Design Studio • **Rapidly Deployable Shelter** • WS2022 • USTUTT

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Supervisor: Jun. Prof. Dr.-Ing. Maria Matheou (ILEK)

ADDitively Manufactured OPTimized Structures by means of Machine Learning
Institute for Lightweight Structures and Conceptual Design (ILEK) | University of Stuttgart

Acknowledgments
This research was supported by the ADDOPTML project:
“ADDitively Manufactured OPTi-mized Structures by means of Machine Learning” (No: 101007595)
belonging to the Marie Skłodowska-Curie Actions (MSCA) Research and
Innovation Staff Exchange (RISE) H2020-MSCA-RISE-2020.

University of Stuttgart
Germany

Rapidly Deployable Shelter

Winter 2022-2023

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Moon Young Jeong

REGION

REGION PROFILE

University of Stuttgart
Germany

REGION PROFILE ETHIOPIA

ETHIOPIA:

LARGEST POPULATED COUTRY IN THE HORN OF AFRICA

ONE OF THE OLDEST COUNTRIES OF THE WORLD

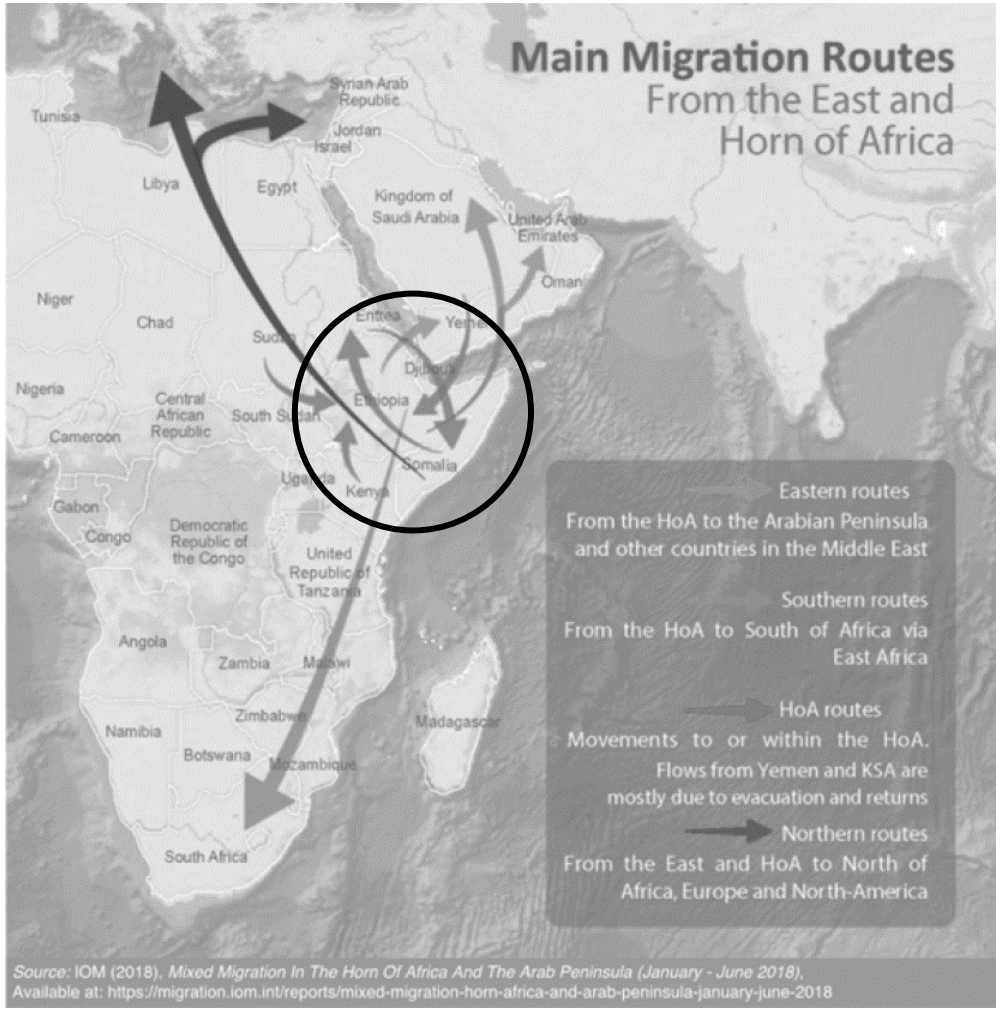
‚COURTY OF CONTRASTS‘

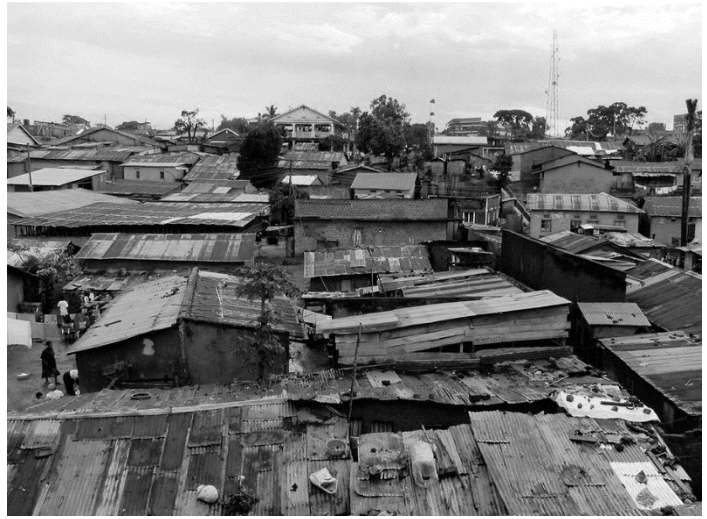
LANDSCAPE RANGES FROM TROPICS TO STEPPE

CITIES ARE VERY DEVELOPED BUT ONLY 1/5 OF THE POPULATION LIVES IN URBAN AREAS

PEOPLE: VERY DIVERSE IN ETHNICITY AND CULTURE

REGION PROFILE





ETHIOPIA:

924,000 REFUGEES HOSTED FROM ABROAD

3.5 MILLION INTERNALLY DISPLACED

> NEED FOR REFUGEE SHELTERS

> PEOPLE SETTLE AT OUTSKIRTS OF CITIES (SLUMS)

USER PROFILE AFAR REGION

AFAR PEOPLE:

GROUPS OF FAMILIES

NOMADIC LIFESTYLE (NO LONGER RETAINABLE)

