

Alberto Pretto

Curriculum Vitae

Address

Alberto Pretto
Department of Information Engineering - University of Padova
Via Gradenigo 6/A 35131 - Padova - Italy

Room 321b (DEI/G building)
Phone +39 049 827 7638
Mobile +39 346 351 3263
Mail alberto.pretto@dei.unipd.it
Homepage <https://albertopretto.altervista.org>

Research Interests

Robotics and Computer Vision

Current Position

Since November 2022 **Associate professor at Department of Information Engineering (University of Padova).**

Research Positions/Experiences

- September 2020 - October 2022 **Tenure track assistant professor at Department of Information Engineering (University of Padova).**
- October 2013 - September 2018 **Fixed term assistant professor at Department of Computer, Control, and Management Engineering, Sapienza University of Rome.**
- February - March 2016 **Visiting researcher at Prof. Cyrill Stachniss' Department of Photogrammetry, University of Bonn, Bonn (Germany).**
- Main research activities: Images pixelwise segmentation with Convolutional Neural Networks.
- January 2012 - September 2013 **Post-doc at Department of Information Engineering (University of Padova).**
- Main research activities: Visual exploration and navigation for mobile robots.
- December 2010 - February 2011, March 2012 - May 2012 **Visiting researcher at Prof. Stefano Soatto's UCLA Vision Laboratory, University of California, Los Angeles (USA).**
- Main research activities: Visual inertial navigation, visual exploration for object recognition.
- January 2009 - December 2010 **Post-doc at Department of Information Engineering (University of Padova).**
- Main research activities: Real-time dense Reconstruction of 3D scenes for mobile robots.
- February - May 2010 **Visiting researcher at Prof. Stefano Soatto's UCLA Vision Laboratory, University of California, Los Angeles (USA).**
- Main research activities: Vision based navigation and object detection, dense 3D mapping and navigation using omnidirectional vision.
- February - April 2008 **Visiting researcher at Prof. Wolfram Burgard's Autonomous Intelligent Systems Laboratory (AIS), University of Freiburg (Germany)..**

- Main research activities: Motion blur invariant visual features and visual odometry.

January
2006–July 2009

Ph.D. student in Information Engineering at Department of Information Engineering (University of Padova).

- Main research activities: Visual Odometry and Vision based Simultaneous Localization and Mapping for Humanoid Robots, Ph.D. Thesis with title: “Visual-SLAM for Humanoid Robots”

November
2003–March
2004

Research fellowship at prof. Enrico Pagello’s Intelligent Autonomous Systems Laboratory (IAS-Lab, University of Padova) .

- Main research activities: Vision based localization for mobile robots.

Awards

Best Poster Award, at “5th Italian Conference of Robotics and Intelligent Machines”, Roma, October 20-22, 2023.

IEEE Robotics & Automation Magazine Best Paper Award, 2022.

Emerging Technologies Best WIP Paper Award, at “25th IEEE International Conference on Emerging Technologies and Factory Automation” (ETFA), September 8-11, 2020.

Best Student Paper Award finalist (runner up), at “2018 IEEE International Conference on Simulation, Modeling, and Programming for Autonomous Robots” (SIMPAN), May 16-19, 2018 Brisbane, Australia.

Best Student Paper Award finalist, at “International Conference on Intelligent Autonomous Systems” (IAS), July 3-7, 2016 Shanghai, China.

Best Paper Award, at “IEEE International Workshop Towards Smart Communications and Network technologies applied on Autonomous Systems”, GLOBECOM 2010, December 6-10, 2010, Florida, USA.

Grants

From Dec. 2021

Coordinator of the “SubEye - Subsea Perception for New Generation Underwater Vehicles” Italian research project, *The SubEye project is funded by the “Uni-Impresa 2020” Italian programme (total grant 100,000 Euros).*

2016-2018

Coordinator of the “FlexSight - Flexible and Accurate Recognition and Localization System of Deformable Objects for Pick&Place Robots” European research project, *The FlexSight project is funded by the European Community’s FP7/Echord++ programme (total grant 300,000 Euros).*

2015-2018

Co-Principal Investigator of the “Flourish - Aerial Data Collection and Analysis, and Automated Ground Intervention for Precision Farming” European research Project, *The Flourish project is funded by the European Community’s Horizon 2020 programme under grant agreement no. 644227-Flourish (total grant 4,780,048 Euros).*

2012-2013

“Giovani Studiosi” grant, *from University of Padova (19,500 Euros). Reserach project title: “TIDY-UP: Enhanced Visual Exploration for Robot Navigation and Object Recognition” (personal research project for the 2-years post-doc fellowship).*

Education

2006–2009

Ph.D. in Information Engineering, *The University of Padova.*

Ph.D. School in Information Engineering - Ph.D. Thesis with title: “Visual-SLAM for Humanoid Robots”

1996–2003

“Laurea” (M.Sc.) in Information Engineering, *The University of Padova.*

Courses and Schools

Courses for Ph.D. Students.

- Applied linear algebra
- Techniques for the Effective Transmission of Multimedia Signals
- Applied functional analysis
- Statistical Methods
- Pattern Recognition and Machine Learning
- 3D Reconstruction from Images
- Software and Algorithms for Scientific Computing

Summer Schools.

- "SLAM Summer School 2006", 27-31 August 2006, University of Oxford, Oxford (UK).
- "Summer School on Perception and Sensor Fusion in Mobile Robotics", 1-7 September 2005, Ancona (Italy).
- "Summer School on Advanced Robotics", ACAI-2003, International University, Bremen (Germany).

Professional Positions

Charter member, CEO and R&D manager, FlexSight Srl.

January
2019-September
2020

Successful projects:

- Design and development of the hardware and software of a Smart RGB-D sensor prototype.
- Design and development of a multi camera rig system for 3D reconstruction of human limbs.

Charter member and CEO (until October 2008), technical consultant and senior software analyst , IT+Robotics Srl.

