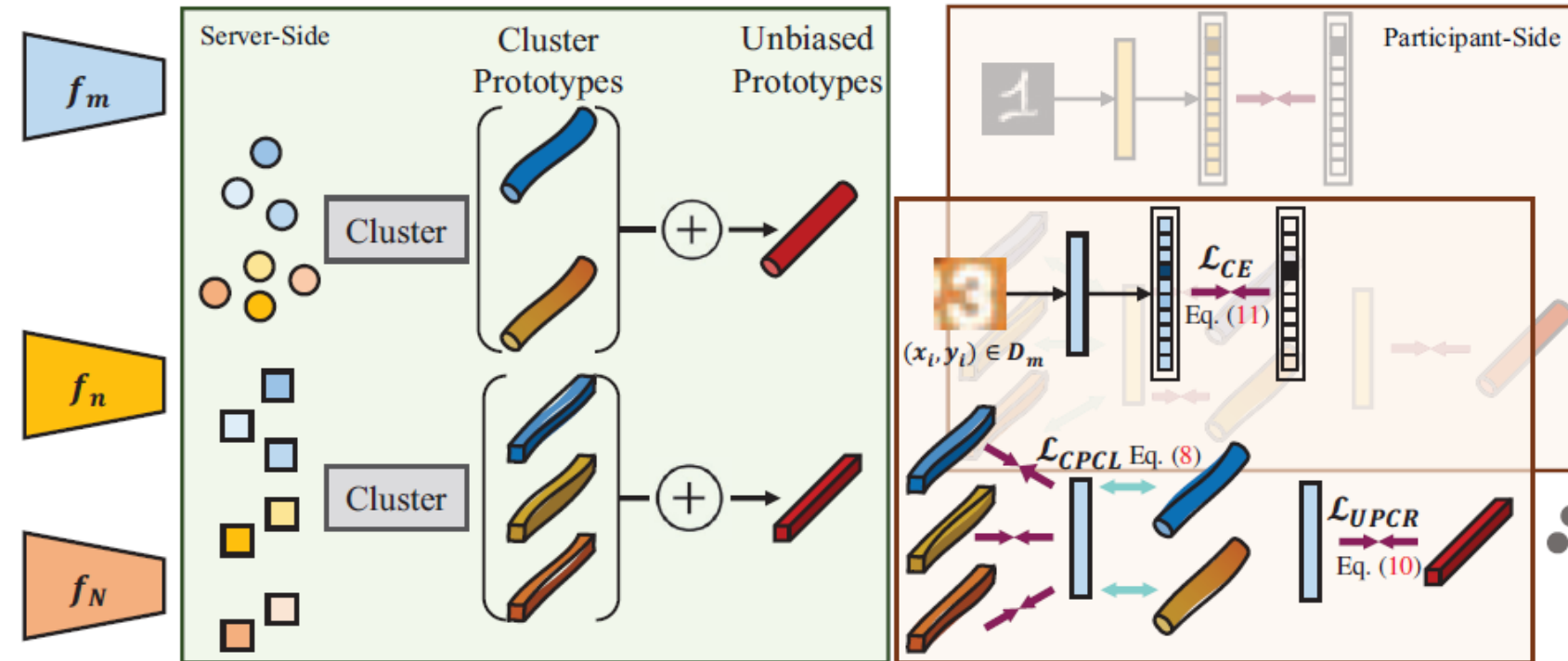


IP2. Color QIS Imaging



Machine Learning

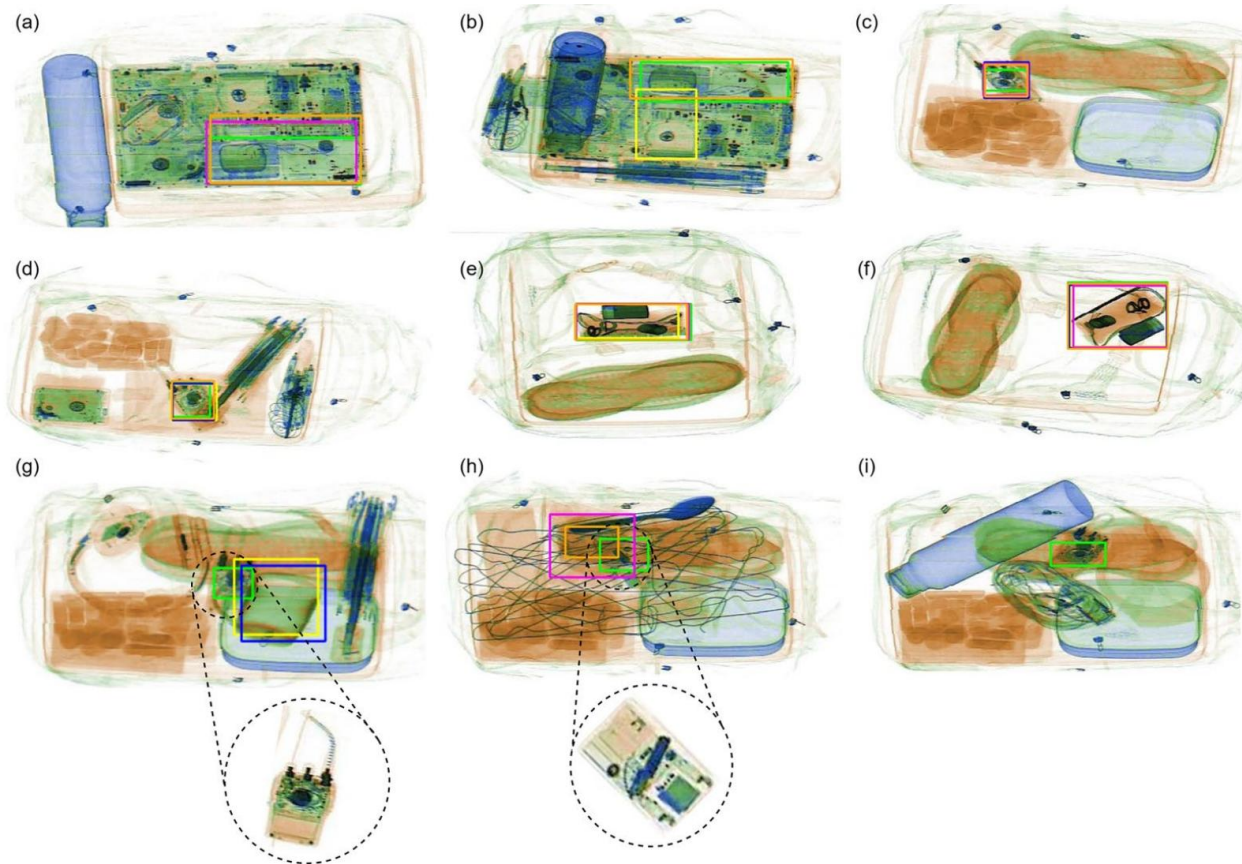
ML1. Unlabeled but Not Unlearned: Semi-Supervised Federated Learning in Domain Shift