LIFESTOCK BREEDING

> NEED FOR FLEXIBLE SETTLEMENT POSSIBILITY

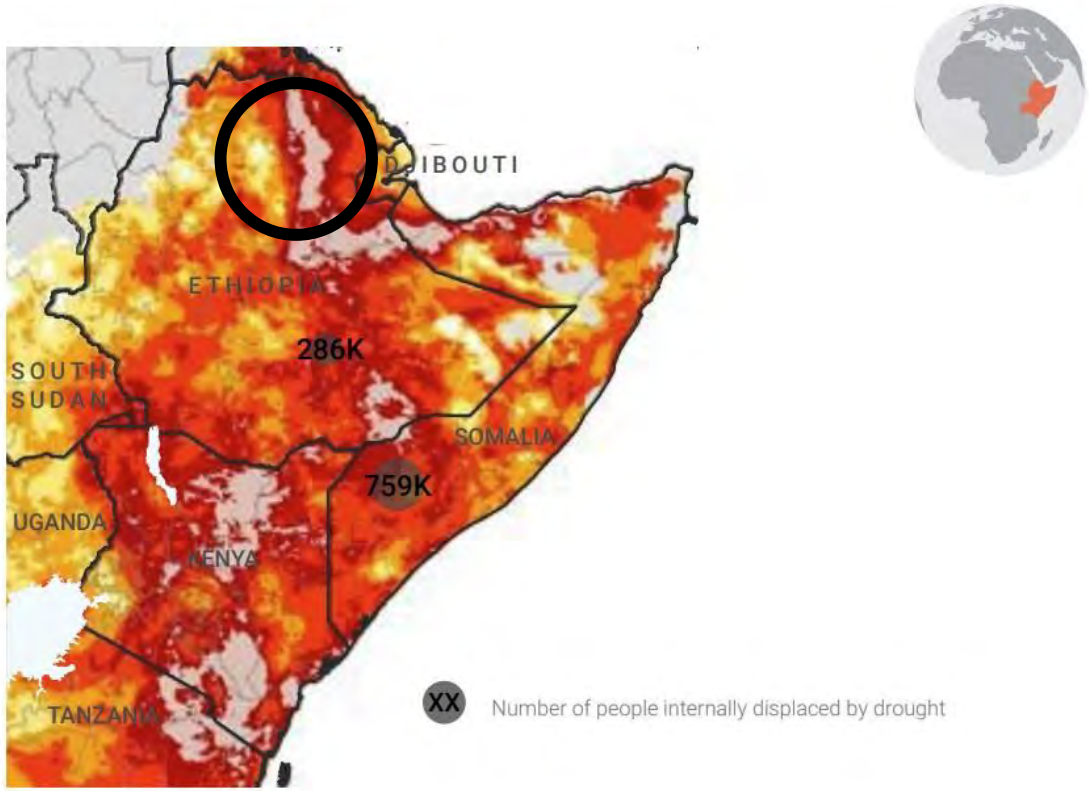
>TRANSITION FROM NOMADIC TO SEDENTARIST LIFESTYLE

REGION CHALLENGES & POTENTIALS

REGION PROFILE

University of Stuttgart
Germany

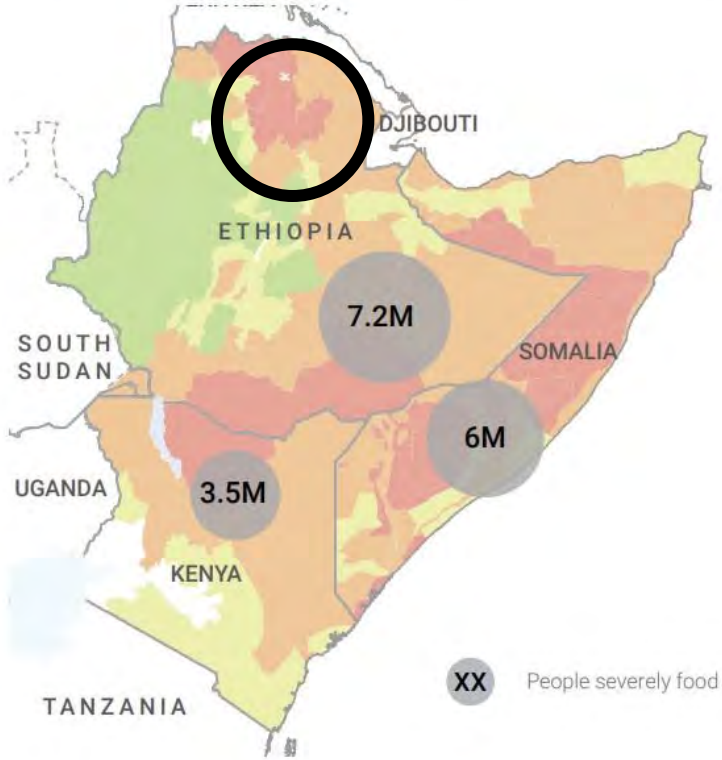
EARLY SEASON RAINFALL DEFICIT & DROUGHT-RELATED INTERNAL DISPLACEMENT



Rainfall Anomalies - % of normal (01 March - 15 April 2022)[9]

