Selected Works for Columbia GSAPP
for M.S. Advanced Architectural Design

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CONTENTS

01 THE NEW/OLD AINA
A GROWING LAND FOR DECOLONIZATION

02 THE LUNG
ISLAND FACING AIR CATASTROPHE

04 TOWARDS A FEARLESS BIRTH
REDESIGNING THE BIRTHING BED
The New/Old Aina is a design project set towards a decolonizing future of Ahupua Waikiki in Hawaii through overlapping the colonial history and the present development condition. It is a growing land floating above Fort Derussy. It grows into the urban texture, while gradually restoring the wetlands system underneath. It also alters the roads for water resilience, creating pervious surfaces and safe evacuation route during floods. It will keep growing in the future, penetrating and altering the tourism and military programs it touches. Eventually, in 100 years, it will serve as the new aina facing the possible flood or sea level rises.
The New/Old Aina starts with the available lands on Fort Derussy right now, and then grows into the urban texture, while gradually restoring the wetlands system underneath. It also alters the roads for water resilience, creating pervious surfaces and safe evacuation routes during floods.
The Lung is a factory, museum, and purifier of air. Facing various underlying urban disasters, The Lung prepares the city for potential air catastrophes while healing the damage. Spatializing natural and technological processes, the museum demonstrates the cleaning and making of ‘air’. The visitor is invited to obtain sensitivity to the so-called ‘void’ or ‘invisible’ through the air. The island prioritizes the invisible as the most crucial and blends the infrastructure abstraction to everyday experience.
The age of airborne infections and air pollution grew hyper sensitivity around breathable air. An essential but overlooked part of life. The lung responds to this need for sensitivity and action towards unbreathable air, acting as a factory for oxygen pre-catastrophe and as an oxygen distribution center during catastrophe time.
We first look into the technological process of producing oxygen. We divided it into 3 parts, the inhaling, the absorbing and the exhaling. The air is first compressed and purified during inhaling; then is liquified to distill oxygen out during absorbing. Finally, the liquid oxygen goes into the reservoir and is ready to be vaporized for later use during exhaling.

We organize these 3 different mechanisms in a circular layout to collect air coming from all directions. Based on all the features of programs, spaces are arranged from outer layer toward the central part.
Oscillating between 2 programs, the island is both a factory and a museum. It is accessible through the 2 entry bridges. The lung consists of 3 concentric zones from inhaling, to absorbing, to exhaling. From the outer ring towards the central reservoir the spaces become more concentrated/denser, from collection of air to storage of oxygen.
The island situates itself proximity to zones with highest air pollution in New York City and also nearby urgent care and hospitals pointed out here: Northwell Urgent Care and CityMD.
In terms of structure, we're inspired by the semi-submersible platform which is commonly used in the offshore oil industry, enhancing the impression and relation between intangible air and solid structure. Moreover, we analyze the annual windrose diagram of New York. By manipulating the density of truss, the structure can respond to this invisible context of air. Gigantic floating pontoons support the whole island.
Instead of following typical compression machinery, we try to visualize the behavior of air compression by introducing 5 various compression episodes. And distribute them around the outer ring, connected by a public pathway. When 
people walk around it, they experience and interact with the unique compression mechanism of each episode. For the inflatable rooms, visitors are invited to walk in to feel the process of compression. For the air lift, this unit isn’t only designed to process air, but also helps to carry people to different levels. For the bubbles, 2 types of units compress the air outside or inside of them. Lastly, visitor can immerse themselves in the rotary chamber before their next destination.
Experiencing Absorbing Towers

Flow of Air

Temperature of Air

Form of Air
The exhaling part is constituted of the semi-immersed liquid oxygen tank, gallery spaces and the oxygen tank pool on the cantilever structure, pneumatic spaces and concrete landscape shell. Reaching to the central reservoir, the visitor sees the expandable semi-immersed liquid oxygen tank. Above the floor inflatable pneumatic gallery rooms react to the production of gas oxygen, using it as a material for its form. Here the visitor is able to experience sounds and volumetric differences associated with the change in form from liquid to gas. The expandable reservoir structure is inspired by the precedents of gas holders from 1950s. But it expands downwards instead of upwards in order to hold liquid oxygen.
The botanical garden and algae bioreactors on the landscape shell provides more organic oxygen production.
03 Towards A Fearless Birth
REDESIGNING THE BIRTHING BED
Summer 2021, Advanced Design Studio, Individual Work
Instructor: Anne Liu
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This project is developed in the Advanced Architecture Design studio, “Feminist Technoscience”, which focuses on how technology can contribute to a better future for reproduction, motherhood, and gender equity. Using inflatable furnitures as vehicle, this project aims to ameliorate the emotional fear caused by unfamiliarity through a redesign of birthing bed, by making it into furnitures that that accompanied the pregnant during the whole pregnancy.
The inflatable Birthing Kit aims to ameliorate the emotional fear caused by unfamiliarity through a redesign of birthing bed, by making it into furnitures that accompanied the pregnant during the whole pregnancy.

