# Oceanic Scales

**An interactive platform exploring ocean ecology**

Blue Trail Project Proposal submitted by UCSC OpenLab

Gene A. Felice II & Prof. Jennifer Parker

East Wharf Plaza - Site Mock-Up

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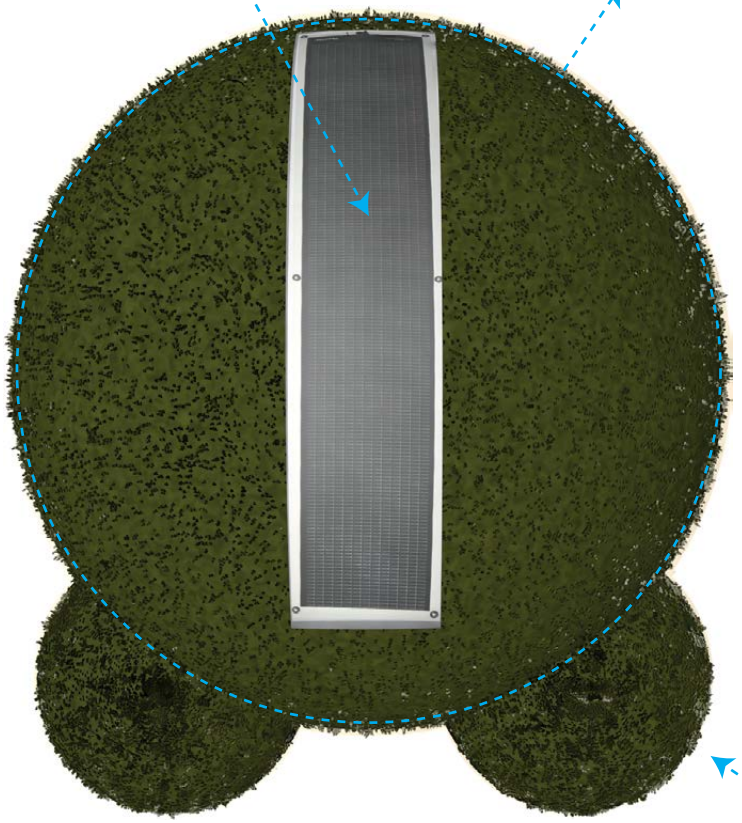
Footprint / Area Envelope

**Solar Panel:**
Powerfilm, flexible solar panel, providing power for the entire installation

**Live Ocean Health Monitor (exterior)**
Onsite and online water quality sensor data will be translated into an exterior display translating current ocean health into a spectrum of colored LED light pulses

Top View




Front View


**Geodesic Dome - Living Roof**
Bamboo planter tiles fit modularly into domed frame. Planters contain native sea grasses and succulents

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## Interior and Rear Views

### Rear View

**Open Design:**
4 wide doorways and multiple windows allow for air and light flow & accessibility

**Bamboo Panels:**
Local & sustainable bamboo plywood walls, waterproofed with local pine resin from Entropy Resins

**Aluminum Frame:**
Modular & corrosion resistant frame


**Info / Educational Panels**
round spaces at the back of the installation designed as learning stations for questions about ocean health, for kids & adults, possibly laser etched into the bamboo

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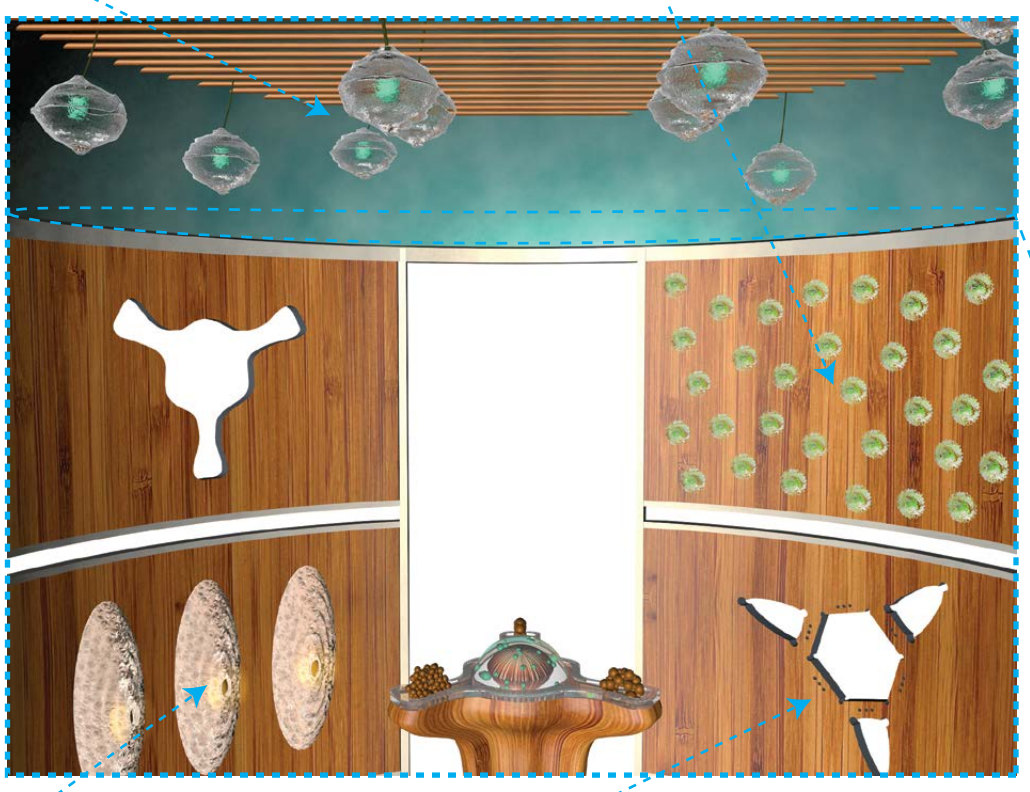
Sub-Systems and Pedestal Design

