1:1 Interactive Architecture Prototype
Urban Furniture

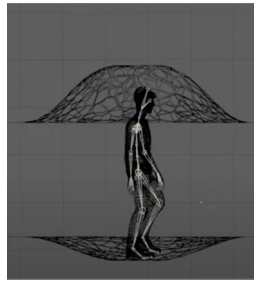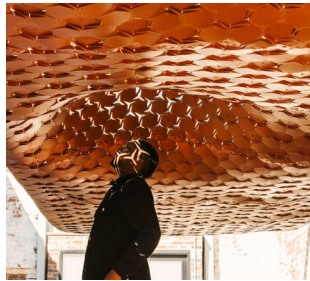Group 1

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# Reference 1: Kinetic Urban Furniture

Urban Imprint, Studio Ini

The installation involves materials often used in construction and made flexible & reactive. As a visitor steps into the installation, a flexible floor depresses around their foot, triggering a system of pulleys that tighten and lift the roof into a dome shape above the inhabitant's head. The design intends to revert the typical relationship humans have with the urban environment. Here the structure adapts to people.

The leather-like skin is made from a mixture of rubber and concrete and is coloured dark red, picking up on the hues of the brick walls. As the honeycomb pattern allows free movement, punctures allow natural light to filter through.

Reference 2: Kinetic Urban Furniture
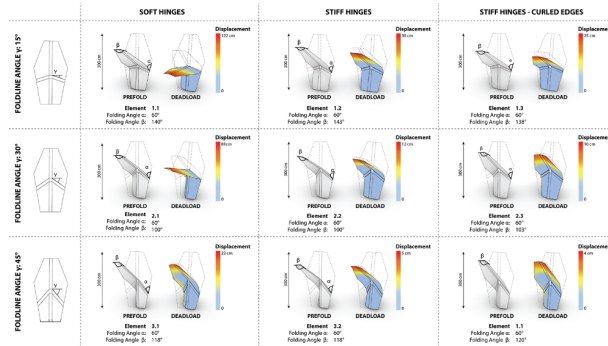
- showcasing the potential of computational design, simulation and fabrication processes in bio-inspired architecture

- inspired by the folding mechanisms of the Coleoptera coccinellidae (Ladybug) wings.

- composed of two adaptive folding elements made of carbon and glass fibre-reinforced plastic.

