

Massimo Caccia

Curriculum Vitae

March 12 2023

Massimo Caccia graduated in Electronic Engineering at the University of Genova on the 31st of January 1991. In the period October 16, 2013 – October 15, 2017 and October 16, 2017 – May 10, 2018 he served as Director and Acting Director, respectively, of the CNR Istituto di Studi sui Sistemi Intelligenti per l'Automazione (ISSIA-CNR). The operating units of Genova and Palermo of ISSIA-CNR, together with the CNR Istituto Nazionale di Studi ed Esperienze di Architettura Navale (INSEAN-CNR), constitute INM-CNR (INstitute of Marine engineering).

After joining CNR on the 2nd of May 1993, his theoretical and applied research activities focused on marine robotics, mainly addressing the topics of modelling and identification, cooperative guidance and control, vision-based motion estimation and control, and embedded real-time platforms and architectures for Unmanned Marine Vehicles. He is among the European pioneer researchers in the field of unmanned surface vehicles and, with his research group, he developed pioneer research projects on the application of robotic technology to maritime safety. Research results, certified by more than 200 publications in international books, journals and conferences, led to the partnership in a number of EC, national and regional projects. Recently he coordinated the projects Blue RoSES (EMFF), ARES (PON Blue Growth), and MODA (PNRM), that represent state-of-the-art R&D in the definition of guidelines and codes of practice for the operation of robotic vehicles in harbour waters and coastal water, and in the integration of shipbuilding and robotics according to the vision identified by Blue Italian Growth National Technology Cluster.

He is member of the Board of Directors of the Maritime Technology Cluster MareFVG, He was Chair of the 9th IFAC Conference on Manoeuvring and Control of Marine Craft 2012, and Exhibit Chair of Oceans'15 MTS/IEEE Conference 2015; Coordinator of the Topic Group Marine Robotics of euRobotics aisbl (2014-2016); member of the Board of Directors of the Distretto Ligure delle Tecnologie Marine (2011-2017); member of the Scientific Technical Committee on innovation in shipyards of the Italian Ministry of Infrastructures and Transport (2010-2012).

Work experience

- May 1st, 1993 - today: employed at Consiglio Nazionale delle Ricerche - Istituto per l'Automazione Navale; Istituto di Studi sui Sistemi Intelligenti per l'Automazione from April 2002; Istituto di Ingegneria del Mare from July 9, 2018
 - 17/2/2020-today: Director of research, i.e. Dirigente di Ricerca (permanent position)
 - 11/5/2018-16/2/2020: Senior researcher, i.e. *Primo Ricercatore* (permanent position)
 - 16/10/2017-10/5/2018: **Acting Director** of the CNR Istituto di Studi sui Sistemi Intelligenti per l'Automazione

- 16/10/2013-15/10/2017: **Director** of the CNR Istituto di Studi sui Sistemi Intelligenti per l'Automazione
- 1/1/2002-15/10/2013: Senior researcher, i.e. *Primo Ricercatore* (permanent position)
- 1/10/2001-31/12/2001: Researcher, i.e. *Ricercatore* (permanent position)
- 19/7/1999-30/9/2001: Researcher, i.e. *Ricercatore* (temporary position)
- 15/7/1994-14/7/1999: Researcher, i.e. *Ricercatore* (temporary position)
- 1/5/1993-30/4/1994: Researcher, i.e. *Ricercatore* (temporary position)
- 1999 (October-December): CNR-NATO Grant at Instituto Superior Tecnico - Instituto de Sistemas e Robotica, Lisbon, Portugal
- 1993, January-April: contract with the Telerobot consortium (Finmeccanica group) on the development of embedded real-time control architectures for advanced robotic systems (vehicles and arms)
- 1991, March-August: scholarship at Ansaldo DNU-RTL on the topic of acoustic navigation, guidance and control of ground vehicles in structured environments

Education and training

- 1991, January: Graduation in Electronic Engineering at the University of Genova with a score of 110 et laude and *dignità di stampa*, with a thesis on the "Automatic planning of the manoeuvres of an autonomous vehicle"
- 1985: high school final exam certificate awarded with a score of 60/60.

Appointments

- **CNR appointments**
 - July 9, 2018 – January 13, 2020: responsible of the Unit of Genova of the Istituto di Ingegneria del Mare of the Consiglio Nazionale delle Ricerche
 - October 13, 2008 – October 15, 2013: responsible of the Support Operating Unit of Genova of the Istituto di Studi sui Sistemi Intelligenti per l'Automazione of the Consiglio Nazionale delle Ricerche
 - 2005 - 2013: principal investigator of the research group "SP-P03-003 Autonomous robotic systems and control" of the Consiglio Nazionale delle Ricerche - Istituto di Studi sui Sistemi Intelligenti per l'Automazione
 - 1998 - 2002: principal investigator of the "Marine robotics" research area of the Consiglio Nazionale delle Ricerche - Istituto per l'Automazione Navale
- **Government appointments**
 - 10/01/2018 – : CapTech Governmental Expert of the CapTech Guidance, Navigation and Control (GEM 04 GNC) within the European Defence Agency (EDA) for the V Reparto "Innovazione Tecnologica" of the Segretariato Generale della Difesa e Direzione Nazionale degli Armamenti
- **Board of Directors**
 - Member of the Board of Directors of the MareFVG from 2021 to now.
 - Member of the Board of Directors of the Distretto Ligure delle Tecnologie Marine,

from 2011 to 2017 (Atto di conferimento Prot. 26626 dated 29/03/2011)

