



LIVING LIGHT

Living Light (2009)

Commissioned by Seoul City Gallery and the Municipal Government of Seoul

OVERVIEW

Living Light is a building envelope of the future, a permanent pavilion in a park, and a giant map that transforms in response to air quality data and public interest in the environment. The project engages issues of environmental quality and public awareness through a dynamic building-scale interface to our shared interests and collective concerns.

DIMENSIONS

6m x 6m x 3m

MATERIALS

Steel, Acrylic, LEDs, Sensors, Computer

DIGITAL SYSTEMS

(1) 27 air quality sensors installed by the Korean Ministry of Environment, (2) Custom-created Living Light Hotline phone number for text message exchange, (3) Custom-created dynamic LED panels

INPUT

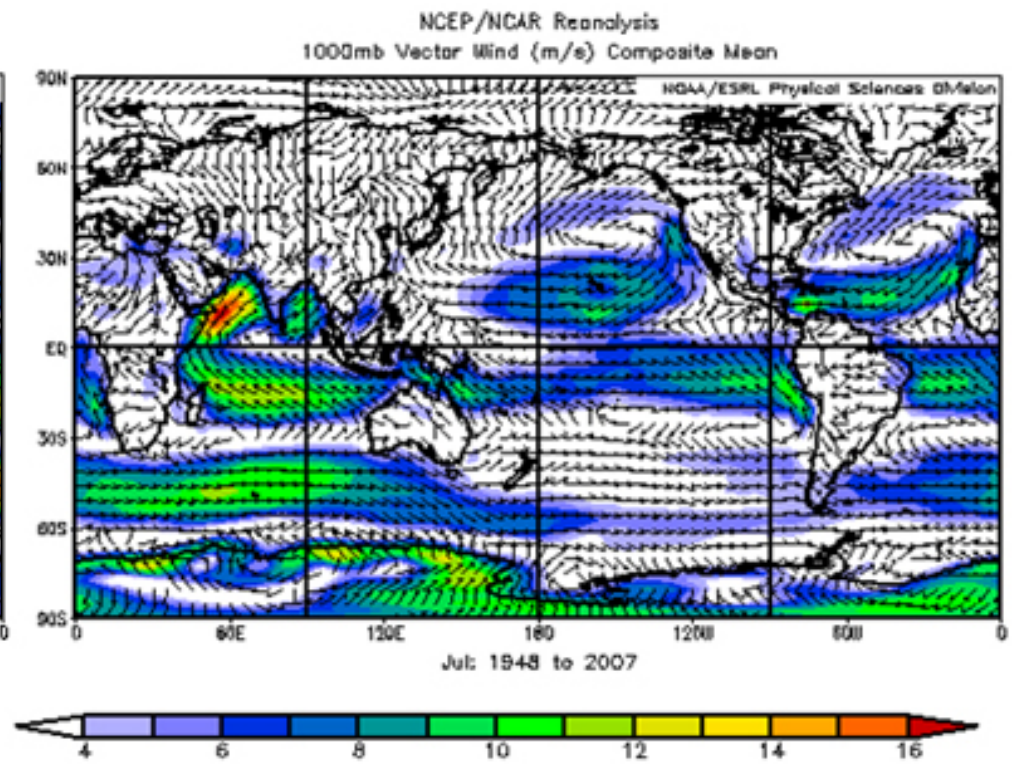
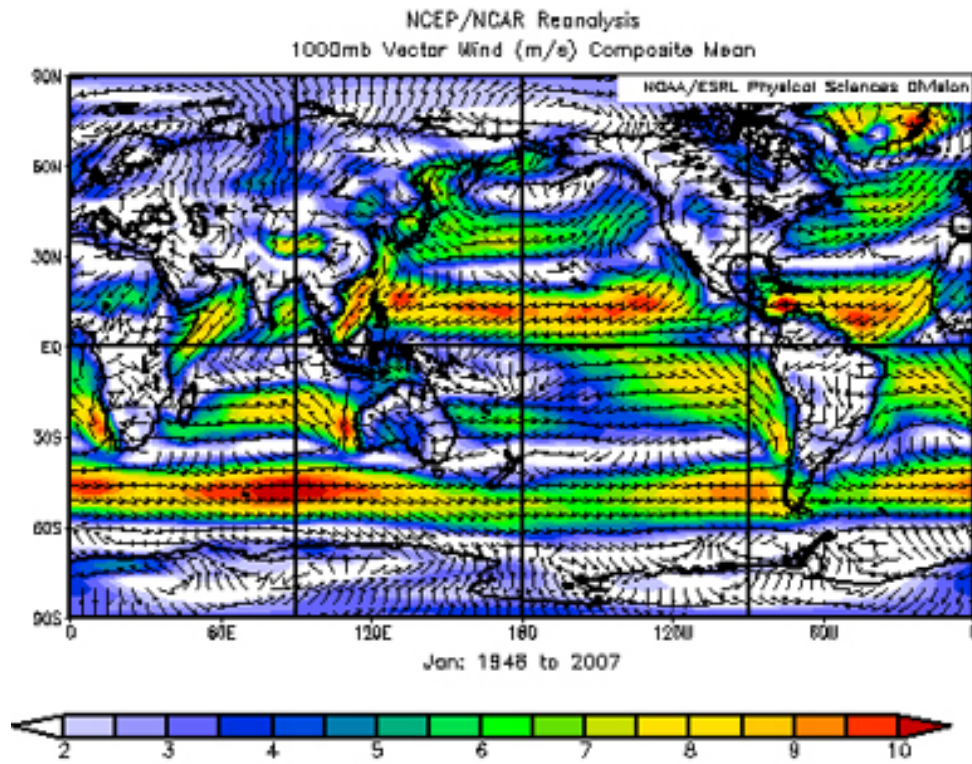
(1) Real-time air quality sensors, (2) History of air quality sensors, (3) Incoming SMS messages

OUTPUT

(1) Glowing of panels, (2) Blinking of panels, (3) Outgoing SMS messages

INTERACTIVITY

(1) Neighborhoods light up when air quality is better today than last year. (2) Every hour neighborhoods turn on in order of best current air quality to worst. (3) Send a text message with a zip code to our Living Light Hotline, receive the zip code's real-time air quality, and trigger its panel to blink.



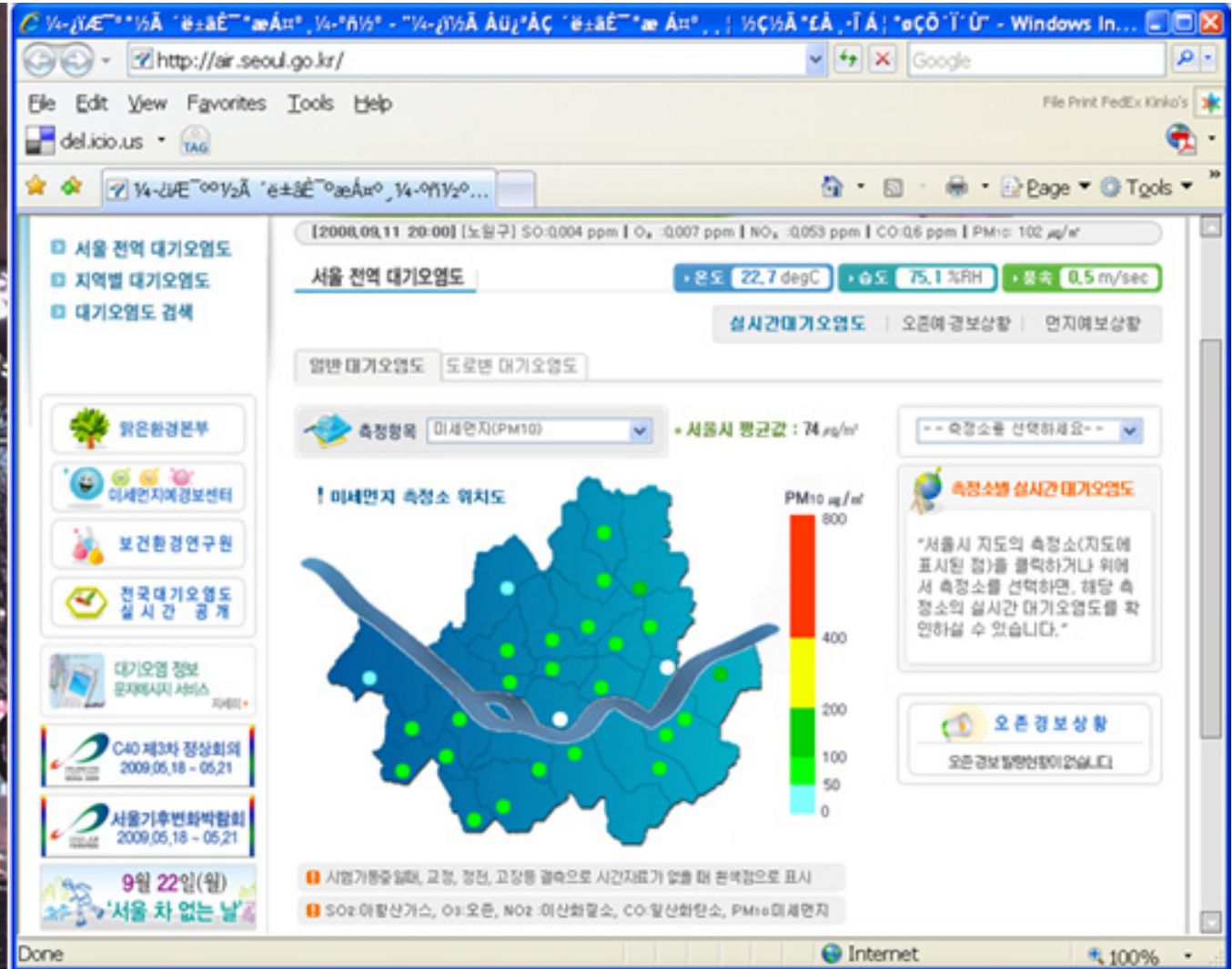
Air ecosystem

Air connects the whole planet without regard to cultural or national boundaries.