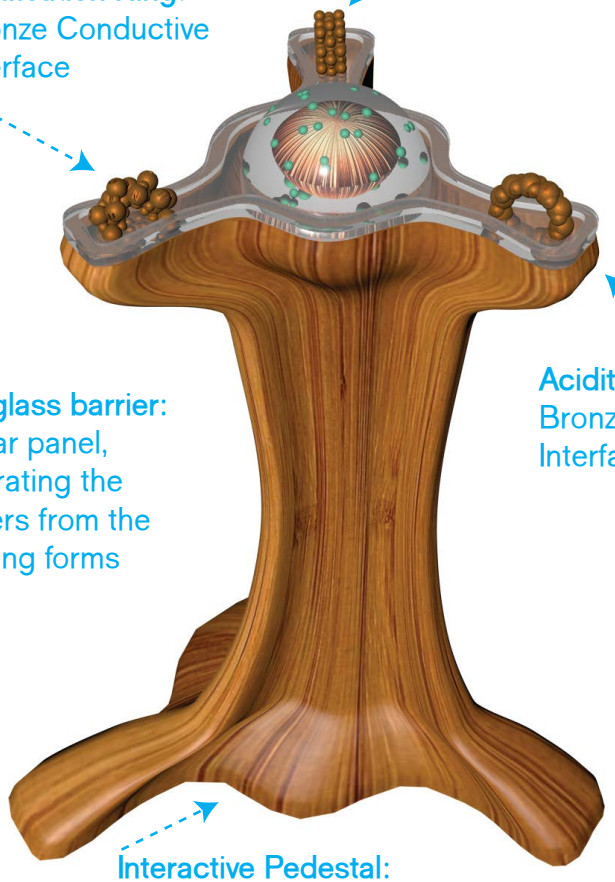
**Dinoilluminates / Dinoflangellates**
Interactive, light emitting organisms, Rise up and down when activated by touching the bronze rings

**Picoprojectons / Picoplankton**
Interactive, vibration & color emitting organisms activated via tactile / haptic feedback



**Salinity Ring:**
Bronze Conductive Interface

**Nitrification Ring:**
Bronze Conductive Interface



**Plexiglass barrier:**
a clear panel, seperating the viewers from the hanging forms

**Acidity Ring:**
Bronze Conductive Interface

**Microphonas / Micromonas**
Interactive, sound & color emitting organisms, activated by speaking into 2 of the forms and listening to the center form

**Laser Cut / Machined Windows:**
Abstract window forms inspired by phytoplankton & oceanic diatoms

**Interactive Pedestal:**
Bamboo Laminate & Pine Resin Pedestal w/ Micro Visualization Bubble in centerpiece

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Project Narrative

Oceanic Scales is a project currently being developed by Gene A. Felice II and the Openlab collaborative research group, in the Digital Arts & New Media Program at UC Santa Cruz. This research is a hybrid practice, involving collaborations between the arts, technology and the sciences. In this installation, phytoplankton is the primary subject of artistic research as it is the first link in our oceanic food chain and the source of over half of the worlds oxygen production. Phytoplankton are also an early detection system or "bio-sensor" that are capable of warning when we are approaching a tipping point in the oceanic equilibrium. We explore biomimicry as it relates to phytoplankton and the effects of the human-made phenomena known as "First Flush". As the season's change in the fall and the first rains begin, they rinse a year's worth of run-off, pesticide, fertilizer and debris into our oceans, often causing phytoplankton to grown out of control into red tides. This natural process that used to feed the ocean has been high jacked by human waste, forming an imbalance in our oceanic ecosystems. The hope is that this hybrid art installation will inspire us to strive for harmony between humanities desires and the health of the world's oceans.