30	75	125	300
45	90	150	Greater than 300
60	110	200	

ACUTE FOOD INSECURITY WITH SPOTLIGHT ON THE DROUGHT



IPC Food Insecurity Phase

1: Minimal	3: Crisis	5: Catastrophe/Famine
2: Stressed	4: Emergency	Not classified / no data available

REGION CHALLENGES

EXTREME HEAT

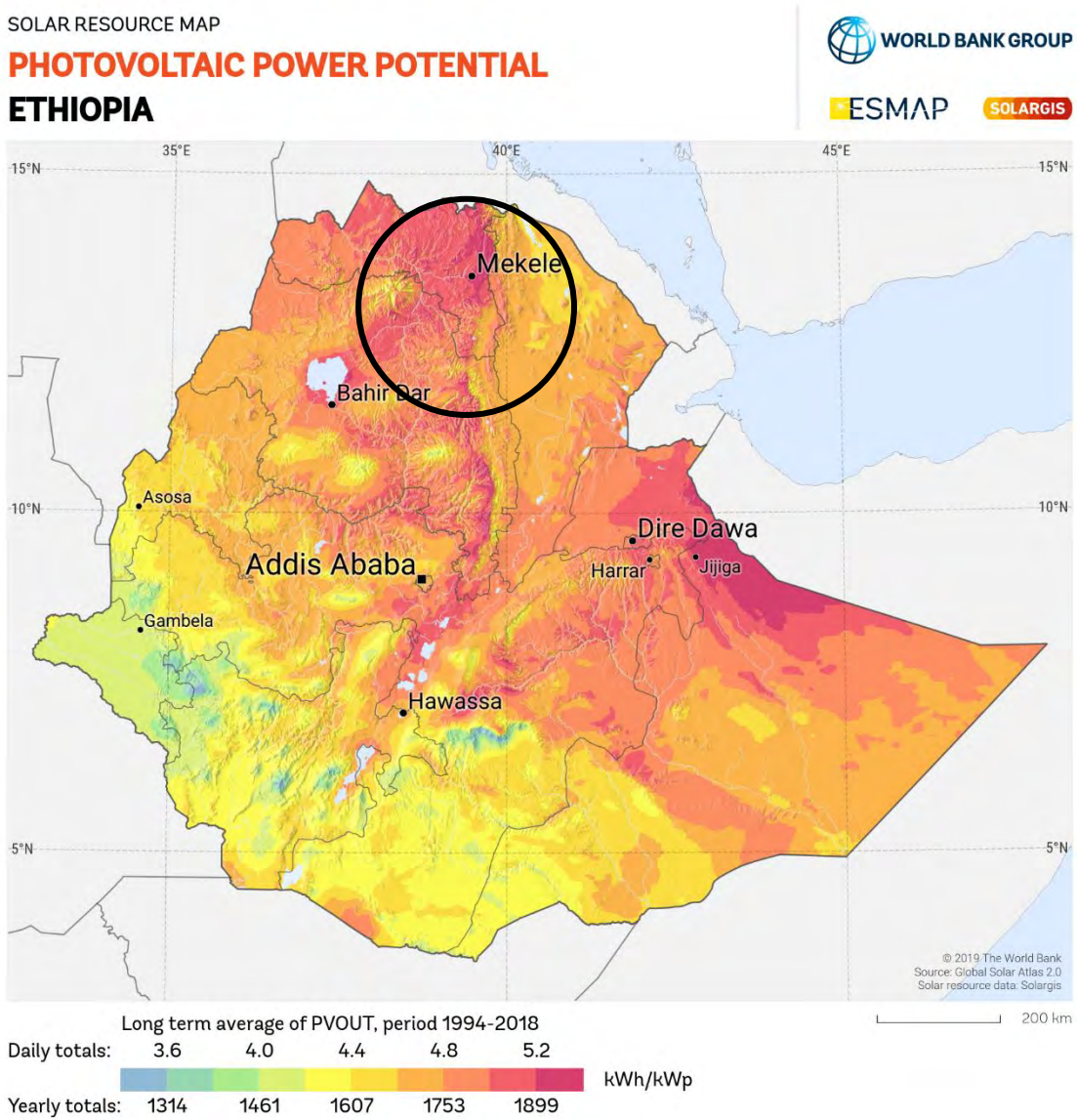
DROUGHT &
EROSION

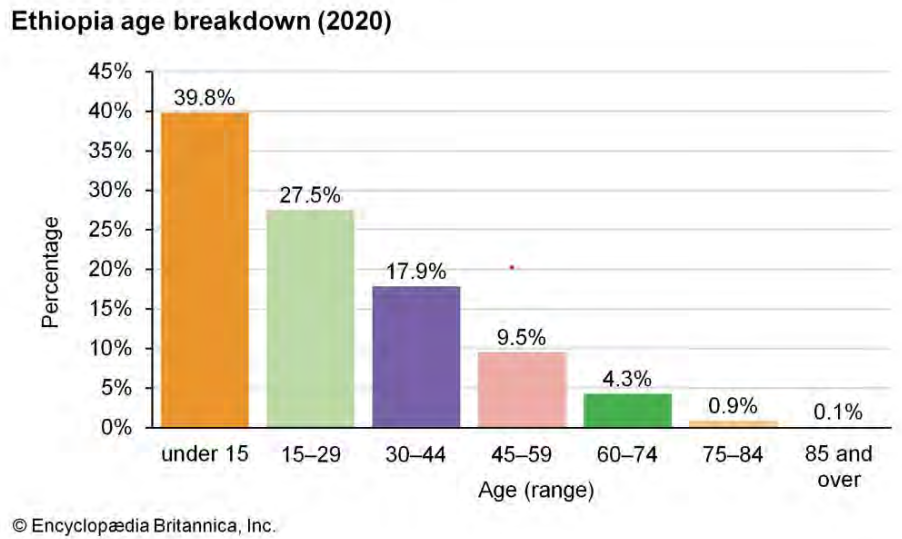
FLOODS
(WHEN RAIN)