Air in Seoul

The air of the city is affected by the air of the region, and city officials recognize concerns about air quality.



Existing air quality measurements

The city has several existing interfaces to real-time air quality data.



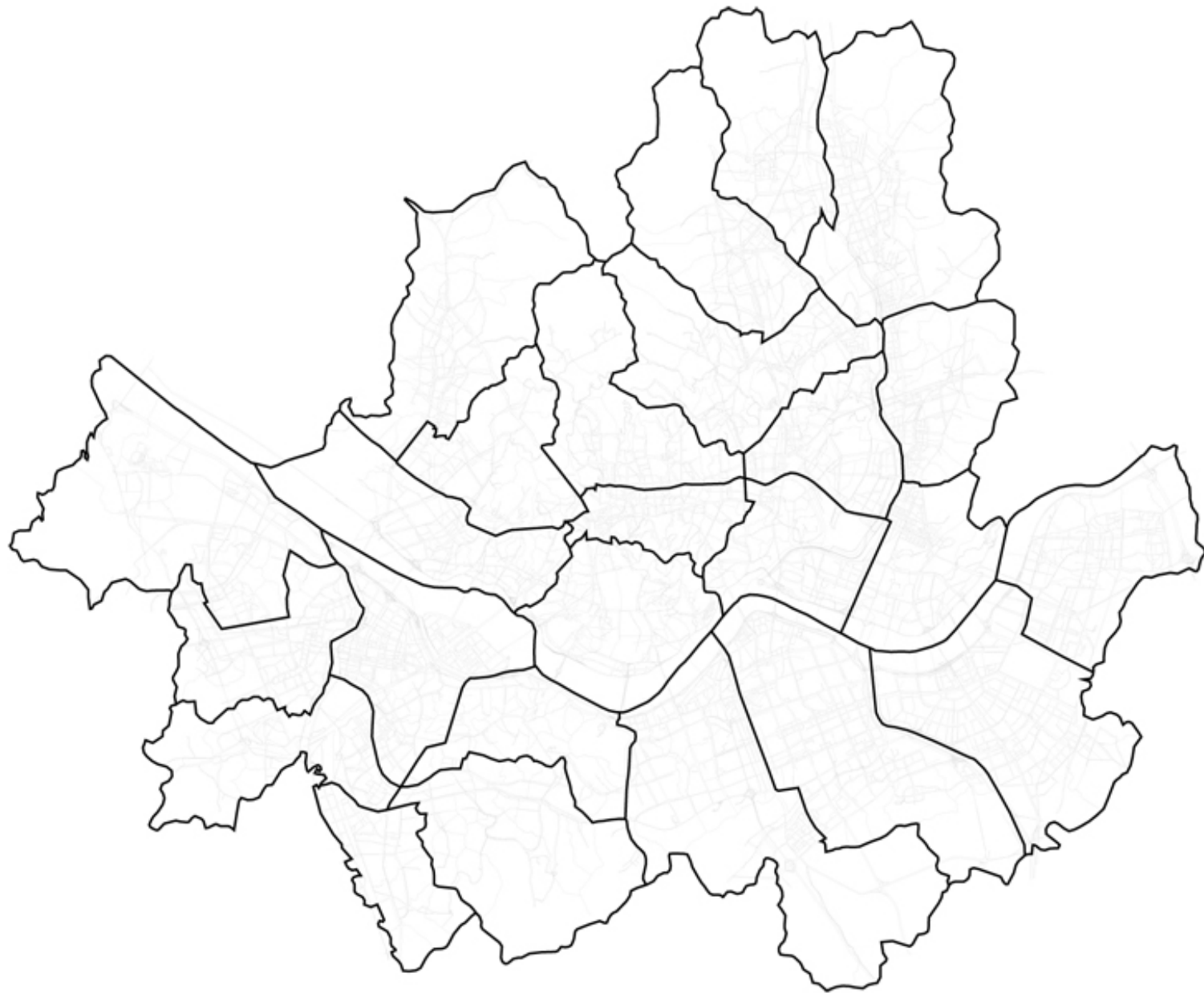
Existing LED facades

The city also has a growing number of facades with dynamic patterns of lighting.



Living Light

Our project combines data about the environment with dynamic lighting to create an interactive facade of the future.



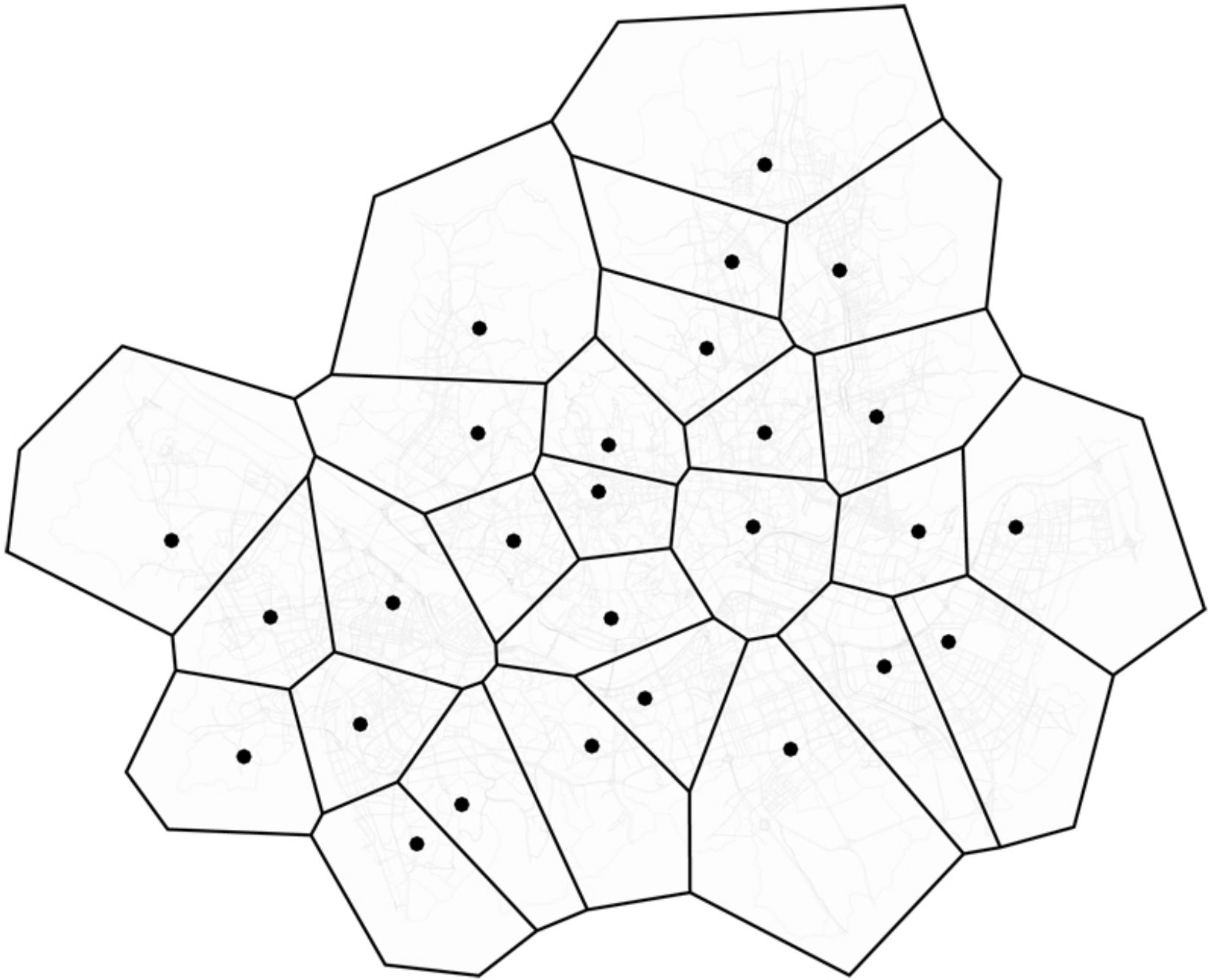
Map of Seoul

We start with a map of the city.



