Curriculum Vitæ

last update: February 8, 2024

Name **Antonio Paolillo**

Nationality Italian

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Research interests

Robotics, machine learning and AI for robotics, robotic control, humanoid robots, visual servoing, human-robot interaction, rehabilitation robotics.

Current position

May 2020 - present — **Researcher at Dalle Molle Institute for Artificial Intelligence (IDSIA), USI-SUPSI, Lugano, Svizzera.**

Previous positions and education

Oct. 2019 - Apr. 2020 — **Post-doc researcher at École polytechnique fédérale de Lausanne (EPFL), Switzerland, Laboratory of Intelligent Systems.**

Jan. 2018 - Aug. 2019 — **Post-doc researcher at Idiap Research Institute, Martigny, Switzerland.** Visual servoing, linear quadratic regulator, model predictive control, Gaussian process regression.

Apr. 2015 - Dec. 2017 — **Post-doc researcher at Laboratoire d'Informatique de Robotique et de Microélectronique de Montpellier (LIRMM), CNRS/University of Montpellier, France.** Visual estimation of articulated floating-based objects and dynamic perception for safe physical interaction.

Apr. 2015 - Nov. 2015 — **Visiting researcher at the CNRS-AIST Joint Robotics Lab (JRL), Tsukuba, Japan.** Development of a vision-based algorithm for making the HRP-2 humanoid robot drive a real car.

Jun. 2015 — **Member of the AIST-NEDO team at the DARPA Robotics Challenge Finals, Pomona, California.** Responsible for the driving task; design of a semi-autonomous driving strategy to make the humanoid HRP-2 successfully drive a car during the competition.

Dec. 2014 - Mar. 2015 — **Researcher at Robotics Laboratory, Dipartimento di Informatica e Sistemistica (DIS), Sapienza University of Rome, Italy.** Development of vision-based algorithms for navigation purposes using optical-flow information.

Nov. 2011 - Nov. 2014 — **PhD student in System Engineering at Robotics Lab of Dipartimento di Ingegneria Informatica, Automatica e Gestionale (DIAG), Sapienza University of Rome, Italy.** Development of vision-based algorithms for the navigation, localization and device-operation with humanoids. Simulations and real experiments carried out with NAO humanoid robot.

Defence — March 16, 2015.

Thesis — Vision-based control of humanoid robots interacting with the real world.

Advisors	Prof. A. De Luca and Prof. M. Vendittelli
Jan. 2014 - Jul. 2014.	**Visiting researcher at Laboratoire d'Informatique de Robotique et de Microélectronique de Montpellier (LIRMM), University of Montpellier, France.** Development of a sensor-based framework for making the real HRP-4 humanoid robot drive a simulated car in a video game set-up.
Mar. 2011 - Oct. 2011	**Research collaborator at Robotics Laboratory, Dipartimento di Informatica e Sistemistica (DIS, now DIAG), Sapienza University of Rome, Italy.** Study and analysis of a footstep planner and a walking motion generation for humanoids.
Oct. 2008 - Jan. 2011	**Master degree in Electronic Engineering at Sapienza University of Rome, Italy**
Defence	January 2011.
Final grade	110/110 cum laude.
Thesis	Walking motion generation for a humanoid robot based on model predictive control
Advisors	Prof. A. De Luca (Sapienza University of Rome, Italy) and Dr. D. Dimitrov (Örebro University, Sweden).
May 2010 - Dec. 2010	**Visiting student at Mobile Robotics and Olfaction Lab of the Centre for Applied Autonomous Sensor Systems (AASS) laboratories of the Örebro University, Sweden.** Development of a walking motion generator for humanoids. Experiments carried out with NAO humanoid robot.

Personal skills

Language proficiency	– Italian (native) – English (fluent) – French (intermediate)
Managerial & Communication skills	– International working experience (Italy, Sweden, France, Japan, Switzerland). – Organization of international events, such as workshop and PhD school. – Co-supervision of Bachelor, Master and PhD students.
Technical skills	– Matlab, Python and C++ programming. – Expertise in robotic programming and simulation. – Hands-on experience with robotics platforms (humanoid robots NAO, HRP-2Kai, HRP-4; Panda robotic manipulator). – Familiar with LaTeX for scientific writing; programs for videos/pictures editing.
Hobbies	Drawing and watercolor painting, cooking, traveling, sport (football, running/trail running, hiking, ski).