- **International appointments**
 - 13/03/2014 – 30/11/2016: Coordinator of the Topic Group Marine Robotics of euRobotics aisbl
- **Technical-scientific committees**
 - 10/11/2010 (for two years): member, as CNR representative, of the Scientific Technical Committee on innovation in shipyards of the Italian Ministry of Infrastructures and Transport (comma 1 of art.4 of Legge 5 May 1976, n. 259 and further modifications)
 - 06/12/2001 – 31/12/2003: member, as CNR representative, of the Technical Committee CT65 “Control and measurement of industrial processes” of the Comitato Elettrotecnico Italiano
- **International delegations**
 - 06/09/2011 - 08/09/2011: member of the Italian delegation to the bilateral Workshop PNRA - KOPRI (South Korea) on polar research
- **Evaluator of international projects**
 - 1-4/2/2021: Swedish Foundation for Strategic Research - Member of the mid-term evaluation committee on Industrial Research Centres with the task to evaluate the Centre SMaRC-Swedish Maritime Robotic Centre
 - 2019: The Research Council of Norway - Member of a Referee panels evaluating "*Knowledge-Building Projects for Industry*" 2019
 - 29/10/2015 – 24/11/2015: reviewer of a proposal submitted for funding to the American Association for the advancement of Science (AAAS), USA, appointed by Ariel Grostern, Senior Program Associate, Research Competitiveness Program, AAAS
 - September-October 2014: reviewer of a proposal submitted for funding to The Norwegian Research Council, appointed by Nanna Amundsen, Senior Executive Officer MAROFF, The Norwegian Research Council
 - 12/06/2013 – 21/06/2013: reviewer of a proposal submitted for funding to the Ministry of Business, Innovation & Employment, Nuova Zelanda, within the 2013 Science Investment Round; appointed by Megan Allday, Investment Process Coordinator, Science and Innovation Group, Ministry of Business, Innovation & Employment
 - 24/09/2008 – 24/11/2008: reviewer of the project 035223 GREX Coordination and control of cooperating heterogeneous unmanned systems in uncertain environments, within the IST Programme of the European Commission (Review n. 2), appointed by European Commission Information Society and Media Directorate-General Embedded Systems & Control
 - 20/09/2007 – 20/11/2007: reviewer of the project 035223 GREX Coordination and control of cooperating heterogeneous unmanned systems in uncertain environments, within the IST Programme of the European Commission (Review n. 1), appointed by European Commission Information Society and Media Directorate-General Embedded Systems & Control
 - 6/08/2002 – 03/09/2002: reviewer for the MIT Sea Grant College Program annual competition, appointed by Rich Morris, Executive Officer MIT Sea Grant College Program
- **International commissions for selection and evaluation of personnel**
 - January 2018: member of the commission for the Evaluation of Associate

Professor Martin Ludvigsen as a full Professor at the Department of Marine Technology della Norwegian University of Science and Technology (NTNU)

- 9/12/2015: member of the Jury for the Habilitation à Diriger des Recherches (HDR) at Université Montpellier II, France, Candidate: Lionel Lapierre
- March 2014: member of the commission for the evaluation of the candidates for a position of Professorship/Qualification Fellowship in Marine Technology (Underwater Technology) at the Department of Marine Technology della Norwegian University of Science and Technology (NTNU)
- **Chair of International Conferences**
 - Exhibit Chair of Oceans'15 MTS/IEEE Conference, Genova, May 18-21, 2015
 - Chair of the National Organizing Committee of 9th IFAC Conference on Manoeuvring and Control of Marine Craft (MCMC 2012), organised in Arenzano (GE) on September 19-21, 2012 by CNR-ISSIA (event sponsored by IFAC Technical Committee 7.2 Marine Systems)

Publications

Scopus, March 12, 2023

H-index: 23

Citations: 2597

International journals

1. Pellegrini, R., Ficini, S., Odetti, A., ...Caccia, M., Diez, M. Multi-fidelity hydrodynamic analysis of an autonomous surface vehicle at surveying speed in deep water subject to variable payload. *Ocean Engineering*, 2023, 271, 113529
2. Lupu, R., Caccia, M., Zereik, E., Barcaro, R. Women in Blue: Toward a Better Understanding of the Gender Gap in Marine Robotics [Women in Engineering] *IEEE Robotics and Automation Magazine*, 2022, 29(4), pp. 138–140
3. De Lorenzo, G., Piraino, F., Longo, F., ...Caccia, M., Fragiaco, P. Modelling and Performance Analysis of an Autonomous Marine Vehicle Powered by a Fuel Cell Hybrid Powertrain. *Energies*, 2022, 15(19), 6926
4. Karaki, A.A., Bibuli, M., Caccia, M., ...Odetti, A., Sguerso, D. Multi-Platforms and Multi-Sensors Integrated Survey for the Submerged and Emerged Areas. *Journal of Marine Science and Engineering*, 2022, 10(6), 753
5. Lambertini, A., Menghini, M., Cimini, J., Odetti, A., Bruzzone, G., Bibuli, M., Mandanici, E., Vittuari, L., Castaldi, P., Caccia, M., De Marchi, L. Underwater Drone Architecture for Marine Digital Twin: Lessons Learned from SUSHI DROP Project. *Sensors*, 22 (3), art. no. 744, DOI: 10.3390/s22030744. 2022
6. Odetti, A., Bruzzone, G., Caccia, M. Introducing a Portable ASV for Extremely Shallow Waters. *Hydro International*, vol. 12, n. 2, pp. 12-15, 2021
7. Boscaino, V., Odetti, A., Marsala, G., ...Caccia, M., Tinè, G. A fuel cell powered autonomous surface vehicle: The Eco-SWAMP project. *International Journal of Hydrogen Energy*, 2021, 46(39), pp. 20732–20749
8. Ferretti, R., Caccia, M., Coltorti, M., Ivaldi, R. New approaches for the observation of transient phenomena in critical marine environment. *Journal of Marine Science and Engineering*, 2021, 9(6), 578