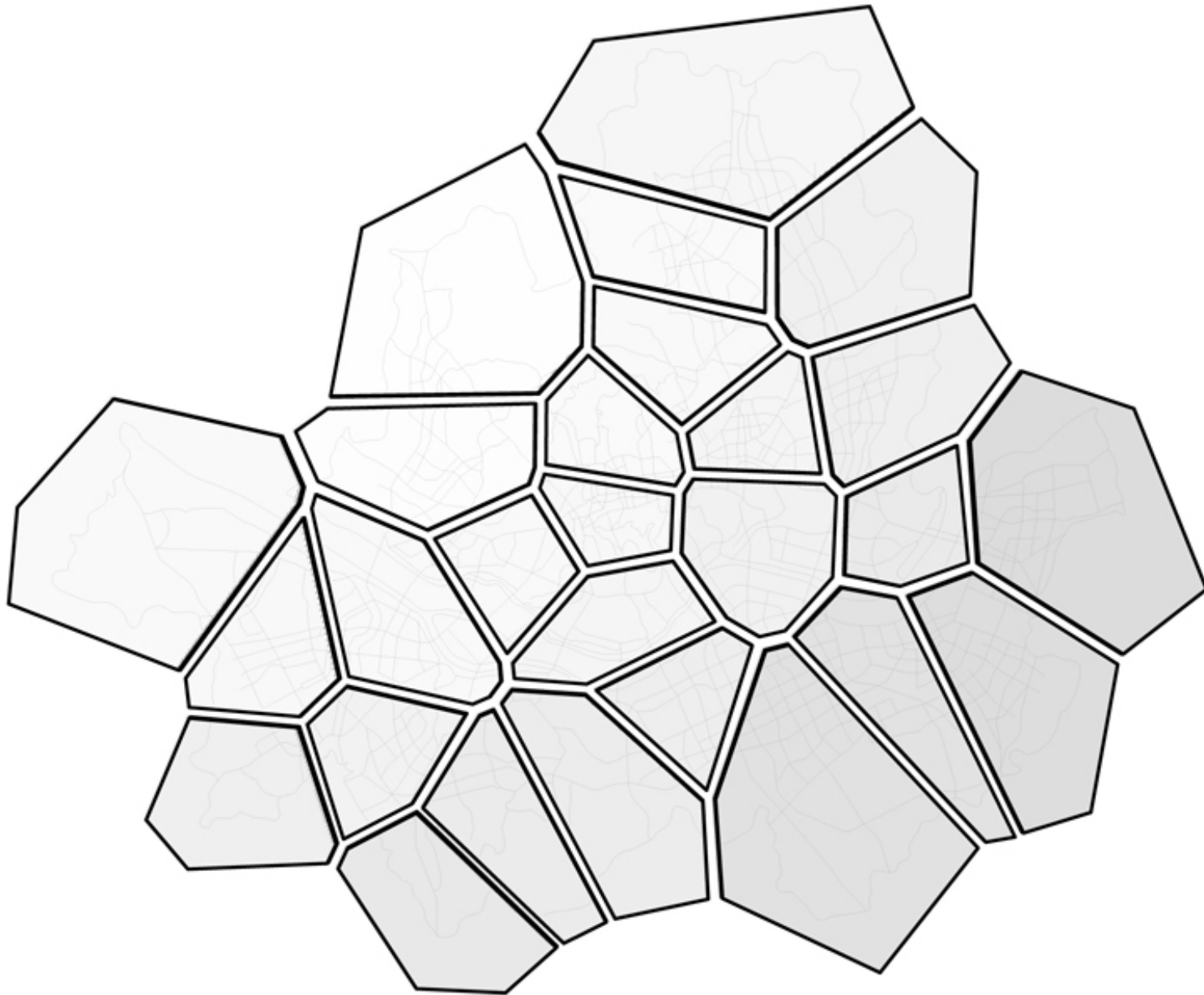
Air monitoring stations

We locate the 27 existing air monitoring stations of the Korean Ministry of Environment.



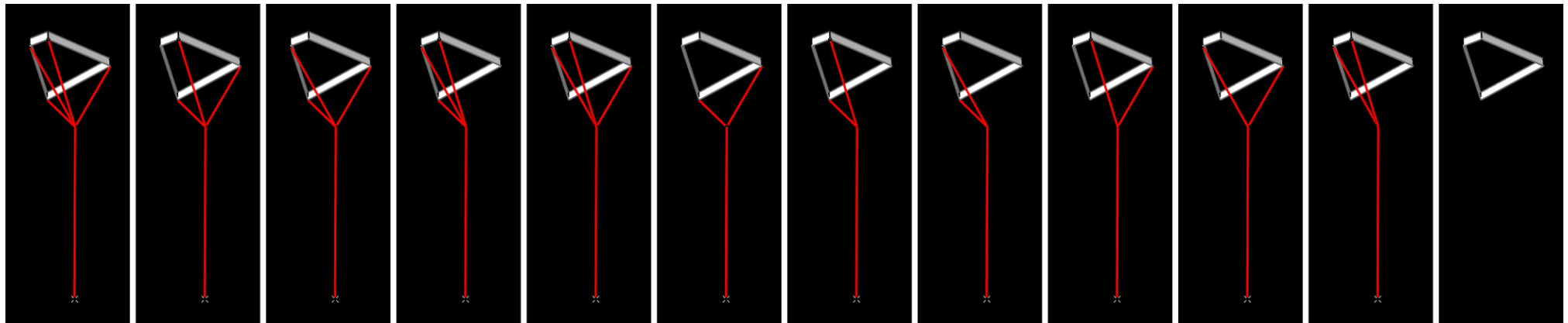
New neighborhood boundaries

We re-draw the neighborhood (gu) boundaries—each new shape encloses the air nearest to one of the sensors.



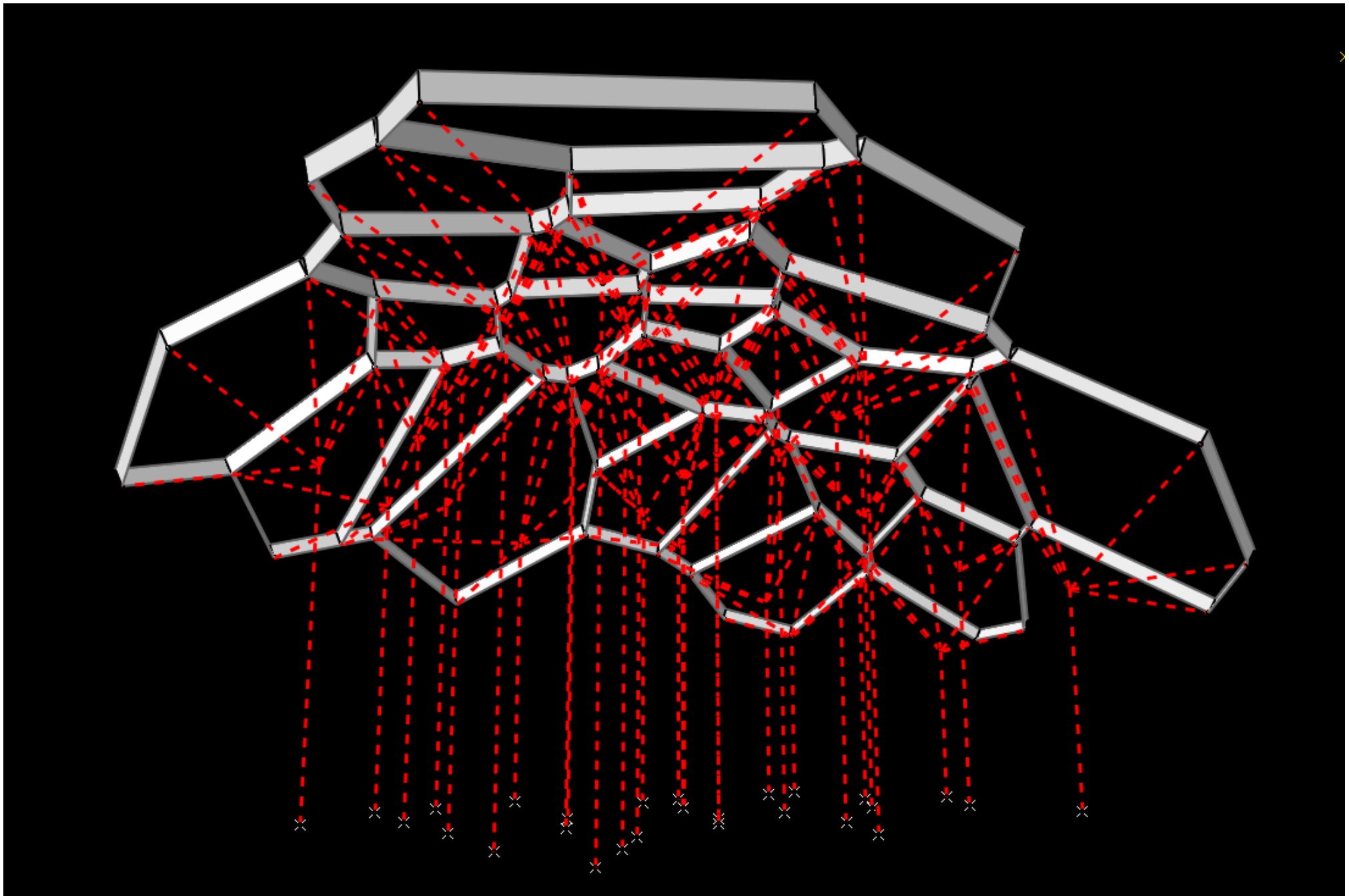
New map as building roof

We bend this new map into a dome-shaped roof for a pavilion.



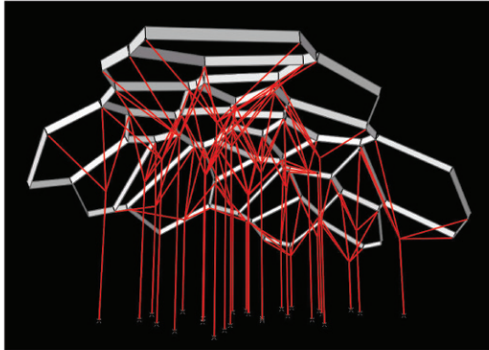
Support structure for the canopy

With a fixed canopy roof, we create a system of branching columns. Each column can have a variety of configurations.

