Development of a Man-Portable Hybrid Autonomous Underwater Vehicle for Antarctic Deep Seabed Exploration

A Cadena
Hadalbotics Startup
Guayaquil, Ecuador

The present poster describes an updated of the development of a low-cost and man-portable Hybrid Autonomous Underwater Vehicle (HAUV) with future 8000 m depth capability to explore the deep-sea bed with applications related to Oceans conservation, Deep-Sea Mining and Genetic Resources. The main objective of the design approach is to reduce the operational costs at sea with a small and light-weight HAUV design allowing operational deployment from sailing yachts instead of costly oceanographic vessel at extreme and challenging environments like Antarctica.

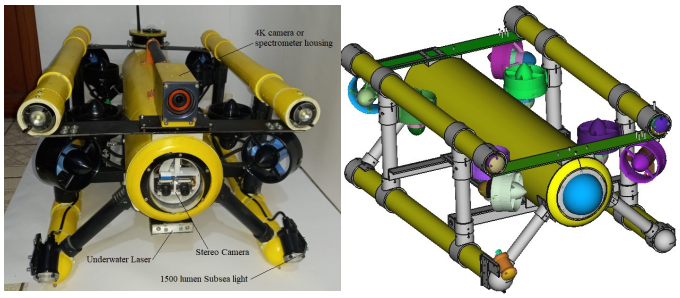

Fig. 1 *Hybrid Autonomous Underwater Vehicle (HAUV)*

The HAUV has a length less than 1 m, weight less than 40 Kg and depth capability of 1000 m, suitable for deployments from zodiac boats.

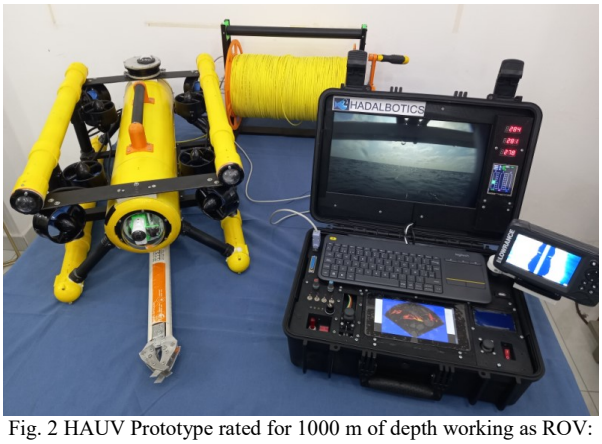

Fig. 2 HAUV Prototype rated for 1000 m of depth working as ROV: underwater vehicle, tether and surface control station.

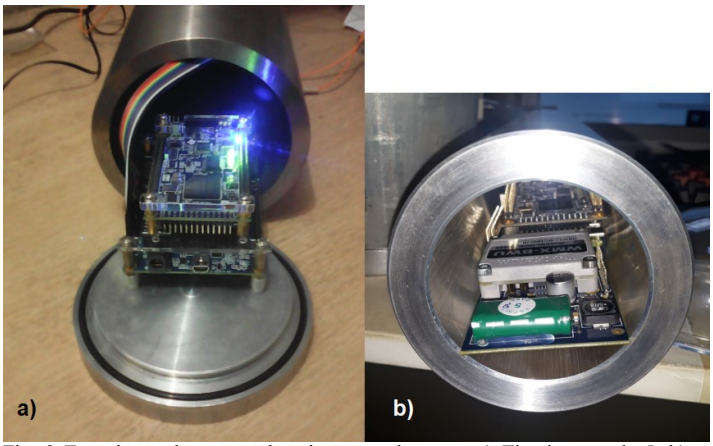

Fig. 3 Experimental pressure housings tested at sea: a) Titanium grade 5, b) aluminum alloy 6061 T6.

The pressure housings to store the batteries and electronics are made of titanium grade 5 and aluminum alloy 6061 T6, they have been tested up to 2200 m at sea. The HAUV has got an Inertial Navigation system, Computer Vision and Artificial Intelligence routines running on ARM CPU, FPGA, GPU and coded by VHDL, C++ and Python.

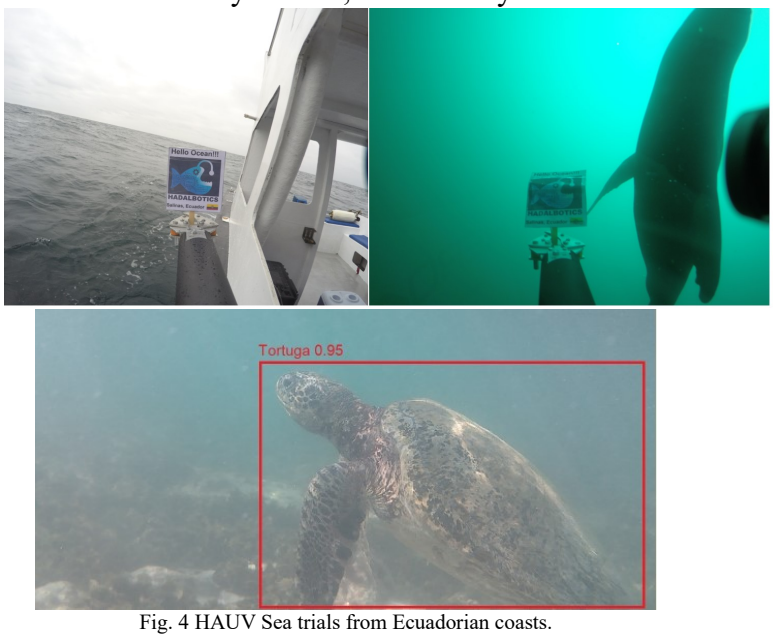

Fig. 4 HAUV Sea trials from Ecuadorian coasts.

The HAUV has been successfully tested at Ecuadorian waters up to 1040 m of depth and is expected future deployments to Antarctica.

Fig.5 Inertial Navigation System (INS) updated with computer vision and underwater lasers.