Project related thesis

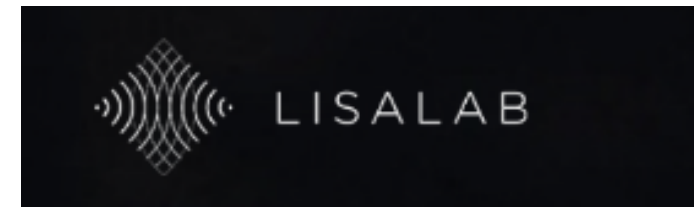
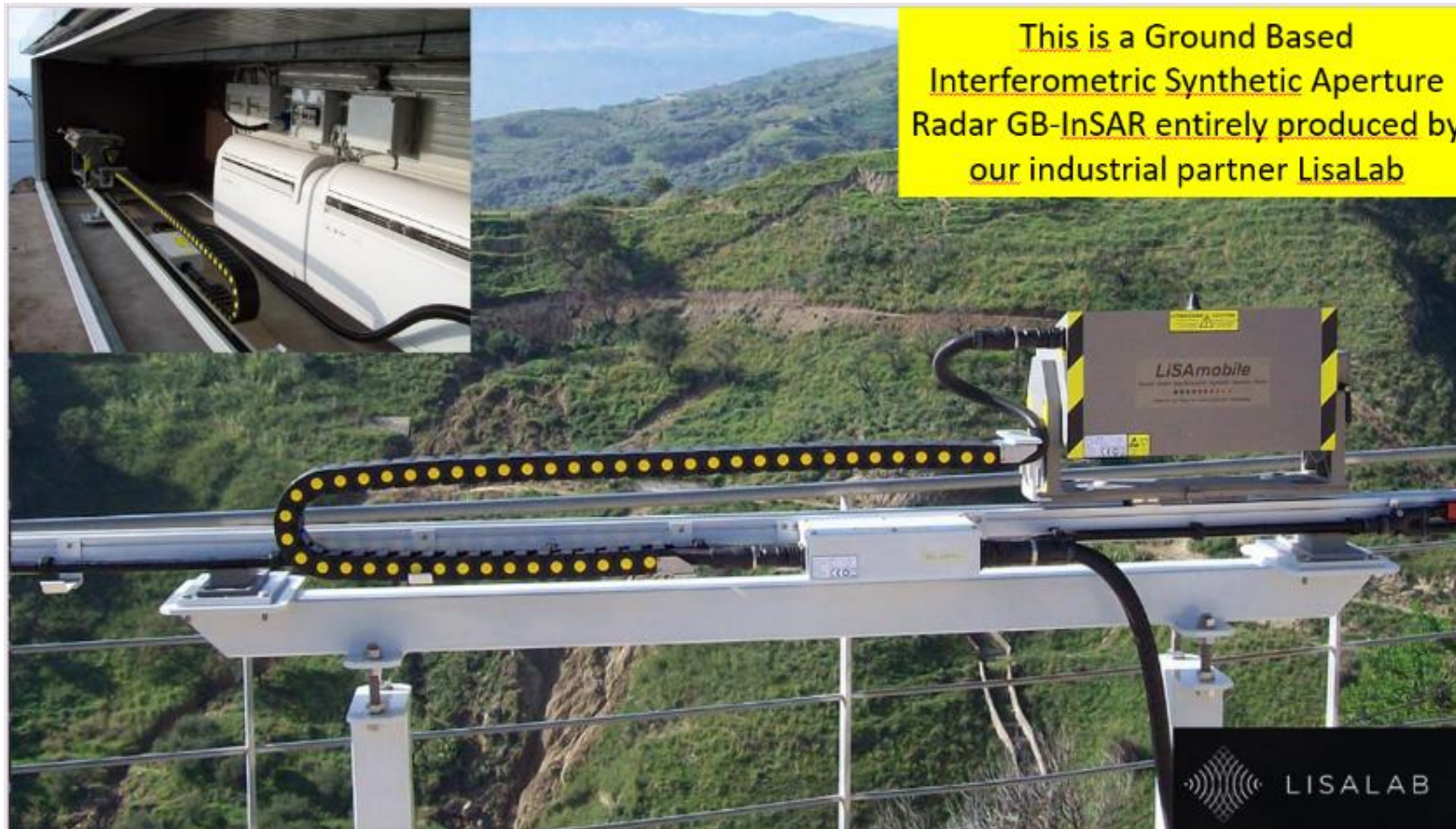
Project thesis: X-ray Security (Gilardoni)

PR1. Gilardoni: Explosive Device Detection in X-ray Images



Project thesis: GB-InSAR Monitoring (LisaLab)

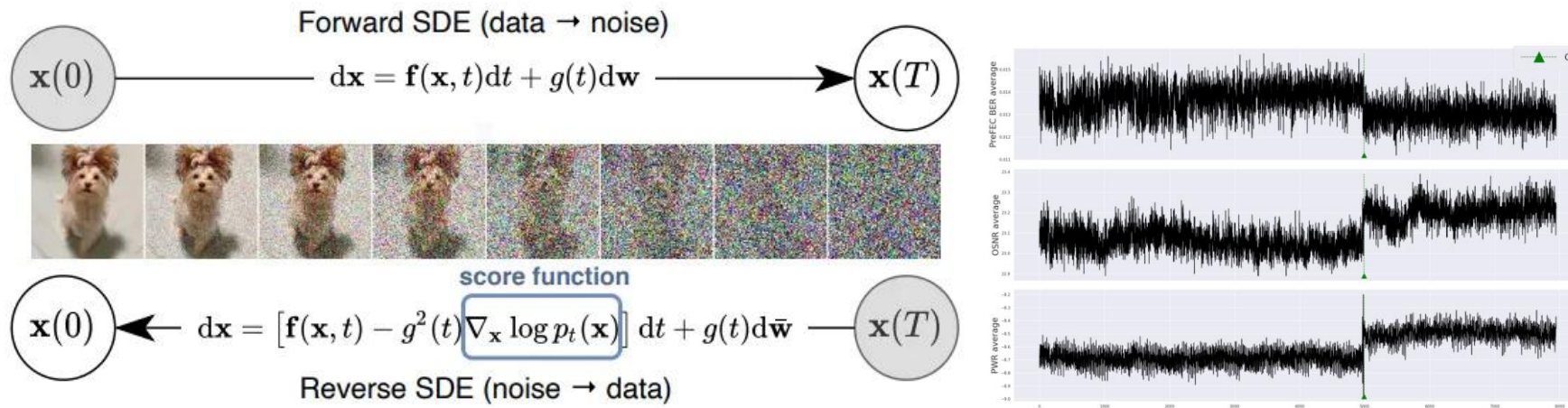
PR2. LisaLab: Atmospheric compensation in GB-InSAR



