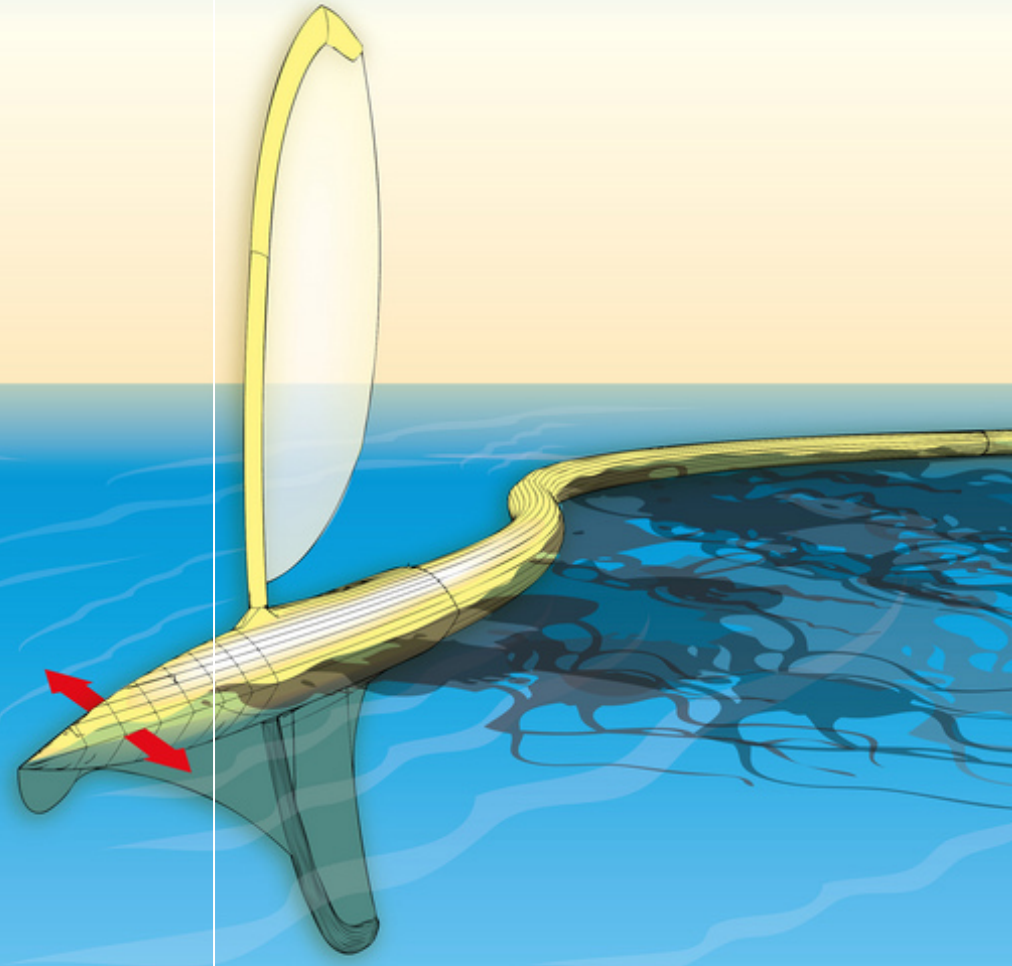
Open Hardware for the Ocean

Protei



The Exploratorium

http://protei.org

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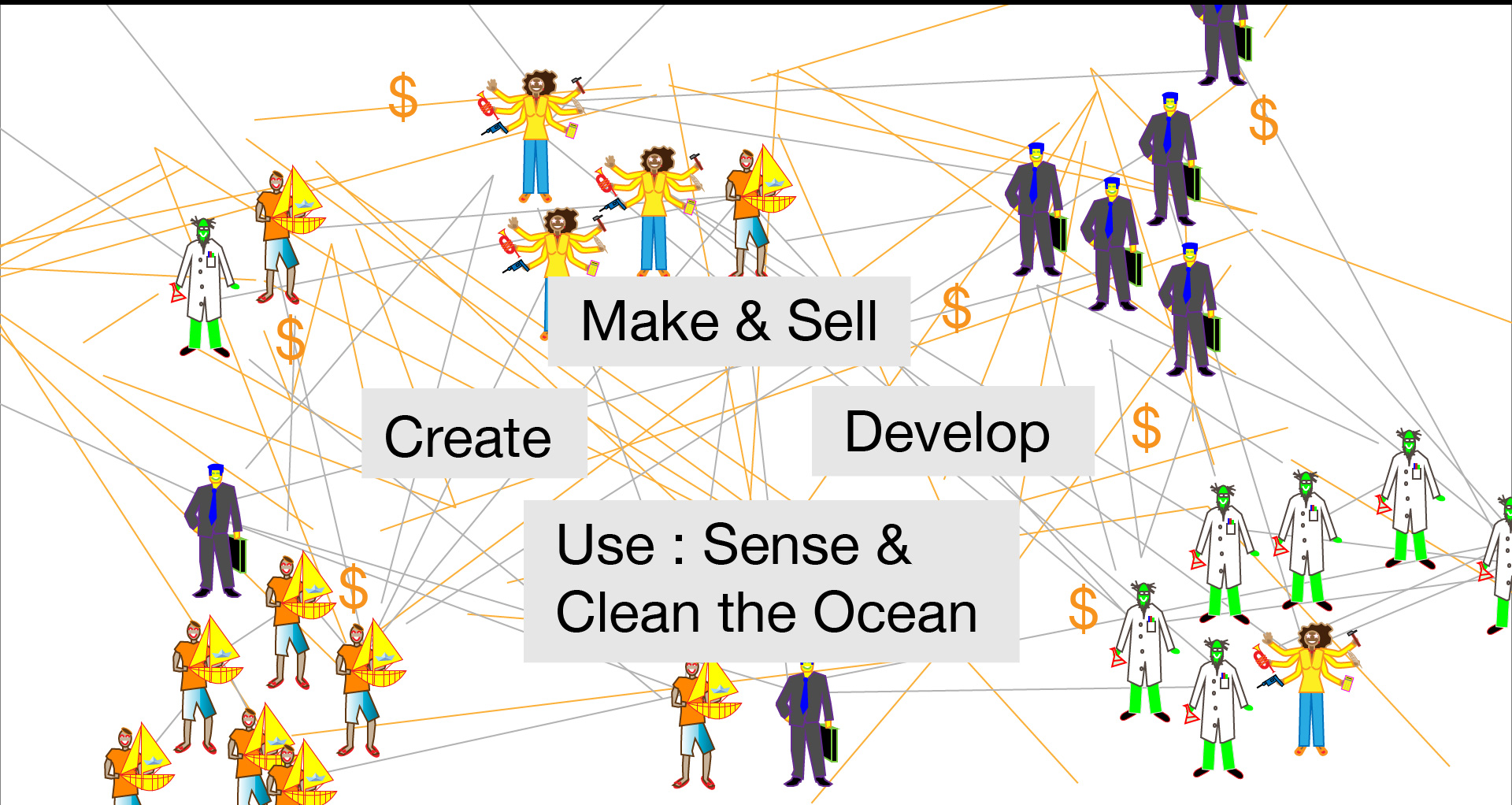
Open-H_2O


Satellite
Photos
Canada
United States
Greenland
Iceland
Sverige
Россия
Kazakhstan
Mongolia
Uzbekistan
Kyrgyzstan
Turkmenistan
Afghanistan
Pakistan
India
Iran
Iraq
Türkiye
Ελλάς
Italia
Portugal
Morocco
Algeria
Libya
Tunisia
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Burkina Faso
Ghana
Guinea
Western Sahara
Saudi Arabia
Yemen
Oman
Syria
South Sudan
Ethiopia
Somalia
Kenya
DR Congo
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
South Africa
Madagascar
Myanmar (Burma)
Vietnam
Philippines
Malaysia
Indonesia
Papua New Guinea
Australia
New Zealand
Brasil
Perú
Bolivia
Paraguay
Uruguay
Venezuela
Colombia
Ecuador
Guyana
Suriname
Cuba
Caribbean Sea
North Atlantic Ocean
South Atlantic Ocean
South Pacific Ocean
Indian Ocean
Southern Ocean
1000 mi
2000 km

Innovation Network



Competition => Collaboration

Product => Market

Object, mechanical design	Documentation, texts, photos, videos, communication materials	Source code	Name, trademark
	Creative Commons BY-SA 	GNU General Public License, version 3 (GPL-3.0) 	US trademark regulation #85339997 