DEATH OF
LIFESTOCK

DEPENDENCY
ON FOOD AID

REGION POTENTIALS





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CONCEPT

AIM

ADAPT TO CLIMATE CONDITIONS

RESPECT CULTURE TRADITIONS

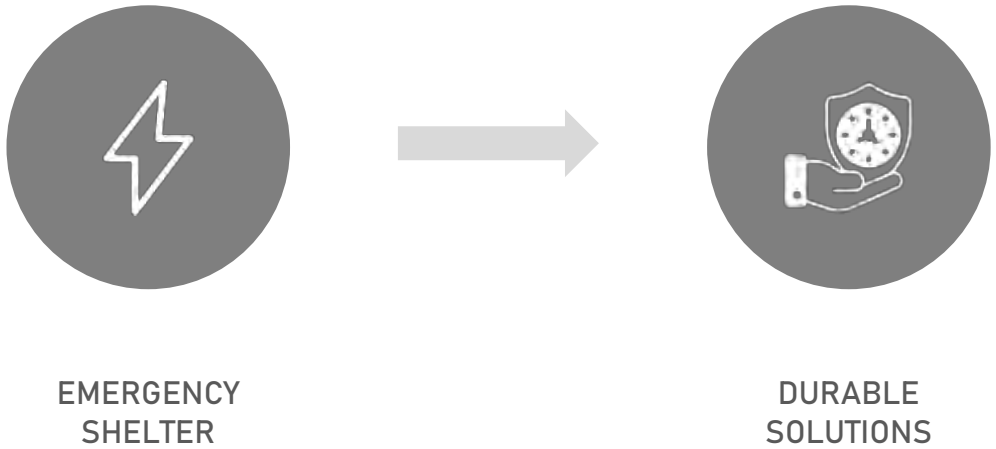
SUSTAINABLE RESSOURCES

EASY & QUICK ASSEMBLY

PARTICIPATION

MULTIPLE TYPOLOGIES

AIM



EMERGENCY SHELTER

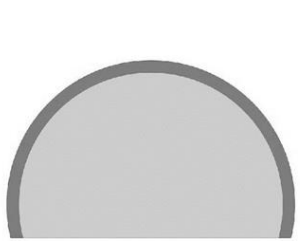
DURABLE SOLUTIONS

DESIGN IS MEANT TO WORK AS AN INVESTMENT INTO THE FUTURE OF THE AFFECTED POPULATION
TO (RE-) BUILD THEIR LIFE AND IMPROVE LIVING CONDITIONS LONG-TERM

