

ENEA Robotics Laboratory is involved in several aspects of advanced robotics research. Our technological and scientific interests follow four main tracks having the characteristics summarized here below.

- **Land mobile robotics**

Many research projects have been carried out in the field of autonomous land mobile robots for surveillance and security goals, cultural heritage preservation, and elderly and handicapped people care. In this frame, algorithms for autonomous navigation, artificial vision pattern recognition and robot cooperation have been developed.

- **Underwater and aerial mobile robotics**

A swarm of autonomous underwater vehicles is currently under development targeted at communications and security applications. The key points are: distributed control system, new underwater optical-acoustic communication strategies and the building of submarine prototypes. An optical head for high rate communication was designed and built in the Lab. The simultaneous control of several independent UAVs, concurring in the same aerial space in order to avoid possible conflicts among themselves and with commercial aircrafts, is developed in the current project SARA and is the subject of the Eurostars ARCA project. Some of the employed solutions are tackled through the use of Cooperative Game Theory.

- **Human-machine interfaces, teleoperation and telemanipulation**

The tele-operation has always been a topic of the laboratory; now we are also developing mechanical and electro-thermal, micro-invasive, neural interfaces based on smart materials to connect living tissue with the mechanical actuator. Side activities include study and analysis of neural signals recorded in vivo using advanced techniques of signal processing and the development of new-generation, thin-film neural interfaces. Robotics also contributes to the advanced exploitation of cultural heritage by augmented reality and techniques concerning classification and analysis of signals.

- **Sensorial systems**

The Laboratory has developed an innovative sensor that uses infrared electromagnetic radiation and wireless devices in order to provide cognitive elements used by blind to model the surrounding context. In the automotive industry we are creating a help for presbycusic people.



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Robotics Lab

Casaccia Research Centre - Rome, Italy

ENEA - Casaccia Research Centre

Via Anguillarese 301 - 00123 Rome, Italy

Robotics Lab

New Physic Technology and New Materials:
Robotic Section

Claudio Moriconi

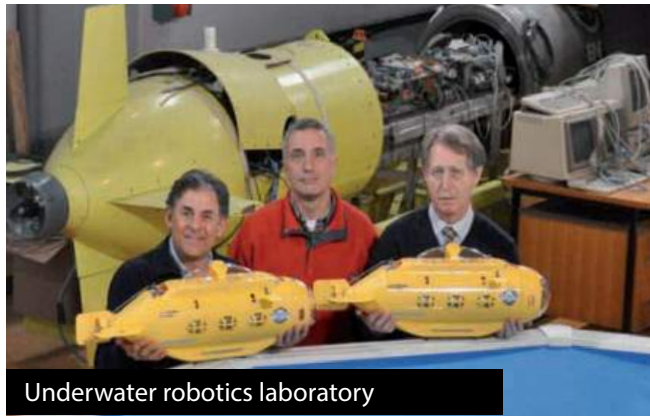
claudio.moriconi@enea.it

www.enea.it

www.enea.it



Cooperant robots PRASSI and ZERO / PRASSI and Magellan



Underwater robotics laboratory



Underwater stereoscopic head - TESSA for 3D rendering



Underwater optical communication head



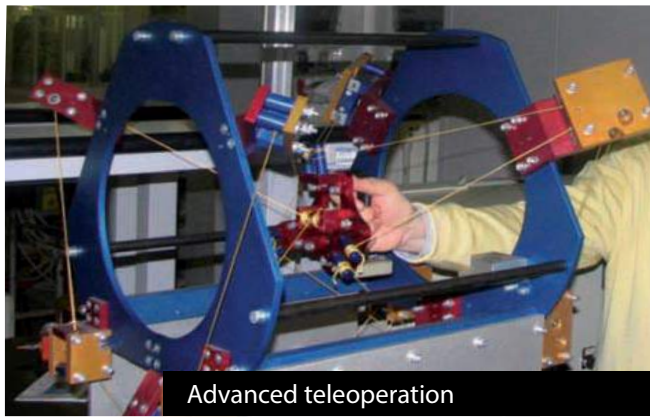
Augmented reality for cultural heritage



Venus back at home



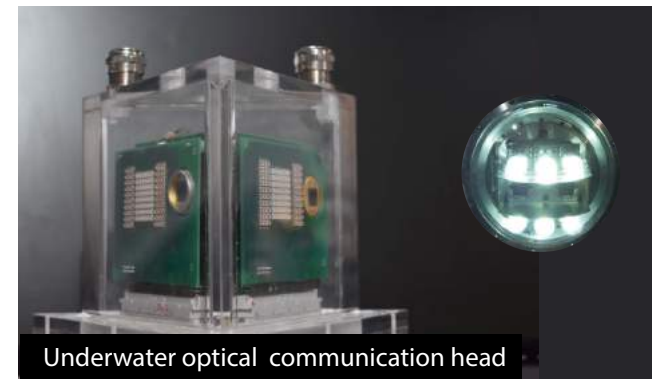
Venus swarm ready for the lake



Advanced teleoperation



Underwater optical communication head



Underwater optical communication head