Project thesis: Optical Data Generation (Cisco)



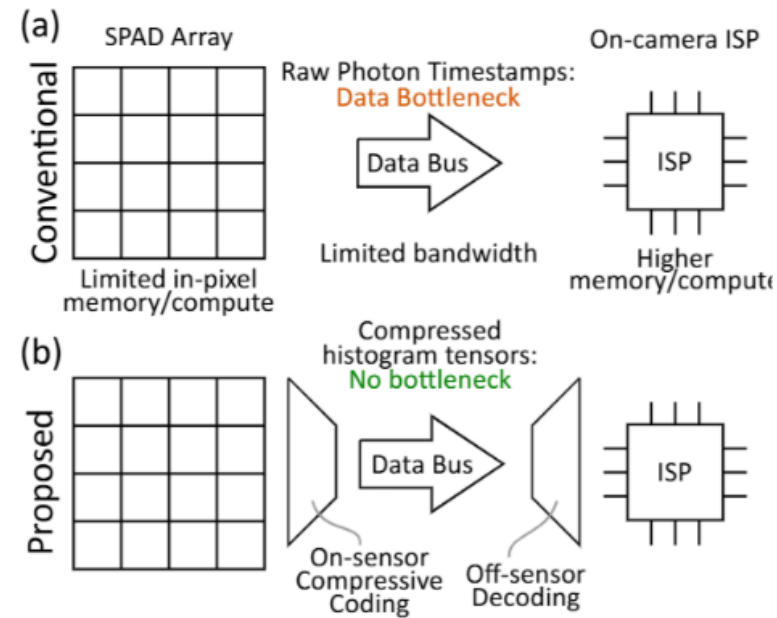
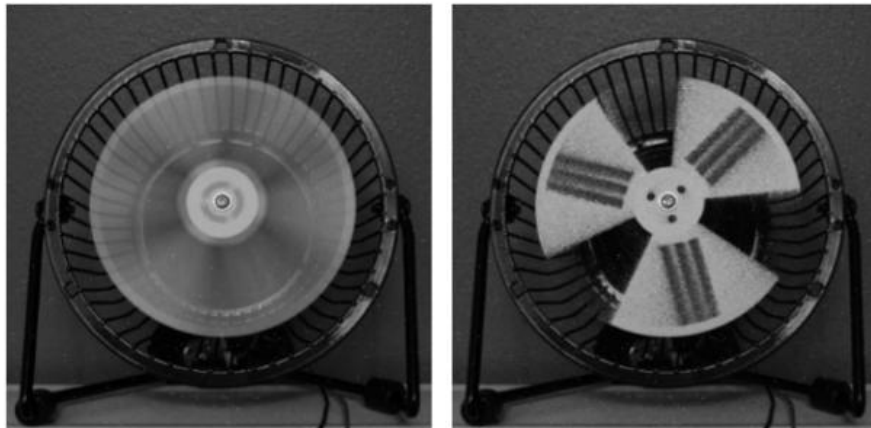
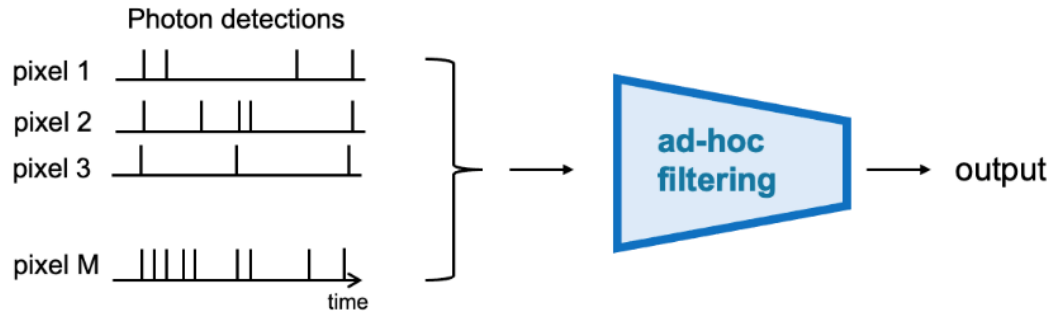
PR3. Diffusion Models for Realistic Optical Data Stream Generation