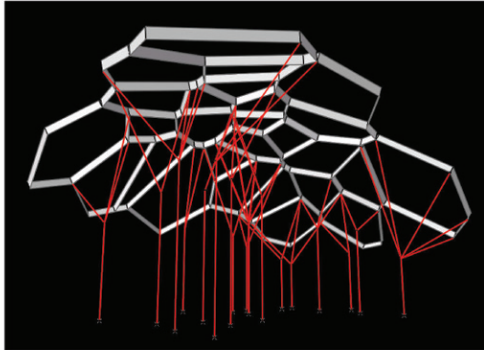


Wide design space

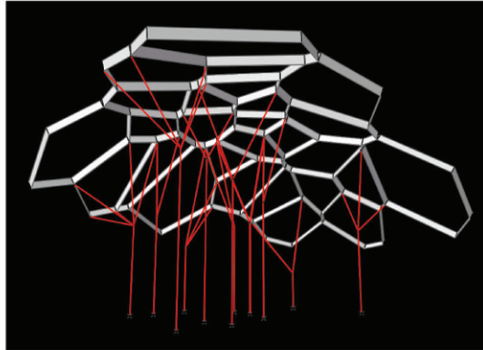
All columns together can have many billions of different design configurations.



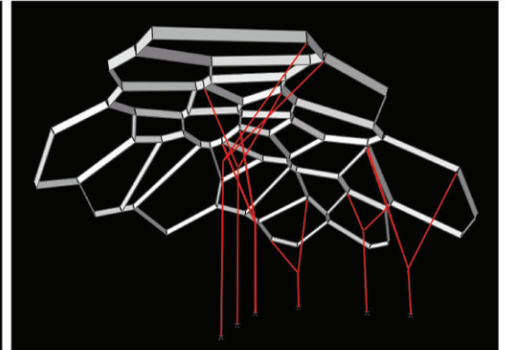
DESIGN: 00002
STRUCTURE SCORE: 45 | MATERIAL SCORE: 179



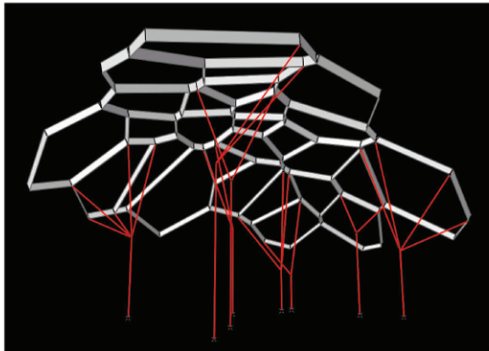
DESIGN: 00143
STRUCTURE SCORE: 40 | MATERIAL SCORE: 166



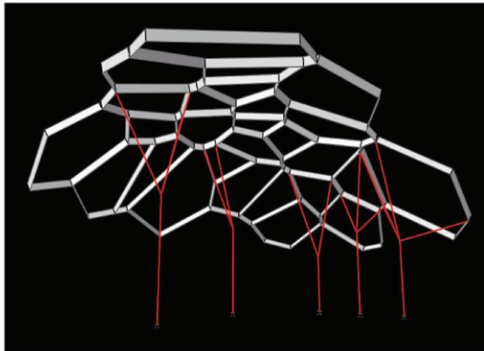
DESIGN: 01018
STRUCTURE SCORE: 111 | MATERIAL SCORE: 93



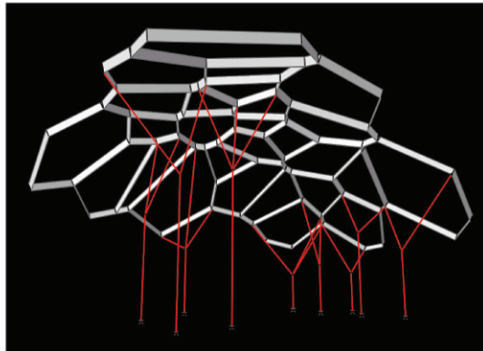
DESIGN: 01119
STRUCTURE SCORE: 3855 | MATERIAL SCORE: 71



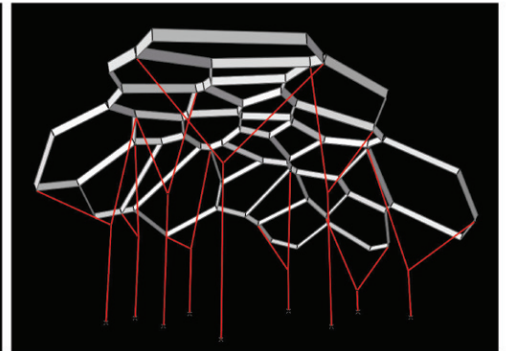
DESIGN: 01219
STRUCTURE SCORE: 122 | MATERIAL SCORE: 83



DESIGN: 01318
STRUCTURE SCORE: 5415 | MATERIAL SCORE: 69



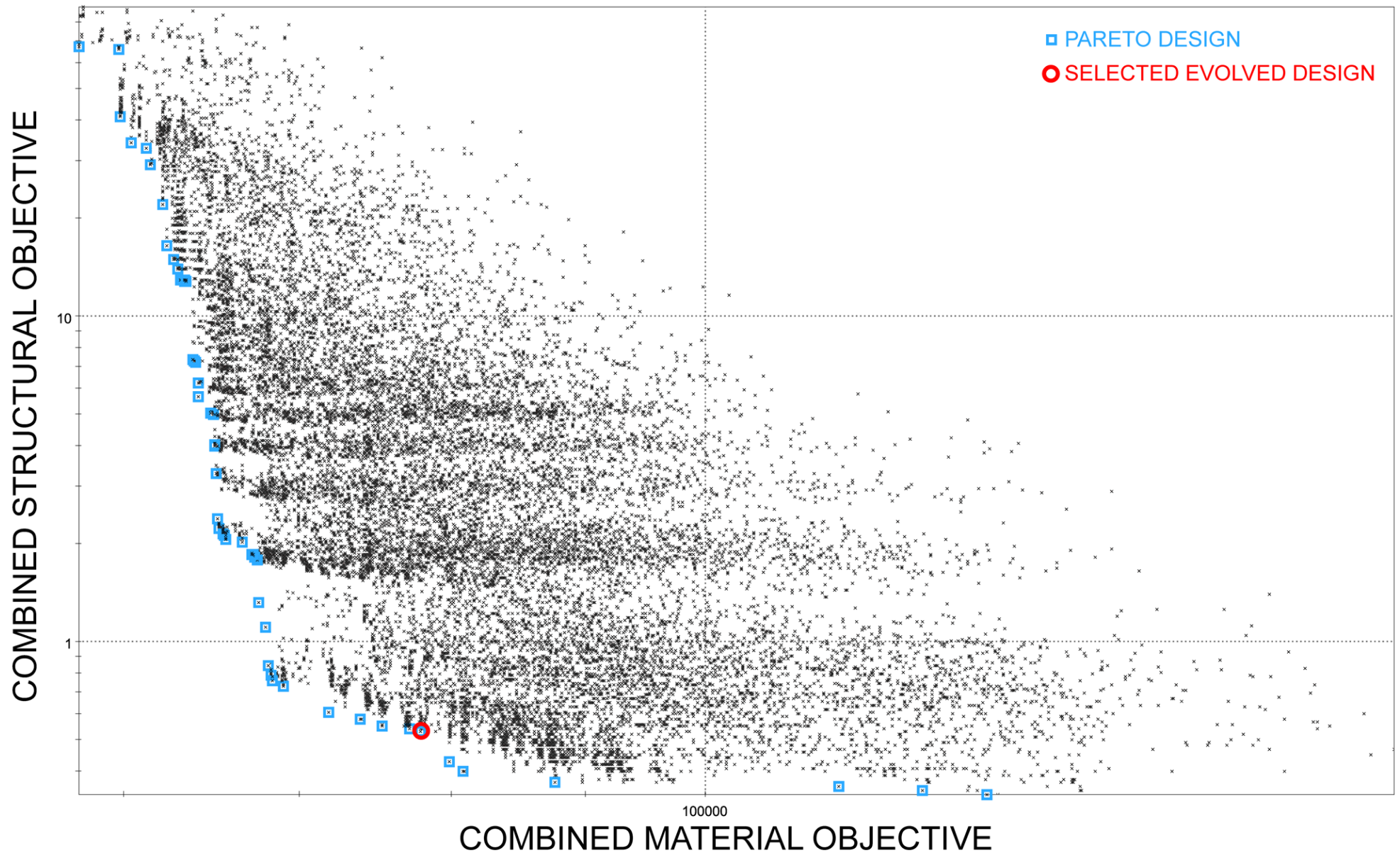
DESIGN: 15816 (SELECTED AS EVOLVED DESIGN)
STRUCTURE SCORE: 53 | MATERIAL SCORE: 78