Everyone is FREE to

- Use
- Modify
- Distribute

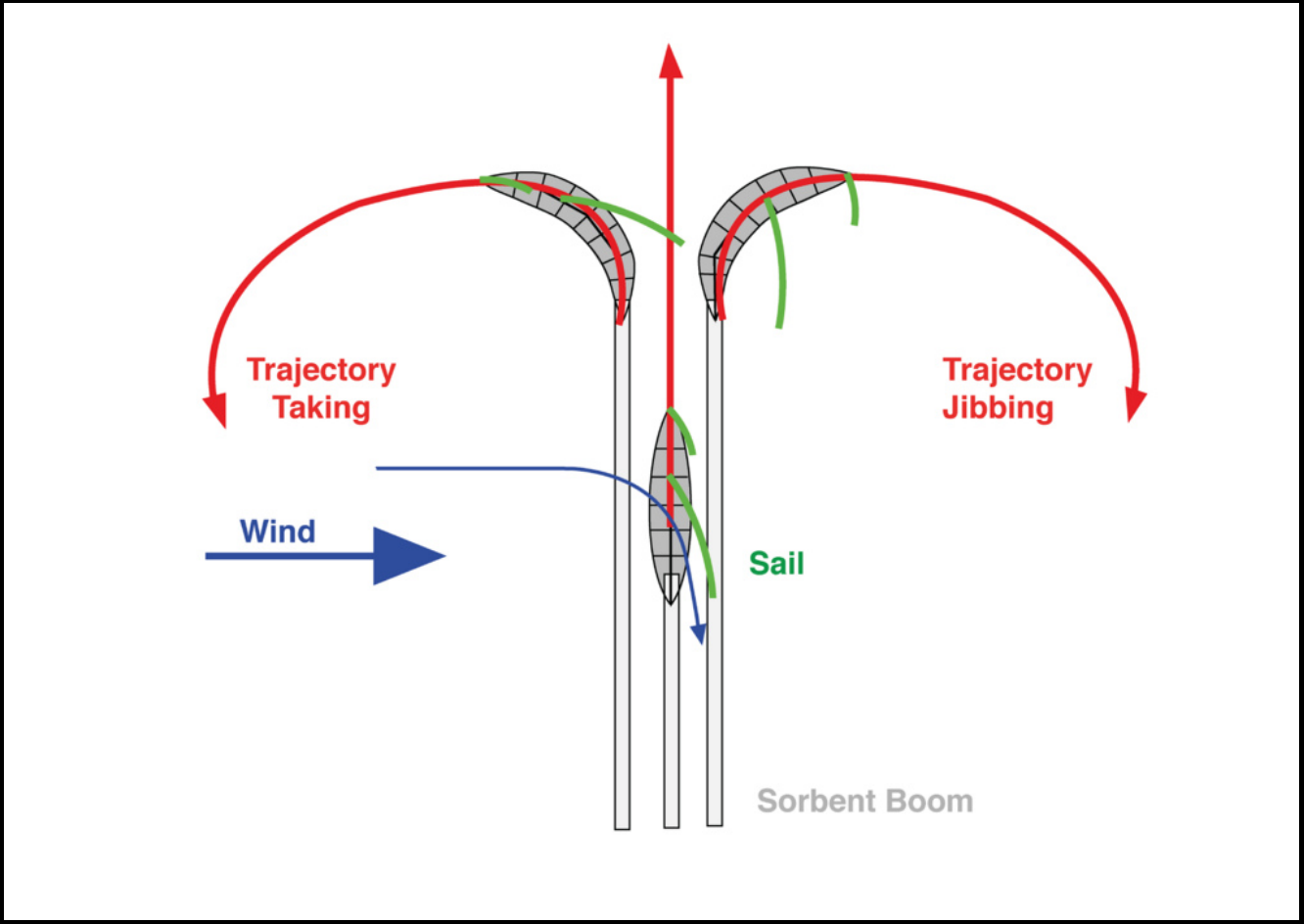
In exchange one must

- Credit "Protei"
- Share finding with community

Physics

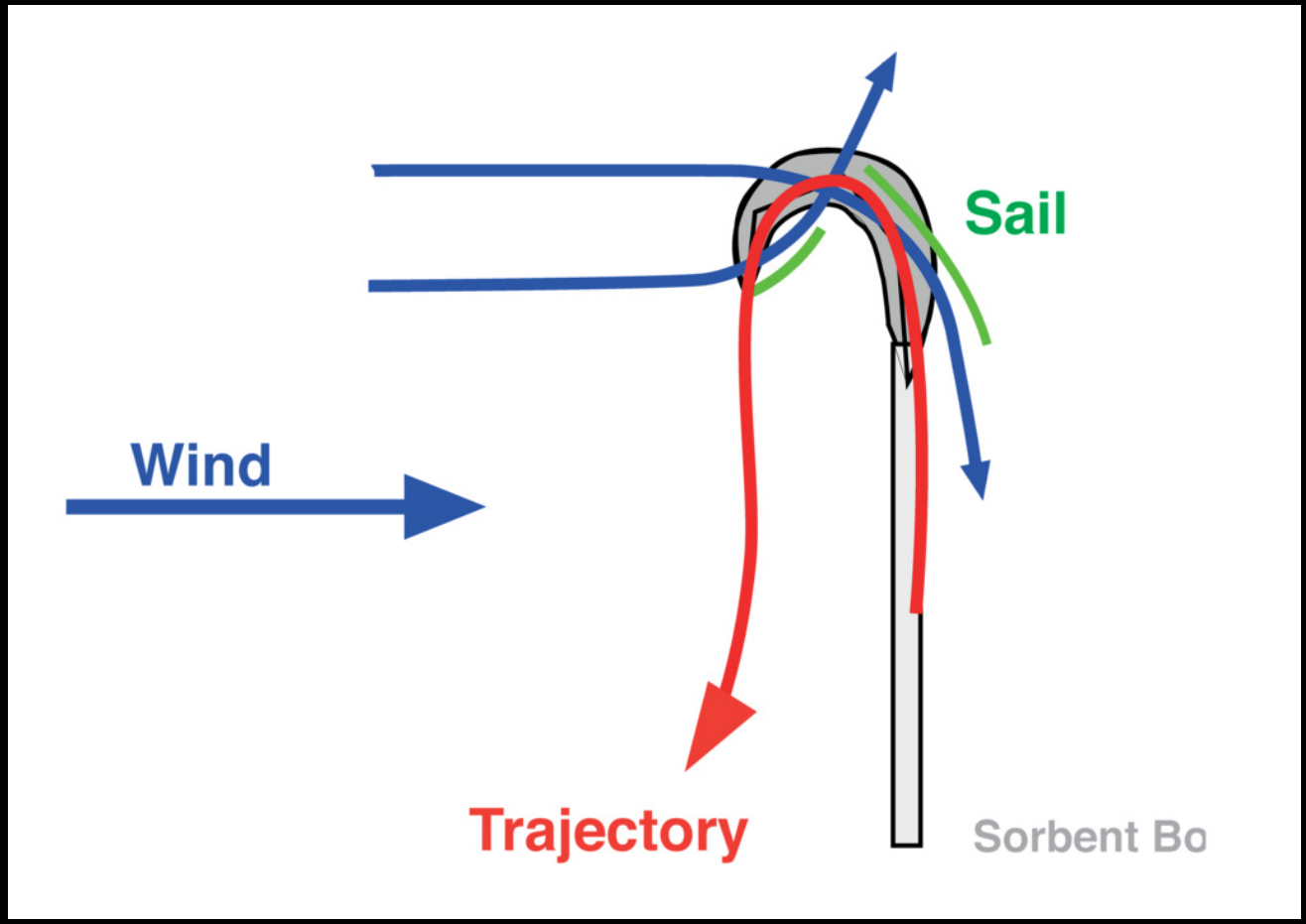
What are the new properties of a shape shifting hull?

Physics



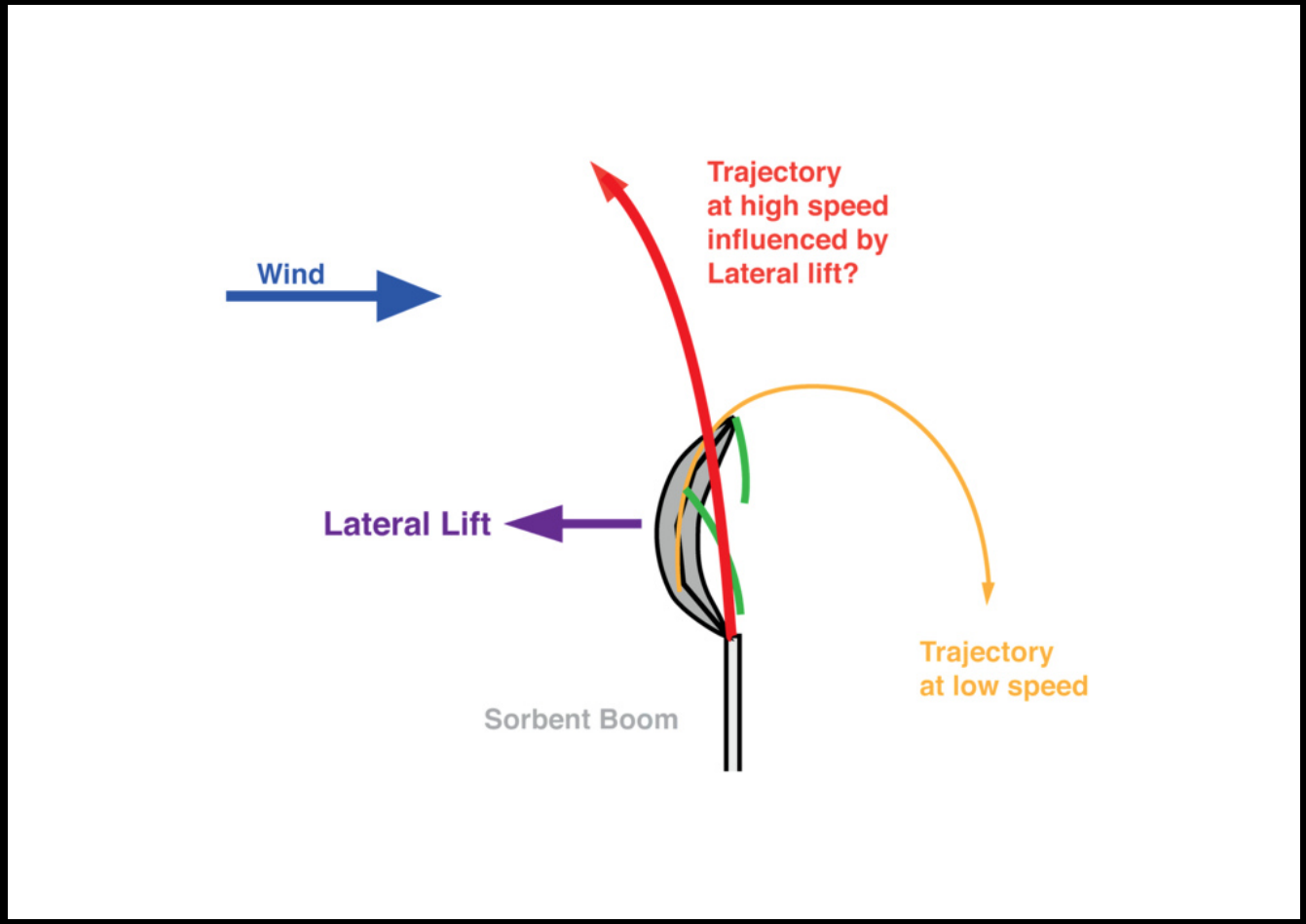
Can a shape-shifting hull improve trajectory control ?

