



## EXPERIENCE

### PhD Student

Politecnico di Milano, DICA, 2020 - now

My research focusees on UAV-based and terrestrial photogrammetry for land and infrastructure monitoring. I am working on a low-cost image-based system for 4D glacier monitoring (ICEpy4D) and on UAV-photogrammetry for structural health assessment and crack detection on concrete bridges.

### Visiting PhD student

University of Twente, ITC, 2022

Developing a wide-baseline stereo matching workflow with Deep Learning for 4D monitoring of an alpine glacier by using low-cost time-lapse cameras.

### Teaching assistant

Politecnico di Milano, 2020 - now

Course of *Trattamento delle Osservazioni* (Statistics) [2020, 2021, 2022]  
 Course of *Sistemi Informativi Territoriali* (GIS) [2020, 2021]  
 Course of *Tecniche di rilievo e modellazione 3D per l'architettura* (3D modelling for architecture) [2020, 2021, 2022].

### Tutoring

Politecnico di Milano, 2021 - 2022

Tutor for the Summer School *Design and Execution of Topographic Surveys for Land Monitoring* at the Belvedere Glacier (Italian Alps) aimed at introducing BSc and MSc students to topographic fielworks in mountain environments.

### Internship

Politecnico di Milano, DICA, 2020

Conducted fielworks for surveying of bridges with UAV-photogrammetry, GNSS, Laser Scanner and Total station, as well as producing tecnical drawing from photogrammetric point clouds.

## EDUCATION

### MSc in Environmental and Land Planning Engineering

Politecnico di Milano, 2017 - 2020

Major in Land Monitoring and Diagnostics. Grade 110L/110.

### Visiting student for MSc thesis development

ETH Zürich, VAW, 2019 - 2020

MSc Thesis: *Evaluation of Airborne Image Velocimetry approaches with low-cost UAVs in riverine environments*. Supervisors: Prof. Livio Pinto, Dr. Martin Detert.

### Erasmus exchange

Aalto University (Helsinki), 2019

Semester spent abroad in Helsinki (Finland) for studying in an international environment

### BSc in Environmental and Land Planning Engineering

Politecnico di Milano, 2014 - 2017

BSc Thesis: *Snowpack surveys aimed at hydrological analysis: a case study carried out with UAVs and manual probing measurements on the Belvedere glacier (Macugnaga, Italian Alps)*. Grade 102/110.

## PROJECTS

ICEpy4D: a multi-purpose Python package for 4D Image-based Continuos monitoring of glaciers' Evolution with deep learning SfM and low-cost stereo-cameras (<https://github.com/franioli/icepy4d>).  
 Realization of an autonomous camera monitoring system by using low-cost IoT hardware, including Raspberry Pi Zero, Arduino Pro Mini and 4G HAT (Ioli et al., 2023).

## CONTACT

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Scholar: Francesco Ioli

## PROGRAMMING

Python ★★★★★

Matlab ★★★★★

C++ ★★★★★

Git ★★★★★

## PHOTOGRAMMETRY

Agisoft Metashape

Photomodeler

CloudCompare  
Colmap

## TOOLS

QGIS, ESRI ArcGIS

Leica Infinity, rtklib

Photoshop, Lightroom

GIMP, Inkscape

AutoCAD, ReCap

Latex

Terminal

Proxmox VE, TrueNas

## OPERATING SYSTEMS



## LANGUAGES

Italian: mother tongue  
 English: C1 (IELTS certificate)

## ACTIVITIES



- » Long-term photogrammetric monitoring of the deris-covered Belvedere Glacier (Italian Alps) with UAVs and historical aerial imageries for deriving glacier's volume and mass balance ([labmgf.dica.polimi.it/projects/belvedere](http://labmgf.dica.polimi.it/projects/belvedere); De Gaetani et al., 2021; Ioli et al., 2022).
- » UAV photogrammetry for structural 3D reconstruction and crack assessment ([labmgf.dica.polimi.it/projects/infrastructure-monitoring](http://labmgf.dica.polimi.it/projects/infrastructure-monitoring); Ioli et al., 2022; Gaspari et al., 2022).

## »»» PUBLICATIONS

- » Ioli, F., Bianchi, A., Cina, A., De Michele, C., Maschio, P., Passoni, D., Pinto, L., 2022. Mid-Term Monitoring of Glacier's Variations with UAVs: The Example of the Belvedere Glacier. *Remote Sensing* 14, 28
- » Ioli, F., Pinto, A., Pinto, L., 2022. UAV-Photogrammetry for Metric Evaluation of Concrete Bridge Cracks. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.* XLIII-B2-2022, 1025-1032
- » Gaspari, F., Ioli, F., Barbieri, F., Belcore, E., Pinto, L., 2022. Integration of UAV-Lidar and UAV-photogrammetry for Infrastructure Monitoring and Bridge Assessment. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.* XLIII-B2-2022, 995-1002
- » De Gaetani, C.I., Ioli, F., Pinto, L., 2021. Aerial and UAV Images for Photogrammetric Analysis of Belvedere Glacier Evolution in the Period 1977-2019. *Remote Sensing* 13, 3787.
- » Ioli, F., Pinto, L., and Ferrario, F., 2021. Low-cost Assisted Aerial Triangulation for Sub-decimeter Accuracy with non-RTK UAVs. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.* XLIII-B2-2021, 25-32
- » Ioli, F., Pinto, L., Passoni, D., Nova, V., Detert, M., 2020. Evaluation of Airborne Image Velocimetry approaches using low-cost UAVs in riverine Environments. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.* Vol.XLIII-B2-2020, 597-604.
- » For a complete and up-to-date publication list, visit Francesco Ioli Scholar page.

## »»» ADDITIONAL INFORMATION

- » Driving license: B
- » UAS license: EASA A2 Open Category, with license for critical standard scenarios
- » Professional qualification: *Esame di Stato* for Civil and Environmental Engineers

## »»» VOLUNTEER EXPERIENCE

» Scout chief: Children's educator in the Italian Scout association <i>AGESCI</i>	2017 - now
» Operazione Mato Grosso: Volunteer for charity organization <i>Operazione Mato Grosso</i>	2016 - 2017
» Libera. Associazioni, Nomi e Numeri contro le mafie: Volunteer for anti-mafia and civil rights association <i>Libera</i>	2012 - 2016