- create a shelter and seat for the users

ITECH Research Demonstrator 2018/19
https://vimeo.com/350144840
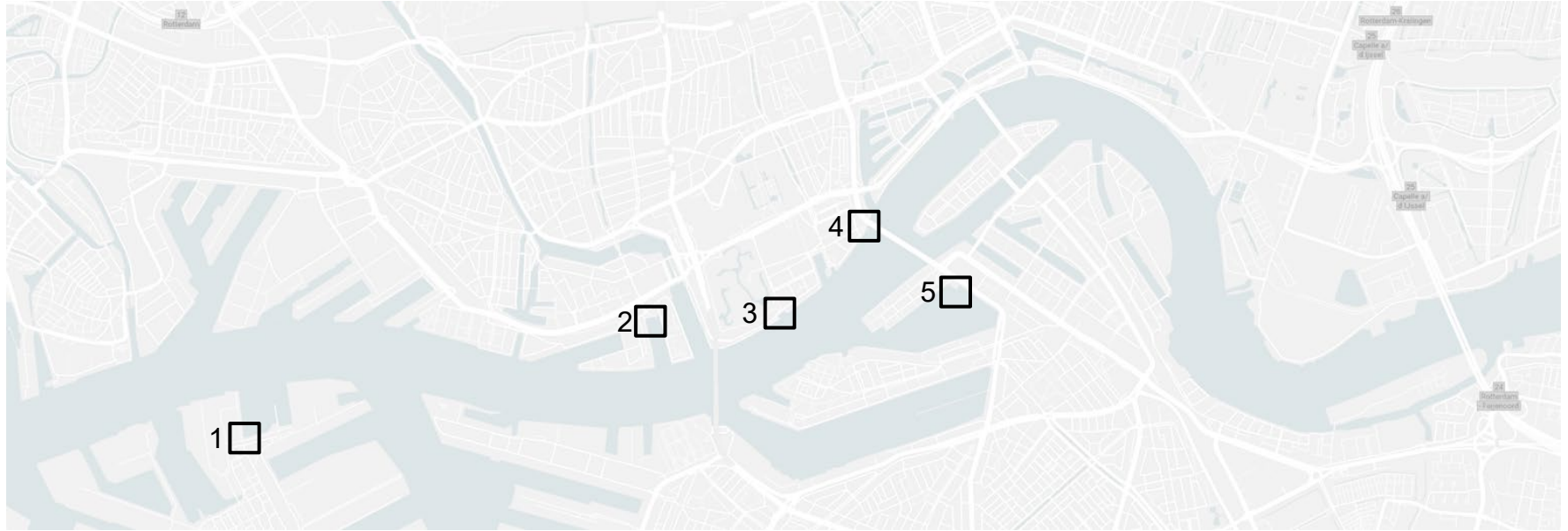
Reference 3: Interactivity
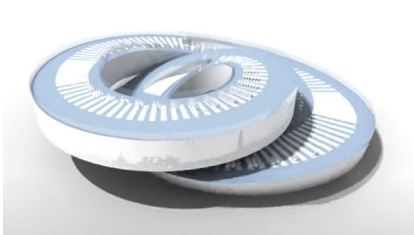
The pavilion has an iconic double-looped shape, a spiralling exhibition space, biking lanes, a pool of water and a dynamic illumination of both inner spaces and outer facades. During nighttime the facade displays a vibrant show of patterns and animations that made the building come to life. The media facade has 3600 pixels along the spiralling outer surface produced by a pattern of holes, which were fitted with diffusing tubes in different sizes. Each tube has a multi-color LED fixture and was controlled by a custom media playback system. This system is also tied in with a series of light and temperature sensors around the building, thereby controlling both light intensity and color temperature.
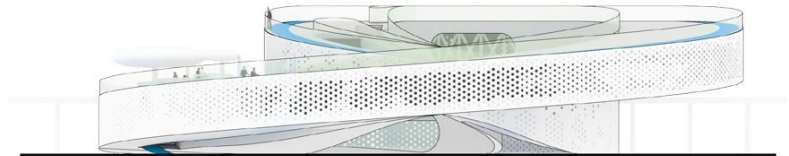
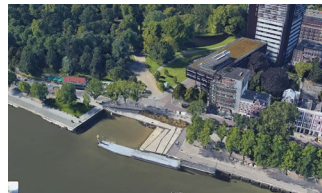*The Denmark Pavilion (Expo 2010 Shanghai, BIG)*