Physics



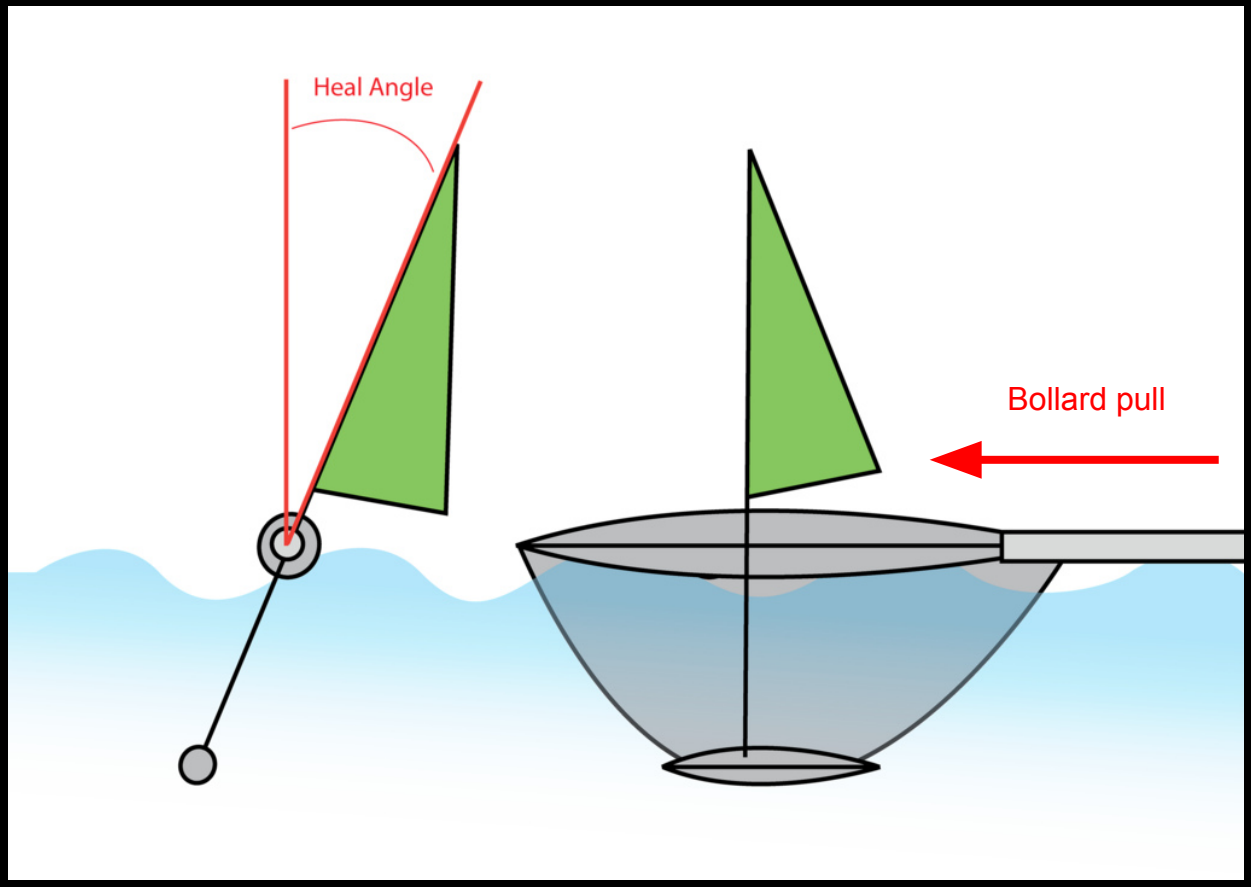
Can a shape-shifting hull improve help us tack and jibe more efficiently ?

Physics



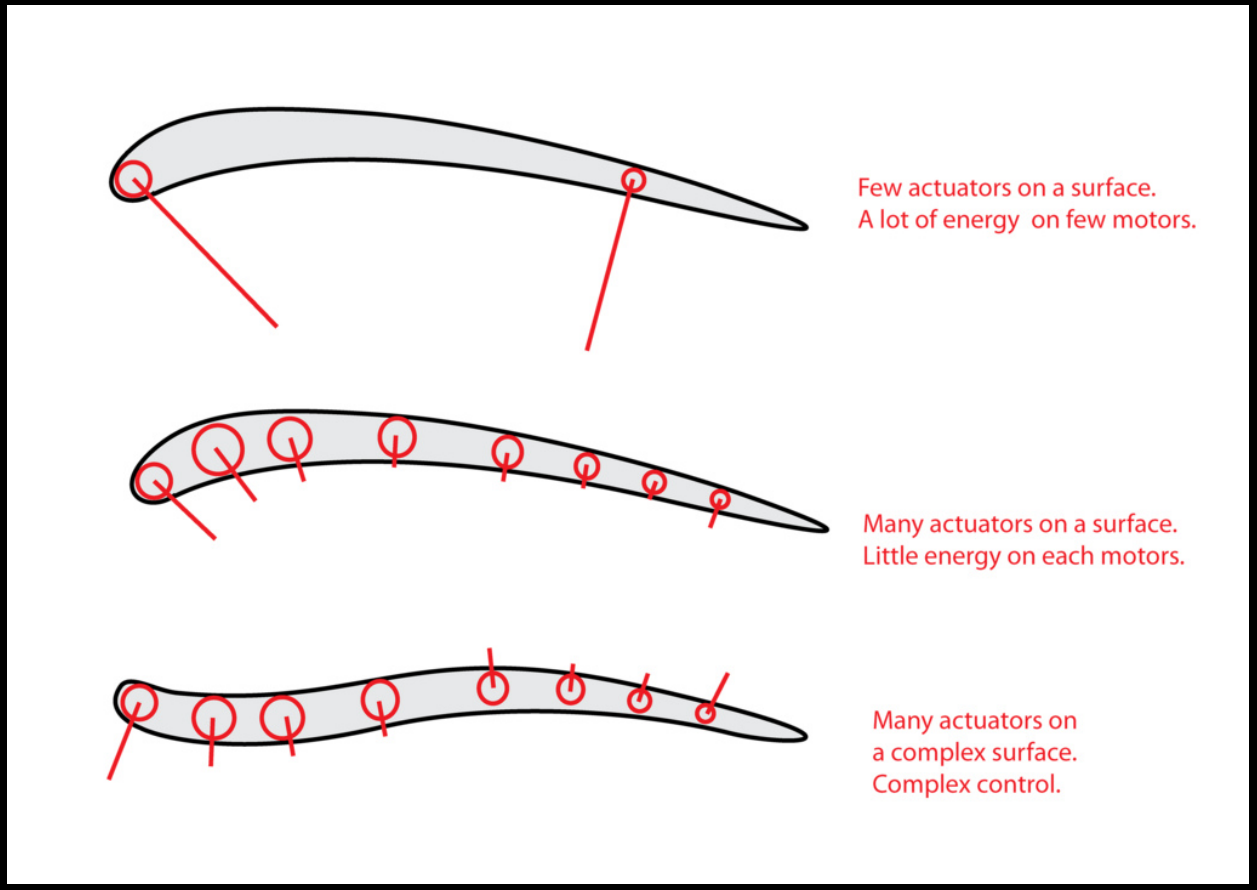
What curvature of hull would provide lateral lift and at what speed?

Physics



How to make Protei an efficient self-righting tugging vessel?
What is the Bollard pull of Protei ?