PREDICTED DESIGN
STRUCTURE SCORE: 378 | MATERIAL SCORE: 79

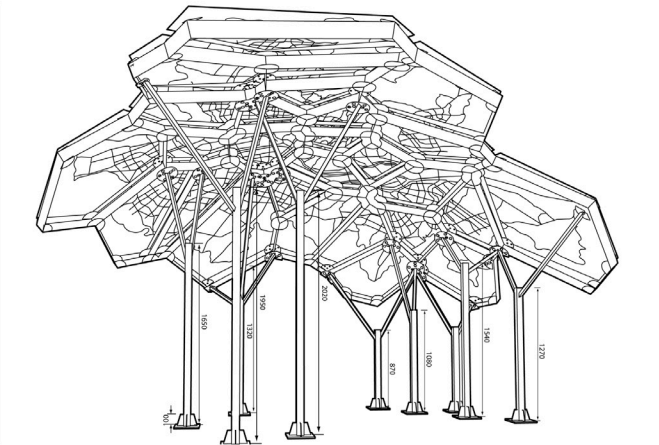
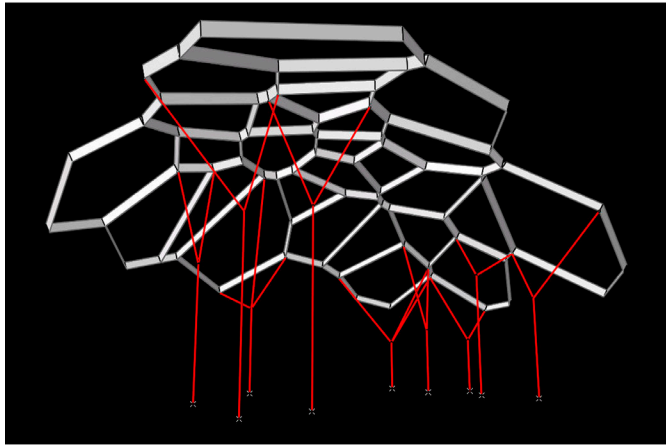
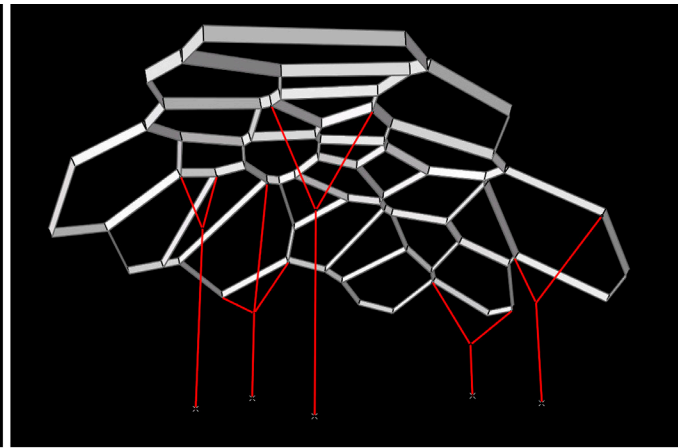
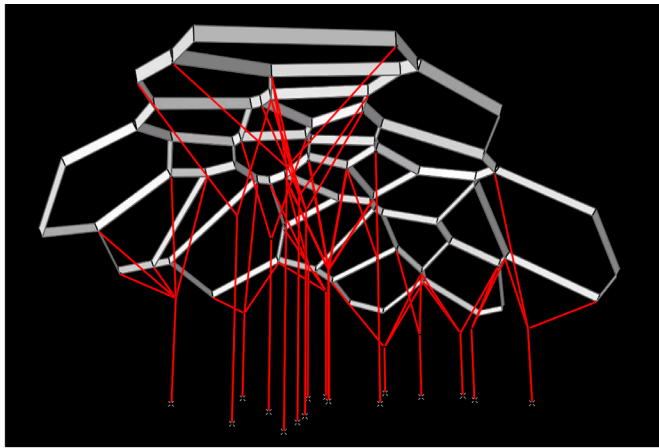
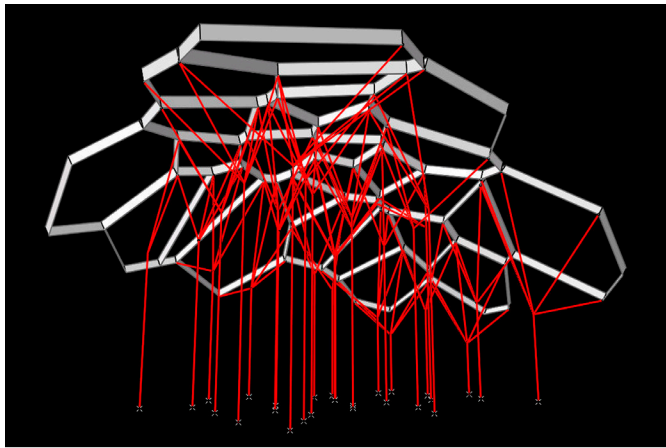
Optimization of tree branches

With a genetic algorithm, we evaluate designs based on two goals—structural performance and amount of material.



Evolution of designs

After 25,000 designs, we select a frame that performs well structurally and uses material efficiently, but is unexpected.



Design to construction

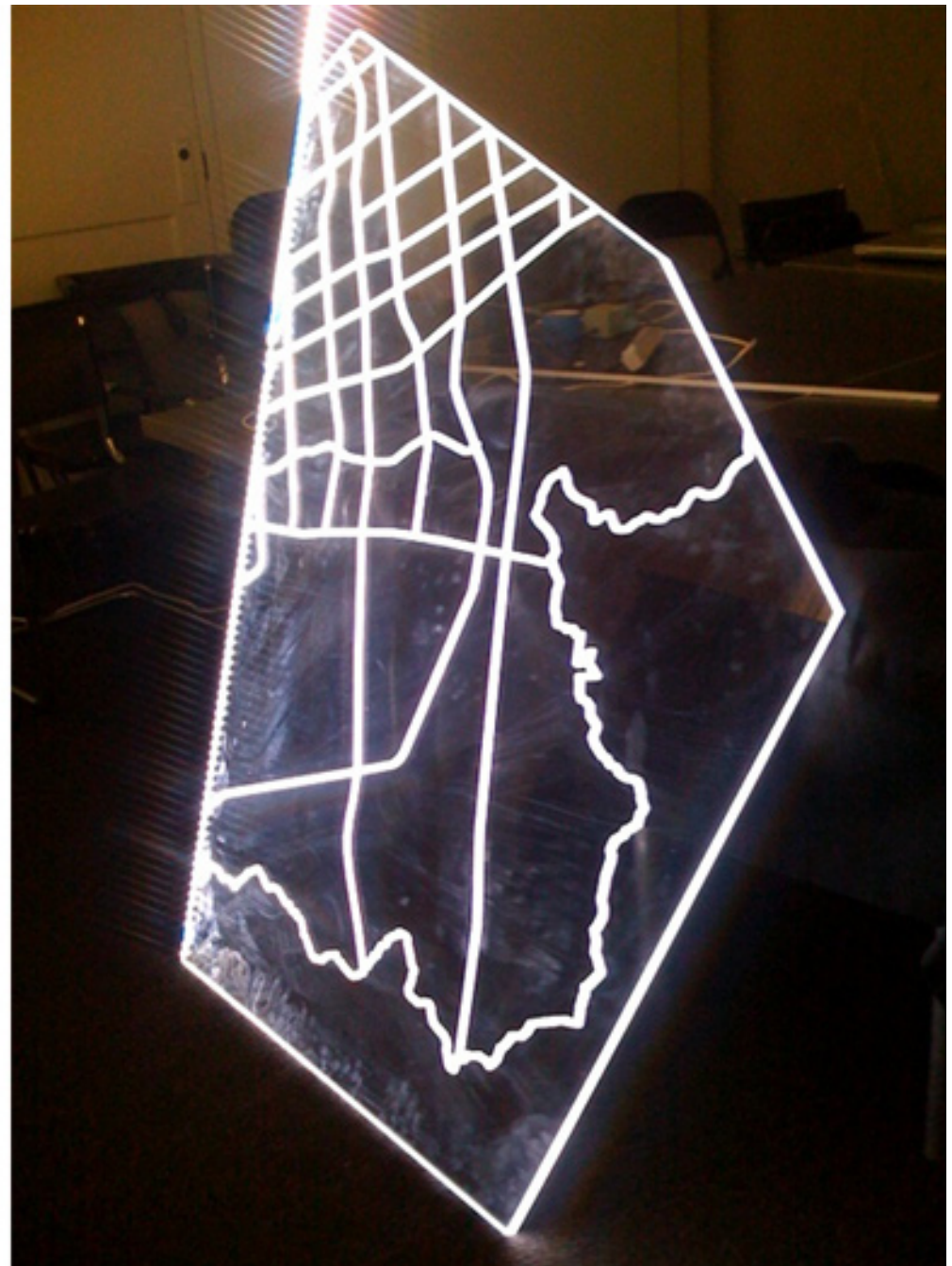
We translate the design from a wireframe sketch to a physical construction through computer controlled fabrication.

