curriculum**vitae**

Francesco Verdoja

contacts

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about

Italian, 22.04.1988

Gyldénintie 7 D 43
00200 Helsinki
Finland

languages

Italian (mother tongue)
English (proficient, C2)

programming

Python, C++, ROS, Matlab, Java, PHP, HTML, JavaScript, SQL, Bash, LaTeX

updated: 30.07.2024

education

07.2024 **National Scientific Habilitation** — Ministry of University and Research, Italy
As Associate Prof. in computer science and computer science engineering

2014–2017 **Ph.D. cum laude** in Computer Science — University of Turin, Italy
Thesis on *The use of Graph Fourier Transform in image processing*

2010–2013 **M.Sc.** in Computer Science — University of Turin, Italy
Major in artificial intelligence and information management systems

2007–2010 **B.Sc. cum laude** in Computer Science — University of Turin, Italy

experience

2023–now **Academy Research Fellow** — National Research Council, Finland
PI for the Hypermaps research project

2022–now **Staff Scientist** — Aalto University, Finland
Tenured research position in intelligent mobile robotics

2020–2022 **Senior AI Scientist (part-time 20%)** — Silo.AI, Finland
Computer vision and machine learning R&D

2017–2022 **Postdoctoral Researcher (part-time 80%)** — Aalto University, Finland
Robotic perception and mapping

01–07.2017 **Postdoctoral Research Fellow** — University of Turin, Italy
Biometric image segmentation for diagnosis assistance

03–08.2015 **Research Intern** — National Institute of Informatics, Tokyo
Segmentation of 3D point-clouds

funding and grants

2023–2027 **Hypermaps** National Research Council, Finland
4-year research fellowship on closing the complexity gap in robotic mapping.
- **Role:** Principal investigator
- **Budget:** 834k€

2022–2024 **SANTTU: To reduce stress from machine & operator** Business Finland
2-year co-innovation project on the development of semi-autonomous assistance systems for heavy industrial machines.
- **Partners:** Aalto University (PI: Prof. Ville Kyrki), LUT-University, Oulu University, GIM Oy, Sandvik Oy, Ponsse Oy, Raute Oy, Mantsinen Oy
- **Role:** Project manager (Aalto), considerable involvement in proposal preparation, writing, and coordination
- **Budget:** 2124k€ total, 671k€ Aalto

2014–2017 **Ph.D. scholarship Sisvel Technology** University of Turin, Italy
3-year full Ph.D. scholarship
- **Value:** 41k€

awards

03.2024 **2023 Best Paper Award** IEEE Finland CSS/RAS/SMCS Joint Chapter
Season-Invariant GNSS-Denied Visual Localization for UAVs

09.2015 **Best 10% Paper** IEEE Int. Conf. on Image Processing (ICIP)
Superpixel-driven Graph Transform for Image Compression

07.2014 **Best Student Award** Microsoft Research Cambridge
Awarded at 2014 International Computer Vision Summer School (ICVSS)

research

output
- **publications:** 6 journals (RAS, IJRR, RA-L, MVAP), 17 conferences (ICRA, IROS, ICIP)
- **patents:** 3 patents
- **citations:** 543 citations, *h*-index 13 *(source: Google Scholar)*

A detailed list of publications is given as separate document

supervision
- **PhD:** currently advising 3 PhD students, advisor of 2 completed PhD thesis
- **MSc:** advisor of 12 master theses
- **BSc:** advisor of 4 bachelor theses

community
- **corresponding organizer:** IROS 2024 workshop on *From Learning-based to Foundation Models for Mapping*
- **co-organizer:** ICRA 2023 workshop on *Unconventional spatial representations*
- **program committee member:** ECMR 2021 workshop on *Robotic Map Assessment and Standardisation*
- **associate editor:** IROS 2022–2023 (robotic perception)
- **chair:** IROS 2018 session on *Motion and Path Planning for UAVs*
- **reviewer:** T-RO, TMM, RAS, IJRR, RA-L, MVAP, ICRA, IROS, and ICIP

service

2022–now **Aalto Robot Lab Coordinator** Aalto University, Finland
Coordinating the joint lab space of five reserach groups on robotics and control in the Dept. of Electrical Eng. and Automation.