9. Odetti, A.; Bruzzone, G.; Altosole, M.; Viviani, M.; Caccia, M. SWAMP, an Autonomous Surface Vehicle expressly designed for extremely shallow waters. *Ocean Engineering*, 2020, 216, 108205. doi:10.1016/j.oceaneng.2020.108205
10. Pasculli, L.; Piermattei, V.; Madonia, A.; Bruzzone, G.; Caccia, M.; Ferretti, R.; Odetti, A.; Marcelli, M. New Cost-Effective Technologies Applied to the Study of the Glacier Melting Influence on Physical and Biological Processes in Kongsfjorden Area (Svalbard). *J. Mar. Sci. Eng.* 2020, 8, 593. <https://doi.org/10.3390/jmse8080593>
11. Bruzzone, G.; Odetti, A.; Caccia, M.; Ferretti, R. Monitoring of Sea-Ice-Atmosphere Interface in the Proximity of Arctic Tidewater Glaciers: The Contribution of Marine Robotics. *Remote Sens.* **2020**, 12, 1707. <https://doi.org/10.3390/rs12111707>
12. Odetti, A.; Altosole, M.; Bruzzone, G.; Caccia, M.; Viviani, M. Design and Construction of a Modular Pump-Jet Thruster for Autonomous Surface Vehicle Operations in Extremely Shallow Water. *J. Mar. Sci. Eng.* **2019**, 7, 222. <https://doi.org/10.3390/jmse7070222>
13. Chiarella, D.; Bibuli, M.; Bruzzone, G.; Caccia, M.; Ranieri, A.; Zereik, E.; Marconi, L.; Cutugno, P. A Novel Gesture-Based Language for Underwater Human–Robot Interaction. *J. Mar. Sci. Eng.* **2018**, 6, 9. <https://doi.org/10.3390/jmse6030091>
14. Bruzzone G. Odetti A., Caccia M. Remote Data Collection Near Marine Glacier Fronts Unmanned Vehicles for Autonomous Sensing, Sampling in the North Pole. (2018) *Sea Technology*, vol. 59, no. 3, pp. 22-26. DOI: 10.1007/s11370-011-0103-x
15. Maglietta R., Milella A., Caccia M., Bruzzone G. A vision-based system for robotic inspection of marine vessels. (2018) *Signal, Image and Video Processing*, vol. 12, n. 3, pp. 471-478. DOI: <https://doi.org/10.1007/s11760-017-1181-9>
16. Milella A., Maglietta R., Caccia M., Bruzzone G. Robotic inspection of ship hull surfaces using a magnetic crawler and a monocular camera (2017). *Sensor Review*, vol. 37 n. 4, pp. 425-435. DOI: <https://doi.org/10.1108/SR-02-2017-0021>
17. Petitti A., Di Paola D., Milella A., Lorusso A., Colella R., Attolico G., Caccia M. A network of stationary sensors and mobile robots for distributed ambient intelligence (2016). *IEEE Intelligent Systems*, vol. 31, n. 6, pp.28-34. DOI: 10.1109/MIS.2016.43
18. Casalino G., Caccia M., Caselli S., Melchiorri C., Antonelli A., Caiti A., et al. Underwater intervention robotics: an outline of the Italian national project MARIS (2016). *Marine Technology Society Journal* vol. 50, n. 4, pp. 98-107. DOI: <https://doi.org/10.4031/MTSJ.50.4.7>
19. Kalwa J., Tietjen D., ..., Caccia M., et al. The European Project MORPH: Distributed UUV Systems for Multimodal, 3D Underwater Surveys (2016). *Marine Technology Society Journal* vol. 50, n. 4, pp. 26-41. DOI: <https://doi.org/10.4031/MTSJ.50.4.10>
20. Mišković N., Bibuli M., Birk A., Caccia M., Egi M., et al. CADDY—Cognitive Autonomous Diving Buddy: Two Years of Underwater Human-Robot Interaction (2016). *Marine Technology Society Journal* vol. 50, n. 4, pp. 54-66. DOI: <https://doi.org/10.4031/MTSJ.50.4.11>
21. Ferreira F., Veruggio G., Caccia M., Bruzzone G. A survey on real-time motion estimation techniques for underwater robots (2016). *Journal of Real-Time Image Processing*, vol. 11, n. 4, pp. 693-711, 2016. DOI: <https://doi.org/10.1007/s11554-014-0416-z>

22. Bruzzone G., Bibuli M., Zereik E., Ranieri A., Caccia M. Cooperative adaptive guidance and control paradigm for marine robots in an emergency ship towing scenario”, *International Journal of Adaptive Control and Signal Processing*, 2016, DOI: 10.1002/acs.2667.
23. Saggini E., Zereik E., Bibuli M., Ranieri A., Bruzzone G., Caccia M., Riccomagno E. Evaluation and comparison of navigation guidance and control systems for 2D surface path-following, *Annual Reviews in Control*, Vol. 40, pp. 182-190, 2015.
24. Sorbara A., Ranieri A., Saggini E., Zereik E., Bibuli M., Bruzzone G., Riccomagno E., Caccia M., Testing the Waters: Design of Replicable Experiments for Performance Assessment of Marine Robotic Platforms (2015) *IEEE Robotics & Automation Magazine (RAM)*, 2015 DOI:10.1109/MRA.2015.2448311.
25. Bibuli M., Bruzzone G., Caccia M., Gasparri A., Priolo A., Zereik E. Swarm based path-following for cooperative unmanned surface vehicles (2014) *Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering for the Maritime Environment*, Vol. 228(2), pp. 192-207, January 2014, DOI: 10.1177/1475090213516108.
26. Ferreira, F., Veruggio, G., Caccia, M., Bruzzone, G. Real-time optical SLAM-based mosaicking for unmanned underwater vehicles (2012) *Intelligent Service Robotics*, 5 (1), pp. 55-71. DOI: 10.1007/s11370-011-0103-x
27. Bibuli, M., Caccia, M., Lapierre, L., Bruzzone, G. Guidance of unmanned surface vehicles: Experiments in vehicle following (2012) *IEEE Robotics and Automation Magazine*, 19 (3), art. no. 6153422, pp. 92-102. DOI: 10.1109/MRA.2011.2181784
28. Mišković, N., Vukić, Z., Bibuli, M., Bruzzone, G., Caccia, M. Fast in-field identification of unmanned marine vehicles (2011) *Journal of Field Robotics*, 28 (1), pp. 101-120. DOI: 10.1002/rob.20374
29. Bruzzone G., Bibuli M., Caccia M.: ”Improving coastal operations with Unmanned Surface Vehicles”, *Sea Technology*, vol. 52, n. 7, pp. 46-49, 2011.
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31. Bruzzone, G., Caccia, M., Ravera, G., Bertone, A. Standard Linux for embedded real-time robotics and manufacturing control systems (2009) *Robotics and Computer-Integrated Manufacturing*, 25 (1), pp. 178-190. DOI: 10.1016/j.rcim.2007.07.016
32. Caccia M., Bibuli, M. Bruzzone G. Aluminium Autonomous Navigator for Intelligent Sampling: the ALANIS project, *Sea Technology*, vol. 50, n. 2, pp. 63-66, 2009.
33. Caccia, M., Bruzzone, G., Bono, R. A practical approach to modeling and identification of small autonomous surface craft (2008) *IEEE Journal of Oceanic Engineering*, 33 (2), pp. 133-145. DOI: 10.1109/JOE.2008.920157
34. Caccia, M., Bibuli, M., Bono, R., Bruzzone, G. Basic navigation, guidance and control of an Unmanned Surface Vehicle (2008) *Autonomous Robots*, 25 (4), pp. 349-365. DOI: 10.1007/s10514-008-9100-0