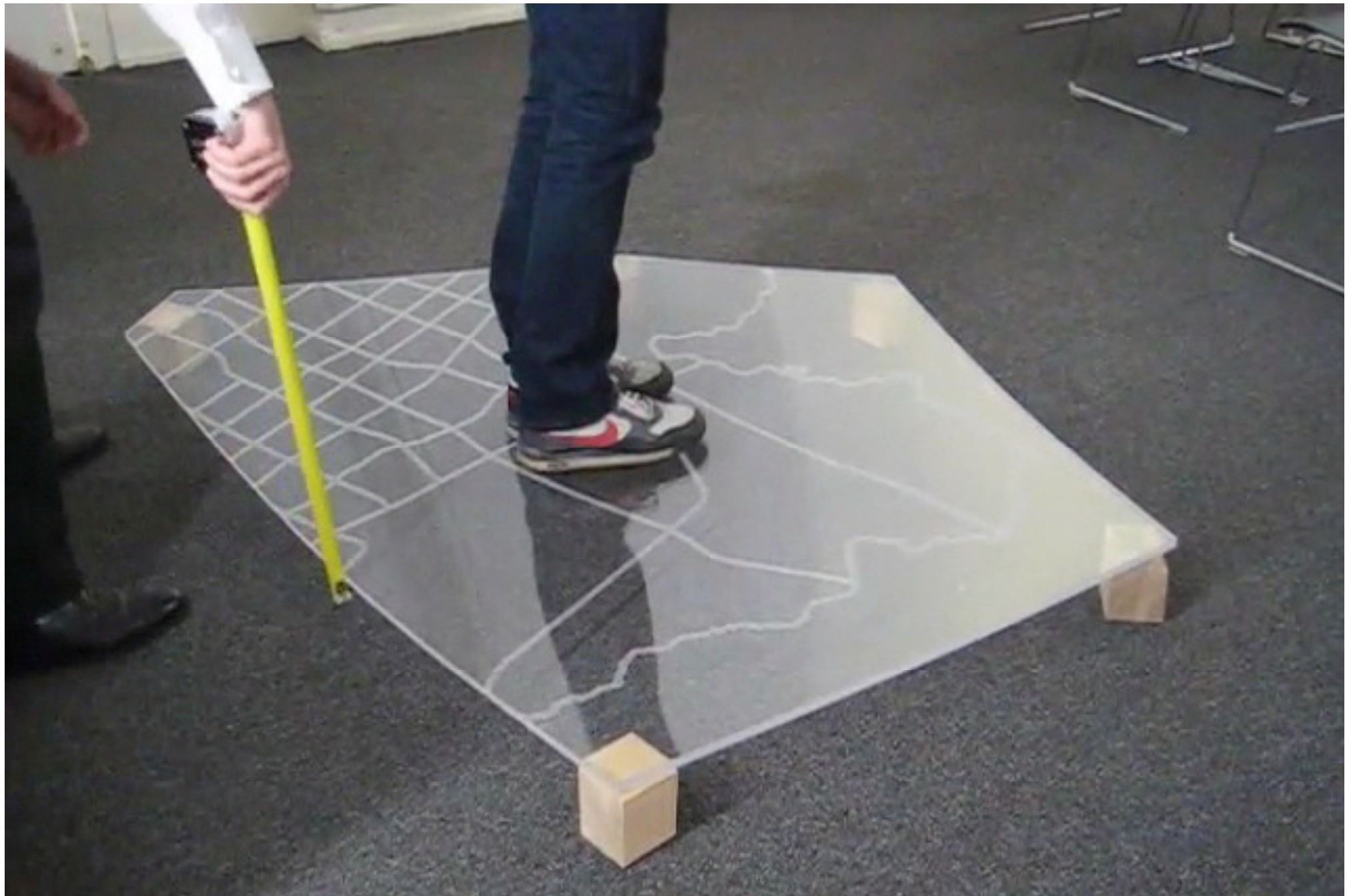


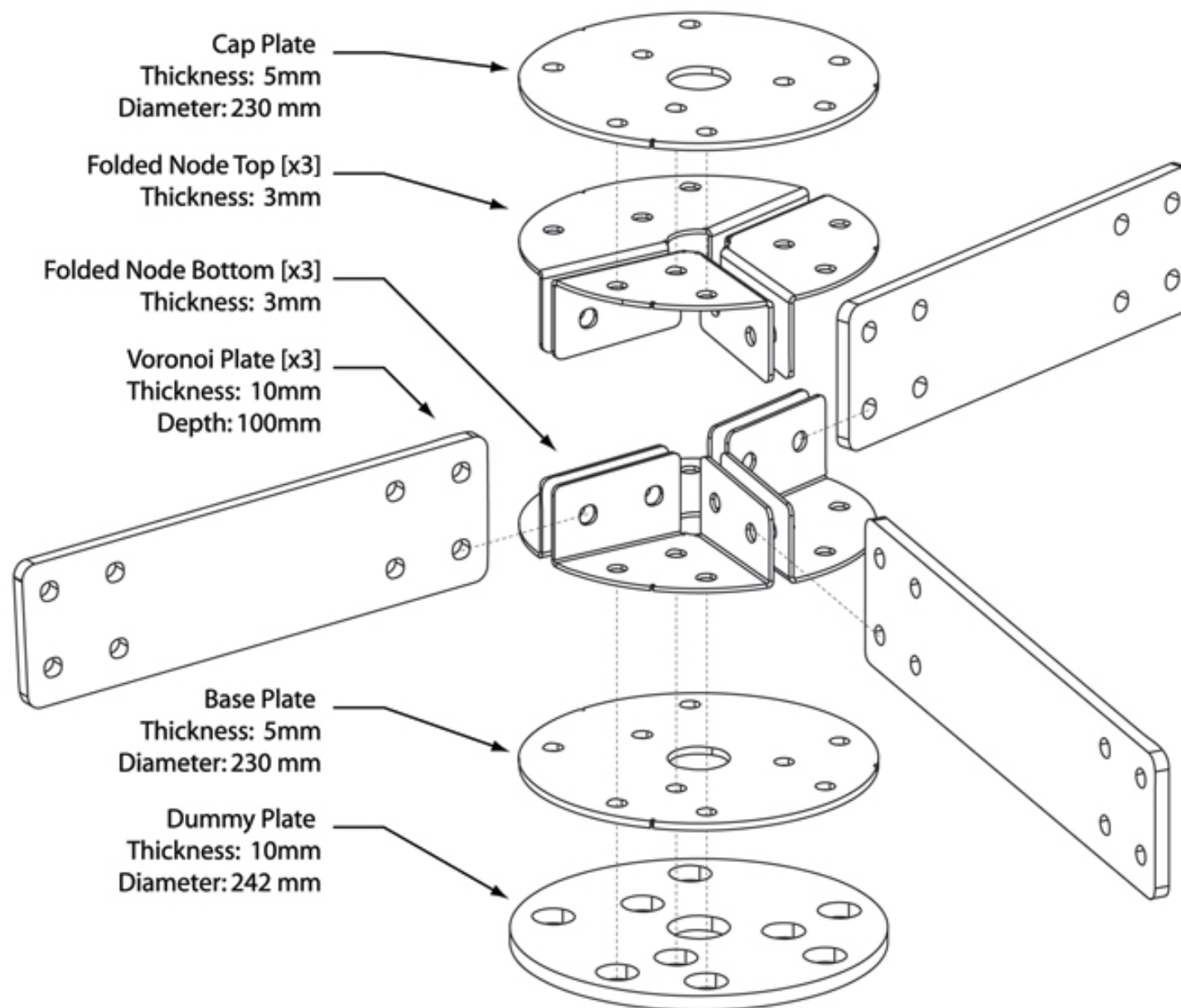
Prototypes

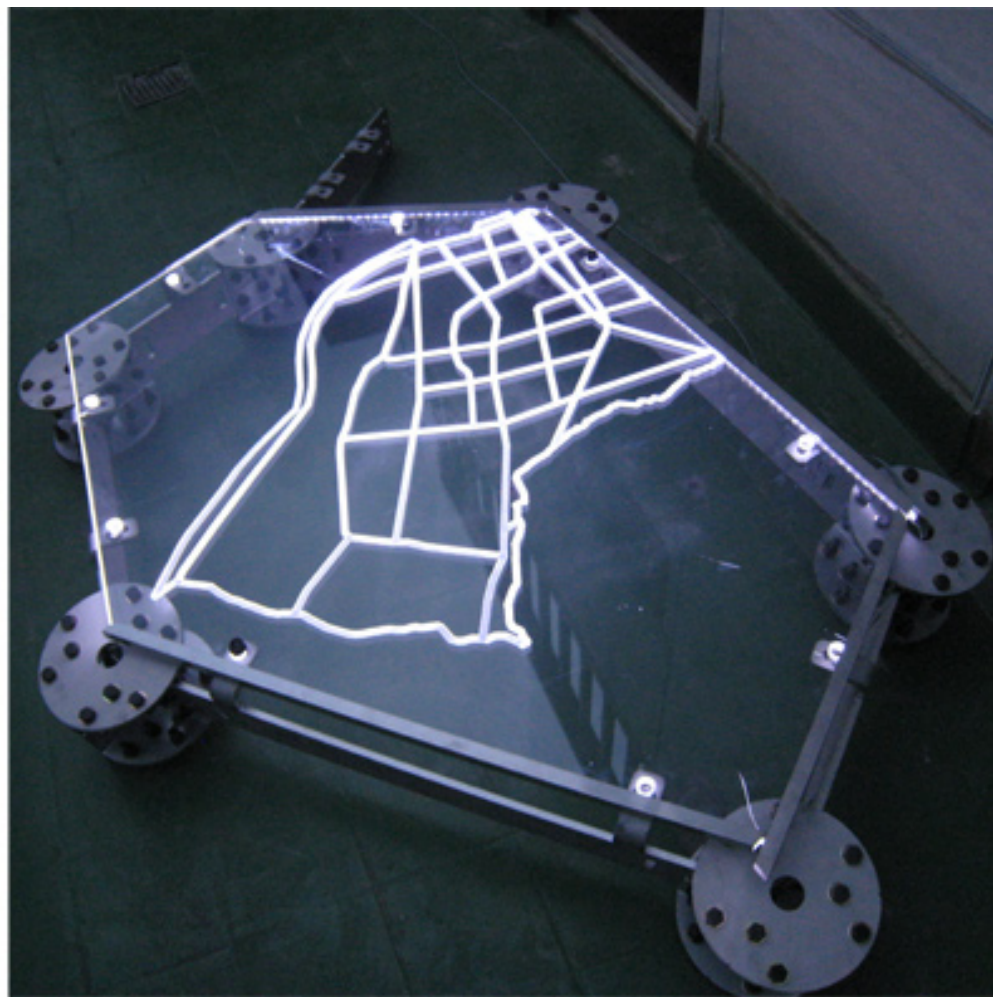
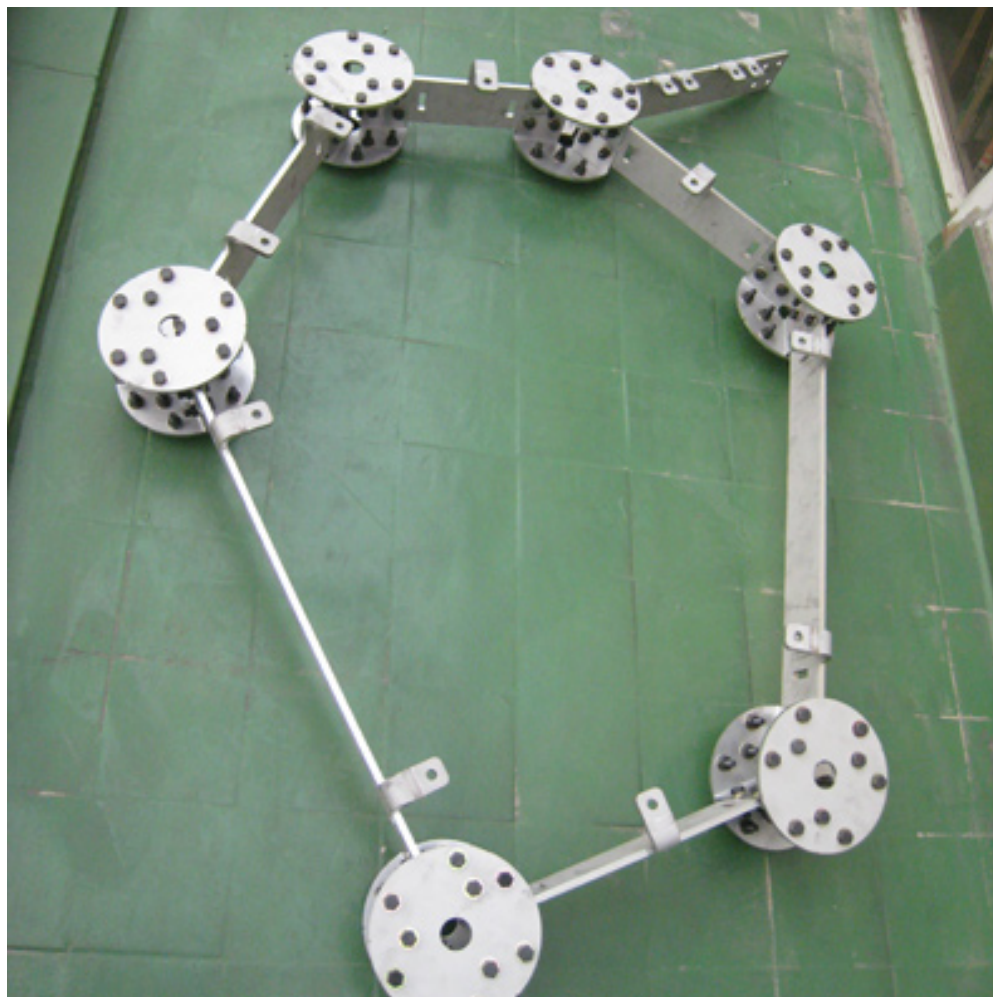
Nevertheless, during the design process we create dozens of full-scale prototypes to test different aspects of the project.