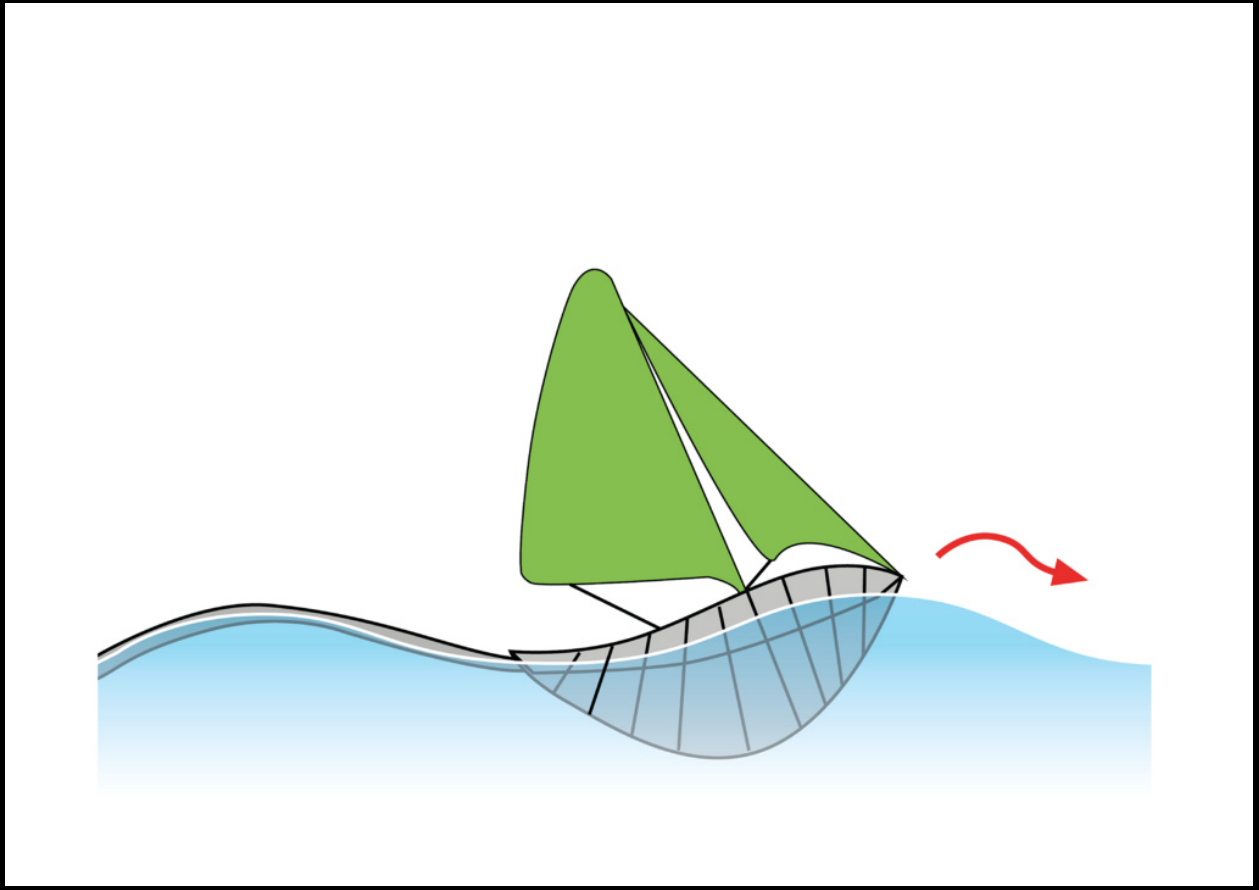
Physics



Can we actuate a large surface with many low power actuators, rather than a few high power actuators?

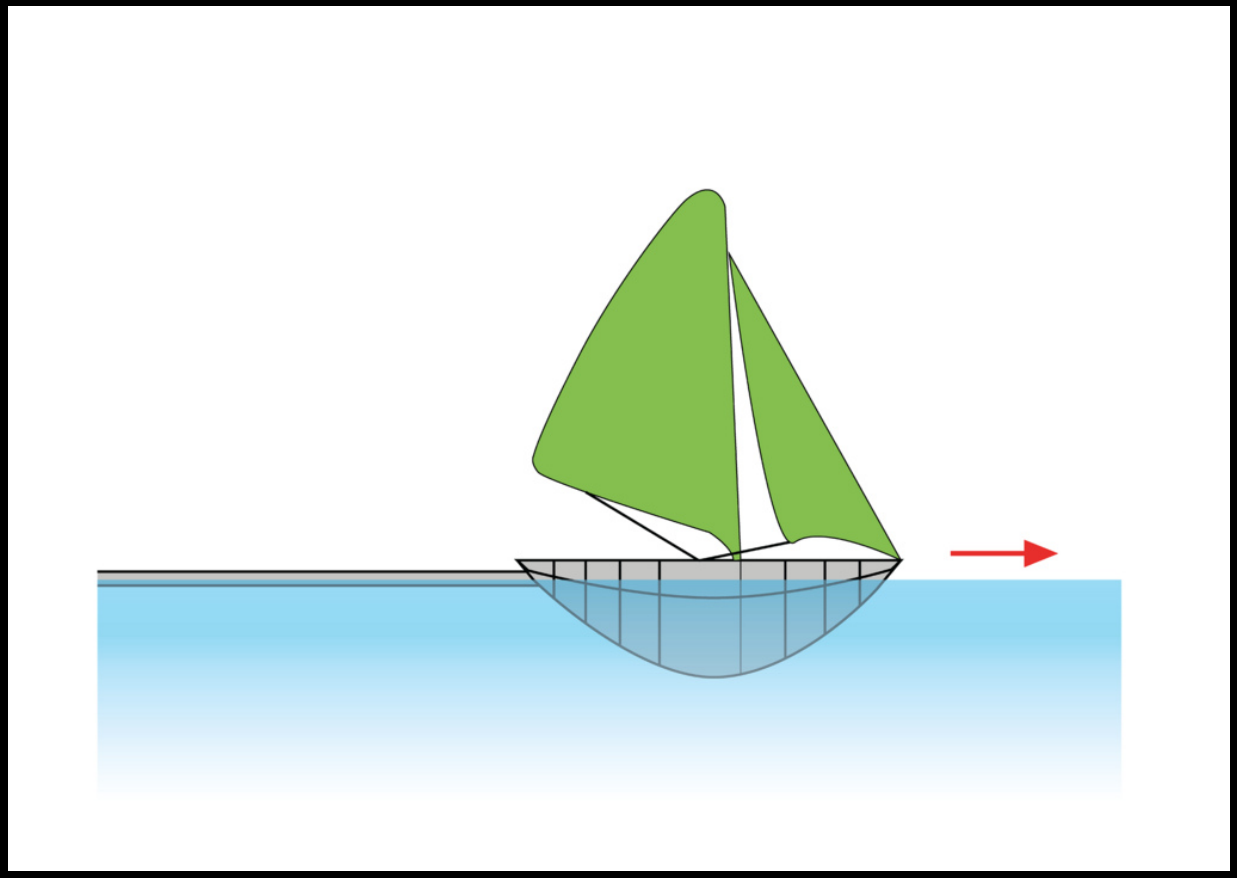
Can We achieve fine control of complex surfaces?

Physics



Can environmental noise be absorbed by our flexible hull, allowing more forward motion ?

Physics



Without no keel and no rudder, can we produce less resistance, less turbulence, less stern wave?

COMMUNICATION

1. Radio (250 m)
2. GSM (cell / sim card)
3. Global reception: Satellites

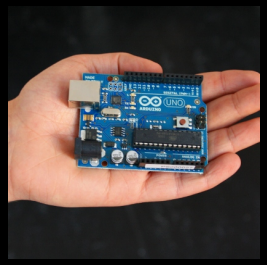
RADIO

CELL

SATELLITE

DISTANCE (RANGE)

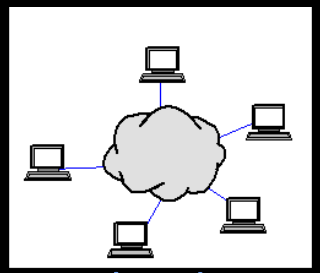
COMPUTATIONAL ARCHITECTURE



Arduino

BeagleBone (Linux)