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36. Caccia, M. Vision-based ROV horizontal motion control: Near-seafloor experimental results (2007) *Control Engineering Practice*, 15 (6), pp. 703-714. DOI: 10.1016/j.conengprac.2006.05.008
37. Caccia M., Bruzzone G. Execution control of ROV navigation, guidance and control tasks, *International Journal of Control*, 80:7, 1109-1124, 2007.
38. Caccia, M. Laser-triangulation optical-correlation sensor for ROV slow motion estimation (2006) *IEEE Journal of Oceanic Engineering*, 31 (3), pp. 711-727. DOI: 10.1109/JOE.2005.858357
39. Caccia M., Coletta P., Bruzzone G., Veruggio G. Execution control of robotic tasks: a Petri net-based approach, *Control Engineering Practice*, vol. 13, n.8, pp 959-971, 2005, Elsevier.
40. Caccia, M., Bono, R., Bruzzone, G., Bruzzone, G., Spirandelli, E., Veruggio, G., Stortini, A.M., Capodaglio, G. Sampling sea surfaces with SESAMO: An autonomous craft for the study of sea-air interactions (2005) *IEEE Robotics and Automation Magazine*, 12 (3), pp. 95-105. DOI: 10.1109/MRA.2005.1511873
41. Caccia M. The SEa-Surface Autonomous MOdular unit project, *Sea Technology*, vol. 45, no. 9, pp. 46-51, 2004.
42. Bruzzone G., Bono R., Caccia M., Veruggio G. Internet-based tele- operation of an ROV in Antarctica, *Sea Technology*, vol. 44, no. 10, pp. 47-56, 2003.
43. Caccia M., Bono R., Bruzzone G., Veruggio G. Bottom-following for remotely operated vehicles, *Control Engineering Practice*, vol. 11, no. 4, pp 461-470, 2003, Elsevier.
44. Caccia M., Bruzzone G., Veruggio G. Bottom-following for remotely operated vehicles: algorithms and experiments, *Autonomous Robots*, 14, pp. 17-32, 2003, Kluwer Academic Publishers.
45. Caccia M., Bono R., Bruzzone Ga., Bruzzone Gi., Spirandelli E., Veruggio G. Romeo-ARAMIS integration and sea trials, *Marine Technology Society Journal*, vol. 36, n. 2, Summer 2002, pp. 3-12.
46. Caccia M., Bruzzone G., Veruggio G. Sonar-based guidance of unmanned underwater vehicles" *Advanced Robotics*, vol. 15, 2001, no. 5, pp. 551-574, Special Issue on Underwater Robotics.
47. Caccia M., Bruzzone G., Veruggio G. Experiments in the guidance of unmanned underwater vehicles, *Underwater Technology*, Winter 2000/2001, vol. 24, n. 4, pp. 143-151.
48. Caccia M., Bono R., Bruzzone G., Veruggio G. Unmanned Underwater Vehicles for scientific applications and robotics research: the ROMEO Project, *Marine Technology Society Journal*, Vol. 24, n. 2, Summer 2000, pp. 3-17.
49. Caccia, M., Indiveri, G., Veruggio, G. Modeling and identification of open-frame variable configuration unmanned underwater vehicles (2000) *IEEE Journal of Oceanic Engineering*, 25 (2), pp. 227-240. DOI: 10.1109/48.838986

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51. Caccia, M., Bono, R., Bruzzone, G., Veruggio, G. Variable-configuration UUVs for marine science applications (1999) *IEEE Robotics and Automation Magazine*, 6 (2), pp. 22-32. DOI: 10.1109/100.774925
52. Caccia M., Veruggio G. Acoustic motion estimation and guidance for unmanned underwater vehicles. *International Journal of Systems Science*, vol. 30, No. 9, 1999, pp. 929-938, Taylor and Francis Ltd., London.
53. Alessandri, A., Caccia, M., Veruggio, G. Fault detection of actuator faults in unmanned underwater vehicles (1999) *Control Engineering Practice*, 7 (3), pp. 357-368. DOI: 10.1016/S0967-0661(98)00169-5
54. Caccia M., Bruzzone G., Veruggio G. Active sonar-based bottom following for unmanned underwater vehicles, *IFAC Control Engineering Practice*, Vol. 7, No. 4, Aprile 1999, pp. 459-468, Elsevier Science Ltd., England.
55. Cristi R., Caccia M., Veruggio G. Motion estimation and modeling of the environment for underwater vehicles, *International Journal of Systems Science*, vol. 29, No. 10, 1998, pp. 1135-1143, Taylor and Francis Ltd., London.
56. Caccia M., Casalino G., Cristi R., Veruggio G. Acoustic motion estimation and control for an unmanned underwater vehicle in a structured environment, *IFAC Control Engineering Practice*, Vol. 6, No. 5, September 1998, pp. 661-670, Elsevier Science Ltd., England.
57. Veruggio G., Bono R., Bruzzone G., Caccia M., Virgili P. A man- machine interface for the development of an innovative underwater gripper. *International Journal of Systems Science*, vol. 29, No. 5, 1998, pp. 529-537, Taylor and Francis Ltd., London.