Talks and seminars

Sep. 28, 2022	"Dynamical Systems-based Imitation Learning for Visual Servoing", Talk at KUKA AG, Virtual.
Mar. 30, 2022	"Visual servoing", Seminar at USI Robotics course taken by Prof. A. Giusti, Lugano, Switzerland.
Aug. 25, 2021	"Visual servoing for navigation and manipulation", Lecture at the GMAR Summer School, Innsbruck, Austria.

Apr. 21, 2021	"Visual servoing", Seminar at USI Robotics course taken by Prof. A. Giusti, Lugano, Switzerland.
Dec. 20, 2019	"Vision-based robotic localization, navigation and interaction", talk at IDSIA, Lugano, Switzerland.
Dec. 12, 2019	"Localize, navigate, interact: the humanoid robotics experience", talk at the robotics group of CERN, Genève, Switzerland.
May 15, 2019	"Closed-loop robotic manipulation of articulated objects", talk at Larsen group, INRIA, Nancy, France.
Jun. 20, 2017	"Humanoid robot driving a car autonomously: a sensor-based approach", talk at the Journeés Nationales de la Robotique Humanoïde, Montpellier, France.
Oct. 27, 2016	"Vision-based control algorithms for humanoids performing everyday tasks", talk at IRCAD, University of Strasbourg, France.
Oct. 26, 2016	"Vision-based control algorithms for humanoids performing everyday tasks.", talk at the Humanoid Robots Lab, University of Bonn, Germany.
Aug. 28, 2015	"Vision-based control of humanoid robots interacting with the real world", talk at GVLab, Tokyo University of Agriculture and Technology, Japan.

Media coverage

Jan. 21, 2024	Interview appeared on Ticino Scienza, an online newspaper created by the IBSA Foundation, about our activity on social human-robot interaction. Available at: `https://www.ticinoscienza.ch/it/news.php?cosi-intelligenza-artificiale-rendera-robot-amici-dell-uomo`.
Apr. 30, 2023	Interview at the RSI TV broadcast "Il Giardino di Hilbert", about the activities on the VRHEM project funded by Innosuisse. Available at `https://www.rsi.ch/la1/programmi/cultura/il-giardino-di-albert/Il-futuro-di-uomini-e-robot-16189303.html`.
Apr. 15, 2022	"Study Ranks Jobs Threatened by Robots—and Offers Robot-Safe Options", by Abigail Eisenstadt, aaas.org. Article on the research carried out in the paper [J4] (see Publication list) available at `https://www.aaas.org/news/study-ranks-jobs-threatened-robots-and-offers-robot-safe-options`
Dec. 11, 2014	"El futuro robot conductor", by Ángel Luis Sucasas, El País. Article on the research carried out in the paper [C17] (see Publication list) available at `https://elpais.com/elpais/2014/11/24/ciencia/1416846426_922222.html`).

Scientific activities

Events organization

2024	V. Villani, L. Sabattini, O. Celiktutan, A. Paolillo, "Fostering Socially Acceptable Robotics and Extended Reality (XR)," workshop at European Robotics Forum 2024, Rimini, Italy.
2016	A. Paolillo, F. Flacco, and E. Yoshida, "The use of dynamics in the field of humanoid robots: identification, planning, perception and control," full-day workshop at the 2016 IEEE-RAS International Conference on Humanoid Robots, Cancun, Mexico, 2016. Webpage (`https://www.lirmm.fr/humanoids16workshop`) not online anymore.

2019	Main organizer of the MEMMO Winter School. Responsible for the didactic program, social events, administrative and logistic aspects. Webpage available at: `https://memmows.sciencesconf.org/`

Community service

2023-today	Associate Editor for the IEEE Robotics and Automation Letters (RA-L)
2024	Associate Editor for the 21st International Conference on Ubiquitous Robots (UR 2024)
2021-2023	Associate Editor for the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
2016	In the international program committee of the 2016 IEEE/SICE International Symposium on System Integration (`http://www.si-sice.org/SII2016/committee.html`)
2012-today	Reviewer of journal and conference papers: IEEE Robotics & Automation Magazine (RAM); IEEE Robotics and Automation Letters (RA-L); Journal of Computer Vision and Image Understanding (CVIU); IEEE International Conference on Robotics and Automation (ICRA); IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS); International Conference on Advanced Robotics (ICAR); IEEE-RAS International Conference on Humanoid Robots (Humanoids); IEEE/SICE International Symposium on System Integration (SII); CIRP Conference on Manufacturing Systems (CMS); Human-Friendly Robotics (HFR).
2022	Reviewer of the PhD thesis "Optimization-Based Methods for Real-Time Generation of Safe Motions in Mobile Robots,", Spyridon G. Tarantos, Sapienza University of Rome.