May 2005 -
September 2013
October
2018-September
2020

Successful projects:

- Algorithms for goods localization using motes with radio frequency and ultra-sound communication.
- Hardware/software robotic platform for a mobile sculpture able to autonomously interact and speak with people (video contribution accepted for the Video Proceedings of IEEE ICRA 2007).
- TCP/IP stack and WEB server for an embedded custom-built system based on Atmel ARM7 microcontroller.
- Integrated PTZ/omnidirectional cameras system with advanced targets tracking capabilities.
- Quality control system for glass bottle inspection based on machine vision algorithms and active illumination.
- Custom built industrial electronic boards (x86) with RTAIXLinux based Hard real-time system, graphic user interface, data logging and connectivity functions.
- Technical partner of an European project to develop a framework for teacher education courses in order to enable teachers to implement a robotics-enhanced constructivist learning in school classrooms.
- Custom built mini carrier-board (RS-232, USB Host, Ethernet, WiFi, MicroSD, Quickcapture interfaces) for a credit-card form factor embedded platform based on XScale ARM PXA 270/320 microcontrollers. Development of the Quickcapture interface device driver for a customized Linux system.
- Software classification (Class C software) for embedded systems (Microchip PIC and ARM based platforms) which perform critical functions (EN 298:93, EN 60730, EN 60730-2-9 international standards).
- State-of-the-art vision based bin-picking systems for robotic manipulators.
- cROS [74][46], a lightweight, single thread, full ANSI C ROS (www.ros.org) client library, that enables C programmers to quickly interface with ROS Topics, Services, and Parameters.

March 2004 –
December 2005

Technical consultant, software analyst and developer, Padova Ricerche/Trastec Scpa.

Successful projects:

- Computer-aided dredging system: multisensor fusion system (differential GPS, inclinometers, sonars, electronic compass, motor encoders, ...) with 3D mathematical sea bottom reconstruction and directX based 3D GUI.
- Custom built linux-based hard real-time system (x86) for embedded low-cost computer with graphics control tools and connectivity.
- "Software Development Kits" (SDKs) for custom-built electronics boards (CAN bus controllers, motor controls boards, ...).
- Distance learning linux-based system: mpeg4 video multi-streaming (up to 4 high-res sources), mp3 audio multi-streaming (up to 10 sources), multicast channel, remote desktop, real-time remote direction.

Research Activities

The topics covered in the research activity carried out are presented, highlighting some of the contributions made for each. The list of publications is provided at the end of this document.

- Detection, 6DoF pose estimation, and manipulation of objects for industrial applications with RGB sensors [68], [42], [73], RGB-D [31], [35], [47] and stereo [1]. New algorithms have been proposed to solve the problem of localizing "textureless" objects, leveraging deep-learning based detection algorithms and proposing new object registration algorithms based on template matching. A differentiable version of the RANSAC algorithm has been proposed to allow the estimation of key points of objects in data-driven algorithms.
- Semantic interpretation of 3D data for autonomous driving, with particular attention to real-time performance [3], [22], [23]. Efficient hierarchical integration algorithms of geometric features have been proposed.
- Synthesis of new views of a 3D scene with Neural Radiance Field (NeRF) [18]. A new framework has been introduced that combines multiple regularization techniques to improve synthesis in case of input datasets composed of few images ("few shot setting").
- SLAM (Simultaneous Localization and Mapping) approaches, both metric [16] and topological [12], [63]. An incremental method for integrating loop-closure detection capable of effectively and robustly handling outliers has been proposed. A new image descriptor based on Wavelet Transform for real-time image-based localization on robots with limited computing power has been proposed.
- Image classification and segmentation based on CNN (Convolutional Neural Network) [2] with specific applications for autonomous agricultural robots [4], [7], [33], [39], [40]. The integration of "zero shot" segmenters based on prompts into existing segmentation methods has been proposed. New methodologies for training CNNs and data augmentation for semantic image classification that minimize the effort of annotating training data have been proposed.
- Sensor calibration: RGB-D cameras [9], [45], Inertial Measurement Unit (IMU) [43], [44], [72], and Hand-Eye calibration [19], [21]. A new unified methodology for calibrating RGB-D cameras that integrates a local distortion correction map with a global systematic error correction map has been proposed. A variation to the "multi-position" IMU calibration technique that allows for automation and process improvement has been proposed. New multi-robot/multi-sensor Hand-Eye calibration techniques based on graph-based optimization techniques have been proposed.
- Task and motion planning for anthropomorphic robots and mobile manipulators operating in dynamic environments with non-ideal sensors [5]. Approximated techniques based on a moving horizon of actions have been developed.
- Control and navigation of autonomous drones (UAV) based on vision and NMPC (Nonlinear Model Predictive Control) controllers [29], [36], [38]. New real-time control and motion planning systems for UAVs that include perceptual constraints (e.g., constant framing of a target during motion) directly within the NMPC controller have been proposed.

- Vision-based navigation and 3D reconstruction in outdoor agricultural environments [8], [10], [34]. Various solutions for 3D positioning and 3D map registration for heterogeneous agricultural robots that exploit sensor redundancy, environment and action specificity, and alternative multimodal representations have been proposed.
- Navigation and perception algorithms for interactive autonomous robots [62], [64] and "guiding robots" [24] with omnidirectional vision. Among others, new techniques for people detection and people tracking on panoramic images with validation in real environments and situations have been proposed.
- Visual odometry based on features robust to motion blur [59], [60] and integration with inertial sensors [49]: new techniques for extracting and describing visual saliences that explicitly take into account the undesirable effects introduced by fast camera movements, with applications in vision-based ego-motion estimation, have been introduced; probabilistic filtering of a motion model that minimizes problems derived from sudden movements has been introduced in the prediction phase.
- Vision-based navigation and 3D reconstruction in outdoor urban environments [50], [53]: a new method of 3D reconstruction from omnidirectional images based on Delaunay triangulation and direct minimization of photometric error has been introduced.
- Robot localization and mapping based on "smart objects" and wireless networks [11], [51], [57]. The objects of the proposed system are equipped with wireless sensors capable of communicating with other devices present in the surrounding environment and sending information about their appearance useful for locating the object in question through a camera.
- Intelligent vision sensors with thermal cameras [55], [58] and omnidirectional cameras [56]. New ensembles of sensors and integrated actuators (e.g., pan-tilt-zoom cameras, thermal cameras, omnidirectional cameras) and related perception algorithms have been proposed, in order to reconstruct temperature maps of large surfaces or perform multiple person tracking.
- Mobile robot localization based on omnidirectional vision and Monte Carlo algorithms [13], [65], [67]. New algorithms for interpreting omnidirectional images and new probabilistic filtering techniques based on particle filters have been proposed.