Projects

- **International projects**

- Horizon Europe Twinning MONUSEN - Montenegrin Center for Underwater Sensor Networks (01/06/2022 – 31/05/2025)
 - Project coordinator: Igor Radusinovic (UoM)
 - Partners: UoM (Montenegro), UniZG-FER (Croazia), CNR-INM (Italy), University of Newcastle (UK)
 - Project total cost: € 1,499,666.25
 - Requested contribution: € 1,499,666.25
 - CNR total cost: 300,158.00 €
 - CNR requested contribution: 300,158.00 €
 - Project goal: MONUSEN strives to create collaborative conditions required for the promising research institution - University of Montenegro (Faculty of Electrical Engineering) to trace clear excellence trajectory in the field of Underwater Sensor Networks (USNs). This will be achieved by twinning with EU research intensive institutions with strong expertise in this field: National Research Council of Italy, University of Zagreb Faculty of Electrical Engineering and Computing and Newcastle University.

- EASME EMFF-BlueEconomy-2018 Blue RoSES - Blue Robotics for Sustainable Eco-friendly Services for innovative marinas & leisure boats (01/12/2019 – 31/05/2021)
 - **Project coordinator: Massimo Caccia (CNR-INM)**
 - Partners: IST-ID (PT), NAVIGO scarl (IT), OptionsNet (GR), Aninver (SP)
 - Project total cost: 1 042 725.78 €
 - Requested contribution: 834 178.00 €
 - CNR total cost: 273.534.80 €
 - CNR requested contribution: 218.827.84 €
 - Project goal: Blue RoSES aims at developing innovative services that seek to adapt marinas and leisure boat design to changing customer demand. By integrating robotics and IoT, these new services will result in creating job opportunities and new business models. Customers will be enabled to visit underwater sites by piloting a Remotely Operated Vehicle (ROV) from a leisure boat, ground control room or web app. This will facilitate access to the subsea environment by the elderly and young people alike, thus adding a "new dimension" to marinas and attracting increasing interest from diversified users. The project will thus foster the design of innovative leisure boats that integrate robotic vehicles with ever-improving ICT services. The project will also address environmental challenges since ROVs will be used to monitor water, seabeds and yacht hulls for safer refitting and dismantling.
- PC Italia-Francia "Marittimo" MATRAC-ACP Monitoraggio Adattivo in Tempo Reale con Automatizzazione del Campionamento - Aree Costiere Portuali (01/04/2018 – 31/08/2021)
 - **Project coordinator: Massimo Caccia (CNR-INM)**
 - Partners: IFREMER (FR), Università di Genova, Genova (IT)
 - Project total cost: 863,016.40 €
 - Requested FESR contribution: 733,563.94 €
 - CNR (INM+IMATI) total cost: 316,689.34 €
 - CNR (INM+IMATI) requested contribution: 316,689.34 €
 - Project goal: to contribute to enhance the protection of harbour waters by improving monitoring procedures through the use of highly automated robotic technologies and adaptive sampling methods.
- H2020-INFRAIA-2017-1-two- stage G.A. 731103 euMarineRobots (01/03/2018 – 28/02/2021)
 - Project coordinator: Universidade do Porto
 - Partners: Universitaet Bremen, Associacao do Instituto Superior Tecnico para a Investigacao e Desenvolvimento, Universita degli Studi di Genova, Sveuciliste u Zagrebu Fakultet Elektrotehnike i Racunarstva, Universitat de Girona, University of Limerick, Consorcio para el Diseno, Construccion, Equipamiento y Explotacion de la Plataforma Oceanica de Canarias, NATO Science and Technology Organisation, Heriot-Watt

- University, Norges Teknisk-Naturvitenskapelige Universitet, Marine Institute, Distretto Ligure delle Tecnologie Marine SCRL (CNR is a third party of DLTM), Natural Environment Research Council, Institut Francais De Recherche Pour L'exploitation De La Mer
 - Principal investigator for CNR: M. Caccia
 - Project total cost: 4,998,736.75 €
 - Requested EC contribution: 4,998,736.75 €
 - CNR-INM total cost: 165,543.25 €
 - CNR-INM requested EC contribution: 165,543.25 €
 - Project goal: implementing a European marine robotics infrastructure
- Interreg Italia-Croazia InnovaMARE - Developing innovative technologies for sustainability of Adriatic Sea (01/07/2020 - 31/12/2022)
 - Project coordinator: Croatian Chamber of Economy (Croatia)
 - Partners: Regional Union of the Chambers of Commerce of Veneto Region (Italy), University of Trieste (Italy), Regional Agency for Technology and Innovation (Italy), Maritime Technology Cluster FVG (Italy), Communication Technology Srl (Italy), National Institute of Oceanography and Experimental Geophysics (Italy), Ruder Bošković Institute (Croatia), Faculty of Electrical Engineering and Computing (Croatia), University of Dubrovnik (Croatia), University of Rijeka (Croatia), Geomar Ltd (Croatia), Šibenik Knin County (Croatia)
 - Principal investigator for CNR-INM: M. Caccia;
 - Project total cost: 5.555.755 €
 - CNR-INM total cost (requested contribution): 238.000,00 €
 - CNR-INM goal: construction, operation and management of a couple of Autonomous Surface Vehicles
- H2020-TWINN-2015 project id. 691980 EXCELLABUST Excelling LABUST in marine robotics (1/1/2016-31/12/2018)
 - Project coordinator: Nikola Miskovic, University of Zagreb (HR)
 - Grant Agreement n. 691980
 - Partners: University of Limerick (Irlanda), University of Girona (SP)
 - Principal investigator for CNR-ISSIA: M. Bibuli;
 - Steering Committee member for CNR-ISSIA: M. Caccia;
 - Project total cost: 1,014,551.00 €
 - Requested EC contribution: 1,014,551.00 €
 - CNR-ISSIA total cost: 201,056.25 €
 - CNR-ISSIA requested EC contribution: 201,056.25 €
 - Project goal: to enhance the know-how of LABUST of University of Zagreb through training and personnel exchange activities
- FP7-ICT-2013-10 project id. 611373 CADDY Cognitive autonomous diving buddy (1/1/2014-31/12/2016)
 - Project coordinator: Nikola Miskovic, University of Zagreb (HR)
 - DoW allegato al Grant Agreement n. 611373