Award, funding and grants, project managing

Nov. 2023	Recipient of the *"Quality of Life" label*, awarded by Fondation Dalle Molle Pour La Qualité de la Vie, for the project REMiT (Remotely-assisted Enhanced Mirror Therapy - A case study for the future of telemedicine), 3333 CHF
Jul. 2023	Main applicant and Principal Investigator of *ViSENSy: Visual Servoing for Embedded Nano-drone Systems*, project funded by Hasler Fundation, 50000 CHF
Sep. 2022	Co-applicant of *Voucher for project writing*, granted by SUPSI, 10000 CHF
May 2022	Applicant and Principal Investigator of *Virtual Reality and Hand Exoskeleton for Mirror Therapy: a Feasibility Study (VRHEM)*, project approved by Swiss Innovation Council (Innolink: 100.533 IP-ICT, `https://www.aramis.admin.ch/Grunddaten/?ProjectID=51064&Sprache=en-US`), 193780 CHF
Oct. 2022	Work Package Leader in *Socially-acceptable Extended Reality Models and Systems (SERMAS)*, project funded by European Commission (Grant agreement ID: 101070351, `https://cordis.europa.eu/project/id/101070351`, overall budget €4 444 228,75)
Jun. 2021	Applicant and Principal Investigator of *Efficient Vision-based Robotic Control (EViRCo)*, project funded by Hasler Fundation, 47040 CHF
2021	Applicant of *Swiss-European Mobility Program (SEMP)*, grant for training activities with an European partner in 2021/2022.

Aug. 2017

Co-author of the best student paper award at the *13th IEEE Conference on Automation Science and Engineering* (see paper [C14] in the Publications list) `https://www.ieee-ras.org/about-ras/latest-news/case-2017-best-paper-award-recipients-announced`.

Publications*

Journal papers

[J1] G. Abbate, A. Giusti, L. Randazzo, A. Paolillo, "A mirror therapy system using virtual reality and an actuated exoskeleton for the recovery of hand motor impairments: a study of acceptability, usability, and embodiment," Scientific Reports, vol. 13, December 2023, 22881 (online since Dec. 2023).

[J2] G. Abbate, A. Giusti, V. Schmuck, O. Celiktutan, A. Paolillo, "Self-Supervised Prediction of the Intention to Interact with a Service Robot," Robotics and Autonomous Systems, vol. 171, January 2024, 104568 (online since Oct. 2023).

[J3] A. Paolillo, M. Forgione, D. Piga, E. Mingo Hoffman, "Fast Predictive Visual Servoing: a Reference Governor-based Approach," Control Engineering Practice, vol. 136, 105521, July 2023 (on-line since Apr. 2023)

[J4] A. Paolillo*, F. Colella*, N. Nosengo*, F. Schiano, W. Stewart, D Zambrano, I. Chappuis, R. Lalive, D. Floreano "How to compete with robots by assessing job automation risks and resilient alternatives," Science Robotics 7 (65), eabg5561, 2022

[J5] M. Nava, A. Paolillo, J. Guzzi, L. Gambardella, A. Giusti, "Learning Visual Localization of a Quadrotor Using its Noise as Self-Supervision," *IEEE Robotics and Automation Letters*, vol. 7, no. 2, pp. 2218-2225, Apr. 2022 (on-line since Jan. 2022).

[J6] M. Nava, A. Paolillo, J. Guzzi, L. M. Gambardella, A. Giusti, "Uncertainty-Aware Self-Supervised Learning of Spatial Perception Tasks," *IEEE Robotics and Automation Letters*, vol. 6, no. 4, pp. 6693-6700, Oct. 2021 (on-line since July 2021).

[J7] T.S. Lembono, A. Paolillo, E. Pignat, S. Calinon, "Memory of motion for warm-starting trajectory optimization," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 2594–2601, 2020.

