



Protei

Open Source Sailing Drone

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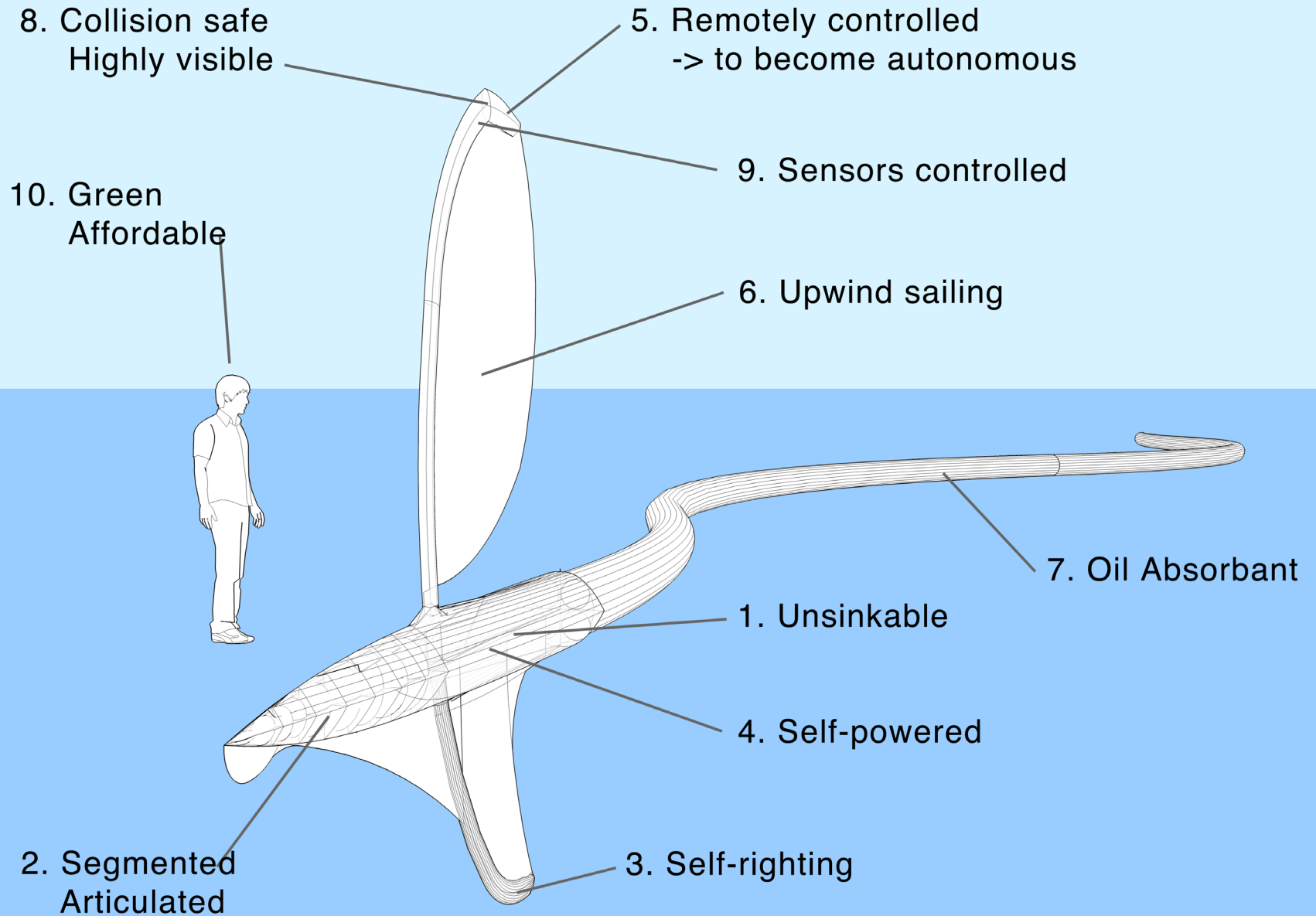
MPS candidate - ITP at NYU

engineer / hacker - Protei



Protei_006

Protei





REPURPOSED MANNED FISHING VESSELS	PROTEI GOALS
Exposes crew to health risks and toxins	Unmanned and autonomous
Cannot operate during a storm	Able to operate during extreme weather conditions
Oil sensing limited to human eye sight	Sensing technologies
Not sustainable, environmentally destructive	Uses renewable energy
Expensive	Inexpensive
Proprietary design	Open-source hardware

How Protei implements Open_source Hardware:

Process:

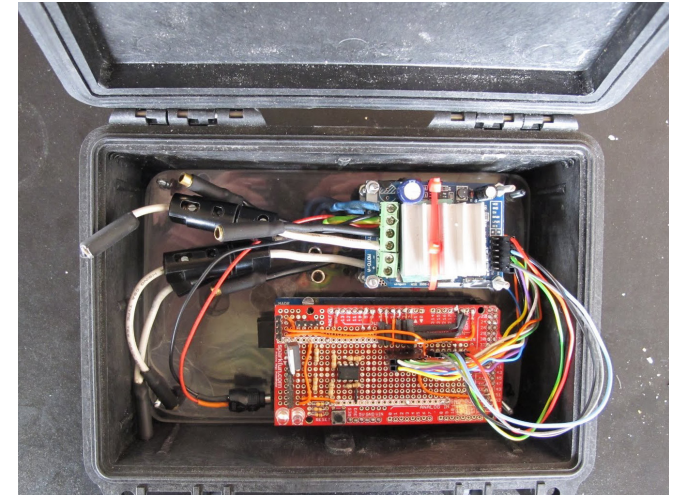
- Shared design
- Open feedback loop
- Document development and progress

Electronic architecture:

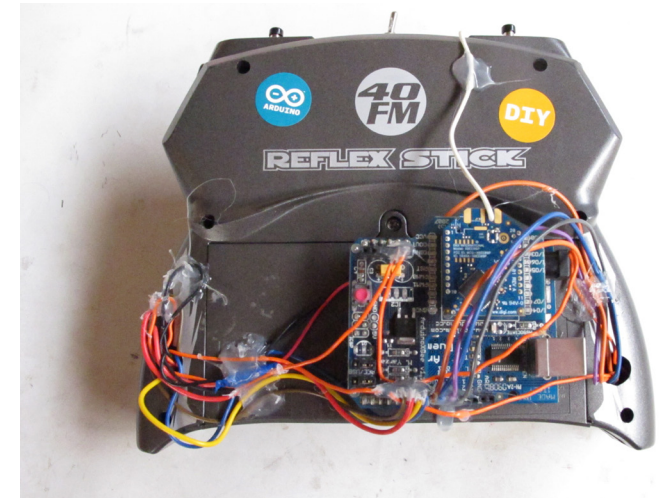
- Use of Arduino, XBee, gps and other sensors

Mechanical Design:

- Built with consumer and industrial products
 - power drills, plumbing equipment, salvaged wood
- 3D models are available online for custom milled parts



Main Electronics Box (Arduino Mega)



Remote Control (Arduino and XBee)

How Protei implements Open_source Hardware:

Documentation and distribution of information:

The screenshot displays a digital interface for a handbook. At the top, there is a video player control bar with a play button, a progress slider, and a close button. The main content area is split into two columns. The left column contains text and two pairs of images. The right column features a large photograph of a boat hull under construction, suspended by ropes in a workshop. At the bottom, a navigation bar shows a series of thumbnail images representing different pages in the handbook, with the current page highlighted.

D) Adding Flotation to the Hull

There were two ways of adding flotation that were explored. First, airbags were placed inside the body and pressurised so that they fit snugly inside each compartment.



Airbags inside hull

However, the airbags were abandoned because it added too much stiffness to the bending, and the seals on the bags were not reliable as they constantly leaked. As an alternative, Styrofoam slices were used to provide flotation. Circular slices were cut for each section and then adjusted to allow space for boxes, connectors, spines etc. inside the hull.

The Styrofoam slices had the advantage that they provided a fixed amount of buoyancy and did not oppose the bending of the hull.



Adding flotation to the hull

Protei Handbook | v.2011 09 02 | CC BY-SA-3.0 | contact@protei.org | p. 48 / 99

The Protei Handbook, available in print and online

Why Open_source?

Collaborative:

- People from all over the world converging to share ideas of Protei's creation
- We function with an open workflow: horizontal rather than hierarchical chain of command for planning, budgeting, hardware, software, fabrication, design, testing

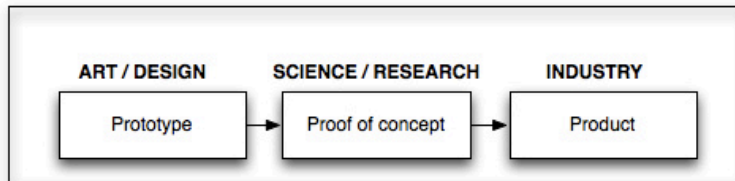


Why Open_source?