Ph.D. Related Activities

Ph.D. Committee Memberships.

- 2024 External examiner for the Ph.D. final examination (15 Ph.D. candidates), Ph.D. Program in Computer Engineering, Sapienza University of Rome
- 2023 External examiner for the Ph.D. final examination (3 Ph.D. candidates), Ph.D. Program in Information Technologies, University of Parma

Ph.D. Student Admission Commission.

- 2023-2024 Member of the external commission for admitting Ph.D. students to the Ph.D. Program in Robotics and Intelligent Machines, University Of Genoa
- 2023 Member of the faculty commission for admitting Ph.D. students to the Ph.D. Program in Information Engineering, University of Padova

Advisor of the following Ph.D. students.

- Since 2023 Wanmeng Li, Ph.D. Program in Information Engineering, University of Padova
- Since 2022 Daniel Fusaro, Ph.D. Program in Information Engineering, University of Padova
- Since 2021 Emilio Olivastri, Ph.D. Program in Information Engineering, University of Padova
- Since 2021 Matteo Bonotto, Ph.D. Program in Information Engineering, University of Padova
- 2019-2023 Daniele Evangelista, Ph.D. Program in Information Engineering, University of Padova (co-advisor with Prof. Emanuele Menegatti)
- 2016-2020 Marco Imperoli, Ph.D. Program in Computer Engineering, Sapienza University of Rome

2016-2020 Ciro Potena, Ph.D. Program in Computer Engineering, Sapienza University of Rome (co-advisor with Prof. Daniele Nardi)

Teaching Activities

Sapienza University of Rome.

2016-2018 Lecturer in the “Seminars in Artificial Intelligence and Robotics” course, 24 hours.
2016-2018 Lecturer in the “Programming Techniques” course, 48 hours.
2014-2016 Lecturer in the “Computer Programming” course, 48 hours.
2013-2014 Lecturer in the “Computer Networks and Operating Systems” course, 48 hours.

University of Padova.

2023-2024 Lecturer in the “3D Data Processing” course, 48 hours.
2023-2024 Teacher assistant in the “Intelligent Robotics” course, 6 hours.
2023-2024 Lecturer in the “Introduction to Computer Science” course, 72 hours.
2022-2023 Lecturer in the “3D Data Processing” course, 48 hours.
2022-2023 Teacher assistant in “Intelligent Robotics” course, 6 hours.
2022-2023 Lecturer in the “Introduction to Computer Science” course, 72 hours.
2021-2022 Lecturer in the “3D Data Processing” course, 40 hours.
2021-2022 Teacher assistant in the “Autonomous Robotics” course, 6 hours.
2021-2022 Lecturer in the “Introduction to Computer Science” course, 48 hours.
2020-2021 Lecturer in the “Computer Vision” course, 32 hours.
2020-2021 Lecturer in the “Introduction to Computer Science” course, 48 hours.
2020-2021 Teacher assistant in the “Autonomous Robotics” course, 12 hours.
2019-2020 Lecturer in the “Computer Vision” course, 32 hours.
2019-2020 Teacher assistant in the “Autonomous Robotics” course, 12 hours.
2018-2019 Teacher assistant in the “Autonomous Robotics” course, 8 hours.
2013-2014 Lecturer in the “Programming Languages for Industrial Systems” course, 24 hours.
2012-2013 Lecturer in the “Programming Languages for Industrial Systems” course, 24 hours.
2012-2013 Teacher assistant in the “Autonomous Robotics” course, 10 hours.
2011-2012 Lecturer in the “Programming Languages for Industrial Systems” course, 26 hours.
2010-2011 Lecturer in the “Programming Languages for Industrial Systems” course, 54 hours.
2010-2011 Teacher assistant in the “Autonomous Robotics” course, 4 hours.
2009-2010 Teacher assistant in the “Autonomous Robotics” course, 10 hours.
2009-2010 Teacher assistant in the “Industrial Automation” course, 16 hours.
2008-2009 Teacher assistant in the “Programming Embedded Systems” course, 20 hours.
2008-2009 Teacher assistant in the “Autonomous Robotics” course, 14 hours.
2007-2008 Teacher assistant in the “Robotics” course, 10 hours.
2006-2007 Teacher assistant in the “Information Systems” course, 4 hours.
2006-2007 Teacher assistant in the “Robotics” course, 6 hours.
2006-2007 Laboratory tutor in the “Robotics” course, 12 hours.

Professional Activities

Area Chair.

- “International Conference on Image Analysis and Processing (ICIAP)”, 2023

Associate Editor.

- “IEEE Robotics & Automation Magazine”, from 2023
- “IEEE International Conference on Robotics and Automation (ICRA)”, 2021, 2022, 2023, 2024
- “IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)”, 2015, 2016, 2017, 2023, 2024
- “European Conference on Mobile Robots (ECMR)”, 2023
- “International Conference on Intelligent Autonomous Systems (IAS)”, 2023

Program Committee Member.

