

curriculumvitae

Francesco Verdoja



contacts

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about

Italian, 22.04.1988

languages

Italian (native)
English (proficient, C2)
Finnish (basic, A1)

updated: 13.01.2026

degrees

07.2024	National Scientific Habilitation As Associate Professor in computer science and computer engineering	Ministry of University and Research, Italy
2014–2017	Ph.D. cum laude in Computer Science Thesis on <i>The use of Graph Fourier Transform in image processing</i>	University of Turin, Italy
2010–2013	M.Sc. in Computer Science Major in artificial intelligence and information management systems	University of Turin, Italy
2007–2010	B.Sc. cum laude in Computer Science	University of Turin, Italy

other education

04–06.2021	A! Peda Intro Pedagogical training (5 ECTS)	Aalto University, Helsinki
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experience

2023–now	Academy Research Fellow <i>PI for the Hypermaps research project</i>	National Research Council, Finland
2022–now	Staff Scientist <i>Research position in intelligent mobile robotics</i>	Aalto University, Finland
2020–2022	Senior AI Scientist (part-time 20%) <i>Computer vision and machine learning R&D</i>	AMD Silo AI, Finland
2017–2022	Postdoctoral Researcher (part-time 80%) <i>Robotic perception and mapping</i>	Aalto University, Finland
01–07.2017	Postdoctoral Research Fellow <i>Biometric image segmentation for diagnosis assistance</i>	University of Turin, Italy
03–08.2015	Research Intern <i>Segmentation of 3D point-clouds</i>	National Institute of Informatics, Tokyo

teaching experience

2018–now	Responsible Instructor Labwork on manipulation with industrial robots of the bachelor course <i>Laboratory exercises in Automation and Control Engineering</i> (ELEC-C1310) ► Duties: Labwork development, organization, and coordination	Aalto University, Finland
2017–2018	Responsible Teacher <i>Information systems and corporate network management</i> ► Duties: Course development, lecturing, and grading	School of Management, University of Turin, Italy
2016–2017	Teaching Fellow <i>Information systems</i> ► Duties: Teaching and grading exercise sessions	Dept. of Business and Statistics, University of Turin, Italy
2015–2017	Teaching Assistant <i>Programming I & II, Discrete Mathematics, and Logic</i>	Dept. of Computer Science, University of Turin, Italy

funding and grants

2023–2027	Hypermaps 4-year research fellowship on closing the complexity gap in robotic mapping. ► Role: Principal investigator ► Budget: 834k€ (funded at 70%), covering the PI and one PhD student ► Acceptance rate: 15% of applications	National Research Council, Finland
2023–2027	Contract Research Multiple projects on AI applied to environment perception and manipulation. ► Role: Company contact, proposal preparation, project manager, technical advising, technical work ► Budget: 727k€ combined	Sandvik Oy, John Deere Forestry Oy
2022–2024	SANTTU: To reduce stress from machine & operator 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€ for Aalto	Business Finland
2014–2017	Ph.D. scholarship Sisvel Technology 3-year full Ph.D. scholarship ► Value: 41k€	University of Turin, Italy

awards

10.2024	Best Safety, Security, and Rescue Robotics Paper Award finalist IEEE Int. Conf. on Intelligent Robots and Systems (IROS) <i>Jointly Learning Cost and Constraints from Demonstrations for Safe Trajectory Generation</i>	
09.2024	Best Paper Award 2022 <i>Season-Invariant GNSS-Denied Visual Localization for UAVs</i>	IEEE Finland CSS/RAS/SMCS Joint Chapter
09.2015	Best 10% Paper <i>Superpixel-driven Graph Transform for Image Compression</i>	IEEE Int. Conf. on Image Processing (ICIP)
07.2014	Best Student Award Awarded at 2014 International Computer Vision Summer School (ICVSS)	Microsoft Research Cambridge

research

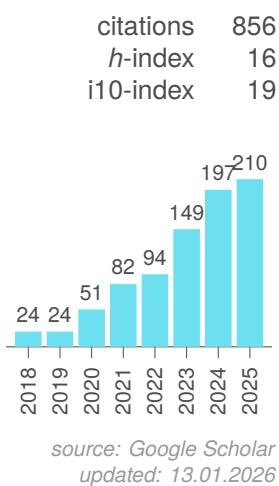
output	<ul style="list-style-type: none">▶ publications: 6 journals (RAS, IJRR, RA-L, MVAP), 23 conferences (ICRA, IROS, ICIP)▶ patents: 3 patents▶ citations: 856 citations, <i>h</i>-index 16 (<i>source: Google Scholar</i>) <i>A detailed list of publications is given as separate document</i>
supervision	<ul style="list-style-type: none">▶ PhD: currently advising 5 PhD students, advisor of 2 completed PhD thesis▶ MSc: supervisor of 1 master thesis, advisor of 15 master theses▶ BSc: advisor of 4 bachelor theses, academic advisor for 12 students
community	<ul style="list-style-type: none">▶ PhD dissertation pre-examiner and committee member: Dept. of Computer Science, University of Turin, Italy, 2023▶ corresponding organizer: IROS 2024 workshop on <i>From Learning-based to Foundation Models for Mapping</i>▶ organizer: ICRA 2023 workshop on <i>Unconventional spatial representations</i>▶ program committee member: ECMR 2021 workshop on <i>Robotic Map Assessment and Standardisation</i>▶ associate editor: IROS 2022–2023 (robotic perception)▶ chair: IROS 2024 <i>SLAM IV</i> and <i>Mapping II</i> sessions, IROS 2018 <i>Motion and Path Planning for UAVs</i> session▶ reviewer: T-RO, IJRR, TMM, RAS, RA-L, MVAP, ICRA, IROS, ICIP▶ member: ELLIS, IEEE Robotics and Automation Society (Senior)

service

2025–now	ELEC Equality Diversity & Inclusion Group Member Aalto University, Finland Serving a two-year term in the Equality, Diversity, and Inclusion (EDI) group of the School of Electrical Engineering (ELEC).
2022–now	Aalto Robot Lab Coordinator Aalto University, Finland Coordinating the joint lab space, part of the Aalto MIDAS infrastructure. The space is shared by five research groups in robotics and control of the School of Electrical Engineering.
2022–2023	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