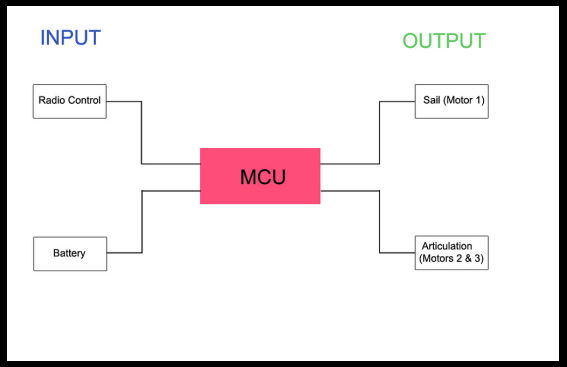
Android

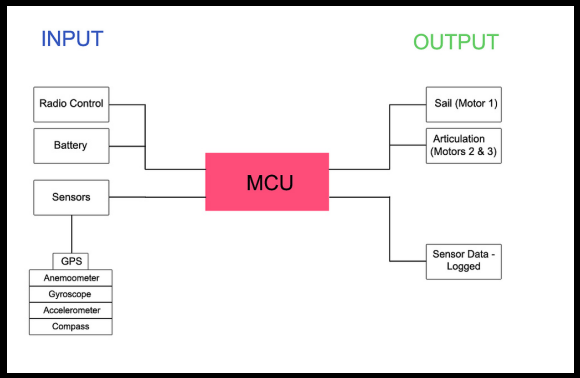


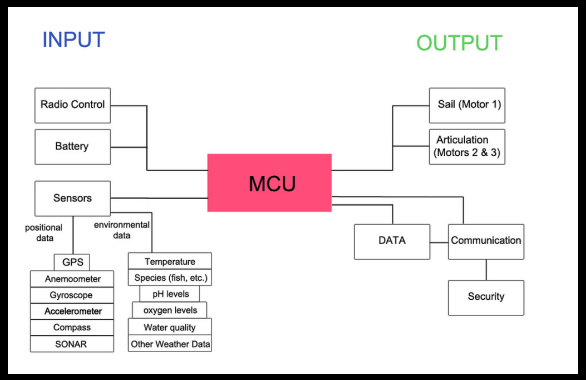
Cloud

COMPLEXITY

ELECTRONIC STRUCTURE

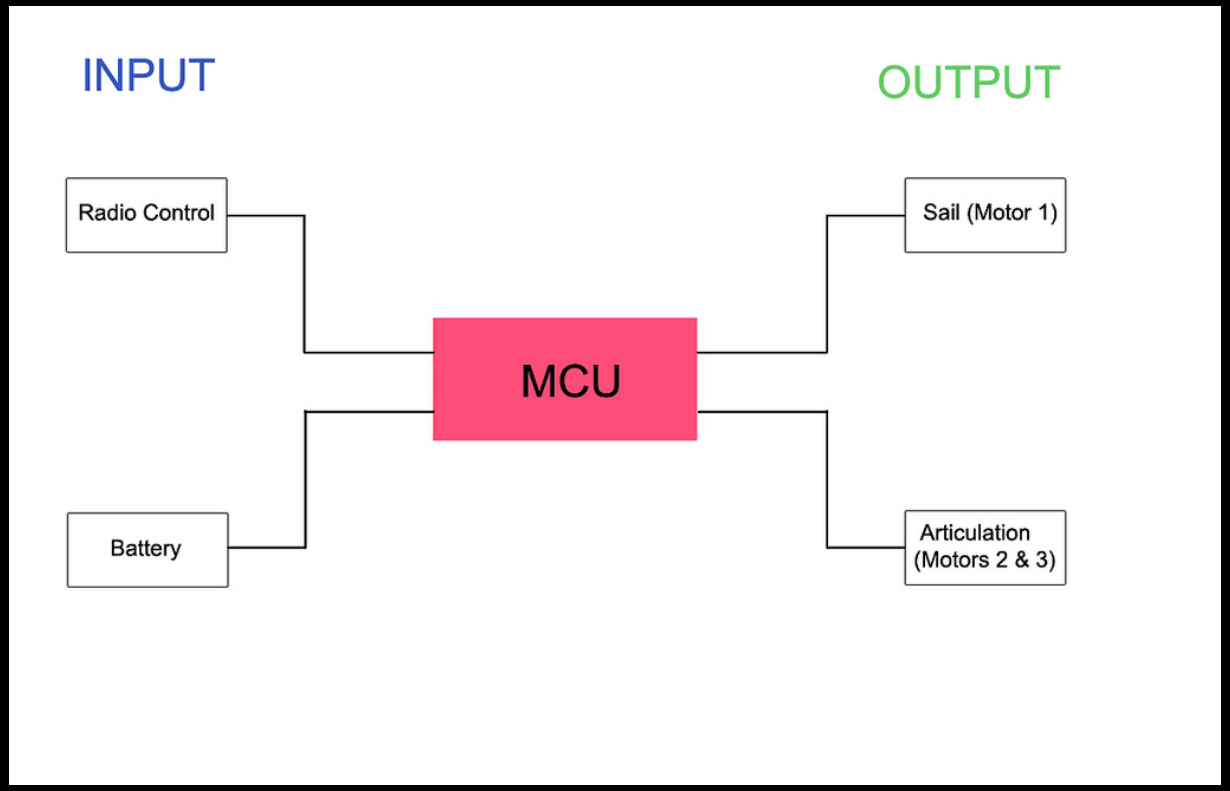






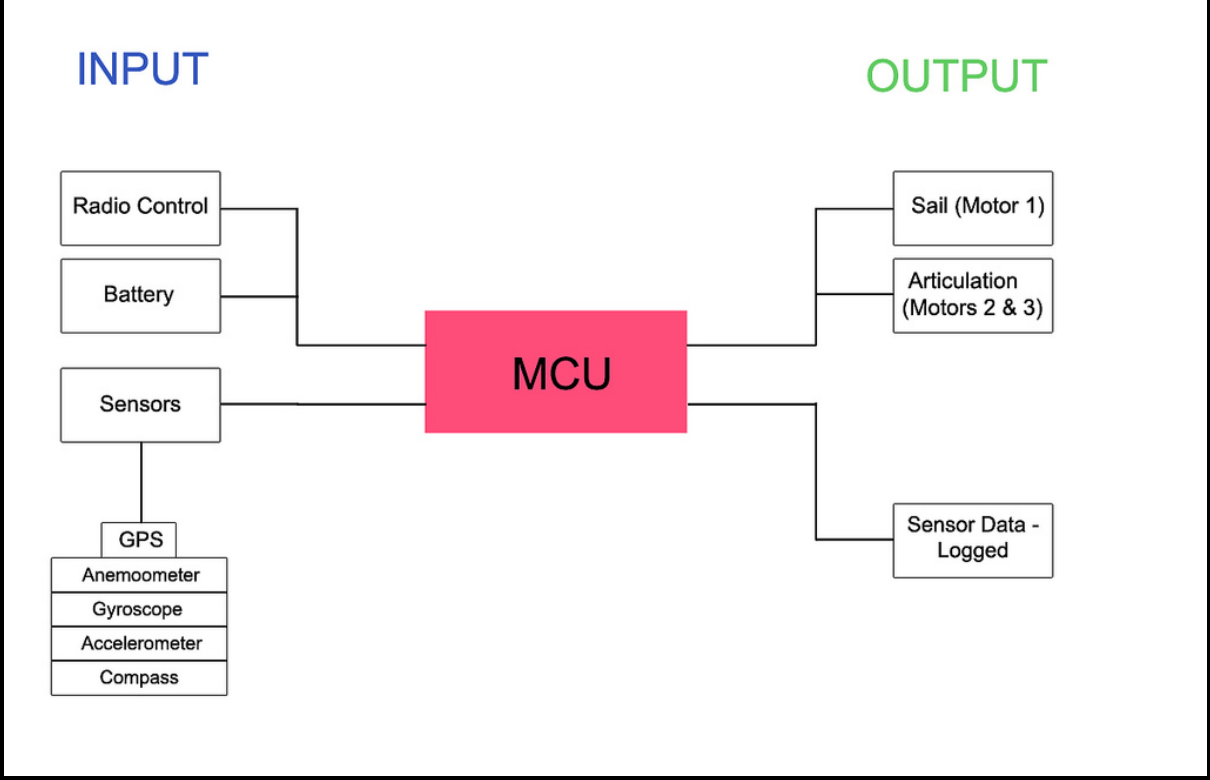
COMPLEXITY

ELECTRONIC STRUCTURE



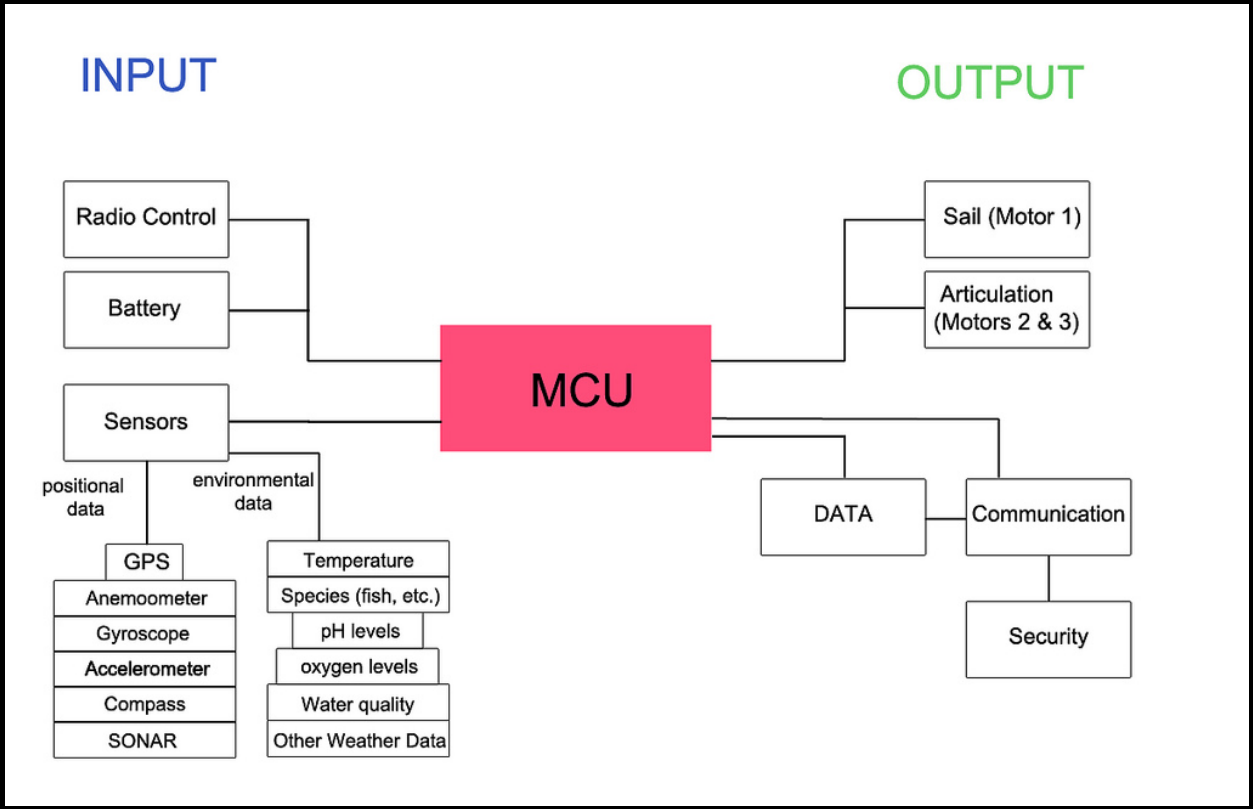
-user controlled

ELECTRONIC STRUCTURE



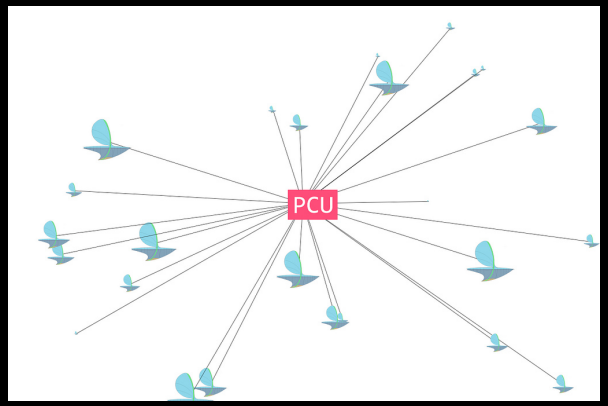
- positional sensors for feedback

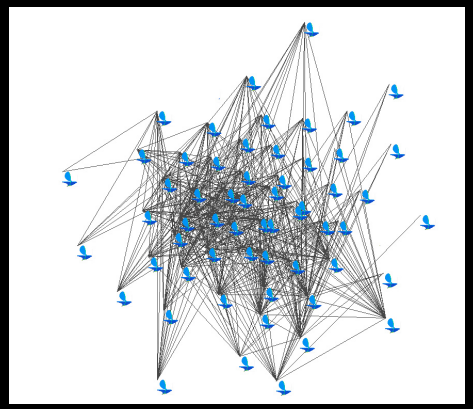
ELECTRONIC STRUCTURE

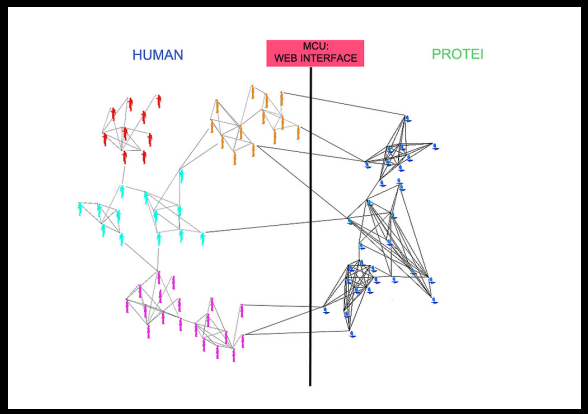


-environmental sensors
-positional sensors

NETWORK STRUCTURE