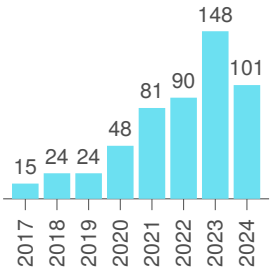
2022–now **Aalto Center for Autonomous Systems Coordinator** Aalto University, Finland
Coordinating the collaboration and dissemination efforts of ACAS

2014–2017 **Dept. Council Member** Dept. of Computer Science, University of Turin, Italy
Served two terms as elected representative of the Ph.D. students

publication**list**

Francesco Verdoja

citations	543
h-index	13
i10-index	17



source: Google Scholar
updated: 30.07.2024

- Francesco Verdoja, Tomasz Piotr Kucner, and Ville Kyrki (Oct. 2024a). "Bayesian Floor Field: Transferring people flow predictions across environments". In: *2024 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*. accepted. URL: https://arxiv.org/abs/2208.10851
- Francesco Verdoja, Tomasz Piotr Kucner, and Ville Kyrki (May 2024b). *Using occupancy priors to generalize people flow predictions*. Presented at the "Long-term Human Motion Prediction" workshop at the IEEE Int. Conf. on Robotics and Automation (ICRA). URL: https://motionpredictionicra2024.github.io
- Matti Pekkanen, Tsvetomila Mihaylova, Francesco Verdoja, and Ville Kyrki (May 2024). *Evaluating the quality of robotic visual-language maps*. Presented at the "Vision-Language Models for Navigation and Manipulation (VLMNM)" workshop at the IEEE Int. Conf. on Robotics and Automation (ICRA). URL: https://vlmnm-workshop.github.io
- Matti Pekkanen, Francesco Verdoja, and Ville Kyrki (May 2024). *Modeling movable objects improves localization in dynamic environments*. Presented at the "Future of Construction: Lifelong Learning Robots in Changing Construction Sites" workshop at the IEEE Int. Conf. on Robotics and Automation (ICRA). URL: https://construction-robots.github.io
- Shivam Chaubey, Francesco Verdoja, and Ville Kyrki (May 2024). *Jointly Learning Cost and Constraints from Demonstrations for Safe Trajectory Generation*. Presented at the "Towards Collaborative Partners: Design, Shared Control, and Robot Learning for Physical Human-Robot Interaction (pHRI)" workshop at the IEEE Int. Conf. on Robotics and Automation (ICRA). URL: https://sites.google.com/view/icra24-physical-hri
- Jouko Kinnari, Riccardo Renzulli, Francesco Verdoja, and Ville Kyrki (Oct. 2023). "LSVL: Large-scale season-invariant visual localization for UAVs". In: *Robotics and Autonomous Systems* 168. DOI: 10.1016/j.robot.2023.104497
- Jens Lundell, Francesco Verdoja, Tran Nguyen Le, Arsalan Mousavian, Dieter Fox, and Ville Kyrki (Oct. 2023). "Constrained Generative Sampling of 6-DoF Grasps". In: *2023 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 2940–2946. DOI: 10.1109/IROS55552.2023.10341344
- Tomasz Piotr Kucner, Martin Magnusson, Sariah Mghames, Luigi Palmieri, Francesco Verdoja, Chittaranjan Srinivas Swaminathan, Tomáš Krajník, Erik Schaffernicht, Nicola Bellotto, Marc Hanheide, and Achim J Lilienthal (Sept. 2023). "Survey of maps of dynamics for mobile robots". In: *The Int. Journal of Robotics Research* 42.11, pp. 977–1006. DOI: 10.1177/02783649231190428
- Jouko Kinnari, Francesco Verdoja, and Ville Kyrki (Oct. 2022). "Season-Invariant GNSS-Denied Visual Localization for UAVs". In: *IEEE Robotics and Automation Letters* 7.4, pp. 10232–10239. DOI: 10.1109/LRA.2022.3191038
- Francesco Verdoja, Tomasz Piotr Kucner, and Ville Kyrki (Aug. 2022). *Generating people flow from architecture of real unseen environments*. Presented at the "Perception and Navigation for Autonomous Robotics in Unstructured and Dynamic Environments (PNARUDE)" workshop at the IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS). URL: https://iros2022-pnarude.github.io