- Partners: Jacobs University, Bremen (DE), Instituto Superior Tecnico, Lisbon (PT), University of Wien (A), University of Newcastle upon Tine (UK), Divers Alert Network Europe Foundation (MT)
 - Principal investigator for CNR-ISSIA: M. Bibuli;
 - Steering Committee member for CNR-ISSIA: M. Caccia;
 - Project total cost: 4,890,582.00 €
 - Requested EC contribution: 3,690,790.00 €
 - CNR-ISSIA total cost: 742,824.00 €
 - CNR-ISSIA requested EC contribution: 559,792.00 €
 - Project goal: to design and develop a cooperative system constituted by a human diver, an Autonomous Underwater Vehicle, and an Autonomous Surface Vehicle to monitor the diver, support the diver, and improve safety of the diver during underwater operations.
 - CNR-ISSIA role: research on the robotic system supporting the diver and cooperative control systems between diver and robot.
- EC ICT- 288704 MORPH Marine robotic system of self-organizing logically linked physical nodes (01/02/2012 – 31/01/2016)
 - Project coordinator: Joerg Kalwa, Atlas Elektronik GmbH (DE)
 - Partners: IFREMER (FR), Jacobs University, Bremen (DE), Instituto Superior Tecnico, Lisbon (PT), Technical University of Ilmenau (DE), Centre for Maritime Research and Experimentation, La Spezia (IT), University of Girona (SP), IMAR – Instituto do Mar (PT)
 - Principal investigator for CNR-ISSIA: M. Caccia;
 - Project total cost: 8,521,744.00 €
 - Requested EC contribution: 6,284,371.00 €
 - CNR-ISSIA total cost: 526,987.00 €
 - CNR-ISSIA requested EC contribution: 398,040.00 €
 - Project goal: the MORPH project advances the novel concept of an underwater robotic system composed of a number of spatially separated mobile robot-modules, carrying distinct and yet complementary resources.
 - CNR-ISSIA role: focuses on carrying out and coordinating research activities on real-time coarse mapping as well as developing and testing algorithms for relative/local navigation and control. Moreover, CNR will make available a tethered underwater vehicle for preliminary data collection and supporting system demonstration
- EC CART-285878- FP7-SME-2011-1 Cooperative Autonomous Robotic Towing system (01/11/2011 – 31/07/2013)
 - Project coordinator: Serena Bianca Ardito, Posidonia Srl (IT)
 - Partners: University of Zagreb (HR), Det Norske Veritas AS (NO), PKL AS (EE), SRS Mecano Instalatie Srl (RO)
 - Principal investigator for CNR-ISSIA: M. Caccia;
 - Project total cost: 912,113.20 €
 - Requested EC contribution: 658,400.00 €

- CNR-ISSIA total cost: 3,394.00 € + 298,437.00 € (RTD activities sub-contracted by SMEs)
 - CNR-ISSIA requested EC contribution: 3,394.00 € + 298,437.00 € (sub-contracts from SMEs) = 301,831.00 €
 - Project goal: the CART (Cooperative Autonomous Robotic Towing system) concept is based on the development of robotised unmanned marine platforms able to (semi-)automatically execute the high risk operation of linking the emergency towing system of distressed ships to towing vessels.
 - CNR-ISSIA role: focuses on carrying out and coordinating research activities on prototype vehicle hardware and software design, development and integration as well as cooperative guidance and manoeuvring.
 - EC FP7 SST.2008.5.2.1 Innovative Product Concepts project: Marine INspection rObotic Assistant System (01/06/2009 – 30/06/2012)
 - Project coordinator: Renato Robino / Alessia Vergine, RINA SpA (IT)
 - Partners: Lloyd's Register (UK), DFKI, Bremen (DE), University of Balearic Islands (SP), Glafcos Marine Ltd (GR), MTG Dolphin Shipyard, Varna (BG), Neorion Shipyard (GR), RIGEL Engineering S.p.A. (IT), Horama S.A. (GR)
 - Principal investigator for CNR-ISSIA: M. Caccia;
 - Project total cost: 2,863,999.35 €
 - Requested EC contribution: 2,057,272.11 €
 - CNR-ISSIA total cost: 382,796.87 €
 - CNR-ISSIA requested EC contribution: 293,851.50 €
 - Project goal: re-engineering of the overall vessel inspection methodology, by introducing an innovative system concept that integrates human personnel with high locomotion enabled robots .
 - CNR-ISSIA role: focused on the development of a Magnetic Autonomous Robotic Climber and the adaptation of commercial mini-ROV for inspecting the internal structures of cargo ships.
- **National projects**
 - PNRM Scheda a2019.138 - MORphing Distributed Autonomous underwater vehicle - "MODA" (15/07/2021-14/07/2024)
 - Project Coordinator investigator: CNR
 - Partners: Università di Padova, Wireless and More
 - **Principal investigator: M. Caccia;**
 - Project total cost: 191,415.00 € (Phase 1)
 205,565.00 € (Phase 2, optional)
 191,795.00 € (Phase 3, optional)
 - Requested contribution: 95,707.50 € (Phase 1)
 102,782.50 € (Phase 2, optional)
 95,897.50 € (Phase 3, optional)

