

## **B.A.G.D.A.D**

B.A.G.D.A.D. is the name of our aquatic drone, developed to improve the monitoring process of artificial water reservoirs, which is fundamental in order to grant their efficiency and avoid accidents and environmental risks. The accumulation of sedimentation could in fact compromise the seismic response of the dam or the related infrastructures (bridges, intake works) and reduce the lake's capacity.

Our drone is provided with a self-developed bathymetric sensor, able to measure the depth of the lake and create a three-dimensional bathymetric map with GPS reference of the seabed. The boat is then capable of moving and taking the measurements autonomously.

The bathymetric sensor uses a system based on force-return feedback, thanks to one spring and one mass. With this system the sensor is cheaper and equally effective as an industrial model.

For the safety of the drone it has a system of cameras to detect obstacles and change the direction in an autonomous way. This system is controlled by the on-board computer. It communicates with the navigation system to decide the new direction and, after dodging the obstacle, to continue the tasks.

The entire software to control the boat, the sensor and collect and analyze the data has been written in Python. The acquired data is stored in the CSV open format.

Thanks to the bathymetric maps, the most critical zones of the seabeds in terms of debris accumulation can be effortlessly monitored. With this information it's easy to understand when the artificial water reservoir needs to be dredged or an intervention in a specific area of it is required.

During the tests we were able to point out how the frame we used (from a model speedboat) is not perfectly suited for its use. Hence, we're considering other options in order to grant more stability during the measurements or in choppy water conditions. We have designed a ring-shaped frame, with multiple engines and the sensor in the middle of it. Such a structure is far more balanced and would be capable of moving in every direction with improved reactivity and maneuverability.