- “International Conference on Computer Vision Systems (ICVS)” - 2023
- “The 1st Workshop on Artificial Intelligence for Cultural Heritage (AI4CH)” - 2022, 2023
- “International Conference on Intelligent Autonomous Systems (IAS)” - 2014, 2020, 2022
- “International Joint Conference on Artificial Intelligence (IJCAI)” - 2015, 2017, 2018, 2019
- “European Conference on Mobile Robots (ECMR)” - 2013, 2015, 2017, 2019, 2021
- “IEEE International Symposium on Robot and Human Interactive Communication (IEEE RO-MAN)” - 2014
- “Robotics: Science and Systems Conference (RSS) - 2011
- “IEEE ICRA Workshop on Omnidirectional Robot Vision” - 2010)
- “Workshop on Teaching with robotics: didactic approaches and experiences” - 2008
- “AAMAS Workshop on Formal Models and Methods for Multi-Robot Systems” - 2008

Invited speaker.

- “Industrial Forum: From Autonomous Systems to Intelligent Manufacturing for Industrie 4.0”, July 7, 2016, National Exhibition and Convention Center, Shanghai, China

Other activities.

- Publicity Chair at “International Conference on Intelligent Autonomous Systems (IAS)” - 2014

Journals Reviewer, (At least one revision for each reported year).

- IEEE Transactions on Robotics - 2009, 2016, 2018, 2022
- IEEE Transactions on Circuits and Systems for Video Technology - 2022
- IEEE Robotics & Automation Letters - 2017, 2018, 2019, 2020, 2021, 2024
- Robotics and Autonomous Systems Journal (RAS) - 2009, 2014, 2015, 2017, 2021, 2023
- Computer Vision and Image Understanding - 2014
- Advanced Robotics (journal) - 2012
- Sensors (journal) - 2011
- IEEE Robotics & Automation Magazine - 2010

Conferences Reviewer, (At least one revision for each reported year).

- IEEE International Conference on Robotics and Automation (ICRA) - 2007, 2009, 2012, 2013, 2014, 2015, 2016, 2017, 2019
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) - 2006, 2010, 2011, 2012, 2013, 2014, 2018, 2019, 2020
- IFAC World Congress - 2020
- International Conference on Unmanned Aerial Vehicles in Geomatics (UAV-g) - 2017
- International Joint Conference on Artificial Intelligence (IJCAI) - 2016

- AAAI Conference on Artificial Intelligence - 2012, 2014
- IEEE-RAS International Conference on Humanoid Robots - 2013
- International Conference on Intelligent Autonomous Systems (IAS) - 2012
- European Conference on Mobile Robots (ECMR) - 2011
- European Signal Processing Conference (EUSIPCO) - 2011
- Robocup International Symposium - 2011
- IEEE ICRA10 Workshop on Omnidirectional Robot Vision - 2010
- International Conference on Simulation, Modeling and Programming for Autonomous Robots (SIMPAN) - 2010
- Workshop on Humanoid Soccer Robots - IEEE Humanoids conference - 2010
- International Symposium on Mechatronics and its Applications (ISMA) - 2009
- Workshop on "Teaching with robotics" - SIMPAR Conference - 2008
- Distributed Autonomous Robotic Systems (DARS) - 2006
- IEEE International Conference on Robotics and Biomimetics (ROBIO) - 2006

Publications

Journal Papers

- [1] I. Donadi and A. Pretto. **KVN: Keypoints Voting Network with Differentiable RANSAC for Stereo Pose Estimation**, In: IEEE Robotics and Automation Letters, vol. 9, no. 4, pp. 3498-3505, April 2024, DOI: 10.1109/LRA.2024.3367508
- [2] L. Nanni, D. Fusaro, C. Fantozzi, A. Pretto. **Improving Existing Segmentators Performance with Zero-Shot Segmentators** In: Entropy, 25(11), 2023, DOI: 10.3390/e25111502
- [3] D. Fusaro, E. Olivastri, I. Donadi, D. Evangelista, E. Menegatti, and A. Pretto. **Pyramidal 3D feature fusion on polar grids for fast and robust traversability analysis on CPU** In: Robotics and Autonomous Systems, Volume 170, December 2023, DOI: 10.1016/j.robot.2023.104524
- [4] M. Fawakherji, C. Potena, A. Pretto, D.D. Bloisi, and D. Nardi. **Multi-Spectral Image Synthesis for Crop/Weed Segmentation in Precision Farming** In: Robotics and Autonomous Systems, Volume 146, December 2021, DOI: 10.1016/j.robot.2021.103861
- [5] N. Castaman, E. Pagello, E. Menegatti, and A. Pretto. **Receding Horizon Task and Motion Planning in Changing Environments** In: Robotics and Autonomous Systems, Volume 145, November 2021, DOI: 10.1016/j.robot.2021.103863
- [6] A. Pretto, S. Aravecchia, W. Burgard, N. Chebrolu, C. Dornhege, T. Falck, F. Fleckenstein, A. Fontenla, M. Imperoli, R. Khanna, F. Liebisch, P. Lottes, A. Milioto, D. Nardi, S. Nardi, J. Pfeifer, M. Popović, C. Potena, C. Pradalier, E. Rothacker-Feder, I. Sa, A. Schaefer, R. Siegwart, C. Stachniss, A. Walter, W. Winterhalter, X. Wu and J. Nieto. **Building an Aerial-Ground Robotics System for Precision Farming: An Adaptable Solution**, In IEEE Robotics & Automation Magazine, Volume: 28, Issue: 3, Pages: 29-49, DOI: 10.1109/MRA.2020.3012492
- [7] M. Fawakherji, A. Youssef, D. D. Bloisi, A. Pretto, and D. Nardi **Crop and Weed Classification Using Pixel-wise Segmentation on Ground and Aerial Images**, In: International Journal of Robotic Computing, Vol: 2, Issue: 1, April 2020, pages 39-57, DOI: 10.35708/RC1869-126258
- [8] C. Potena, R. Khanna, J. Nieto, R. Siegwart, D. Nardi, and A. Pretto. **AgriColMap: Aerial-Ground Collaborative 3D Mapping for Precision Farming**, In: IEEE Robotics and Automation Letters, Vol: 4, Issue: 2, April 2019, pages 1085-1092, DOI: 10.1109/LRA.2019.2894468