- Krishnananda Prabhu Sivananda, Francesco Verdoja, and Ville Kyrki (Aug. 2022). "Augmented Environment Representations with Complete Object Models". In: *2022 IEEE Int. Conf. on Robot and Human Interactive Communication (RO-MAN)*, pp. 1123–1130. DOI: 10.1109/RO-MAN53752.2022.9900516
- Jouko Kinnari, Francesco Verdoja, and Ville Kyrki (Dec. 2021). "GNSS-denied geolocalization of UAVs by visual matching of onboard camera images with orthophotos". In: *2021 IEEE Int. Conf. on Advanced Robotics (ICAR)*, pp. 555–562. DOI: 10.1109/ICAR53236.2021.9659333
- Jens Lundell, Francesco Verdoja, and Ville Kyrki (Oct. 2021). "DDGC: Generative Deep Dexterous Grasping in Clutter". In: *IEEE Robotics and Automation Letters* 6.4, pp. 6899–6906. DOI: 10.1109/LRA.2021.3096239
- Nils Dengler, Tobias Zaenker, Francesco Verdoja, and Maren Bennewitz (Aug. 2021). "Online Object-Oriented Semantic Mapping and Map Updating". In: *2021 Eur. Conf. on Mobile Robots (ECMR)*. DOI: 10.1109/ECMR50962.2021.9568817
- Francesco Verdoja and Ville Kyrki (July 2021). *Notes on the Behavior of MC Dropout*. Presented at the "Uncertainty and Robustness in Deep Learning (UDL)" workshop at the 2021 Int. Conf. on Machine Learning (ICML). URL: https://sites.google.com/view/udlworkshop2021
- Jens Lundell, Enric Corona, Tran Nguyen Le, Francesco Verdoja, Philippe Weinzaepfel, Grégory Rogez, Francesc Moreno-Noguer, and Ville Kyrki (May 2021). "Multi-FinGAN: Generative Coarse-To-Fine Sampling of Multi-Finger Grasps". In: *2021 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 4495–4501. DOI: 10.1109/ICRA48506.2021.9561228
- Tran Nguyen Le, Francesco Verdoja, Fares J. Abu-Dakka, and Ville Kyrki (Apr. 2021). "Probabilistic Surface Friction Estimation Based on Visual and Haptic Measurements". In: *IEEE Robotics and Automation Letters* 6.2, pp. 2838–2845. DOI: 10.1109/LRA.2021.3062585
- Tobias Zaenker, Francesco Verdoja, and Ville Kyrki (Sept. 2020). "Hypermap Mapping Framework and its Application to Autonomous Semantic Exploration". In: *2020 IEEE Int. Conf. on Multisensor Fusion and Integration for Intelligent Systems (MFI)*, pp. 133–139. DOI: 10.1109/MFI49285.2020.9235231
- Francesco Verdoja and Ville Kyrki (May 2020). *On the Potential of Smarter Multi-layer Maps*. Presented at the "Perception, Action, Learning (PAL)" workshop at the 2020 IEEE Int. Conf. on Robotics and Automation (ICRA). URL: https://mit-spark.github.io/PAL-ICRA2020
- Jens Lundell, Francesco Verdoja, and Ville Kyrki (May 2020). "Beyond Top-Grasps Through Scene Completion". In: *2020 IEEE Int. Conf. on Robotics and Automation (ICRA)*, pp. 545–551. DOI: 10.1109/ICRA40945.2020.9197320
- Francesco Verdoja and Marco Grangetto (Jan. 2020). "Graph Laplacian for image anomaly detection". In: *Machine Vision and Applications* 31.11 (1). DOI: 10.1007/s00138-020-01059-4
- Jens Lundell, Francesco Verdoja, and Ville Kyrki (Nov. 2019). "Robust Grasp Planning Over Uncertain Shape Completions". In: *2019 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*. Macau, China, pp. 1526–1532. DOI: 10.1109/IROS40897.2019.8967816
- Francesco Verdoja, Jens Lundell, and Ville Kyrki (Oct. 2019). "Deep Network Uncertainty Maps for Indoor Navigation". In: *2019 IEEE-RAS Int. Conf. on Humanoid Robots (Humanoids)*. Toronto, Canada, pp. 112–119. DOI: 10.1109/Humanoids43949.2019.9035016