Site: Nieuwe Maas, Rotterdam
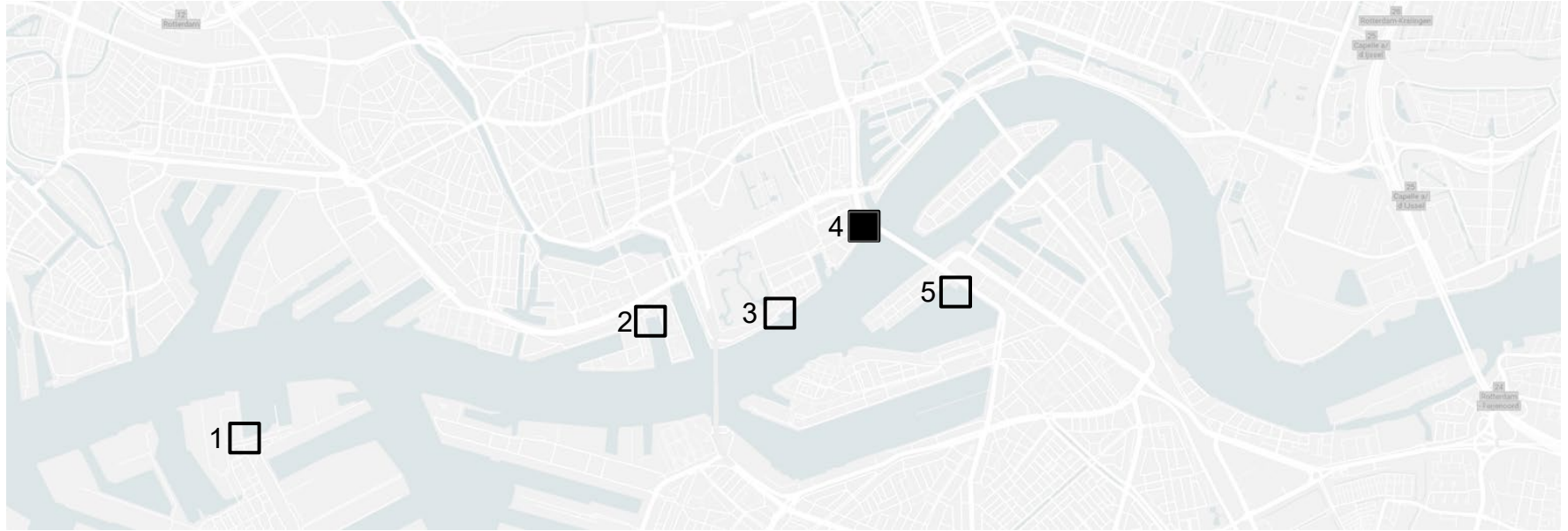

1 Makers District

2 St.Jobshaven Terminal

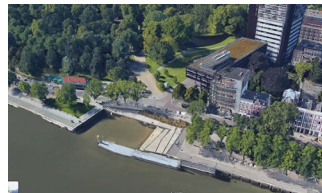3 Parkkade Terminal

4 Erasmusbrug Terminal

5 Wilhlminapier

Site: Willemsplein, Nieuwe Maas, Rotterdam

1 Makers District

2 St.Jobshaven

3 Parkkade Terminal

4 Erasmusbrug

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# Site: Willemsplein, Nieuwe Maas, Rotterdam

References: River Precedent

Cheonggyecheon Stream

Seoul, South Korea

- urban renewal and beautification
- gentrification of adjacent areas
- Species of fish, birds, and insects have increased significantly
- promoted the urban economy through amplifying urban infrastructure for a competitive city in the business and industrial area centered on the stream.
- functions: popular for tourist, locals, lunch place for office workers.
- dynamically changes along the stream to meet different requirements for each area
- gathering along. river motion - movement.

Dutch version:

bike path, walking, vegetation sitting, ledge
walking, amphitheatre, stage
walking, seating / stairs, tourist viewpoint
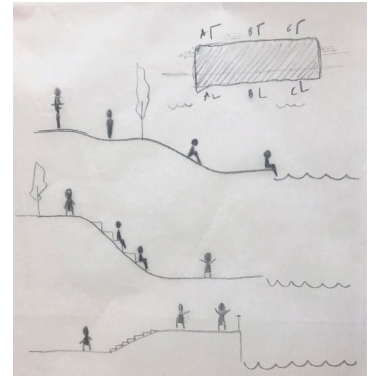
Focus

Ideas on what your group project will (or could) focus on and what the individual foci within each group will be with respect to D2RP&O

The approach involves D2RP&O with the aim is to improve process- and material-efficiency in construction as well as embed intelligence in the built environment by (1) robotically optimizing material distribution and by (2) embedding sensor-actuators that are enabling interaction between users and physically built environment.

The 3D printed pieces of furniture such as stools/chairs, benches, pavilions, moorings and water taxi/info/food booths with integrated sensor-actuators will be proof of concept for:

(a) Process- and material-efficiency achieved through smart robotic (i.e. selective) material deposition. Material considered is 3D printed wood polymers.

(b) Smart operation by integrating sensor-actuators such as light dependent resistors, infrared distance sensor, pressure sensor, etc. informing lights, speakers, ventilators, etc. in order to allow users to customize operation and use of the urban furniture.

Group Brief

Interactive Data Ideas
1. Human activity (walking, sitting, laying down, etc.) and required space
2. Shelter (rain, solar, radiation, etc.)