By accommodating a series of liberal birthing position, the Inflatable Birthing Kit actually serves a pedagogical purpose of promoting the liberal position birth knowledge. And with the help of our smart mirror and tutorials online, pregnant can easily access pre-birth exercises, birthing simulation trainings with partner, and postpartum recovery exercises.

To really rethink birthing beds as daily life companies, all of the furnitures in the Inflatable Birthing Kit is also designed as furnitures that can be used in daily life. Our goal is to help pregnant get as familiar as possible with the furnitures that they will be giving birth in, and erase fear caused by strangeness permanently.
Liberal position birth refers to that the pregnant is in a comfortable position, such as lying down, walking, standing, sitting, kneeling, lying on her back, squatting, etc., instead of the traditional lithotomy position. As promoting vaginal birth becomes a consensus among the Chinese medical field, liberal position birth has proven several distinguish advantages. The fetus and the mother's pelvis is easier adapt to each other, making it easier to enter the pelvis and the pregnant mother's uterine opening will dilate faster. And the pressure of the uterus on the mother's blood vessels can also be reduced. In addition, the fetus will be able to receive more adequate oxygen, reducing the risk of hypoxia.

Step 1 Purchase/Customize online
The Inflatable Birthing Furnitures come in all sizes and a wide range of colors. You can choose your favourite ones, submit the order, or even customize your own in advance, and leave the rest to us!

Step 2 Get familiar at home
After receiving your Inflatable Birthing Kit, you can follow our instructions and install all the items with the complimentary tools including an automatic air pump that saves you the effort to inflate with your own strength. Then, use them in your giving birth practices, or even just use them as normal furnitures! The only goal is to get used to their company!

Step 3 Use your own at the hospital
When the baby comes, you and your partner can easily deflate the whole set and bring them to the hospital with you. The hospital will inflate and sanitize them to get ready for your birth. No more fear from unfamiliarity, you are giving birth on the very familiar furnitures that have companied you through the last months. After birth, if you had chosen our smart handrail, you will even get your own souvenir of this epic journey of giving birth to life.
This item is designed to facilitate recumbent birth position, and is also a comfortable sofa that you can rest on whenever you like.

The PVC flocking material ensures a comfortable experience for your skin.

Worrying about slipping? The PVC rubber bottom with capula-like structure perfectly solve the problem.

Inflatable Furniture No.1

Inflatable Furniture No.2

This set is designed for the squatting birth position. In addition, they both serve as a nice chair in your daily life.

RECURBENT

SQUATTING
This item comes with a stool that can hold your leg when giving birth in lateral recumbent position. It also is designed to be a cozy sofa.

_Inflatable Furniture No.3_

This item comes with a stool that can hold your leg when giving birth in lateral recumbent position. It also is designed to be a cozy sofa.

**¥ 299 $44.9**

The crease on both side provide comfortable and secure fixation for your arm.

This item comes with a stool that can hold your leg when giving birth in lateral recumbent position. It also is designed to be a cozy sofa.

Inflatable Furniture No.4

This item is a kneeling pad with breast support, aiming to provide a stable and effortless kneeling position birth. It also serves as a sitting pad and the support in the middle can hold your head comfortably.

**¥ 249 $37.9**

The hole in the middle allows you to see the birthing situation whenever you want to.
Inflatable Furniture No.5

This item can support squatting and leaning birth position. Besides, it also can be a cozy stool during your pregnancy.

Inflatable Furniture No.6

Though similar to No.5, this item is designed specifically to support standing birth position. It provides strong support to the upper body and is a comfortable company to lean on. When put down, it becomes a bench.

$179 $22.5

$239 $35.9
Always there for you

The goal of the Inflatable Birthing Kit is to let birthing furnitures be around you from the very beginning of pregnancy to even after the born of a new life. It has multiple identities. It is a set of tools that leads you through pregnancy and is a set of daily furnitures that is a part of your pregnancy life, and after giving birth, it shifts form to become a souvenir that celebrate this memorable journey.
Available in both rural and urban areas

The low cost of manufacturing and transportation makes it affordable to all. Anyone can order it online! The relatively expensive smart mirror can be substituted by group lessons in the local hospitals in rural areas, and the smart handrail is optional. It brings the opportunity to promote vaginal births in rural areas by promoting liberal position births.

Social and Environmental Friendly

Our production insists on using environmentally friendly recycled materials as far as health standards allow. And we believe we can find a balance between providing each pregnant with their own clean birthing furnitures while minimize the harm to nature. After used at the hospital, the inflatable birthing furnitures are disassembled into two parts, the contaminated PVC flocking skin, and the PVC rubber kernel. The PVC flocking, classified as medical waste, is carefully sterilized by the hospitals and transported by special truck to designated waste incineration plants, where the heat generated by incineration is used to generate electricity. The PVC rubber kernel is grained and then recycled with other PVC waste in professional factories and eventually transformed into recycled PVC granules, which is bought by us again for production.

Purchase, Use and Recycle

Manufactured with recyclable material

Used and disassembled at hospital

Incorporated in waste-to-energy plant

Regenerated

Used at home

Manufatured with recyclable material