- Jens Lundell, Francesco Verdoja, and Ville Kyrki (Oct. 2018). “Hallucinating robots: Inferring obstacle distances from partial laser measurements”. In: *2018 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*. Madrid, Spain, pp. 4781–4787. DOI: 10.1109/IROS.2018.8594399
- Francesco Verdoja, Diego Thomas, and Akihiro Sugimoto (July 2017). “Fast 3D point cloud segmentation using supervoxels with geometry and color for 3D scene understanding”. In: *2017 IEEE Int. Conf. on Multimedia and Expo (ICME)*. Hong Kong, pp. 1285–1290. DOI: 10.1109/ICME.2017.8019382
- Francesco Verdoja and Marco Grangetto (Mar. 2017a). “Directional graph weight prediction for image compression”. In: *2017 IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP)*. New Orleans, LA, pp. 1517–1521. DOI: 10.1109/ICASSP.2017.7952410
- Francesco Verdoja and Marco Grangetto (Mar. 2017b). “Efficient representation of segmentation contours using chain codes”. In: *2017 IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP)*. New Orleans, LA, pp. 1462–1466. DOI: 10.1109/ICASSP.2017.7952399
- Francesco Verdoja, Barbara Bonafè, Davide Cavagnino, Marco Grangetto, Christian Bracco, Teresio Varetto, Manuela Racca, and Michele Stasi (Sept. 2016). “Global and local anomaly detectors for tumor segmentation in dynamic PET acquisitions”. In: *2016 IEEE Int. Conf. on Image Processing (ICIP)*. Phoenix, AZ, pp. 4131–4135. DOI: 10.1109/ICIP.2016.7533137
- Francesco Verdoja and Marco Grangetto (Sept. 2015). “Fast Superpixel-Based Hierarchical Approach to Image Segmentation”. In: *Image Analysis and Processing—ICIAP 2015*. Lecture Notes in Computer Science 9279. Springer, pp. 364–374. DOI: 10.1007/978-3-319-23231-7_33
- Giulia Fracastoro, Francesco Verdoja, Marco Grangetto, and Enrico Magli (Sept. 2015). “Superpixel-driven Graph Transform for Image Compression”. In: *2015 IEEE Int. Conf. on Image Processing (ICIP)*. Quebec City, Canada, pp. 2631–2635. DOI: 10.1109/ICIP.2015.7351279
- Francesco Verdoja, Marco Grangetto, Christian Bracco, Teresio Varetto, Manuela Racca, and Michele Stasi (Oct. 2014). “Automatic method for tumor segmentation from 3-points dynamic PET acquisitions”. In: *2014 IEEE Int. Conf. on Image Processing (ICIP)*. Paris, France, pp. 937–941. DOI: 10.1109/ICIP.2014.7025188

patents

- Marco Grangetto and Francesco Verdoja (Sept. 2018a). “Method and Apparatus for Encoding and Decoding Digital Images or Video Streams”. Pat. WO2018158735 (A1)
- Marco Grangetto and Francesco Verdoja (Sept. 2018b). “Methods and Apparatuses for Encoding and Decoding Superpixel Borders”. Pat. WO2018158738 (A1)
- Giulia Fracastoro, Enrico Magli, Francesco Verdoja, and Marco Grangetto (Mar. 2017). “Methods and Apparatuses for Encoding and Decoding Digital Images Through Superpixels”. Pat. WO2017051358 (A1)