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Spring 2014

Arch 346 - Competitions in Architecture

Triumph Architectural Treehouse Award

Floating Capsule

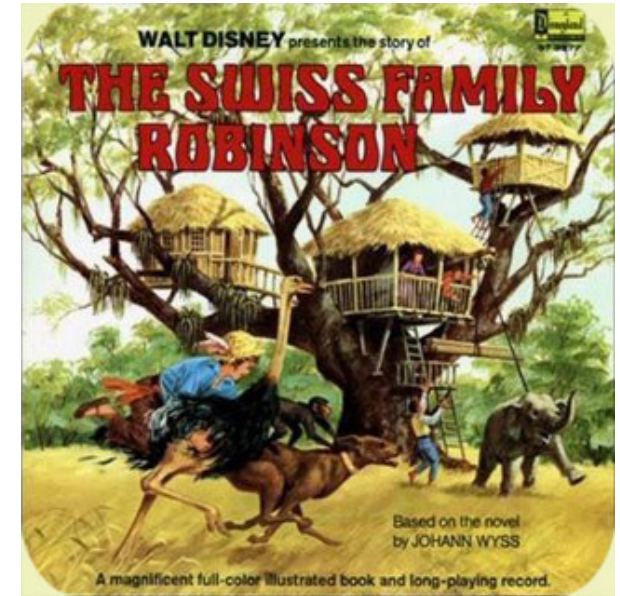
“The works of the past always influence us, whether or not we care to admit it, or to structure an understanding of how that influence occurs. The past is not just that which we know, it is that which we use, in a variety of ways, in the making of new work....”

For thousands of years, humans have co-existed with nature and adapted to local living conditions by creating various forms of vernacular habitats. Only in the last few decades, the concept of modern cities drove people to gather in high dense, industrialized areas. To many, living among nature has become a luxurious and almost unrealistic ideal. In the wake of the environmental crises in recent years, people are pursuing ways to reemerge themselves into nature and seek a lifestyle harmonious with the natural habitat. One of the growing global trends is to recreate this sustainable habitat with the tree house typology. Historically, Southern Pacific and southeastern Asian tribes have long lived in tree dwellings as means to remove themselves from threats on ground level, such as wildlife or floods.⁽¹⁾ However, other than its

practicality, the tree house has been an architectural type that is often associated with fantasies and meditation. Tree houses become settings for several literatures including “Peter Pan” and “The Swiss Family Robinson”. Franciscan and Hindu monks are also known to use modest tree rooms for meditation in order to remove themselves from their earthly desires.⁽²⁾ Therefore a successful tree house design would require consideration for its aesthetic and atmospheric effect on its inhabitants, its physical construction and also environmental impact.



old treehouse



The Swiss Family Robinson

1. "L'Histoire des cabanes dans les arbres au fil des siècles." <http://www.sur-un-arbre-perche.com/en/tree-houses-history> (accessed April 29, 2014).

2. "HowStuffWorks "History of Tree Houses"" HowStuffWorks. <http://home.howstuffworks.com/home-improvement/remodeling/designer-tree-houses1.htm> (accessed April 29, 2014).

The Triumph Architectural Treehouse Award asks for participants to design an arboricultural dwelling as a retreat lodging or a relaxation space for a professional city couple. The proposal should consider a wide range of design criteria, such as welfare of the tree, aesthetic and materials, comfort and accessibility and finally safety and security. Participants are given the opportunity to pick any site and tree that sees fit to their designs. The site that I chose is Lighthouse Park in West Vancouver, British Columbia, Canada. With a rather mild, moist and cool climate, this beautiful forest is located by the shore and features a combination of Western Red Cedar and Douglas fir.

(1) Red cedar is the provincial tree of British Columbia and native people around the region had harvested cedar to build totem pole, canoes and dwellings for years. (2) This strong, large tree can grow up to 60m tall and is one of the trees in the region with the least concerned conservative status (3), making it a culturally and environmentally appropriate construction material as well as supports for the tree house.

In the early stages of the project, various precedents of other built tree houses in similar climates were examined and referenced. While most tree houses are built around a tree trunk or supported and elevated by vertical elements to stand among the trees, several precedents explored the possibility of hanging the house from the trunks without attaching the body directly to the tree or having the trunk penetrating through the residence.