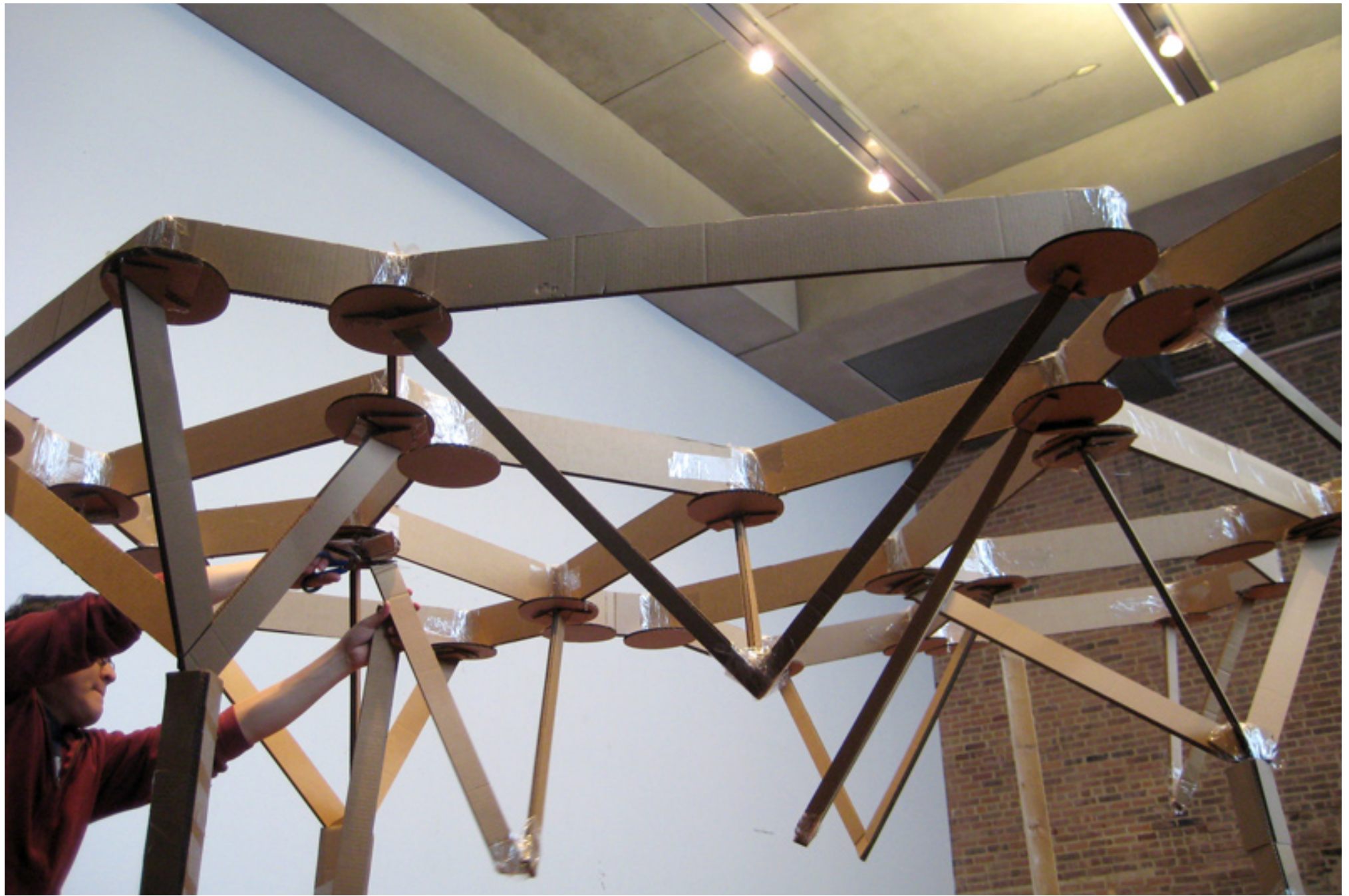


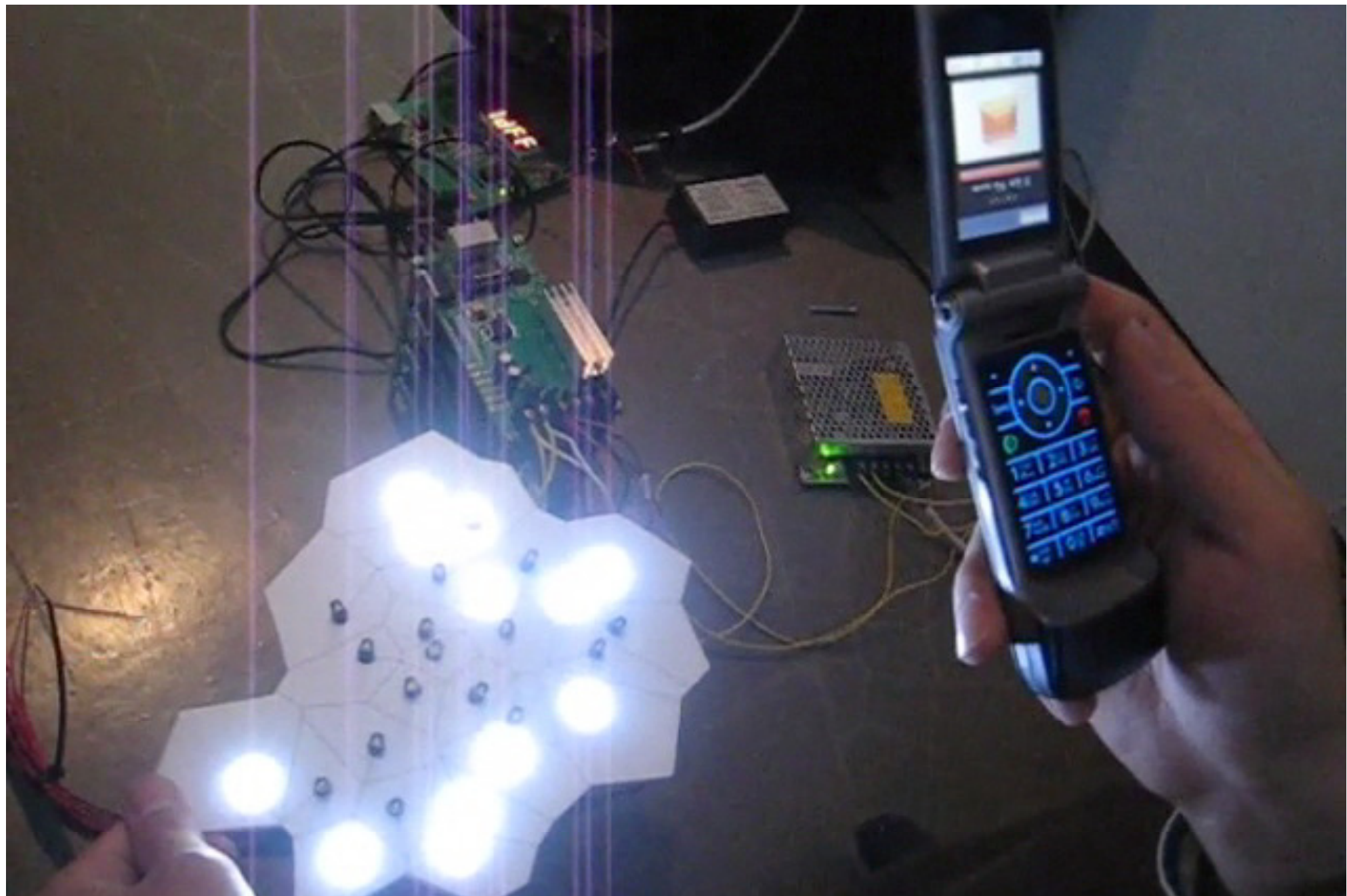








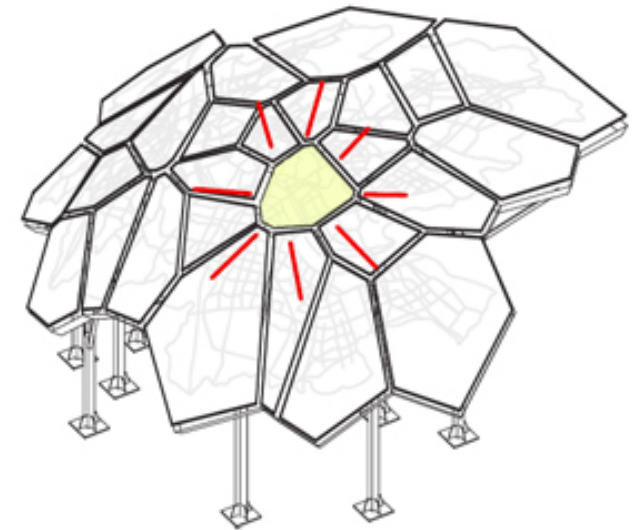
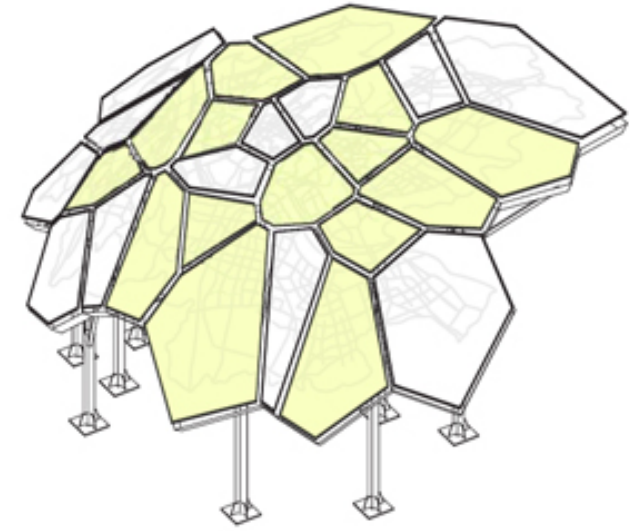






Assembly in a few days

Our prototypes and precise digital fabrication allow us to assemble the structure for a public park in Seoul in few days.

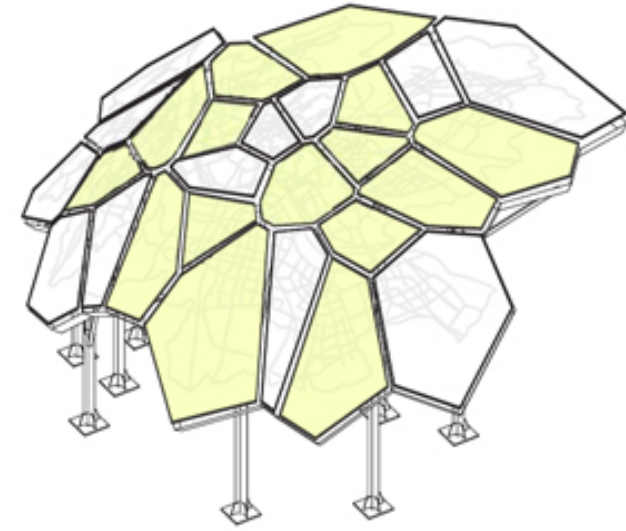


Glow according to data and public interest

The dynamic facade responds to real-time air quality data from existing sensors and to public interest in the environment.



EXISTING: Number is displayed and continually changes



NEW: Panel is lit when today is better than last year



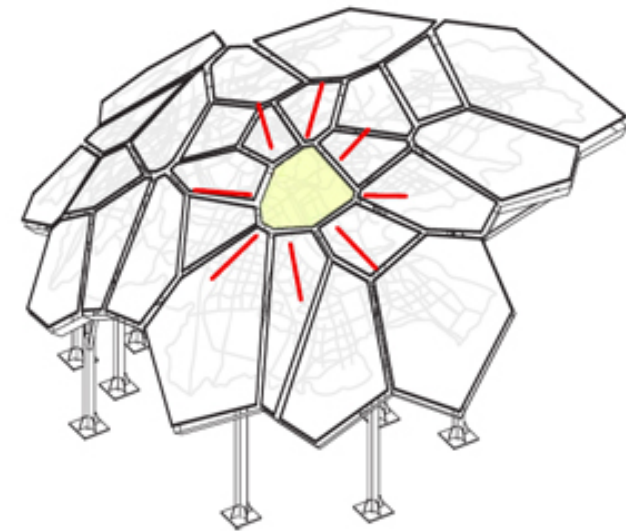
EXISTING: Number is displayed and continually changes