- [9] F. Basso, E. Menegatti, and A. Pretto. **Robust Intrinsic and Extrinsic Calibration of a Camera-Depth Sensor Couple**, In: IEEE Transactions on Robotics, Vol: 34, Issue: 5, Oct. 2018, pages 1315-1332, ISSN: 1552-3098, DOI: 10.1109/TRO.2018.2853742
- [10] M. Imperoli, C. Potena, D. Nardi, G. Grisetti and A. Pretto. **An Effective Multi-Cue Positioning System for Agricultural Robotics**, In: IEEE Robotics and Automation Letters, Vol: 3, Issue: 4, October 2018, pages 3685-3692, ISSN 2377-3766, DOI: 10.1109/LRA.2018.2855052
- [11] A. Bardella, M. Danieletto, E. Menegatti, A. Zanella, A. Pretto and P. Zanuttigh, **Autonomous robot exploration in smart environments exploiting wireless sensors and visual features** In: Annals of Telecommunications, August 2012, Volume 67, Issue 7-8, pp 297-311, ISSN: 0003-4347, DOI: 10.1007/s12243-012-0305-z
- [12] A. Pretto, E. Menegatti, Y. Jitsukawa, R. Ueda, T. Arai, **Image similarity based on Discrete Wavelet Transform for robots with low-computational resources**, In: Robotics and Autonomous Systems, Elsevier Vol: 58, Issue: 7, July 2010, Pages 879-888, ISSN: 0921-8890, DOI: 10.1016/j.robot.2010.03.009
- [13] E. Menegatti, A. Pretto, A. Scarpa, E. Pagello **Omnidirectional vision scan matching for robot localization in dynamic environments**, In: IEEE Transactions on Robotics Vol: 22, Iss: 3, June 2006, pages 523- 535, ISSN: 1552-3098, DOI: 10.1109/TRO.2006.875495

Book Chapters

- [14] H. Andreasson, G. Grisetti, T. Stoyanov, and A. Pretto, **Sensors for Mobile Robots** In: Ang, M.H., Khatib, O., Siciliano, B. (eds) Encyclopedia of Robotics. Springer, Berlin, Heidelberg (2023), DOI: 10.1007/978-3-642-41610-1_159-1
- [15] H. Andreasson, G. Grisetti, T. Stoyanov, and A. Pretto, **Software Architectures for Mobile Robots** In: Ang, M.H., Khatib, O., Siciliano, B. (eds) Encyclopedia of Robotics. Springer, Berlin, Heidelberg (2023), DOI: 10.1007/978-3-642-41610-1_160-1

Conference Papers

- [16] E. Olivastri and A. Pretto. **IPC: Incremental Probabilistic Consensus-based Consistent Set Maximization for SLAM Backends** In Proc. of the IEEE International Conference on Robotics and Automation (ICRA 2024), May 13-17, 2024, Yokohama, Japan (accepted)
- [17] A. Bacchin, L. Barcellona, S. Shamsizadeh, E. Olivastri, A. Pretto, and E. Menegatti. **PanNote: an Automatic Tool for Panoramic Image Annotation of People's Positions** In Proc. of the IEEE International Conference on Robotics and Automation (ICRA 2024), May 13-17, 2024, Yokohama, Japan (accepted)
- [18] M. Bonotto, L. Sarrocco, D. Evangelista, M. Imperoli, and A. Pretto. **CombiNeRF: a Combination of Regularization Techniques for Few-Shot Neural Radiance Field View Synthesis** In Proc. of the 2024 International Conference on 3D Vision (3DV), March 18-21, 2024, Davos, Switzerland. DOI: 10.1109/3DV62453.2024.00025
- [19] D. Evangelista, E. Olivastri, D. Allegro, E. Menegatti, and A. Pretto **A Graph-Based Optimization Framework for Hand-Eye Calibration for Multi-Camera Setups** In Proc. of the IEEE International Conference on Robotics and Automation (ICRA 2023), May 29 - June 2, 2023 London, UK, DOI: 10.1109/ICRA48891.2023.10160758