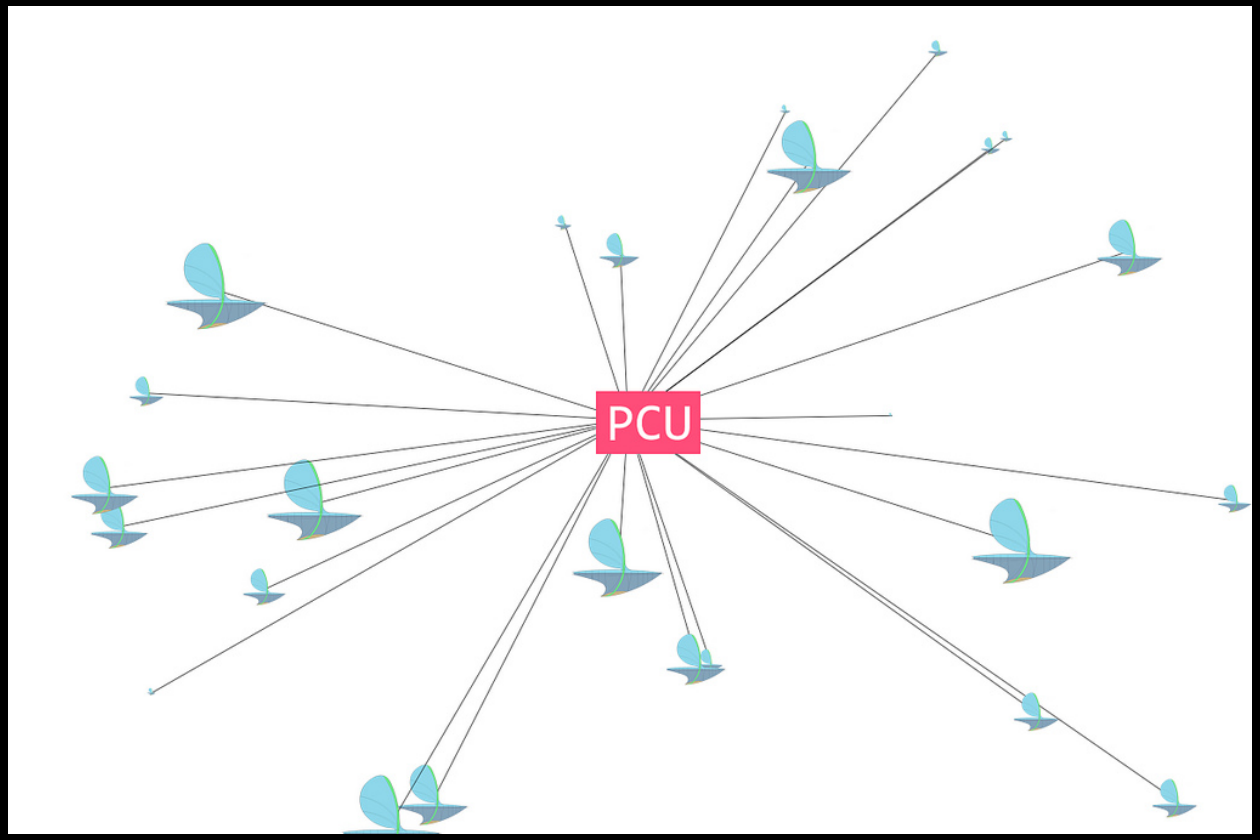






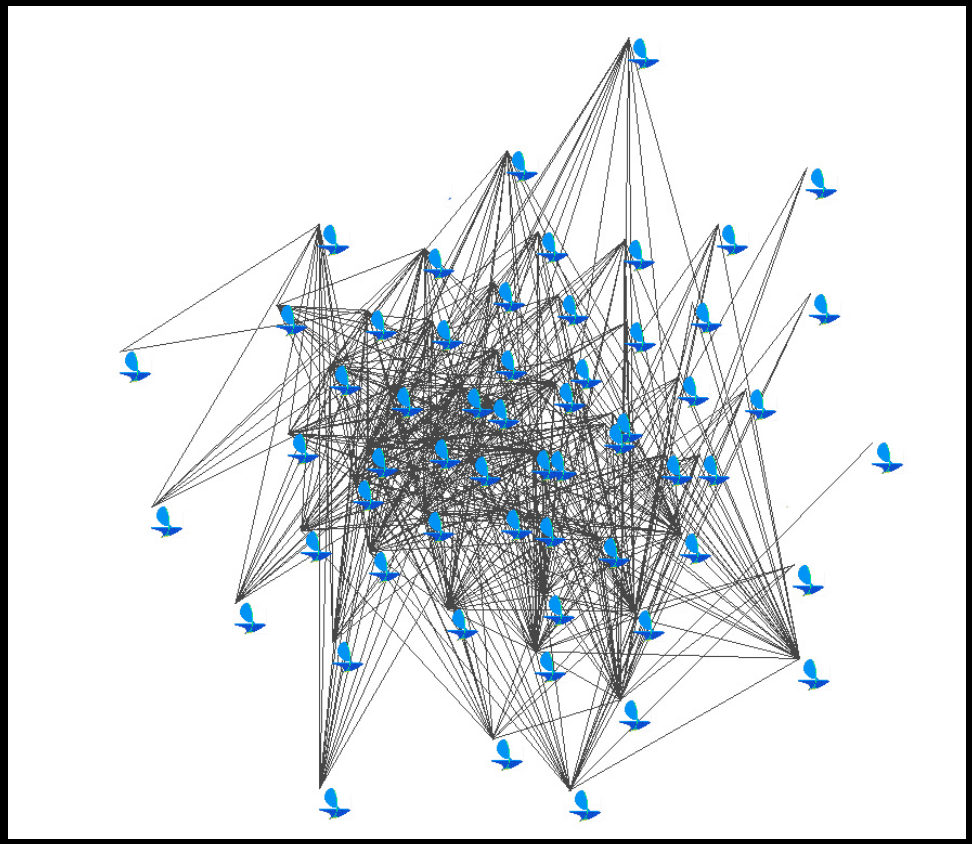
COMPLEXITY

NETWORK STRUCTURE



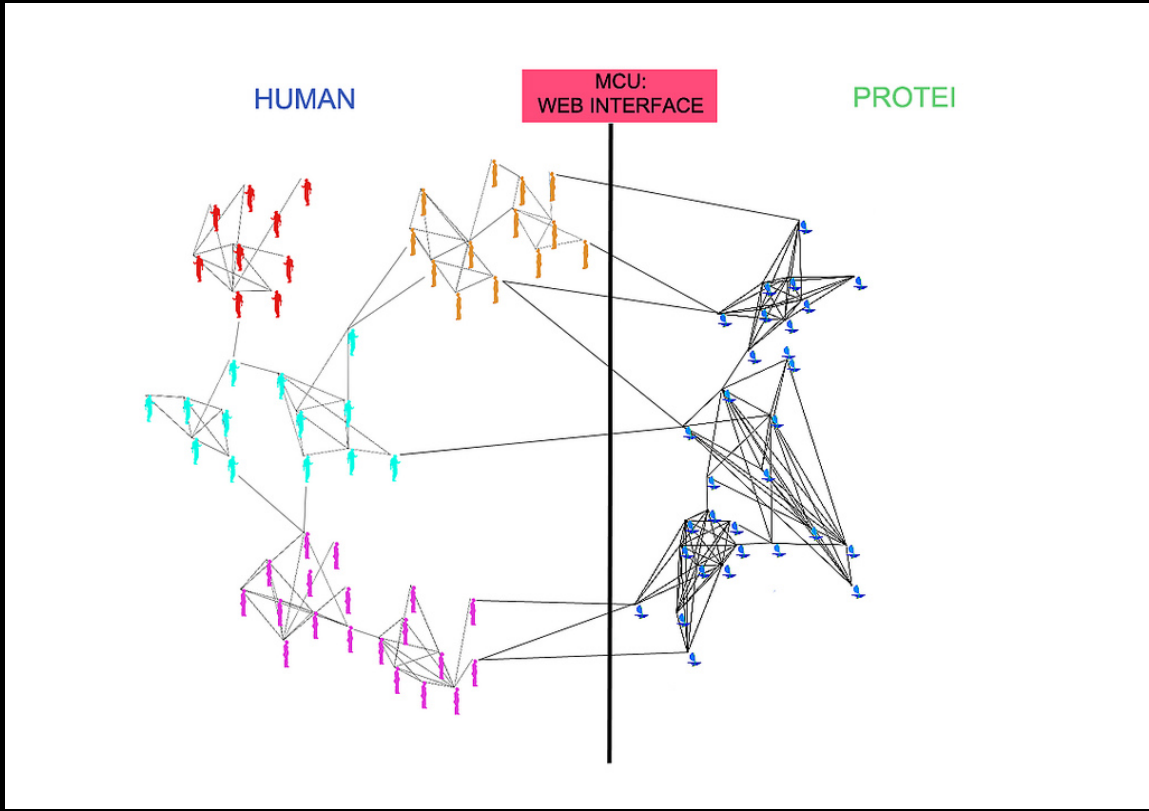
-Swarm of boats
-Centralized control

NETWORK STRUCTURE



-Swarm of boats
-decentralized control

NETWORK STRUCTURE



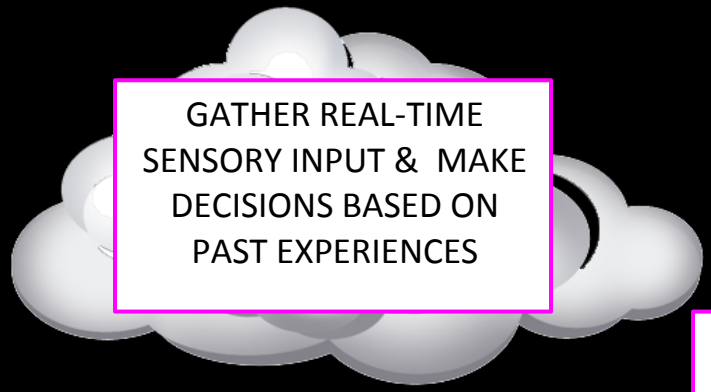
-Swarm of boats
-Web Interface
-Networked communication

WEB INTERFACE

-Multi-platform network
-onshore gamers, fishermen

GAMING INTERFACE

ARTIFICIAL INTELLIGENCE



COLLECT DATA TO A DATABASE (THE CLOUD); LEARN FOR THE FUTURE

PREDICT AND PLAN

PAST

PRESENT

FUTURE

-Communication between units

-Logging and learning from feedback and forecasting

