IWAMOTOSCOTT WITH PROCES2 (USA)
JELLYFISH HOUSE

Like the sea creature, Jellyfish House is designed to coexist with its environment as a distributed set of networked senses and responses. Jellyfish have no brain, no central nervous system, no eyes, and consist largely of the water around them. All the same, they sense light and odor, are self-propulsive, bioluminescent, and highly adaptive to changing aquaculture. Like a jellyfish, the house attempts to incorporate emerging material and digital technologies in a reflexive, environmentally contingent manner. Jellyfish House is designed as a mutable layered skin or "deep surface" that mediates between internal and external environments. The skin is an organization of fluid materials and technologies that acts as an infrastructural and structural network, allowing the house to be communicatively connective and largely self-sustaining.

The house is a transformative prototype for reclaimed land. Specifically, it is sited on Treasure Island, a flat, artificial island built off Yerba Buena, a natural island in the middle of the San Francisco Bay. Treasure Island is at once local and distant, isolated and connected. It is currently only accessible by off-ramp from the Bay Bridge. Recently decommissioned by the military, it is now being redeveloped for primarily residential uses.

Like many former military bases, Treasure Island suffers from a range of environmental hazards. The most geographically desirable parts of the island have toxic soil in need of remediation. In these areas, the hazardous materials in question require up to five feet of topsoil be removed for cleansing. In other areas, the contaminated soil can be treated on site using plant-based phyto-remediation techniques. The proposed site strategy is to infiltrate the island with sinuous fields of wetlands that would allow the removed soil to not need to be replaced and remediate the remaining toxins. In addition, the wetlands act as a filtration system for the island, becoming a form of productive infrastructure that naturally filters storm water run-off.

Jellyfish House taps into this water filtration strategy at the scale of the house. It captures, stores and filters rain and gray water for use in the home. For the water filtration system, the exterior surface geometry directs rainwater from the roof, and stores it below grade for future use. The water is filtered through cavities in the skin coated with titanium dioxide (TiO_2) and exposed to ultraviolet (UV) light. UV light is a common means of removing microorganisms from water, and when combined with titanium dioxide works more effectively than traditional chemical chlorine processes. The titanium dioxide coating is inexpensive, and removes a large range of pollutants. It not only cleans the water, but also interior air and building surfaces. It also absorbs the otherwise harmful UV rays, allowing only the blue, visible light to emerge, resulting in a softly glowing structure during the filtration process.

The filtered water can be used for household purposes, and is also used as a mechanical water-filled radiant system. Similar to a water pump, water is distributed through thickened bands of the skin, cycling either solar-heated water or cool water stored underground. Jellyfish House combines this system with latent heating and cooling using phase change materials (PCM) layered into the skin. Conceived as a largely transparent fluid filled "water jacket," areas of the skin pattern and thickness transform to become quilted baffles containing hydrated salt, a form of salt water. This material fluctuates between solid and liquid states based on changes in air temperature. As it changes from a liquid to a solid state, it releases energy in the form of heat, and subsequently warms the surrounding space; when the reverse occurs, it absorbs energy and cools the space.

Conceived as a deep surface, the skin of Jellyfish House combines structure and envelope with physical and informational infrastructures. What unites them conceptually is that they create an ambient experience in the home that reveals the work of the skin in largely a peripheral manner. In this regard, the project expands upon of the notion of "calm," or ambient, technology, which suggests that the digital realm will ultimately recede to the background of our spaces and lived experience. Using calm technology as a conceptual strategy in the design of the house, the project revisits the digital and the material by cultivating this latent technological relationship while still offering a productive, non-naturalized awareness of the forces at work around us.

Jellyfish House links the inner workings of the home with the environment in an ambient manner, employing sensorial tactics like subtly changing skin patterns while also altering light and environmental qualities for the benefit of the dweller which can be appropriated or ignored as part of everyday experience.

