

Concept Evolution

Protei is not the result of academic or scientific research.

Protei is a direct response to environmental crises, including the financial and technological inaccessibility of solutions to the general public.

It is an exploration of the concept of a flexible-hull sailing boat, and the consequences of this bio-inspired design. As the design of the individual Protei vessel improves, further versions will develop towards the behavior of multiple vessels, making up a swarm of sailing drones. As we progress, the vessel will move towards energetic autonomy, possessing sensing and decision-making skills, and eventually will evolve from a centralized swarm control to a decentralised peer-to-peer autonomy.



Protei_001

When a conventional sailboat pulls a long heavy load, it gradually loses steering (direction) and traction (pulling power). The centre board can no longer act as axis of rotation, the rudder can no longer act as a lever on this axis of rotation, resulting in the loss of steering. The energy accumulated in the sail can no longer be transferred into general motion, resulting in the loss of traction.



What we tried first was to move the rudder at the front of the vessel (Protei_001). We observed that a front-rudder on a remote controlled boat could pull a long heavy load.

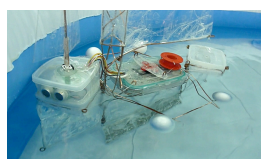
Protei_002

Inspired by these results we made the hypothesis that multiple surfaces of control (rudders) would likely enhance steering, traction and fulfil the function of a centreboard as well. We build Protei_002 as a fully articulated hull sailing vessel that had remarkable sailing properties.



Protei_003

It was a very large inflatable flexible sailing boat. With its extreme light weight, and large sail surface, it had great pulling power. It gave us the confidence to scale up and envision Protei as a viable technology for autonomous sailing oil spill clean-up application.



Protei_005

Protei_005 was designed to be as small as possible, yet containing much more advanced electronics: basic environmental sensing (wind, position) and collision avoidance logic.



Protei_005.1

Protei_005.1 was designed as an enhanced version of Protei_002, inflatable and articulated, with a simple RC kit for all the controls. This larger version was designed to test the strength of the RC servos.



Protei_005.3

Protei_005.3 is an enhanced version of Protei_002. The hull is mostly made of foam sandwiching one layer of wood. It is divided into 3 equal sections of 38 cm each.