EXISTING: Request and receive data via the Web



EXISTING: Request and receive data via the Web

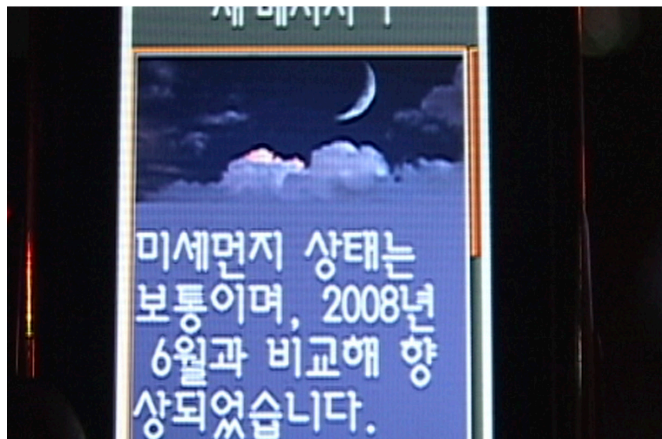
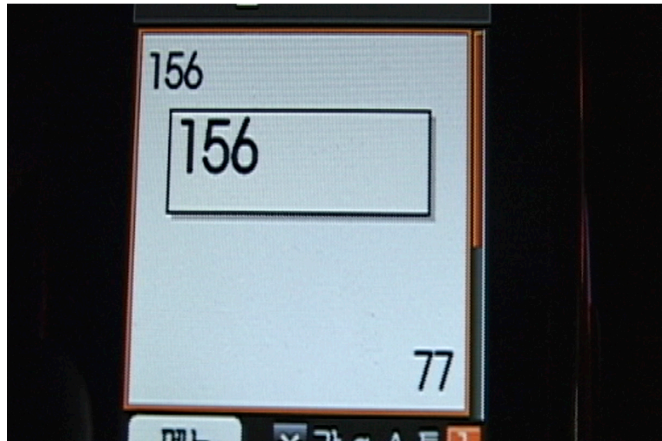


NEW: Request and receive data via SMS, plus display interest



Display of real-time air quality

Neighborhoods light up if air quality is better than last year. Every hour, the neighborhoods light up in order of air quality.



Display of public interest in the environment

Text message a zip code to the hotline. Receive a reply with current air quality and make a panel blink.



Living Light

The structure provides tactile enclosure and also suggests that a building envelope itself can be a new kind of public space.