Jellyfish House's deep surface is a parametric mesh using efficient geometric logics of Delaunay triangulation and the

OVERALL VIEW OF JELLYFISH HOUSE, CONCEIVED FOR TREASURE ISLAND, AN ARTIFICIAL ISLAND IN SAN FRANCISCO BAY FORMERLY USED BY THE MILITARY

Voronoi diagram. It deforms locally to geometric, structural, and mechanical circumstances. The skin, made of fiber reinforced polymers and glass, fluctuates in thickness becoming both enclosure and structure. Thickened areas create structure and cavities for the electrical, radiant water, and water filtration systems. Thinner parts of the skin's surface are layered with organic plastic solar cells, titanium dioxide, a wireless sensor network, hydrated salt phase change materials, and organic light emitting diodes. The outer layer of the skin is coated with organic plastic solar cells that absorb the direct sunlight and generate electricity for the home and radiant water system. An insulated air space separates this exterior layer from the phase change materials, so that they respond to the interior house temperature.

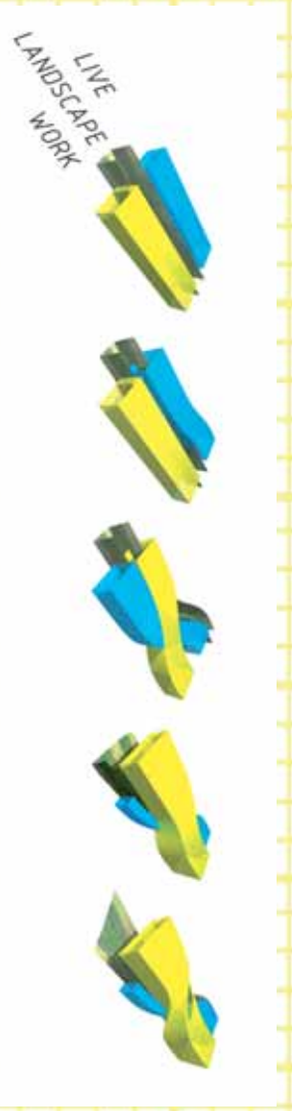
The innermost layer is glass printed with transparent thin-film transistors, liquid crystal and polymer light emitting diodes. This flexible digital display system allows the skin to mutate in opacity, transparency, color, light, and image. It is activated either by the user, for example to control lighting, privacy, or simulate a cloudy day, or by the environmental sensor network consisting of MOTES. In Jellyfish House, they sense and communicate environmental data such as temperature, humidity, wind, fog, and direct sunlight, subtly controlling the radiant system and skin display. Thus the house's skin becomes a subtly changing surface that mediates between the internal and external environments.

In terms of urban planning, the house is part of an adaptable system that can aggregate to increase density. Each house is designed to programmatically transform. The proposed single-family residence represents a hybrid form of urbanism where the home initially has two programs of live and work. These programs intertwine so that each has amenities associated with a traditional house or office, such as a backyard garden, or recognizable street address. While the work space can be completely separate from the house, it is also designed to be able to connect fluidly to the home through the interior, so that can be transformed from an office to an in-law unit, to children's wing, or rental apartment, depending on the occupant's current needs.

Like the skin, the house's spatial and formal lay out is a permutable system of intertwining volumes and surfaces that can adapt to different site and programmatic constraints. Each house is shaped by negotiating between internal and external spatial criteria, whereas the spaces between homes are designed to facilitate social networking, allowing for informal, neighborly communication.