- [20] I. Donadi, E. Olivastri, D. Fusaro, W. Li, D. Evangelista, and A. Pretto **Improving Generalization of Synthetically Trained Sonar Image Descriptors for Underwater Place Recognition** In Proc. of the 14th International Conference on Computer Vision Systems (ICVS), September 27-29 2023, Vienna, Austria DOI: 10.1007/978-3-031-44137-0_28
- [21] D. Evangelista, D. Allegro, M. Terreran, A. Pretto, and S. Ghidoni **An Unified Iterative Hand-Eye Calibration Method for Eye-on-Base and Eye-in-Hand Setups** In Proc. of the 2022 IEEE 27th International Conference on Emerging Technologies and Factory Automation (ETFA), DOI: 10.1109/ETFA52439.2022.9921738
- [22] D. Fusaro, E. Olivastri, D. Evangelista, P. Iob, A. Pretto. **An Hybrid Approach to Improve the Performance of Encoder-Decoder Architectures for Traversability Analysis in Urban Environments** In Proc. of the 2022 IEEE Intelligent Vehicles Symposium (IV) Workshops, 2022
- [23] D. Fusaro, E. Olivastri, D. Evangelista, M. Imperoli, E. Menegatti and A. Pretto. **Pushing the Limits of Learning-based Traversability Analysis for Autonomous Driving on CPU** In Proc. of the 17th International Conference on Intelligent Autonomous Systems (IAS-17), 2022
- [24] A. Bacchin, F. Berno, E. Menegatti and A. Pretto. **People Tracking in Panoramic Video for Guiding Robots** In Proc. of the 17th International Conference on Intelligent Autonomous Systems (IAS-17), 2022
- [25] A. Saviolo, M. Bonotto, D. Evangelista, M. Imperoli, J. Lazzaro, E. Menegatti, and A. Pretto. **Learning to Segment Human Body Parts with Synthetically Trained Deep Convolutional Networks** In Proc. of the 16th International Conference on Intelligent Autonomous Systems (IAS-16), 2021
- [26] M. Terreran, D. Evangelista, J. Lazzaro, and A. Pretto. **Make It Easier: An Empirical Simplification of a Deep 3D Segmentation Network for Human Body Parts** In Proc. of the International Conference on Computer Vision Systems, 2021
- [27] M. Fawakherji, C. Potena, I. Prevedello, A. Pretto, D. D. Bloisi, and D. Nardi **Data Augmentation Using GANs for Crop/Weed Segmentation in Precision Farming**, In: Proceedings of the IEEE Conference on Control Technology and Applications (CCTA), 2020
- [28] D. Evangelista, M. Antonelli, A. Pretto, C. Eitzinger, M. Moro, C. Ferrari, and E. Menegatti **SPIRIT - A Software Framework for the Efficient Setup of Industrial Inspection Robots**, In: Proceedings of the IEEE International Workshop on Metrology for Industry 4.0 and IoT, 2020, DOI: 10.1109/MetroInd4.0IoT48571.2020.9138179
- [29] C. Potena, D. Nardi, and A. Pretto **Joint Vision-Based Navigation, Control and Obstacle Avoidance for UAVs in Dynamic Environments**, In: Proceedings of the European Conference on Mobile Robots (ECMR), Sept. 4-6 2019, Prague, Czech Republic, DOI: 10.1109/ECMR.2019.8870944
- [30] M. Fawakherji, C. Potena, D. D. Bloisi, M. Imperoli, A. Pretto and D. Nardi **UAV Image Based Crop and Weed Distribution Estimation on Embedded GPU Boards**, In: Proceedings of the Workshop on Deep-learning Based Computer Vision for UAV (in conjunction with the 18th International Conference on Computer Analysis of Images and Patterns), 2019, DOI: 10.1007/978-3-030-29930-9_10

- [31] D. Evangelista, M. Imperoli, and A. Pretto **FlexSight - A Flexible and Accurate System for Object Detection and Localization for Industrial Robots**, In: Proceedings of the IEEE International Workshop on Metrology for Industry 4.0 and IoT, 2019, DOI: 10.1109/METROI4.2019.8792902
- [32] D. Evangelista, M. Imperoli, E. Menegatti, and A. Pretto **Machine Vision for Embedded Devices: from Synthetic Object Detection to Pyramidal Stereo Matching**, In: Proceedings of the Austrian Robotics and OAGM Workshop, 2019, DOI: 10.3217/978-3-85125-663-5-08
- [33] M. Fawakherji, A. Youssef, D. D. Bloisi, A. Pretto, and D. Nardi. **Crop and Weeds Classification for Precision Agriculture using Context-Independent Pixel-Wise Segmentation**, In: Proceedings of the IEEE International Conference on Robotic Computing (IRC), 2019, DOI: 10.1109/IRC.2019.00029
- [34] C. Potena, R. Khanna, J. Nieto, D. Nardi, and A. Pretto. **Collaborative UAV-UGV Environment Reconstruction in Precision Agriculture**, In: Proceedings of the IEEE/RSJ IROS Workshop "Vision-based Drones: What's Next?", 2018
- [35] L. Monorchio, D. Evangelista, N. Imperoli, and A. Pretto. **Learning from Successes and Failures to Grasp Objects with a Vacuum Gripper**, In: Proceedings of the IEEE/RSJ IROS Workshop "Task-Informed Grasping for rigid and deformable object manipulation", 2018
- [36] C. Potena, B. Della Corte, D. Nardi, G. Grisetti and A. Pretto. **Non-Linear Model Predictive Control with Adaptive Time-Mesh Refinement**, In: Proceedings of the IEEE International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAN), May 16-19, 2018 Brisbane, Australia, DOI: 10.1109/SIMPAN.2018.8376274 - (*Best Student Paper Award - Runner up*)
- [37] D. Evangelista, W. U. Villa, M. Imperoli, A. Vanzo, L. Iocchi, D. Nardi and A. Pretto. **Grounding Natural Language Instructions in Industrial Robotics**, In: Proceedings of the IEEE/RSJ IROS Workshop "Human-Robot Interaction in Collaborative Manufacturing Environments (HRI-CME)", 2017
- [38] C. Potena, D. Nardi and A. Pretto. **Effective Target Aware Visual Navigation for UAVs**, In: Proceedings of the European Conference on Mobile Robots (ECMR), Sept. 6-8 2017 Paris, France, DOI: 10.1109/ECMR.2017.8098714
- [39] M. Di Cicco, C. Potena, G. Grisetti and A. Pretto. **Automatic Model Based Dataset Generation for Fast and Accurate Crop and Weeds Detection**, In: Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Sept. 24-28 2017, Vancouver, BC, Canada, DOI: 10.1109/IROS.2017.8206408
- [40] C. Potena, D. Nardi and A. Pretto. **Fast and Accurate Crop and Weed Identification with Summarized Train Sets for Precision Agriculture**, In: Proceedings of the 14th International Conference on Intelligent Autonomous Systems (IAS-14), July 3-7, 2016 Shanghai, China, DOI: 10.1007/978-3-319-48036-7_9 - (*Best Student Paper Award - Finalist*)
- [41] C. Potena, A. Pretto, D. D. Bloisi and D. Nardi **Plane Extraction For Indoor Scene Recognition**, In Proceedings of Advanced Concepts for Intelligent Vision Systems, Oct. 26-29, 2015, Catania, Italy, pages: 530-540, DOI: 10.1007/978-3-319-25903-1_46