[J8] M. Ferro, A. Paolillo, A. Cherubini, M. Vendittelli, "Vision-based navigation of omnidirectional mobile robots," *IEEE Robotics and Automation Letters*, vol. 4, no. 3, pp. 2691-2698, July 2019 (on-line since 24 April 2019).

[J9] A. Paolillo, K. Chappellet, A. Bolotnikova, A. Kheddar, "Interlinked visual tracking and robotic manipulation of articulated objects," *IEEE Robotics and Automation Letters*, vol. 3, no. 4, pp. 2746–2753, Oct. 2018 (on-line since 11 May 2018).

[J10] A. Paolillo, P. Gergondet, A. Cherubini, M. Vendittelli, A. Kheddar, "Autonomous car driving by a humanoid robot," *Journal of Field Robotics*, vol. 35, no. 2, pp. 169–186, 2018 (on-line since 19 June 2017).

[J11] A. Paolillo, A. Faragasso, G. Oriolo, M. Vendittelli, "Vision-based maze navigation for humanoid robots," *Autonomous Robots*, vol. 41, no. 2, pp. 293-309, 2017 (on-line since 27 January 2016).

[J12] G. Oriolo, A. Paolillo, L. Rosa, M. Vendittelli, "Humanoid odometric localization integrating kinematic, inertial and visual information," *Autonomous Robots*, vol. 40, no. 5, pp. 867–879, 2016 (on-line since 22 September 2015).

*Authors equally contributed.

International conference papers

[C1] S. Arreghini, G. Abbate, A. Giusti, A. Paolillo, "Predicting the Intention to Interact with a Service Robot: the Role of Gaze Cues," *IEEE International Conference on Robotics and Automation*, to appear, 2024.

[C2] S. Arreghini, G. Abbate, A. Giusti, A. Paolillo, "A Long-Range Mutual Gaze Detector for HRI," *ACM/IEEE International Conference on Human-Robot Interaction*, to appear, 2024.

[C3] R. Felici, M. Saveriano, L. Roveda, A. Paolillo, "Imitation Learning-based Visual Servoing for Tracking Moving Objects," *International Workshop on Human-Friendly Robotics*, 2023.

[C4] A. Paolillo, P. Robuffo Giordano, M. Saveriano, "Dynamical System-based Imitation Learning for Visual Servoing using the Large Projection Formulation," *IEEE International Conference on Robotics and Automation*, pp. 755–761, 2023.

[C5] A. Paolillo, M. Nava, D. Piga, A. Giusti, "Visual Servoing with Geometrically Interpretable Neural Perception," *IEEE International Conference on Intelligent Robots and Systems*, pp. 5300–5306, 2022.

[C6] A Paolillo, G Abbate, A Giusti, Š Trakić, H Dzafic, A Fritz, J Guzzi, "Towards the integration of a pointing-based human-machine interface in an industrial control system compliant with the IEC 61499 standard," *Procedia CIRP*, 107, 1077-1082, 2022.

[C7] A. Paolillo*, M. Saveriano*, "Learning Stable Dynamical Systems for Visual Servoing," *IEEE International Conference on Robotics and Automation*, pp. 8636–8642, 2022.

[C8] G. Abbate, A. Giusti, A. Paolillo, L. M. Gambardella, A. E. Rizzoli, J. Guzzi, "Selecting Objects on Conveyor Belts Using Pointing Gestures Sensed by a Wrist-worn Inertial Measurement Unit," *IEEE 18th International Conference on Automation Science and Engineering*, pp. 633–640, 2022.

[C9] J. Guzzi, G. Abbate, A. Paolillo, A. Giusti, "Interacting with a Conveyor Belt in Virtual Reality using Pointing Gestures," *ACM/IEEE International Conference on Human-Robot Interaction*, pp. 1194–1195, 2022.

[C10] G. Abbate, A. Giusti, A. Paolillo, B. Gromov, L. Gambardella, A. E. Rizzoli, J. Guzzi, "PointIt: A ROS Toolkit for Interacting with Co-located Robots using Pointing Gestures," *ACM/IEEE International Conference on Human-Robot Interaction*, pp. 608-612, 2022.

[C11] E. Mingo Hoffman, A. Paolillo*, "Exploiting visual servoing and centroidal momentum for whole-body motion control of humanoid robots in absence of contacts and gravity," *IEEE International Conference on Robotics and Automation*, pp. 2979–2985, 2021.