2012: 1m Remote Controlled

USERS: hobbyists, kids, hackers

FUNCTION: data collection, toys, education, platform for further research and development

2013: 1m Autonomous

USERS: scientists, engineers

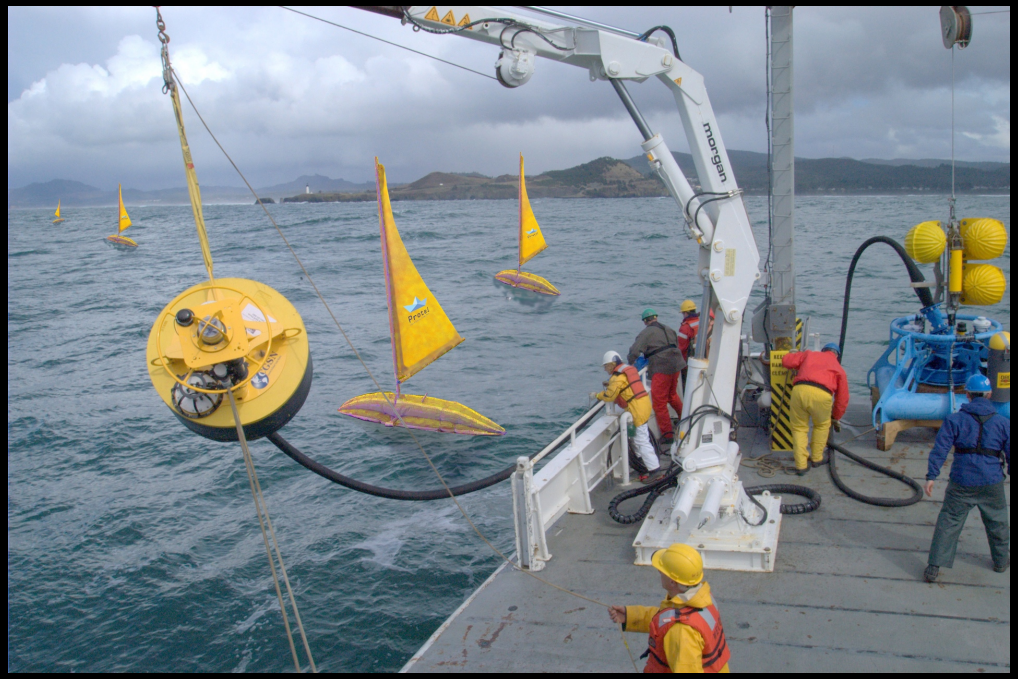
FUNCTION: marine data collection, oceanography, coordination with underwater vehicles, toxicity level measurements, fishery monitoring

2014: 6m Manned

USERS: sailors

FUNCTION: test the new technology of high performance flexible hulls

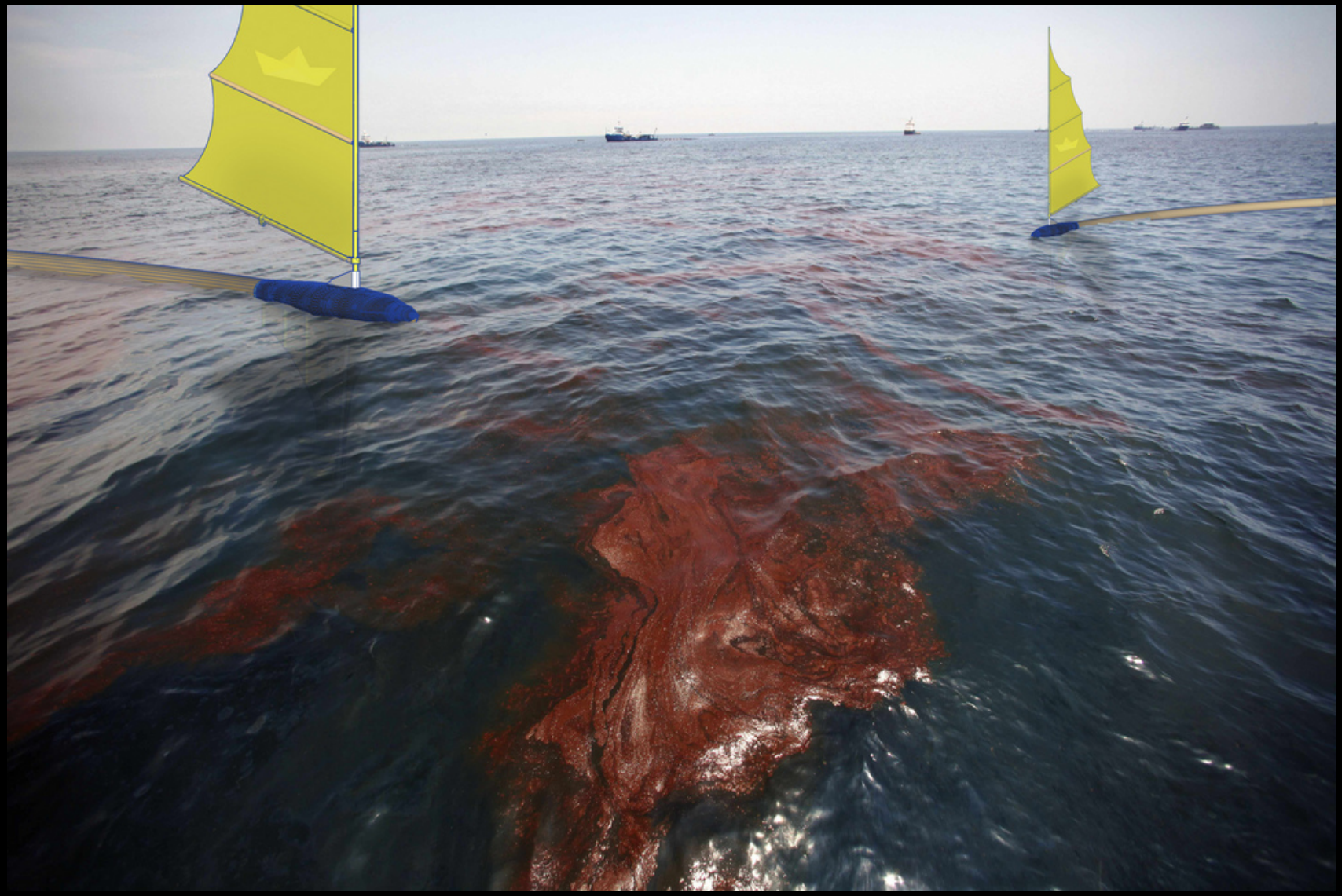
2015: 6m Autonomous



USERS: activists, environmentalists, governments, teachers, scientists, engineers