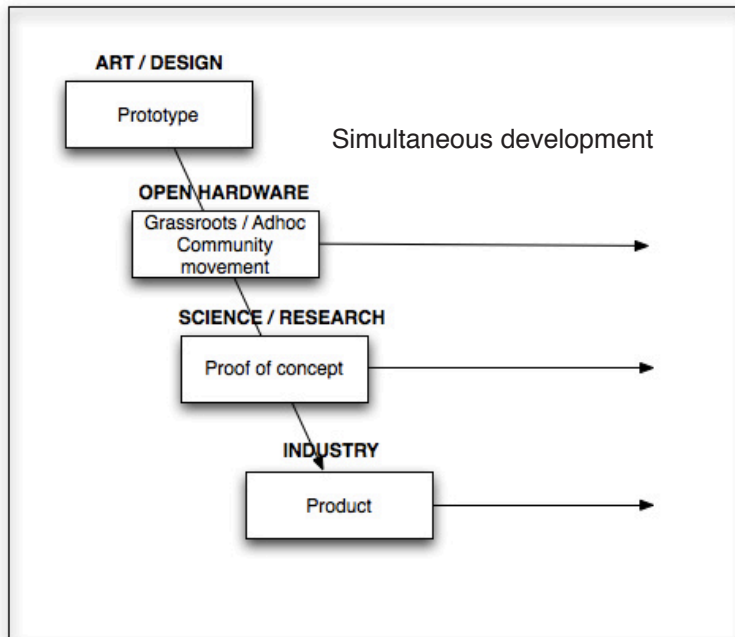
Anybody can build one:

- low cost design
- shortens the time frame for development

Sequential Development (classical)

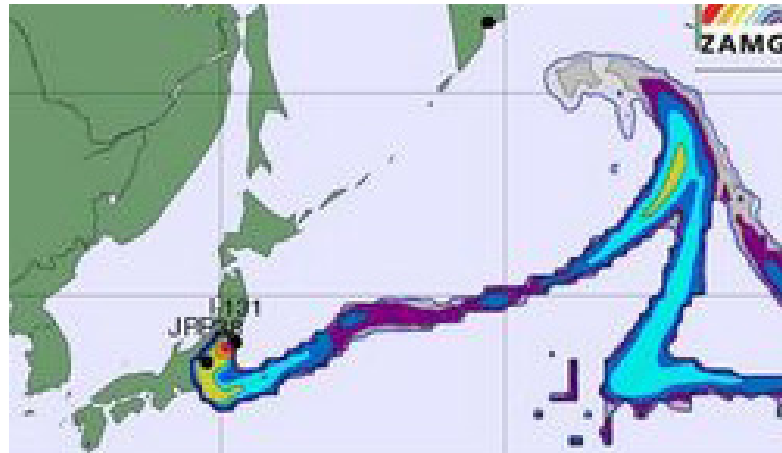


Parallel Development (Proposed for Protei with an Open hardware structure)

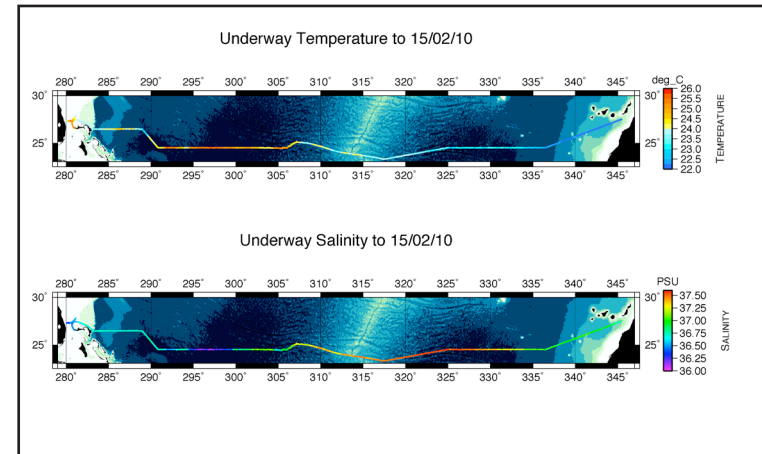


Why Open_source?

Reappropriated for other purposes



Radioactive plume over Japan



Ocean temperature and salinity data



Sample of plastic garbage

OBJECTIVE: Protect the oceans through 'low cost' technology that ends illegal overfishing and poaching

2048 The year global fish stocks may collapse unrecoverably given our current course. - *Worm et al. Science 2008*

1 Billion The number of people who rely on the oceans as their primary source of protein. - *Environmental Justice Foundation*

\$23 Billion The value (USD) of ocean wildlife that is illegally poached every year. - *Environmental Justice Foundation*

90% Reduction in large fish (sharks, tuna, etc.) populations since the 1950s. - *Mjers and Worm, Nature*

The Integrated Approach

- Hydrophones:** Underwater microphones for real time monitoring of protected areas.
- Satellite Vessel Monitoring Systems:** Cooperative real time tracking of registered vessel movement via communication and GPS satellites.
- Vessel Detection Systems:** Technology like space-based radar and small unmanned aircraft to track unregistered vessels.
- Radar:** Cost effective extended range radar monitoring for coastal regions.
- FishNET Information System:** A web-based tool to manage and display vessel data by incorporating crowdsourced monitoring and stakeholder input.