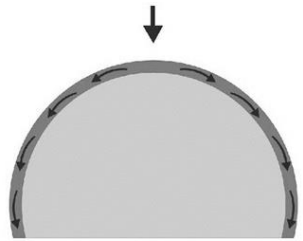
CONCEPT

TRADITIONAL AFAR NOMAD DWELLING

CONCEPT FORM

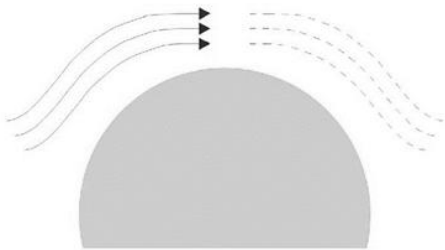


SELF
SUPPORTING

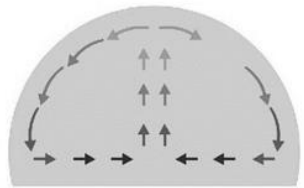


LOAD
DISTRIBUTION

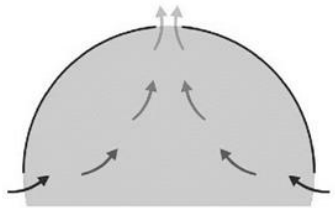
MODULAR
CONSTRUCTION



WIND AND STORM
RESISTANCE



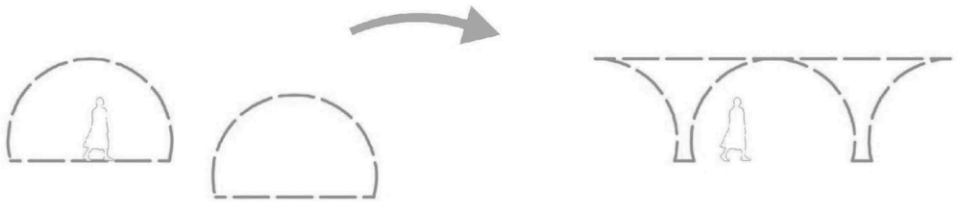
AIR FLOW /
CIRCULATION



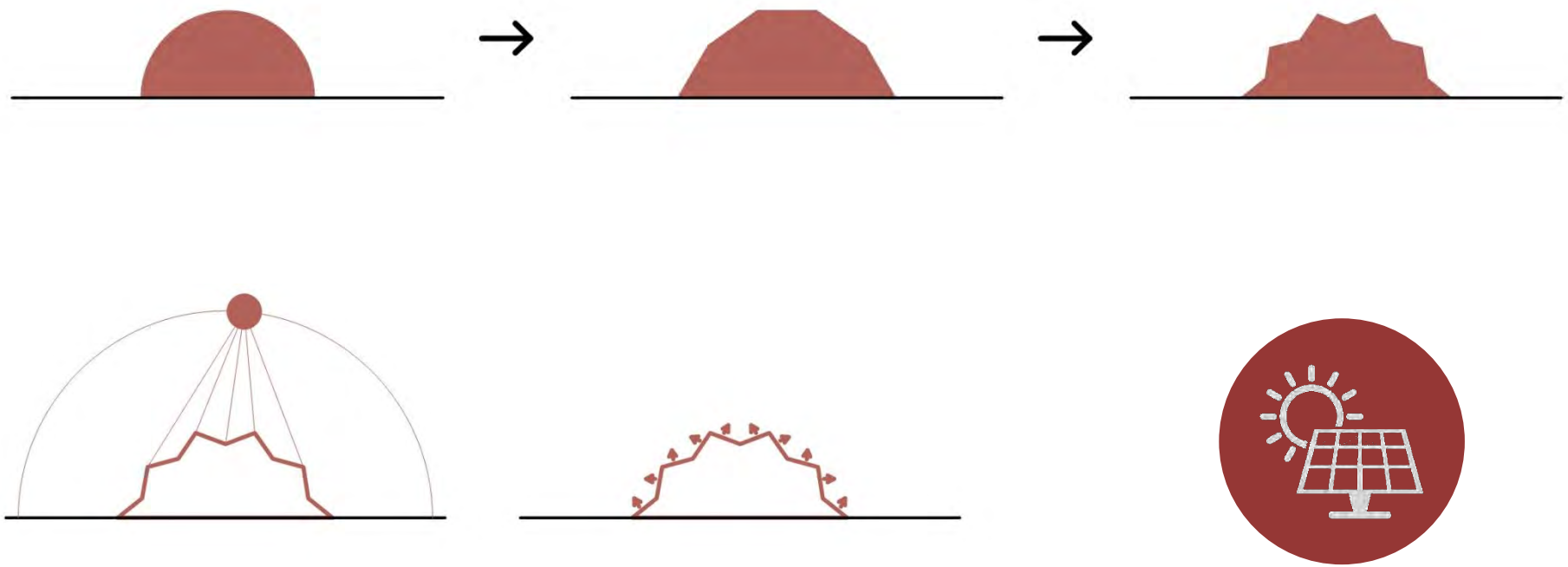
CHIMNEY EFFECT

UNIFORM
TEMPERATURE

CONCEPT REUSABILITY



FORM ADJUSTMENTS



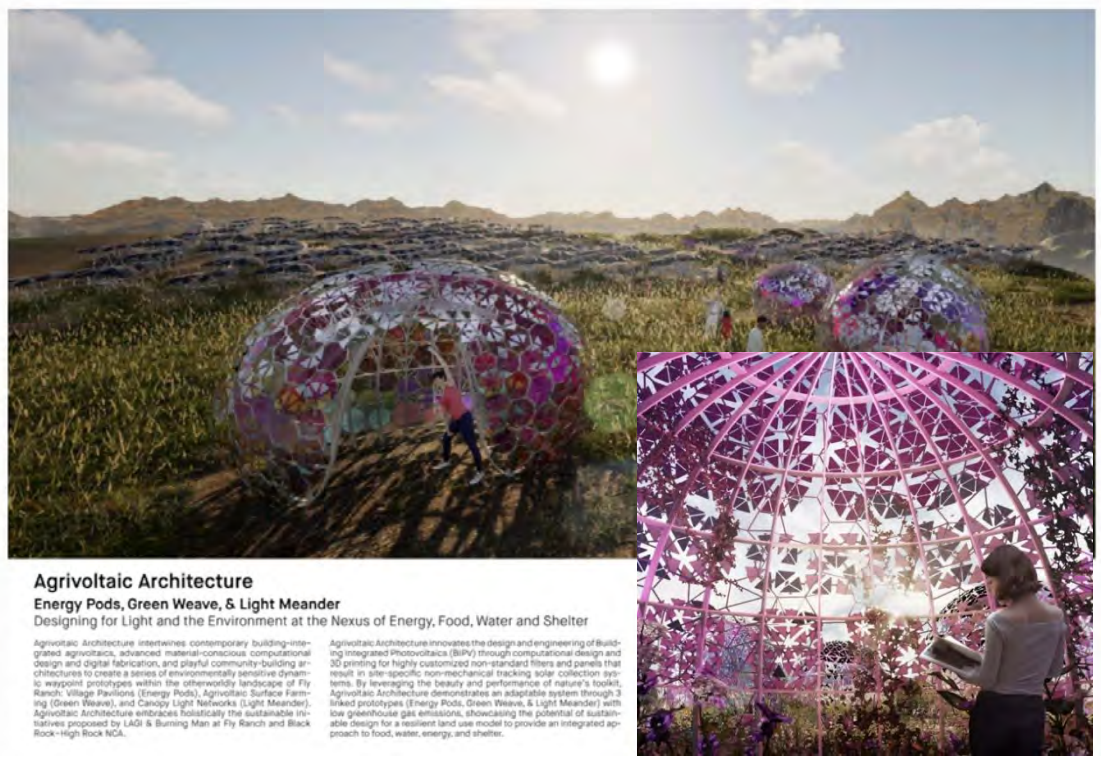