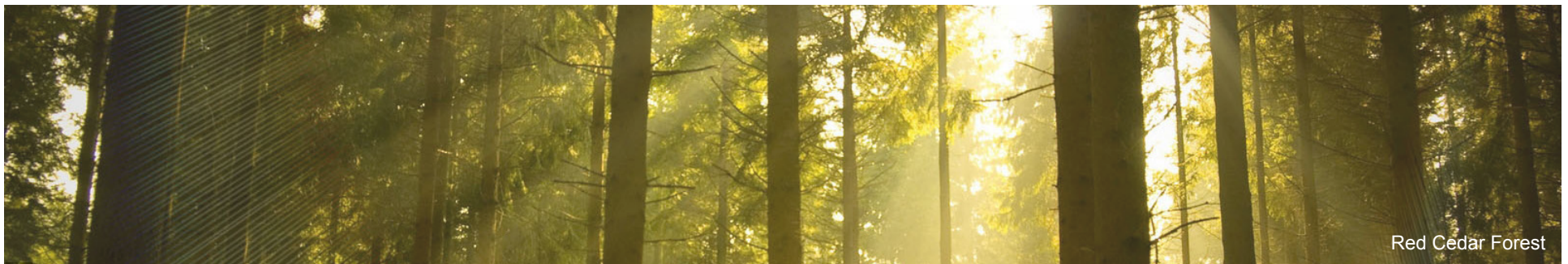
Lighthouse park, West vancouver , BC



Totem Poles

1. "Lighthouse Park | Vancouver Trails." Vancouver Trails. <http://www.vancouvertrails.com/trails/lighthouse-park/> (accessed April 29, 2014).
2. "Western redcedar." Western redcedar. <http://www.for.gov.bc.ca/hfd/library/documents/treebook/westernredcedar.htm> (accessed April 29, 2014).
3. Wikimedia Foundation. "Thuja plicata." Wikipedia. http://en.wikipedia.org/wiki/Thuja_plicata (accessed April 29, 2014).

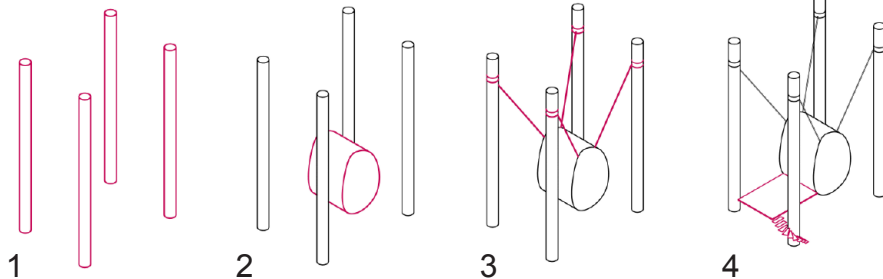
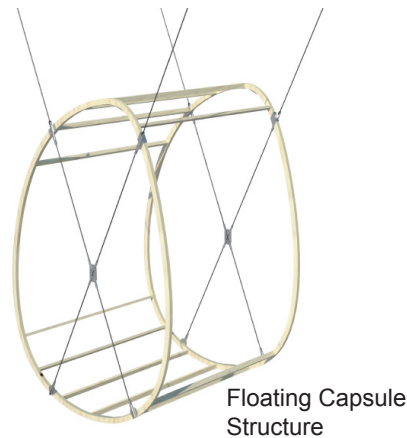
The Cabin Tree house by Swedish architects Mårten Cyrén & Gustav Cyrén, The UFO by Bertil Harström⁽¹⁾ and The Free Spirit spheres designed by Tom Chudleigh⁽²⁾ are successful designs that demonstrated the potential of suspended tree houses. These designs showed that when a tree house is attached to several trunks, allowing the weight of the structure to be divided between the trees, the structure could stay in air without any ground support. This approach gives the structure an appearance of a small-scale, light capsule that floats among the trees, resembling a small birdhouse. In my proposal, the floating capsule also takes on the shape of an egg in profile, which mirrors its role as a self-contained, comfortable shelter for life and nourishment. To relate the tree house to its surrounding context, I was particularly interested in drawing inspiration from patterns in the forest. Many of the most powerful images I found highlights the verticality of the tree trunks and contrasts the dark colors of the trunks with the lively lights that shine through the spaces between them. The cladding of the capsule simulates a similar effect with alternating long red cedar panels of three different shades.



1. "Treehotel." Treehotel. <http://www.treehotel.se> (accessed April 29, 2014).

2. "Frequently Asked Questions." Frequently Asked Questions. <http://www.freespiritspheres.com/faq.htm> (accessed April 29, 2014).

Among the three designs mentioned above, the free spirit sphere is a particularly helpful precedent for my design as it provides direction towards the suspension systems involved. According to inventor of the free spirit spheres, “The concept borrows heavily from sailboat construction and rigging practice, the wooden spheres are built much like a cedar strip canoe or kayak. Suspension points are similar to the chain plate attachments on a sailboat.”⁽¹⁾ Similar to the sphere, my design, the floating capsule can be prefabricated off-site and the only steps necessary on site is installing the suspension system and lifting the capsule in place. The structure of the capsule is essentially two red cedar rings on each end of the house, each formed with two bended red cedar logs connected at their top and bottom points to create the skeleton of the egg-shaped profile. In the center of each ring, one will find a basic steel x-bracing structure that provides the house with lateral support. Finally, eleven joists run between the two cedar rings, five at the top and six at the bottom, completes the structure and provide support for the interior slabs. As illustrated by the concept diagram below, my design can conclude in four major steps: first of all, we have to locate a site that provide us with four western red cedar trees and a clearance area of at least 6m x 6m in the center, the four trees will act as the supporting element for the tree house where compression rings will be installed around the trunks. The second step would involve transporting the prefabricated capsule to the site and measuring the exact point where it will be lifted. The following step is to suspend the capsule into the air by connecting the compression ring on each tree to the steel suspension connection on the structure with strong steel cables. The final step would be the only construction involved on site. After the tree house is suspended in place, a deck would be constructed around one of the tree trunks and extends to the capsule itself, this will



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Back View



Front View

stabilize the structure and stops it from swinging in winds.