PR4. Cisco Photonics: Handle missing data of a monitored time series data stream

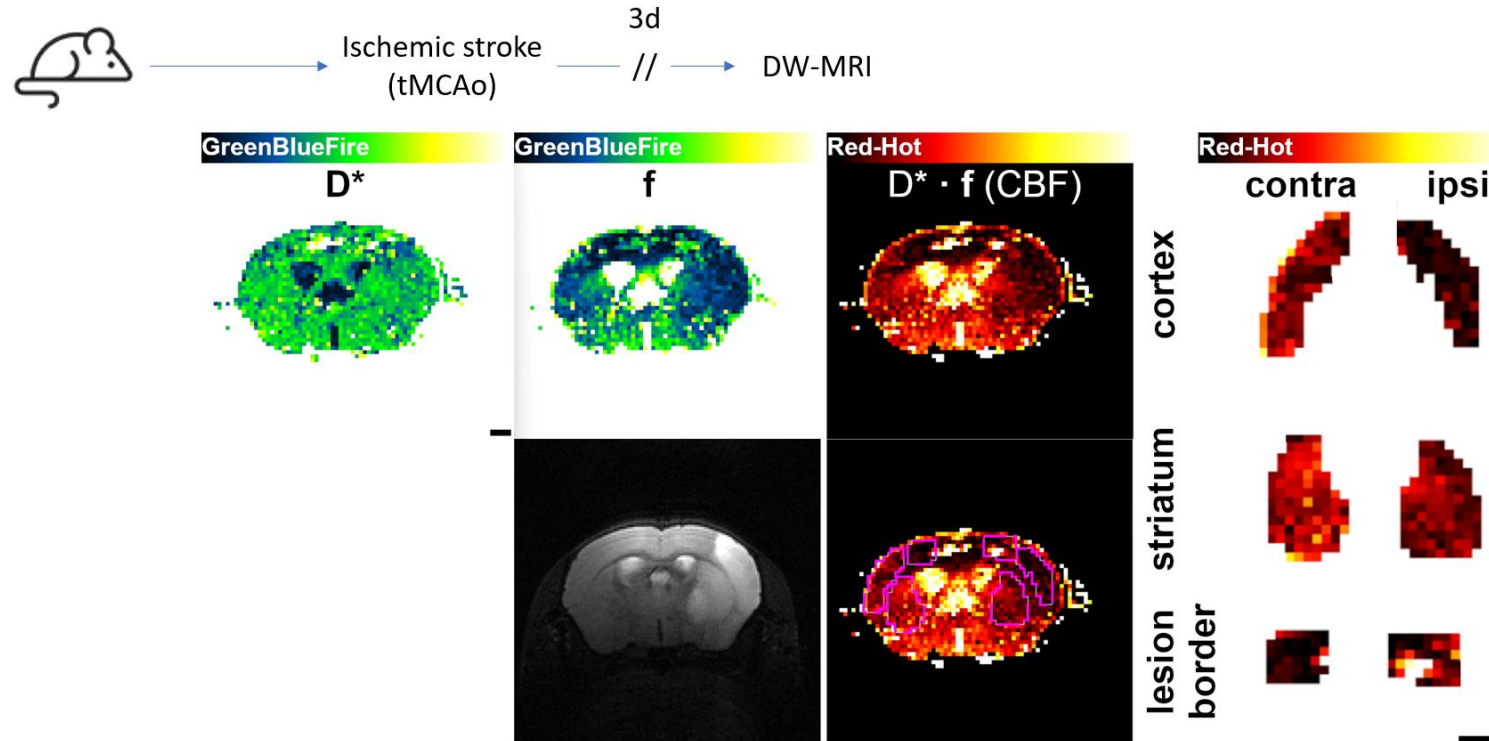
Project thesis: Single-Photon Compression

PR5. Huawei: Compact Representation for Single-Photon Cameras



Project thesis: Biomedical Imaging (Mario Negri)

PR6. Multimodal integration of MRI and X-ray tomography
for the characterization of microvascular damage



Internships Thesis: STMicroelectronics



PCB Thermal Simulator surrogate modeling

Location: Agrate Brianza (hybrid) · Start: September 2026 · Duration: 9 months