FUNCTION: ocean sensing, ocean cleaning, carry heavy payloads

APPLICATIONS: Oil Collection

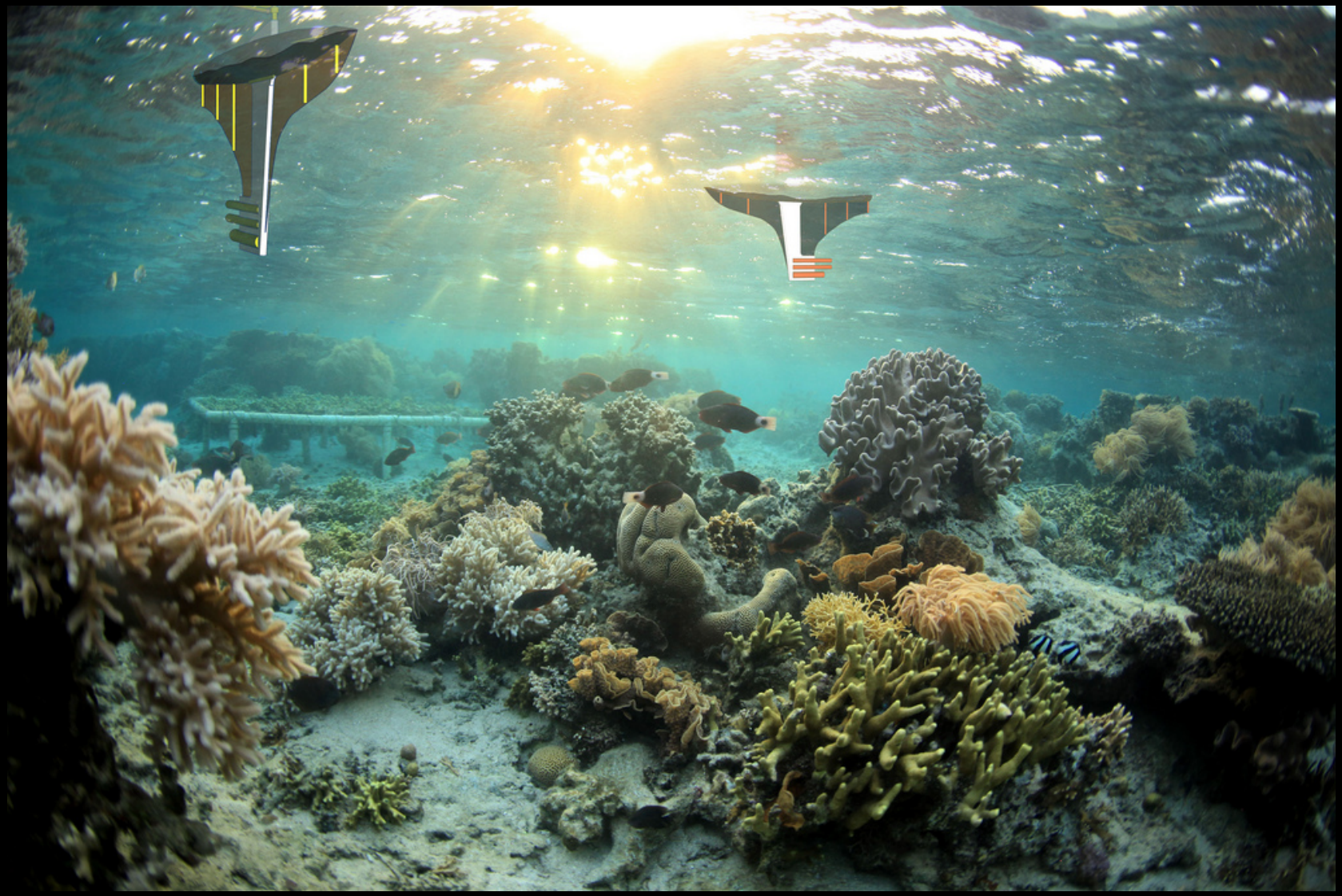


APPLICATIONS: Plastic Trash Collection

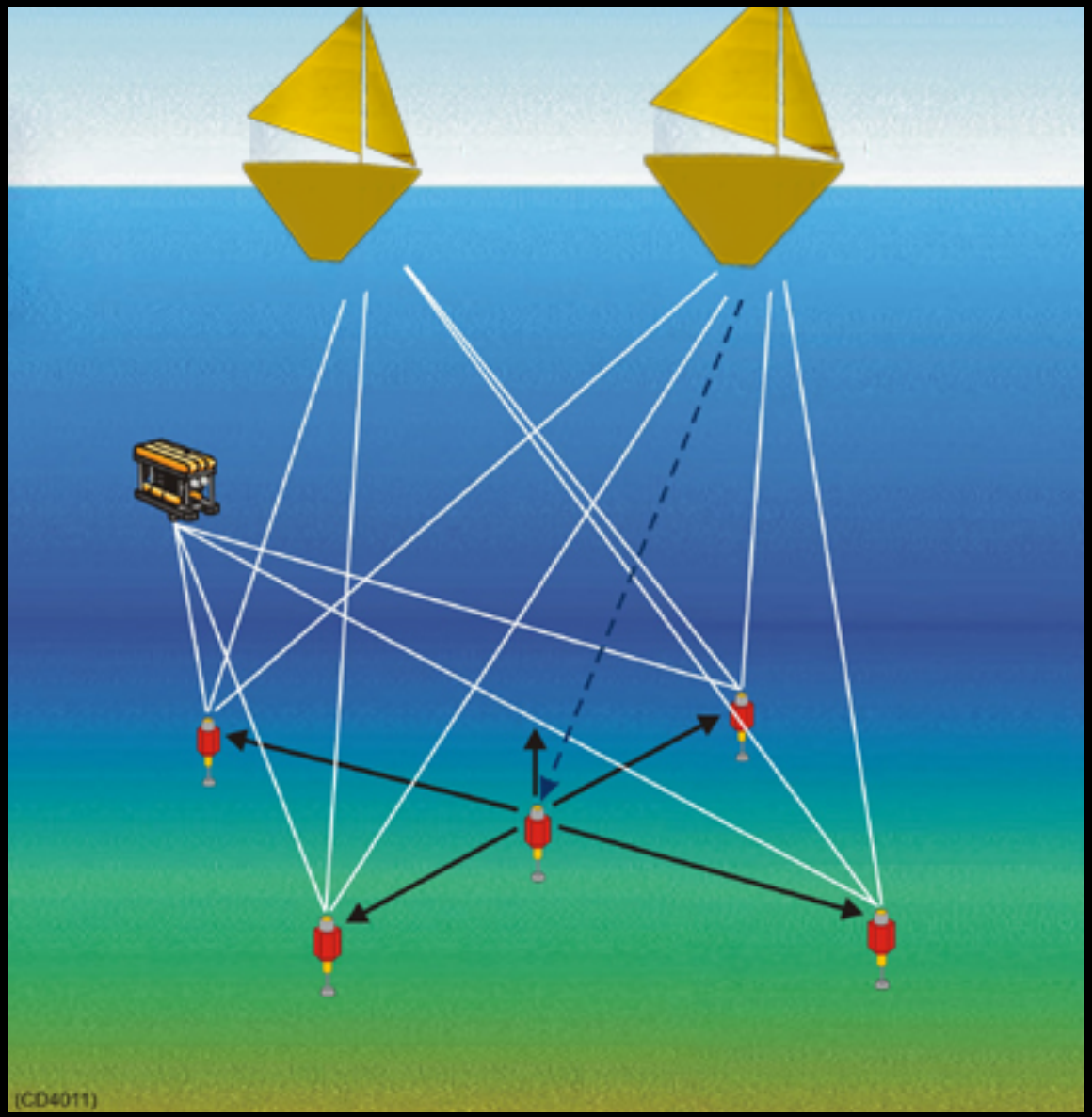
APPLICATIONS: Fishery Monitoring

APPLICATIONS: Algal Blooms

APPLICATIONS: Coral Reef Mapping



APPLICATIONS: Subsurface Communication



APPLICATIONS: Astroparticle Physics

Protei + Exploratorium

Open Hardware for the Ocean

Protei

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