[C12] A. Paolillo, T.S. Lembono, S. Calinon, "Using a memory of motion to efficiently achieve visual predictive control tasks", *IEEE International Conference on Robotics and Automation*, Paris, France, 2020.

[C13] A. Paolillo, A. Bolotnikova, K. Chappellet, A. Kheddar, "Visual estimation of articulated objects configuration during manipulation with a humanoid," *2017 IEEE/SICE International Symposium on System Integration*, pp. 330–335, Dec. 2017.

[C14] A. Bolotnikova, K. Chappellet, A. Paolillo, A. Escande, G. Anbarjafari, A. Suarez-Roos, P. Rabaté, A. Kheddar, "A circuit-breaker use-case operated by a humanoid in aircraft manufacturing," *13th IEEE Conference on Automation Science and Engineering*, pp. 15–22, Aug. 2017.

[C15] F. Flacco, A. Paolillo, A. Kheddar, "Residual-based contacts estimation for humanoid robots," *IEEE-RAS International Conference on Humanoid Robots*, Cancun, Mexico, pp. 409–415, Nov. 2016.

[C16] M. Ferro, A. Paolillo, A. Cherubini, M. Vendittelli, "Omnidirectional humanoid navigation in cluttered environments based on optical flow information," *2016 IEEE-RAS International Conference on Humanoid Robots*, Cancun, Mexico, pp. 75–80, Nov. 2016.

[C17] A. Paolillo, A. Cherubini, F. Keith, A. Kheddar, and M. Vendittelli,"Toward autonomous car driving by a humanoid robot: A sensor-based framework," *2014 IEEE-RAS International Conference on Humanoid Robots*, Madrid, Spain, pp. 451–456, Nov. 2014.

[C18] M. Bellacini, L. Lanari, A. Paolillo, and M. Vendittelli, "Manual Guidance of Humanoid Robots without Force Sensors: Preliminary Experiments with NAO," *2014 IEEE International Conference on Robotics and Automation*, Hong Kong, China, pp. 1184–1189, 2014.

[C19] G. Oriolo, A. Paolillo, L. Rosa, and M. Vendittelli, "Vision-based trajectory control for humanoid navigation," *2013 IEEE-RAS International Conference on Humanoid Robots*, Atlanta, GA, pp. 118–123, 2013.

[C20] A. Faragasso, G. Oriolo, A. Paolillo, and M. Vendittelli, "Vision-based corridor navigation for humanoid robots," *2013 IEEE International Conference on Robotics and Automation*, Karlsruhe, Germany, pp. 3190–3195, 2013.

[C21] G. Oriolo, A. Paolillo, L. Rosa, and M. Vendittelli, "Vision-based odometric localization for humanoids using a kinematic EKF," *12th IEEE-RAS International Conference on Humanoid Robots*, Osaka, Japan, pp. 153–158, 2012.

[C22] D. Dimitrov, A. Paolillo, and P.-B. Wieber, "Walking motion generation with online foot position adaptation based on ℓ_1- and ℓ_∞-norm penalty formulation," *2011 IEEE International Conference on Robotics and Automation*, Shanghai, China, pp. 3523–3529, 2011.

International workshop papers

[W1] G. Abbate, A. Giusti, V. Schmuck, O. Celiktutan and A. Paolillo, "Toward the Detection of the Human Intention to Interact with a Service Robot," in Workshop *SOLAR – Socially-acceptable robots: concepts, techniques, and applications* at ICRA 2023.

[W2] G. Abbate, A. Giusti, L. Randazzo and A. Paolillo, "Rehabilitation of Hand Motor Impairment Through Combined Virtual Reality and Wearable Robotics," Workshop *Emerging paradigms for assistive robotic manipulation: from research labs to the real world* at ICRA 2023.

[W3] M. Saveriano and A. Paolillo, "Towards Combined Action-Perception: Learned Dynamical Systems for Visual Servoing," *15th International Workshop on Human-Friendly Robotics*, Delft, The Netherlands, 2022.

[W4] A. Paolillo, F. Flacco, and A. Kheddar, "The residual method for humanoid robots," *9th International Workshop on Human-Friendly Robotics*, Genoa, Italy, 2016.

[W5] M. Bellacini, L. Lanari, A. Paolillo, and M. Vendittelli, "Manual guidance of the humanoid NAO without force measurements," *6th International Workshop on Human-Friendly Robotics*, Rome, Italy, 2013.