- [42] M. Imperoli and A. Pretto. **D²CO: Fast and Robust Registration of 3D Textureless Objects using the Directional Chamfer Distance**, In: Proceedings of the 10th International Conference on Computer Vision Systems, July 6-9, 2015 Copenhagen, Denmark, pages: 316 - 328, DOI: 10.1007/978-3-319-20904-3_29
- [43] A. Pretto and G. Grisetti. **Calibration and performance evaluation of low-cost IMUs**, In Proceedings of the 20th IMEKO TC4 International Symposium, Sep. 15 - 17, 2014 Benevento, Italy, pages: 429 - 434, ISBN-14: 978-92-990073-2-7
- [44] D. Tedaldi, A. Pretto and E. Menegatti. **A Robust and Easy to Implement Method for IMU Calibration without External Equipments**. In: Proceedings of the IEEE International Conference on Robotics and Automation (ICRA 2014), May 31 - June 7, 2014 Hong Kong, China, Page(s): 3042 - 3049, DOI: 10.1109/ICRA.2014.6907297
- [45] F. Basso, A. Pretto and E. Menegatti. **Unsupervised Intrinsic and Extrinsic Calibration of a Camera-Depth Sensor Couple**. In: Proceedings of the IEEE International Conference on Robotics and Automation (ICRA 2014), May 31 - June 7, 2014 Hong Kong, China, Page(s): 6244 - 6249, DOI: 10.1109/ICRA.2014.6907780
- [46] N. Boscolo, F. Pretto, A. Pretto and S. Colombo. **cROS: a ROS interface for motion controllers** In: Workshop Proceedings of 13th International Conference on Intelligent Autonomous Systems (IAS-13), Padova, Italy
- [47] M. Antonello, A. Pretto and E. Menegatti. **Fast Incremental Objects Identification and Localization using Cross-correlation on a 6 DoF Voting Scheme** In: Proc. of International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP 2014), pages: 499-5040
- [48] A. Pretto, S. Tonello, E. Menegatti **Flexible 3D Localization of Planar Objects for Industrial Bin-Picking with Monocamera Vision System** Proc. of the IEEE International Conference on Automation Science and Engineering (IEEE CASE 2013), Madison, Wisconsin, (USA), August 17-21, 2013, Pages: 168 - 175, DOI: 10.1109/CoASE.2013.6654067
- [49] K. Tsotsos, A. Pretto, S. Soatto **Visual-Inertial Ego-Motion Estimation for Humanoid Platforms** Proc. of the IEEE-RAS International Conference on Humanoid Robots (Humanoids 2012), Osaka (Japan), Pages: 704 - 711, ISBN: 978-1-4673-1369-8, DOI: 10.1109/HUMANOIDS.2012.6651597
- [50] A. Pretto, E. Menegatti and E. Pagello **Omnidirectional Dense Large-Scale Mapping and Navigation Based on Meaningful Triangulation** In: Proceedings of the IEEE International Conference on Robotics and Automation (ICRA 2011), May 9-13, 2011 Shanghai (China), Pages: 3289 - 3296, ISBN: 978-1-61284-386-5, DOI: 10.1109/ICRA.2011.5980206
- [51] E. Menegatti, M. Danieletto, M. Mina, A. Pretto, S. Zanconato, P. Zanuttigh, A. Zanella **Autonomous discovery, localization and recognition of smart objects through WSN and image features** In: IEEE International Workshop Towards Smart Communications and Network technologies applied on Autonomous Systems (SaCoNAS), IEEE GLOBECOM 2010, Pages: 1653 - 1657, ISBN: 978-1-4244-8863-6, DOI: 10.1109/GLOCOMW.2010.5700221 - (*Best Paper Award*).
- [52] J. Meltzer, A. Pretto, B. Taylor and S. Soatto **Closing the Recognition Loop: Recognizing and Searching for Objects in the Real World** In: Towards Closing the Loop: Active Learning for Robotics - Workshop at Robotics: Science and Systems Conference 2010 (poster)