Biomimicry is "innovation inspired by nature" or, in other words, "the technology of biology." Rather than extracting from nature, it is learning from nature. Biomimicry is found in the innovation of swimsuits that mimic the skin of the shark, in Velcro, which mimics the mechanics of a burr and in wind turbine blades that take their form from the fin of a blue whale. As science writer Janine M. Benyus says, "It is a design discipline, a problem-solving method, a sustainability ethos, a movement, a stance towards nature, a new way of viewing and valuing biodiversity." In this project, we apply the "interaction mechanisms" of bioluminescent phytoplankton (Lingulodiinium Dinoflagellate) where we derive our biomimicry inspired creatures "Dinoilluminates", from picoplankton (an even smaller relative of phytoplankton) or "Picoprojectons" and from Micromonas (a eukaryotic, photosynthetic microorganism) adapted into, "Microphonas". Together, these three biomimicry inspired systems form an interactive exhibit for learning and thinking about our impact on ocean health.

These three systems are separated out into different multi-sensory interaction zones. The first system is the "Dinoilluminates", which are controlled by a central pedestal in the middle of the installation space. They are hung from the ceiling and communicate with pulses of light and color, rising up and down as they are interacted with. They represent the balanced elements (nitrification, salinity & acidity) of healthy ocean water and are activated by touching three conductive bronze rings around the top of the pedestal. This is a collaborative system, requiring three participants to work together to unlock a harmony between the three rings, through the power of their perception and touch. If they fail to find a harmony, an imbalance will grow until it reaches a tipping point. The second system is the "Picoprojectons". This is a wall mounted system of smaller interactive forms that focus on tactile / haptic feedback and light and color balancing. Again, this system focuses on achieving balance with a reward of harmony or a warning of crisis if they're left out of balance. The third system is the "Micromonas" consisting of three larger forms that focus on sound and air. Participants will play a collaborative game on the left and right, where they will try to blend their voices so that they can be released as a balanced sonic breath from the center form. Again, harmony will be rewarded and imbalance will lead to a system crash.

When the system is not being interacted with, it will slip into an automated mode, alluring visitors into the space. Via connections to online data feeds from the USGS system (http://sfbay.wr.usgs.gov/access/wqdata/) and on-site water quality sensors installed under the pier that the project is located on, local ocean water quality data will be translated into the three systems as a multi-sensory barometer of local ocean health. Through light, color, touch and sound, the entire structure will pulse inside and out, giving an instant translation of the local ocean health status. The entire project is powered with a solar panel system, mimicking the way that bioluminescent phytoplankton absorb their energy from the sun through photosynthesis. Finally, the roof will consist of a series of interlocking planter boxes, with local sea grasses that absorb rainwater and help purify the air. Overall, we hope the viewer will be inspired by a multi-sensory experience of marine ecology, leaving the space with a new appreciation and understanding of the human impact on and responsibility for the microscopic elements that create the foundation for all other oceanic life.

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Budget & Timeline

**Team Members**

**Gene Felice**: Lead Artist/Researcher UCSC DANM Graduate Student, Project Manager, developing concept and design, fabraction, and curating of programming UCSC OpenLab Participants and DANM Mechatronics Students
**Art Prof. Jennifer Parker:** OpenLab Director, Project Advisor
**DANM Prof. Emeritus Helen & Newton Harrison:** Project Advisors
**Marine Science Prof. Steven Haddock:** Bioluminescence & Zooplankton advisor
**Marine Science Prof. Raphael Kudela:** Microbial Ecology advisor
**Steven Paul Lewis:** Electrical Engineering UCSC Graduate Program
**Joseph Rowley:** Computer Science Student UCSC Gaming Program
**Tyler Smith:** Computer Science Student UCSC Gamming Program

**Budget**

Pine Resin from Entropy resins: 3-gallons - $600
Silicone Rubber for molds & castings 5-gallon kit - $600
Small Electronics: vibration motors, LED's, microcontrollers, wiring, etc. - $1,500
Flexible Solar Panel / Battery / Regulator System (Powerfilm) - $1,100
Bamboo Plywood - $1500
Aluminum framing & welding / machining supplies - $2,500
Wood, Frame & Hardware for Geodesic Living Roof: $1,500
Bronze - $150
Machinable Wax - $150
Various Fasteners / Wire / misc. - $200
Truck & Gas for delivery and return to Blue Trail from Santa Cruz: $450
Wood & Metal Fabrication assistance: $1,000
Insurance - $1,500
Nitrogen / Salinity / PH Marine Sensors: $1,200
Sales Tax 7.5%: $750
UCSC Engineering Dept. engineering drawings: $1,100
City of San Francisco, permit fees $1,200
Artist's honorarium for time & work: $3,000

**SUBTOTAL:** $20,000
Contingency Fee 10%: $2,000

**TOTAL: $22,000**

**Timeline:**

November & December: Prototype / Phase 1 construction

January & February: prototype development and collaboration with UCSC ocean science dept.

March thru June: Construction & Testing

July & August: Completion of final prototype at a large scale

September: Test set up at UCSC DANM site

October: Final Blue Trail installation set up

**References:**

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