Sail Sail Revolution
An interactive dance machine for the preservation of the Hong Kong junk
Year 3 - project 1
The Brief
The fall of traditional Junk Boats

The rise of piracy in the Pearl River Delta spelled a steady decline for Hong Kong Junks. The protection of the usual trade routes in the region required new and improved ships that could handle upwind sailing. Thus the influx of the more nimble European cutter rigs brought forth the slow demise of an age old tradition. Even though old master boat builders still exist in present day Hong Kong there is no young generation to carry the tradition forward.

In this project I iterate through concepts for a device that could bring about the return of the Junks.
Initial Concept
Arm-mounted bamboo-weaver

This device would streamline the process of traditional sail-making for old master boat builders. It would allow them to pursue the Hong Kong tradition without the need for young assistants. This peculiar symbiosis was inspired by Steiner’s use of a robotic arm to split his sensory experience amongst three individuals around the globe.
Air Apparatus 1
The Haptic Wristband

Building on from the concept of a wearable sail-maker I experimented with the interaction between human and device. I wanted to create a mechanism that teaches the user the choreography for bamboo sail-making. As part of the device, the Haptic Wristband would blow air onto the sail-maker’s skin if a correction of technique was necessary, thus creating a performance between man and machine.

Choy Ka Fai’s “Cortex Dance Clinic” was a big inspiration for this idea as the dancer’s bramwavers were transformed into music that the dancer then performed to.

Air junction detail that would allow feedback loop to form between the user and the device.

1. Screw cup
2. 4-way air junction
3. Stand fastener
4. Compressed air pump attachment

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Richy Dinnew
Air Apparatus 2

The Wind Plotter

Inspired by Marey’s “Movements of Air” I wanted to propose a wind tunnel that maps different sail designs by collecting smoke from their turbulent flow. The device would translate the efficiency of the sail (or its lack thereof) onto a 2D plane. I hoped that the result would manifest itself as patterns of wind akin to meteorological reports.

Whilst this device failed to output meaningful efficiency data, it inspired the idea of creating an anthropomorphic “sail puppet” through the delicate movements of the latex in the wind.

I intended my next device to trick the viewer to its autonomy by utilising wind - perhaps interaction with such a device would foster affinity towards the tradition of making Junks.
Air Apparatus 3

The junk rig model

I could not start puppeteering a "sail" without understanding the precise motions of its fabric in the wind. I chose to make a scale model of a junk rig and sewn in multi-coloured diodes in even increments. I set it up with an industrial fan and took long exposure photographs to map the movement.

I was inspired by Conrad Shawcross' "Timepiece" to create an armature that would follow a predefined path based on the long exposure photographs. The user would have to perform gestures that would activate pulleys and fans and cause the fabric to "dance" in space. I intended the device to seem autonomous and with a mind of its own. The project's central idea of fostering affinity through interaction began to take shape.
Air Apparatus 4-6
The evolution of the final device

Junk Armature 1
Anne Lily’s use of bearings and bevel gears in her kinetic sculptures inspired the mechanical build up of the Junk Armature. The telescopic arm was to provide the sail with 360 degrees of motion around a cam rail shaped as one of the Junk Rig wind patterns.

Junk Armature 2
Due to technical limitations involving the armature’s inability to move with vigour, I resorted to man-powered motion to retain the interactivity. The device would use the physics of a double pendulum to achieve a motion similar to that of Foreythe’s “Black Flags.”

Sail Sail Revolution
The previous device/iterations lacked interactivity. This wall-mounted dancing machine aims to illuminate the intricacies of sailing a traditional junk by connecting the dancer directly to the sail. Better dance well or else the sail de-powers. Affinity grows with familiarisation.
Final Film
Creating a choreography of balance

To be able to connect the dancer with the sail, eight points of contact are proposed. The waist controls the stability of the sail by adjusting its height. The wrists and elbows cooperate in order to shift the sail side-to-side and the ankles allow for a repositioning of the fabric within the drum.

Powder paint is dispensed from tea infusers, which hang from threads that connect the device to the dancer. As the paint falls to the ground it is used by the dancer's feet to record the choreography. In sailing standards, green denotes the right-hand side of the vessel (starboard), whilst red denotes the left (port).

Please watch the full video on Vimeo: https://vimeo.com/254197450
Destructive Détente

An architectural manual for subliminal critique in China's Hong Kong

Year 3 - project 2
The Brief

Hong Kong, China and the pro-democracy dilemma

With materials donated by the UK, USA and Germany, the building is a gift to China she can’t refuse before 2047. Overtly it functions as a centre for dialogue and a mouthpiece for Demosisto - the student opposition party set up in the aftermath of 2014. Covertly, however, it performs the role of an in-erasable critique of the Chinese political system and ultimately the inevitable fate of the Hong Kong self-determination movement after 2047.

The building gives Demosisto an illusion of dialogue and, while it provides a vertical auditorium for radical speeches, a debate chamber for healed discussions and a library for quiet contemplation, it simultaneously distorts, disrupts and censors the student opposition campaign.
The Site

Hing Hon Road

Hing Hon Road is located in the North-Western region of Hong Kong Island and is in close vicinity to HKU. Easy access is provided by two nearby MTR stations to the West and North-East of the site. Although secluded, the road is busy with pedestrian traffic, who use it as a short-cut to access the gastronomical locations surrounding Pok Fu Lam Road to the North. This incentivises the development of "soft fronts" on the building’s north-western face with an additional focus on vistas from the pedestrian stairway and Bonham Road to the South.

The area is very densely packed and predominantly residential, with some mixed-use pavilions attached to the ground floors of the high-rises.
Initial Concept
Creating a vertical agora

I began by looking into patterns of the Umbrella Movement of 2014 and applied them as spatial conditions for the first prototype of the building.

