BIODRONES

PRIN 2022

PROJECT CLOSING WORKSHOP

Biomimetic and Innovative Optimized hydrodynamic concepts of high-efficiency underwater gliding DRONES for ocean research

Wednesday February 25, 2026 – h. 09:00 – 13:00

Università Roma Tre

Dept. of Civil, Computer Science and Aeronautical Technology Engineering

Via della Vasca Navale 79, Room N13

09:00	**Prof. Umberto Iemma (Roma Tre)**, Welcome address
09:10	**Dr. Matteo Diez (CNR-INM)**, BIODRONES: A highly multidisciplinary project on biomimetic hydrodynamic concepts of high-efficiency underwater gliding drones for ocean research
09:30	**Dr. Andrea Serani (CNR-INM)**, How to survive the curse of dimensionality with examples for underwater gliding drones
10:15	**Mr. Andrea Brilli (Sapienza)**, A clustering technique for multi-fidelity surrogate-based multi-objective optimization
11:00	Break
11:30	**Dr. Lorenzo Burghignoli (Roma Tre)**, Dynamic neural networks for the hydrodynamic optimization of a closed-wing underwater glider
12:15	**Dr. Simona Aracri (CNR-INM)**, Unconventional marine robotics for extreme environments

https://sites.google.com/inm.cnr.it/biodrones

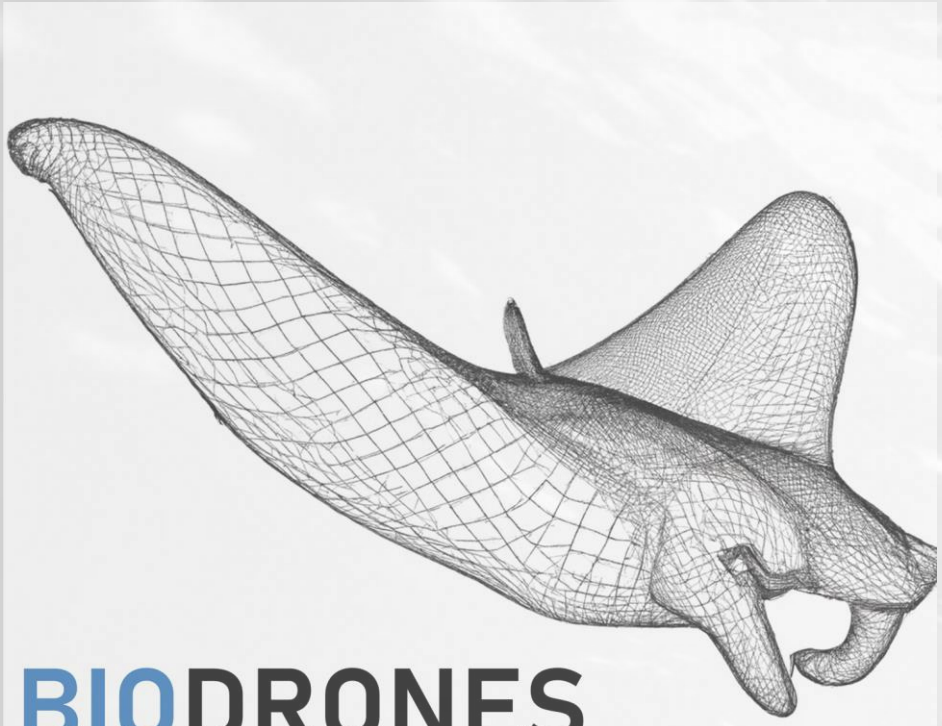
https://www.linkedin.com/company/biodrones

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

Consiglio Nazionale delle Ricerche



Biomimetic and Innovative Optimized hydrodynamic concepts of high-efficiency underwater gliding DRONES for ocean research

THE PROJECT

- The BIODRONES project aims to optimize hydrodynamic designs for compact autonomous underwater gliders (AUGs) tailored for ocean surveying. These designs seek maximum efficiency, range, and endurance within set constraints. The project's objectives include providing guidance for next-gen AUGs, enabling cost-effective ocean data collection, and promoting technology transfer to small and medium underwater robotics enterprises.
- AUGs offer cost-effective, long-range data collection capabilities, measuring various ocean parameters. Buoyancy control methods involve seawater flooding/evacuation or adjusting oil levels in an external bladder. Efficient hydrodynamic designs are crucial for equilibrium between lift, drag, and buoyancy force, ensuring extended missions.
- The project explores biomimetic and innovative glider concepts inspired by nature (rays, sea turtles) and other industries (aircraft design). To ensure a fair comparison, all concepts undergo high-fidelity hydrodynamic optimization using simulation-driven methodologies, including multi-fidelity solvers, metamodeling, active learning, dimensionality reduction, and robust multi-objective optimization techniques.

THE PARTNERS

- Consiglio Nazionale delle Ricerche – Istituto di Ingegneria del Mare
- Università Roma Tre
- Sapienza Università di Roma

https://sites.google.com/inm.cnr.it/biodrones

https://www.linkedin.com/company/biodrones

Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA
Consiglio Nazionale delle Ricerche