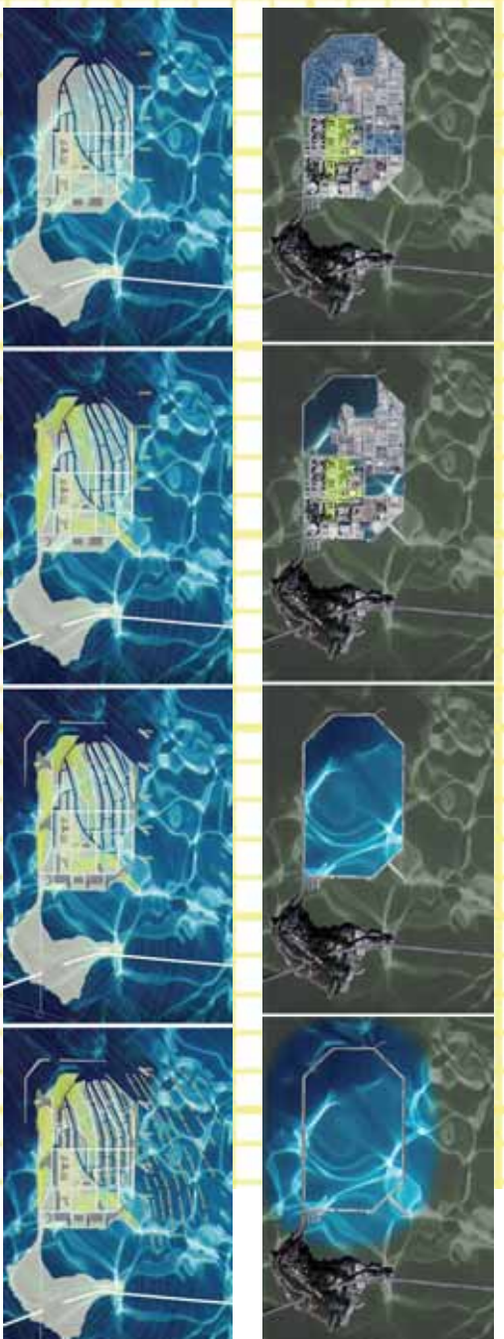
DIAGRAM OF JELLYFISH HOUSE INTERTWINING A LIVING SCAPE, A WORKSCAPE, AND A LANDSCAPE LIVE, WORK AND LANDSCAPE

STRUCTURAL AND INFRASTRUCTURAL LAYERS OF THE BUILDING SKIN



TREASURE ISLAND SOIL REMEDIATION AND WATER FILTRATION CONCEPT

INFRASTRUCTURAL LAYERS OF TREASURE ISLAND SITE



INTERIOR VIEW OF JELLYFISH HOUSE A WATER FILTRATION SYSTEM IS INTEGRATED INTO THE BUILDING'S SKIN OPERATING WITH ULTRAVIOLET LIGHT AND TITANIUM DIOXIDE COATING.

THE SKIN OF JELLYFISH HOUSE CAN SUBTLY CHANGE BETWEEN TRANSPARENT AND OPAQUE.

IwamotoScott
Jellyfish House

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IwamotoScott's work centers on amplifying the perceptual performance of architecture. The work attempts to leverage avenues of design investigation to create a greater confluence between the material world, immaterial phenomena, and architectural space, form and material. An evolving analogy in their work is that of the "spatial phenotype": in this case, the visible spatial result of how the familiar is affected by its environment. The projects employ both standard and unconventional materials and building methods as a way of confounding expectations, or de-familiarizing the familiar.

IwamotoScott Architecture was formed in 1998 by Lisa Iwamoto and Craig Scott in Berkeley, California. Lisa Iwamoto is an Assistant Professor at the Department of Architecture at UC Berkeley. Craig Scott is an Adjunct Associate Professor at California College of the Arts in San Francisco. IwamotoScott's work has been honored and awarded numerous times, including the Progressive Architecture Award Citation 2005, and featured internationally by relevant architecture and design magazines.

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Digital Skin Geometry Consultant
Proces2 was established in San Francisco in 1997 by Sean Ahlquist as a firm focusing on design, visualization, and experimentation in the field of architecture. The primary goal for Proces2 is to employ the process of design investigation as a means to discover new perceptions and realizations of architecture. The method of investigation takes place within the realm of digital space and utilizes the latest 3d technologies and software. By linking process directly to digital design technologies, the design method evolves as technology advances. Proces2 explores these ideas in a wide range of projects, stretching from conceptual and theoretical works to residential and commercial design and construction.

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