- Phuoc Nguyen, Francesco Verdoja, and Ville Kyrki (Oct. 2025a). *Event-Grounding Graph: Unified Spatio-Temporal Scene Graph from Robotic Observations*. IEEE Robotics and Automation Letters (submitted). URL: <http://arxiv.org/abs/2510.18697>
- Matti Pekkanen, Francesco Verdoja, and Ville Kyrki (Oct. 2025). *QuASH: Using Natural-Language Heuristics to Query Visual-Language Robotic Maps*. 2026 IEEE Int. Conf. on Robotics & Automation (ICRA) (submitted). URL: <http://arxiv.org/abs/2510.14546>
- Matti Pekkanen, Tsvetomila Mihaylova, Francesco Verdoja, and Ville Kyrki (Oct. 2025). “Do Visual-Language Grid Maps Capture Latent Semantics?” In: *2025 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*. IEEE. URL: <http://arxiv.org/abs/2403.10117>
- Phuoc Nguyen, Francesco Verdoja, and Ville Kyrki (Oct. 2025b). “REACT: Real-time Efficient Attribute Clustering and Transfer for Updatable 3D Scene Graph”. In: *2025 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*. IEEE. URL: <http://arxiv.org/abs/2503.03412>
- Yuying Zhang, Wenyan Yang, Francesco Verdoja, Ville Kyrki, and Joni Pajarinen (Sept. 2025b). *ReMoBot: Retrieval-Based Few-Shot Imitation Learning for Mobile Manipulation with Vision Foundation Models*. 2026 IEEE Int. Conf. on Robotics & Automation (ICRA) (submitted). URL: <http://arxiv.org/abs/2408.15919>
- Yuying Zhang, Wenyan Yang, Francesco Verdoja, Ville Kyrki, and Joni Pajarinen (Sept. 2025c). *ReMoBot: Retrieval-Based Few-Shot Imitation Learning for Mobile Manipulation with Vision Foundation Models*. Presented at the “RemembeRL” workshop at the 2025 Conference on Robot Learning (CoRL). URL: <https://rememberl-corl25.github.io>
- Yuying Zhang, Kevin Sebastian Luck, Francesco Verdoja, Ville Kyrki, and Joni Pajarinen (July 2025a). *MoDeSuite: Robot Learning Task Suite for Benchmarking Mobile Manipulation with Deformable Objects*. IEEE Robotics and Automation Letters (submitted). URL: <https://arxiv.org/abs/2507.21796>
- Shivam Choubey, Francesco Verdoja, Shankar Deka, and Ville Kyrki (July 2025). *Minimal Intervention Shared Control with Guaranteed Safety under Non-Convex Constraints*. 2026 IEEE Int. Conf. on Robotics & Automation (ICRA) (submitted). URL: <https://arxiv.org/abs/2507.02438>
- 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)*, pp. 12801–12807. DOI: [10.1109/IROS58592.2024.10802300](https://doi.org/10.1109/IROS58592.2024.10802300)
- Shivam Choubey, Francesco Verdoja, and Ville Kyrki (Oct. 2024a). “Jointly Learning Cost and Constraints from Demonstrations for Safe Trajectory Generation”. In: *2024 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, pp. 3635–3642. DOI: [10.1109/IROS58592.2024.10802533](https://doi.org/10.1109/IROS58592.2024.10802533)
- Matti Pekkanen, Francesco Verdoja, and Ville Kyrki (Sept. 2024a). “Localization Under Consistent Assumptions Over Dynamics”. In: *2024 IEEE Int. Conf. on Multisensor Fusion and Integration for Intelligent Systems (MFI)*. DOI: [10.1109/MFI62651.2024.10705760](https://doi.org/10.1109/MFI62651.2024.10705760)

- Matti Pekkanen, Francesco Verdoja, and Ville Kyrki (Sept. 2024c). “Object-Oriented Grid Mapping in Dynamic Environments”. In: *2024 IEEE Int. Conf. on Multisensor Fusion and Integration for Intelligent Systems (MFI)*. doi: 10.1109/MFI62651.2024.10705762
- 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, Francesco Verdoja, and Ville Kyrki (May 2024b). *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>
- 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>
- Shivam Chaudhary, Francesco Verdoja, and Ville Kyrki (May 2024b). *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>
- 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
- 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
- Tomasz Piotr Kucner, Martin Magnusson, Sariah Mghames, Luigi Palmieri, Francesco Verdoja, Chittaranjan Srinivas Swaminathan, Tomáš Krajiník, 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 (Oct. 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 geolocation of UAVs by visual matching of onboard camera images with orthophoto-

tos". 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 under-

standing". 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
- Christian Bracco, Francesco Verdoja, Marco Grangetto, Amalia Di Dia, Manuela Racca, Teresio Varetto, and Michele Stasi (Feb. 2016). "Automatic GTV contouring applying anomaly detection algorithm on dynamic FDG PET images". In: *Abstracts of the 9th National Congress of the Associazione Italiana di Fisica Medica*. Vol. 32. Physica Medica 1, p. 99. doi: 10.1016/j.ejmp.2016.01.343
- 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)