- CNR-INM total cost: 72,772.00 € (Phase 1)
86,754.00 € (Phase 2, optional)
85,934.00 € (Phase 3, optional)
 - CNR-INM requested contribution: 36,386.00 € (Phase 1)
43,377.00 € (Phase 2, optional)
42,967.00 € (Phase 3, optional)

- Project goal: MODA investigates key technologies for the development of a “distributed AUV” that is capable of transforming its shape in a fluid, gradual and seamless way, while maintaining wireless connections between the composing robots. In the strategic perspective of the realization of a MORphing Distributed Autonomous underwater vehicle, the MODA project has the objective of studying and validating: i. a communication and short-range positioning system; ii. a control system of a mobile robot with wireless connections.
- CNR-INM role: study of distributed OWTT-based navigation and control systems for a team of UMVs
- PON DD1735-13/07/17 ARS01_00682 Autonomous Robotics for the Extended Ship (01/07/2019 – 31/12/2021)
 - Project Coordinator investigator: CNR
 - Partners: Seastema SpA, Next Geosolutions Europe SpA, SO.PRO.MAR. SpA, MAR.TE. scarl, Apphia srl, Diamec Technology srl, Geocart srl, Università della Calabria, Università di Palermo, Consorzio Universitario per la Ricerca Socioeconomica e per l'Ambiente, Università degli Studi di Genova, Sapienza Università di Roma, Università degli Studi di Bologna
 - **Principal investigator: M. Caccia;**
 - Project total cost: 9,999,368.31 €
 - Requested contribution: 4,998,684.15 €
 - CNR-INM total cost: 1,298,000.00 €
 - CNR-INM requested contribution: 606.000.20 €
 - Project goal: developing a new paradigm in the marine technology area relying on a complex system – the ship with all the subsystems (for control, measurement, etc.) – integrated with new marine robotic technologies (a cooperative system of underwater and surface drones), to extend its operability and flexibility of use in many missions: environmental emergencies, support to the defense system, deployment and maintenance for marine renewable energy devices, off-shore platforms, etc.
 - CNR-INM role: study of innovative methodologies for rapid prototyping of autonomous marine vehicles and autonomous cooperative operations, including launch and recovery, of AUVs and ASVs; study of energy management onboard autonomous marine vehicles; planning of the use robotic resources onboard the ship

- SUSHI-DROP (1/6/2019 – 31/12/2020)
 - Research agreement with University of Bologna
 - **Principal investigator: M. Caccia;**
 - Project total cost: 80,000.00 €
 - Requested contribution: 80,000.00 €
 - Project goal: design and construction of an AUV in the framework of University of Bologna Interreg Italy-Croatia project SUSHI-DROP
- MIT Decreto n. 7557 del 4/10/2016 IBRHYDRO (1/9/2016 – 31/8/2019)
 - Coordinator: Intermarine SpA
 - Partners: CNR-INSEAN
 - Principal investigator for CNR-ISSIA: M. Caccia;
 - Project total cost: 3,947,449.00 €
 - Requested contribution: 2,443,516.85 €
 - CNR-ISSIA total cost: 186,259.00 €
 - CNR-ISSIA requested contribution: 121,068.00 €
 - Project goal: to study a new type of hydrofoil with a hybrid wing system
 - CNR-ISSIA goal: control algorithms design
- PRIN 2010-2011 MARIS: Marine Autonomous Robotics for InterventionS (01/02/2013 – 31/01/2016)
 - Project coordinator: Giuseppe Casalino, University of Genova
 - Partners: University of Cassino and Lazio Meridionale, University of Pisa, University of Parma, University of Salento, University of Bologna
 - Principal investigator for CNR-ISSIA: M. Caccia;
 - Project total cost: 1,798,039 .00 €
 - Requested EC contribution: 1,258,628 .00 €
 - CNR-ISSIA total cost: 377,927.00 €
 - CNR-ISSIA requested contribution: 264,549.00 €
 - Project goal: studying, developing and integrating, technologies and methodologies enabling the development of underwater robotic systems for manipulation and transportation activities within underwater scenarios typical for the off-shore industry, underwater search and rescue operations, as well as underwater scientific missions.
 - CNR-ISSIA role: focuses on carrying out and coordinating research activities on environment reconstruction, cooperative distributed mission control and system integration. Moreover, CNR will make available the underwater vehicles for supporting system demonstration.
- Flagship Project RITMARE – La Ricerca ITaliana per il MARE (1/1/2012-31/12/2016)
 - SP5-WP6 Development of autonomous vehicles
 - Work Package coordinator: M. Caccia, CNR-ISSIA
 - Partners: CNR-ISMAR, CINFAI
 - Work Package total cost: 2,300,000.00 €
 - CNR-ISSIA requested contribution: 1,650,000.00 €