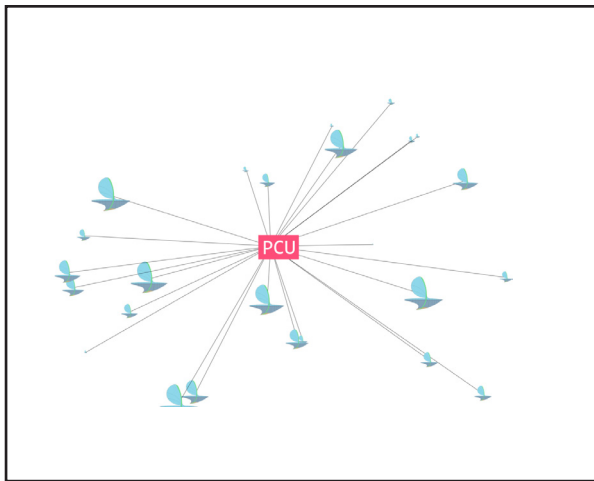
FishNET

Fishery monitoring in marine protected areas

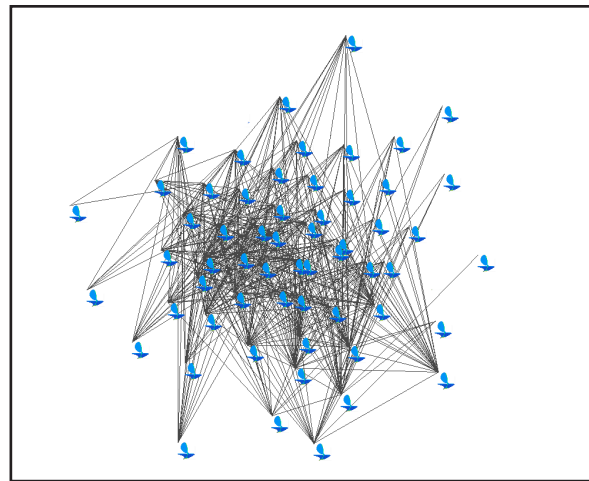
Protei's goal in use of OSHW

Fleets of DIY sailing drones

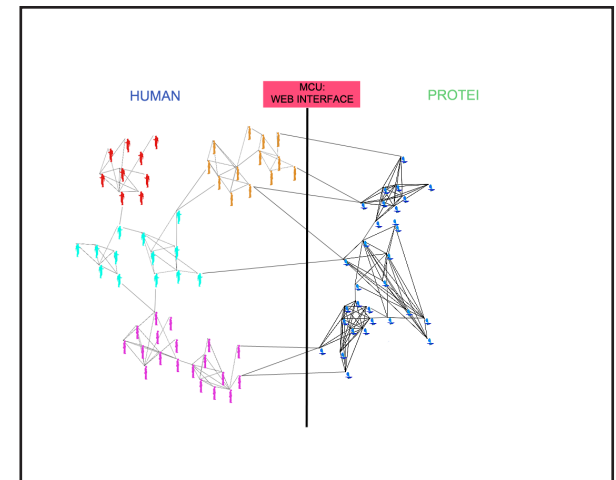
- Protei needs users (people to build and deploy it)
- Networks of autonomous vessels
- Boats controlled by onshore gamers, fishermen, etc.



Centralized swarm







Decentralized swarm



Multi-platform network

Open_hardware and Intellectual Property

<p>Object, mechanical design</p> 	<p>Documentation, texts, photos, videos, communication materials</p> <p>Creative Commons BY-SA</p> 	<p>Source code</p> <p>GNU General Public License, version 3 (GPL-3.0)</p> 	<p>Name, trademark</p> <p>US trademark regulation #85339997</p> 
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Licenses that fall under the definition of Open_hardware

- Licenses chosen according to the content of work that they protect
- The aim is that all of our materials can be studied, modified, reproduced, redistributed, with the credit of Protei.org

Challenges Protei faces using OSHW

- **Documentation takes organization and time**
- **Uniting many disciplines**
- **Encouraging continuous feedback**
- **Maintaining a sustainable business**
- **Efficiency in chain of command**



Ways to find out more about Protei, even how to build one yourself

Protei website: protei.org

flickr: www.flickr.com/groups/protei

kickstarter

- documentation of work processes
- current events related to Protei
- **the Protei Handbook**

Github:

<https://github.com/Protei/Protei-005-6>

- source code
- orthographic views of parts
- SolidWorks files

Email:

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THANK YOU!