- [53] A. Pretto and E. Menegatti **Omnidirectional Dense Structure Reconstruction Based on Meaningful Reconstruction** In: OMNIVIS 2010: The 10th Workshop on Omnidirectional Vision, Camera Networks and Non-classical Cameras - Robotics: Science and Systems Conference 2010 (poster)
- [54] A. Pretto, S. Soatto and E. Menegatti **Scalable Dense Large-Scale Mapping and Navigation** In: 2010 IEEE International Conference on Robotics and Automation, Workshop on Omnidirectional Robot Vision, May 7, 2010, Anchorage, (USA) pages: 49-56, ISBN: 978-88-95872-02-5
- [55] A. Pretto, E. Menegatti, P. Bison, E. Grinzato, G. Cadelano and E. Pagello **An Autonomous Robotized System for a Thermographic Camera** In. ISR/ROBOTIK 2010 (Proceedings of the joint conference of ISR 2010 (41st International Symposium on Robotics) and ROBOTIK 2010 (6th German Conference on Robotics)) June 2010, Munich, Germany, pages: 245-261, ISBN 978-3-8007-3273-9
- [56] S. Ghidoni, A. Pretto and E. Menegatti, **Cooperative Tracking of Moving Objects and Face Detection with a Dual Camera Sensor** In: Proceedings of the 2010 IEEE International Conference on Robotics and Automation (ICRA 2010), May 7, 2010, Anchorage, (USA), pages 2568-2573, ISBN: 978-1-4244-5040-4, DOI: 10.1109/ROBOT.2010.5509849
- [57] E. Menegatti, M. Danieletto, M. Mina, A. Pretto, A. Bardella, A. Zanella and P. Zanuttigh **Discovery, localization, and recognition of smart objects by a mobile robot** In: Ando, N.; Balakirsky, S.; Hemker, Th.; Reggiani, M.; von Stryk, O. (Eds.), Simulation, Modeling, and Programming for Autonomous Robots, SIMPAR 2010, Series: Lecture Notes in Computer Science, Vol. 6472, 2010, pages 436-448, Springer, ISBN: 978-3-642-17318-9, DOI: 10.1007/978-3-642-17319-6_40
- [58] A. Pretto, E. Menegatti, P. Bison and, and E. Grinzato **Automatic Indoor Environmental Conditions Monitoring by IR Thermography** In: NDT in Canada 2009 National Conference, August 25 -27, 2009 London, Ontario
- [59] A. Pretto, E. Menegatti, M. Bennewitz, W. Burgard, and E. Pagello. **A Visual Odometry Framework Robust to Motion Blur** In: Proceedings of the IEEE International Conference on Robotics and Automation (ICRA 2009) ISBN: 978-1-4244-2788-8, DOI: 10.1109/ROBOT.2009.5152447
- [60] A. Pretto, E. Menegatti, M. Takahashi, T. Suzuki and E. Pagello. **Visual Odometry for an Omnidirectional-drive Robot** In: Proceedings of the 6th International Symposium on Mechatronics and its Applications (ISMA09) ISBN: 978-1-4244-3480-0, DOI: 10.1109/ISMA.2009.5164787
- [61] A. Pretto, E. Menegatti, E. Pagello **Reliable Features Matching for Humanoid Robots** Proc. of the IEEE-RAS International Conference on Humanoid Robots (Humanoids 2007), November 2007, Pittsburgh (Usa), Pages: 532 - 538 ISBN: 978-1-4244-1861-9 DOI: 10.1109/ICHR.2007.4813922
- [62] E. Menegatti, A. Pretto, S. Tonello, A. Lastra, A. Guatti **A robotic sculpture speaking to people** Proc. Of the IEEE International Conference on Robotics and Automation (ICRA) 10-14 April 2007, Roma, Italy, (video contribution), Pages: 3122 - 3123, ISBN: 1-4244-0601-3 DOI: 10.1109/ROBOT.2007.363947

- [63] A. Pretto, E. Menegatti, E. Pagello, Y. Jitsukawa, R. Ueda, T. Arai **Toward image-based localization for AIBO using wavelet transform** In Basili, Roberto; Paziienza, Maria Teresa (Eds.), *AI*IA 2007: Artificial Intelligence and Human-Oriented Computing*, Series: Lecture Notes in Computer Science, 2007, pages 831-838, Springer, ISBN 978-3-540-74781-9, DOI: 10.1007/978-3-540-74782-6_75
- [64] A. Lastra, A. Pretto, S. Tonello and E. Menegatti **Robust color-based skin detection for an interactive robot** In Basili, Roberto; Paziienza, Maria Teresa (Eds.), *AI*IA 2007: Artificial Intelligence and Human-Oriented Computing*, Series: Lecture Notes in Computer Science, 2007, pages 507-518, Springer, ISBN 978-3-540-74781-9, DOI: 10.1007/978-3-540-74782-6_44
- [65] E. Menegatti, A. Pretto, E. Pagello **A New Omnidirectional Vision Sensor for Monte-Carlo Localization** In Nardi, D.; Riedmiller, M.; Sammut, C.; Santos-Victor, J. (Eds.), *RoboCup 2004: Robot Soccer World Cup VIII*, Series: Lecture Notes in Computer Science, 2005, pages 97-109, Springer, ISBN 978-3-540-25046-3, DOI: 10.1007/2F978-3-540-32256-6_8
- [66] E. Pagello, G. Clemente, A. D'Angelo, E. Menegatti, A. Pretto, S. Tonello **A Surveillance System based on a Distributed Vision System Cooperating with a Mobile Robot** Proc. of 36th International Symposium on Robotics (ISR), November 2005, Tokyo, Japan, ISBN:4-9902717-0-X
- [67] E. Menegatti, A. Pretto, and E. Pagello **Testing omnidirectional vision-based Monte-Carlo Localization under occlusion** In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, September 2004, Sendai, Japan, Pages: 2487 - 2493 Vol. 3, ISBN: 0-7803-8463-6 DOI:10.1109/IROS.2004.1389782

Pre-Print

- [68] M. Imperoli and A. Pretto. **Active Detection and Localization of Textureless Objects in Cluttered Environments**, In arXiv preprint arXiv:1701.05748, 2017

Thesis

- [69] A. Pretto **Visual-SLAM for Humanoid Robots**, Ph.D. thesis, University of Padova, 2009.
- [70] A. Pretto **Localizzazione di Monte-Carlo in Ambiente RoboCup**, Master's thesis, University of Padova, 2003. In Italian.

Patents

- [71] A. Pretto, E. Menegatti and E. Pagello **Italian patent of a vision system device integrating a moving camera (with motors for pan and/or tilt, and/or zoom) and a panoramic camera of any kind (catadioptric or polidiotric) with advanced targets tracking capabilities**, 2007

Open-Source Software

- [72] A. Pretto **IMU-TK: Inertial Measurement Unit ToolKit**, https://bitbucket.org/alberto_pretto/imu_tk.
- [73] A. Pretto and M. Imperoli **D²CO: Direct Directional Chamfer Optimization**, https://bitbucket.org/alberto_pretto/d2co.
- [74] A. Pretto, F. Pretto and N. Boscolo **cROS: a lightweight, single thread, full ANSI C ROS client library**, <https://github.com/ros-industrial/cros>.

Research Metrics

Google Scholar h-index: 22 i10-index: 33 citations: 2177

<https://scholar.google.it/citations?user=-kX87sgAAAAJ&hl=en>

Scopus h-index: 18 citations: 1314

<https://www.scopus.com/authid/detail.uri?authorId=23393749700>