Placed at its feet, the Undergarden and Tree Bay take inspiration from the overwhelming greenery that weaves itself into the urban fabric of the HKU area - it welcomes and entices visitors.

A protest isn't often a protest if it does not involve some form of violence, but, instead of spreading that violence uncontrollably, the building attempts to channel it into a boxing match at the One Metro Ring. Afterwards feel free to head downstairs to H&K where you will be able to rest your weary body.

If, however, you prefer a slightly more peaceful approach to political expression, head up to the Boycott Bar and Streetview Picnic! They are sure to remind you of the busy streets of Admiralty.
Iterative Sketches

Although I really enjoyed adapting protest activities into physical spaces, the process seemed a little bit too literal. I began to dig deeper into the concept of satire, irony and futility of the pro-democracy movement. I wanted to provide a space that would fulfill their needs for a level playing field with the government while at the same time making a provocative statement about the political reality within Hong Kong.

I began developing these ideas through countless sketches that specialised the tough political situation and began shaping the building into a monument for free speech.
Survivalism
Preventing the certainty of Chinese demolition

I realised that at no point did I address the other side of the divide which was the Chinese Government. In the real world a building that would either criticise the CCP or support its opponents would be immediately and unceremoniously decommissioned and demolished and so I needed to ensure that the building would remain in death as it would in life a monument to free speech.

An exhibition by Forensic Architecture pushed me to move on from demolition prevention in its traditional form and work towards prevention based on fear of high collateral damage - this became the focal point of my technical dissertation.
Demolition
Deterrence
Maximising collateral damage

By researching common demolition techniques, I concluded that selective demolition would be the only valid way for China to erase my building. I was inspired by London’s Centrepoint, in which pre-stressed concrete made it extremely difficult for the building to be demolished.

The most volatile of the pre-stressed concrete family is progressively tensioned concrete. During construction this type of concrete is incrementally tensioned as more load is being put on it - in this way the system remains balanced. If, however, the load acting downwards is removed without securing the beam, the excess tension can cause the concrete to burst aggressively.

While it is dangerous in itself, this technique might become an even greater demolition deterrent if concrete is substituted for the UK stock brick. This would subsequently create an architectural version of a fragmentation grenade.
Deterrent 1
The exploding brick arch

Following the curvature of the deep segmental arch I began forming the concept for an exploding brick arch that could support higher tiers of the building. The arch itself could not be cantilevered, but it had to support the debate chamber, which would protrude from the North-Western side of my building over the main access road. This would ensure that highest collateral damage in case of tampering, but would require a supportive structure to carry the dead load acting vertically down.
Deterrent 1
The exploding brick arch

The brick arch stems at the corbeled reinforced concrete column and forks out to create a groin vault at its furthest point. As a compromise between highest potential collateral damage and legitimate structural integrity, the arch cantilevers over the street, but is partially supported by the steel truss below. This allows the arch to be progressively tensioned as the building is constructed. Additionally, a pedestrian walkway is extended below to allow politicians, activists and visitors great views over the descending landscape surrounding HKU.
For the building to be considered difficult or dangerous to demolish it needed more than just one unstable structural element.

By considering the sequence of demolition as a Rube Goldberg machine I began crafting a relationship between the ‘architectural charge’ (the Brick Arch), the auditorium and the water tank within.

The application of a submarine’s structural build up allows the auditorium to be light and self-supportive. The ribbing gives it additional toughness which could play an important role in causing damage to surrounding buildings.

The auditorium also follows the principle of a barrel, where the only thing that keeps it from falling apart are the tension rings surrounding it.
Deterrent 2
The unfolding metal auditorium

In the event of demolition and a subsequent collapse of the debate chamber, the auditorium will detach from the floor plates. This could be possible if the tension members between the debate chamber and auditorium were counteracting the latter's moment of leaning. The seams on the auditorium are located on its 8 compass points, giving a total of 8 segments that have the ability to break their integral seams and collapse in multiple directions.

1. Steel plate
2. Insulation
3. Reinforced concrete
4. Bent steel plate junction - allows for the auditorium to detach if it begins to tip
5. Steel clip to conceal the auditorium seam
6. Steel truss holding up the viewing tower
7. Timber clad floor
Deterrent 3
Concrete monocoque water tank

This robust reinforced concrete tank is designed to utilise the gradient of the slope to roll as far down and cause as much damage as possible. It’s bottom cap is heavily reinforced, allowing it to withstand a fall from height.

By collapsing into its 8 constituent segments, the auditorium can sever the connection between the water tank and its support system. The falling oratory space will be able to pave the way for the water tank to roll down.

Key:
1. Blase dome reinforced with concrete ribs
2. Industrial spring on runners
3. Steel truss
4. Multi-propped tension member
5. Connection between tension member and the concrete water tank
6. Tension hoops
7. Reinforced concrete bottom
July 1st 2050

Animating the forensic reconstruction of the building

Piranesi’s picturing of Roman architecture as ruins of the future inspired me to speculate on the fate of the building on Hing Hon Road after 2047.

Using the Fracture Voronoi v.1.0 plug-in for 3Ds Max I subdivided components of the building and exposed them to external forces in order to simulate the potential outcome of a failed demolition by the Chinese government. Seeing my building in ruins encouraged me to animate a forensic reconstruction of my own, tying it back to the highly politicised Handover 30 years in the future.

Please watch the full video on Vimeo: https://vimeo.com/275510161
Moments
Dissecting China’s gift from the free world

Ultimately the project argues quite a bleak reality for the future of Hong Kong’s self-determination movement. But perhaps as long as Demosisto can continue defending democratic values in Hong Kong the opposition has a fighting chance. Defense is the best form of attack. Architecture as weapon.