- CNR-ISSIA SP-03-003 requested contribution: 690,000.00 €
- WP goal: This WP aims at designing and developing key technologies for a new generation of Unmanned Marine Vehicles. The activity will be supported by the development of prototype platforms for shallow water such as cooperative USV, integrated USV – mini-ROV system, and Interaction-Intervention AUV (I2-AUV).
- CNR-ISSIA role:
 - SP5-WP6-A1 Development of innovative autonomous vehicles (Action responsible: M. Caccia, CNR-ISSIA; budget CNR-ISSIA: 720,000.00 €): design, development and validation of the new robotic platforms. The activity involves the participation of researchers of ISSIA-BA and ISSIA-PA.
- PNRA Project: SEa Surface Autonomous MODular unit (SESAMO) (2002-2003)
 - **Principal investigator M. Caccia**
 - Project leader: CNR-ISSIA
 - Partner: CNR-IDPA
 - Funding: 25,823.00 Euro
 - Project goal: development, test and exploitation of an unmanned surface vehicle for the collection of data and samples for biological, chemical and physical studies on the sea-air interface.
- CNR – Agenzia2000 Project: Web interfaces for underwater virtual environments (2001-2003)
 - **Principal investigator M. Caccia**
 - Project leader: CNR-IAN
 - Funding: 10,329.00 Euro
 - Project goal: development of a web interface to allow the interaction of remote users with a robotic vehicle in an underwater virtual environment.
- CNR Project: Automatic inspection of underwater pipelines (1998-2000)
 - Principal investigator per CNR-IAN: M. Caccia
 - Project leader: CNR-IESI
 - Funding per CNR-IAN: 20,000,000.00 Lire
 - Project goal: development of automatic systems for the inspection of underwater pipelines through visual sensors
- **Regional projects**
 - PO CRO Fondo Sociale Europeo Regione Liguria 2007-2013 Asse IV “Capitale Umano” obiettivo specifico, 1/6 – Research grants for young researchers (03/08/2012 – 2014)
 - Study of an anti-collision system for civilian avionic platforms
 - **Principal investigator: M. Caccia, CNR-ISSIA**
 - Partner: Selav Srl
 - Contribution: 52,000.00 €

- Project goal: one grant for young researcher
 - Study of advanced manipulation systems at uncertain dynamics in less structured environment
 - **Principal investigator: M. Caccia, CNR-ISSIA**
 - Partner: Heron Robots Srl
 - Contribution: 52,000.00 €
 - Project goal: one grant for young researcher
- PO CRO Fondo Sociale Europeo Regione Liguria 2007-2013 Asse IV “Capitale Umano” obiettivo specifico, 1/6 inerenti le aree di attività in cui operano i Poli di ricerca e innovazione e i Distretti tecnologici liguri – Research grants for young researchers (22/06/2012 – 2014)
 - Technologies and methodologies for monitoring wetlands and very shallow waters in coastal areas
 - **Principal investigator: M. Caccia, CNR-ISSIA**
 - Partner: Sistemi Operativi Anfibi Srl
 - Contribution: 104,000.00 €
 - Project goal: two grants for young researchers on the topics:
 - Study of methodologies for modeling, identification and control of hovercrafts
 - Study of methodologies of adaptive sampling for geophysical and environmental monitoring in wetlands and coastal areas
- Parco Scientifico e Tecnologico della Liguria Project: Study of a multi-purpose unmanned vessel for water and seabed monitoring - UMV (Unmanned Multipurpose Vessel) (29/3/2007 – 30/06/2008)
 - **Principal investigator: M. Caccia;**
 - Project total cost: 146,526.00 €
 - Contribution: 122,105.00 €
 - Project goal: design and development of the dual-mode manned/unmanned ALuminium Autonomous Navigator for Intelligent Sampling (ALANIS)
- PRAI-FESR-FESR Regione Liguria Project: Harbour and coastal underwater anti-intrusion system (01/10/2005 – 30/09/2007)
 - **Project coordinator: M. Caccia, CNR-ISSIA**
 - Partners: INGV, ENEA, WASS, Sielco Srl, Colmar Srl, ISME, CNR-ISMAR, GraalTech Srl
 - Project total cost: 774,180.00 €
 - Requested contribution: 534,268.00 €
 - CNR-ISSIA total cost: 76,632.00 €
 - CNR-ISSIA requested contribution: 49,765.00 € + two years of young researcher grant
 - Project goal: study and development of enabling technologies for the development of a harbour and coastal underwater anti-intrusion system.

- CNR-ISSIA role: focused on the study and development of technologies for the exploitation of Unmanned Surface Vehicles in harbour areas.
- **Bilateral research projects**
 - Short Term Mobility, Prof. Shahriar Negahdaripour from 18/07/2016 to 29/07/2016
 - Project goal: study of underwater combined acoustic-optical navigation techniques
 - Bilateral research project CNR-CNRS: Coordinated mission control for autonomous marine vehicles (01/01/2008 – 31/12/2009)
 - Principal investigator: M. Caccia;
 - Partner: CNRS-LIRMM
 - Project funding: 9,1000.00 €
 - Project goal: design, implementation and test of coordinated and cooperative control algorithms and systems for autonomous marine vehicles
 - Italian Government and Croatian Ministry of Science, Education and Sport project: Guidance and control of Unmanned Marine Vehicles (01/01/2008 – 31/03/2008)
 - Principal investigator: M. Caccia;
 - Project goal: research grant to Dr. Nikola Miskovic for a three months stage at CNR-ISSIA laboratory of marine robotics
 - Bilateral research project CNR-CNRS: Sensor-based guidance and control of autonomous marine vehicles: path-following and obstacle avoidance (01/01/2006 – 31/12/2007)
 - Principal investigator: M. Caccia;
 - Partner: CNRS-LIRMM
 - Project goal: design, implementation and test of nonlinear path-following algorithms for Unmanned Surface Vehicles
 - Bilateral research project CNR-GRICES: Marine robotic vehicles for underwater habitat mapping (2003-2004)
 - Principal investigator: M. Caccia;
 - Partner: ISR-IST
 - Prot. 6097 del 23/2/2003
 - Project goal: preliminary study of the use of autonomous marine vehicles to map underwater habitat.
 - Bilateral research project CNR-ICCTI: Advanced control of underwater vehicles (1999-2000)
 - Principal investigator: M. Caccia;
 - Partner: ISR-IST
 - Project goal: integration of different layers of intelligent control architectures for Unmanned Marine Vehicles and validation through Internet-based mission control of the Romeo ROV in Genova, Italy, by the CORAL mission controller in Lisbon, Portugal