Sensors/Inputs
1. Humidity
2. Temperature
3. Pollutants
4. Pressure
5. Proximity
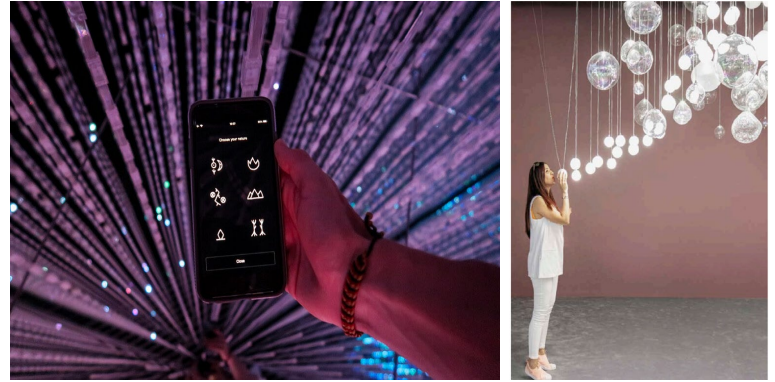6. Motion
7. Sound
8. Vision
9. Manual input, etc.
10. Wind

Group Brief

Actuators

1. RGBW lighting
2. AR
3. Kinematics
4. Pneumatics
5. Sound
6. Watering, etc.

UI

1. Illumination brightness, color, and turn on/off rhythm
2. Watering
3. Kinematics
4. Pneumatics, etc.

Structure: Voronoi Diagram

In mathematics, a Voronoi diagram is a partition of a plane into regions close to each of a given set of objects. In the simplest case, these objects are just finitely many points in the plane (called seeds, sites, or generators). For each seed there is a corresponding region consisting of all points of the plane closer to that seed than to any other. These regions are called Voronoi cells. The Voronoi diagram of a set of points is dual to its Delaunay triangulation.
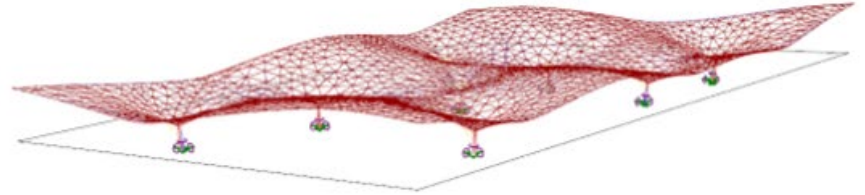
Structure: Voronoi Origami
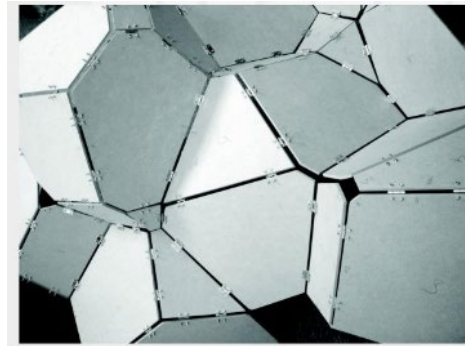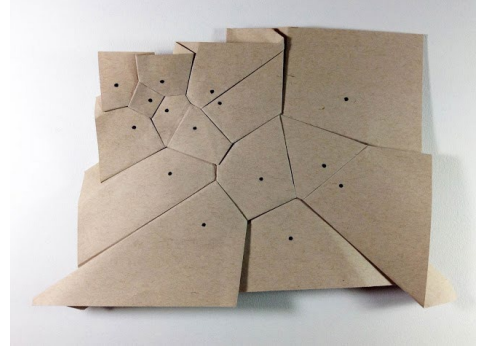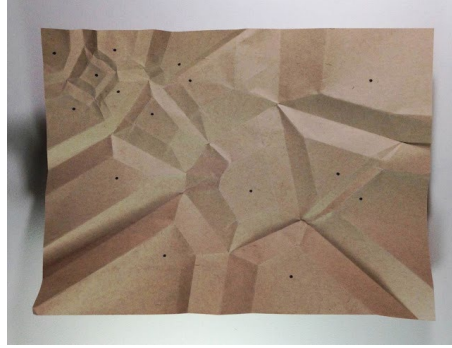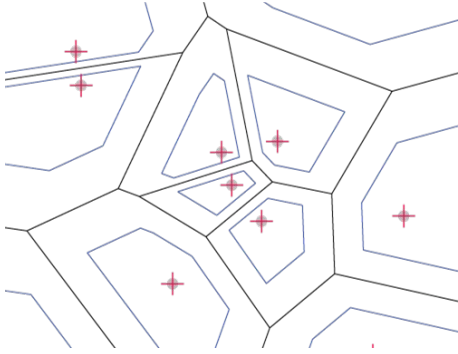
Material: 3D printed wood polymers

Poroso Wall, Emerging Objects

Stonefil filaments. Source: Formfutura