Due to the limited square footage requirements and the goal to keep the house as light as possible, the interior of the tree house drew inspirations from layouts of small Japanese homes which often features furniture and spaces that have dual functionality. There are two floors in the house where the upper floor is the resting quarter and the first floor includes the lounge space and bathroom. The lounge space is designed to have the most flexibility by putting in Japanese tatami panels, which are often used in traditional Japanese houses. They are made of rice straw which helps create a comfortable, cool surface for sitting.⁽¹⁾ These panels are also very light in weight and can be lifted up to access a secondary storage space right underneath, so furniture such as the bean bags and coffee table which also functions as two stools, can be stored away to create more floor space for studio purposes. The compartments in the bookshelf is also spaced in a way that can function as a ladder to the second floor, and attached to the front is a retractable dining table which can be flipped up when not in use. The small-scale electronic fireplace is set inside the small kitchen counter in order to contribute more of the floor space for activities as well. The second floor's design is relatively simple with a double bed on one end surrounded with storage spaces that also act as bedside seating and electronic charging stations.



First Floor Plan



Living Room



Tatami paneled room

1. "Tatami." Wikipedia. Wikimedia Foundation, n.d. Web. 29 Apr. 2014. <<http://en.wikipedia.org/wiki/Tatami>>.

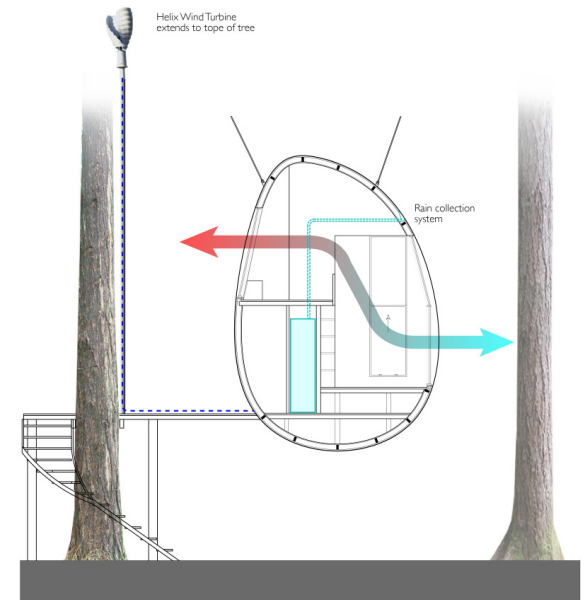
The final category that comes into play in a tree house design is the environmental factor. Since a tree house is most likely to be located in a rural area where plumbing and electrical supply is limited, it is designed to be as self-contained as possible and leave the least environmental impact in the surrounding nature. There are several solutions to achieve these goals. The first one is by implementing a rain collection system inside the house. A collection drain on the roof carries rain or melted snow through a pipe embedded in the wall into the water tank in the bathroom, this water will be used to feed the shower and sink. The only fixture that is not supplied by the water tank is the self-contained camping toilet. The second solution is to place windows on both sides of the house and on the different levels to allow natural ventilation and let in natural light. Finally the third solution in place is the Helix wind₍₁₎, the residential wind turbine for main electricity supply. Initially I looked into the possibility of using solar panels as the renewable energy source. However given the shades in the forest, the amount of energy produced from solar panels would be minimal. The Helix wind is a turbine small enough to attach to the top of one of the supporting trees and take advantage of the coastal winds on site.



Bedroom View



Helix Wind



Environmental Solutions

1. "Helix Wind - S322 - Savonius VAWT" Helix Wind - S322 - Savonius VAWT. <http://www.helixwind.com/en/S322.php> (accessed April 29, 2014).

Architecture is a general practice that requires knowledge and consideration for multiple principals; and finding the balance between these principals and combining them in a cohesive manner is the key to a successful design. Although a tree house is often understated as a small, low-budget project, it is a typology that interestingly bridges many principals that drive sustainable development. It can be considered as a small-scale study of how structural integrity, materials, environmental impact and human comfort can be brought together in one design. The floating capsule strives to embrace all of these aspects and present them in a design that sparks the imagination, and serves as my answer to the growing demand for humans to remerge themselves in a nature landscape.

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