INSPIRATION AND RESEARCH

REFERENCE PROJECTS - STRUCTURE

OMBRES LUMINOISES, Sukkahville 2013

ARBOSKIN, University of Stuttgart (itke)

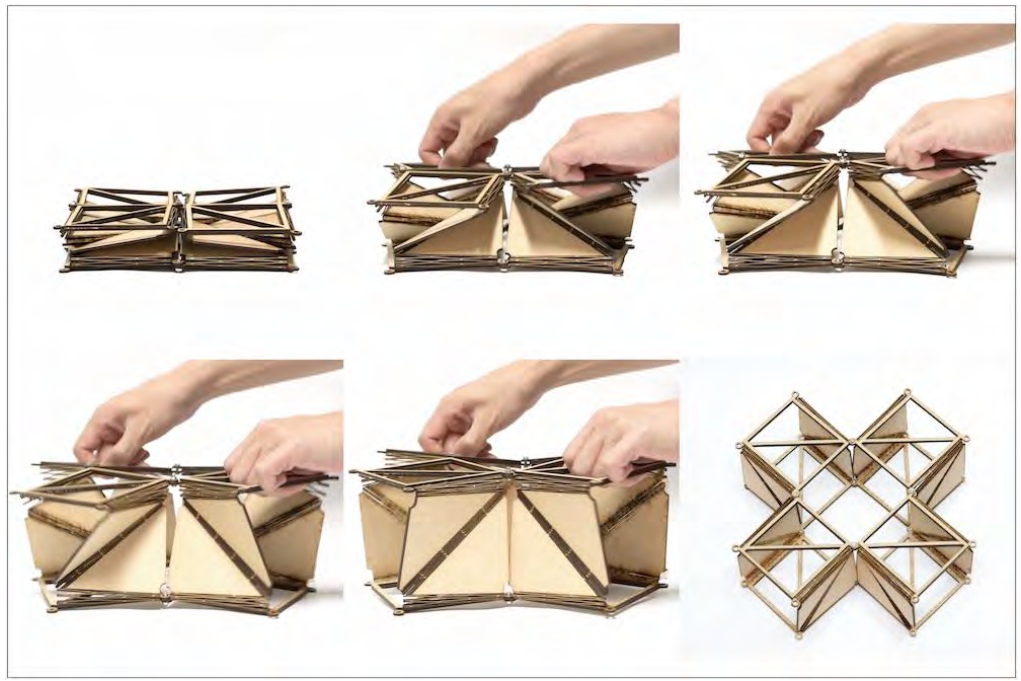
REFERENCE PROJECTS - ENERGY



AGRIVOLTAIC ARCHITECTURE, Ithaca, USA (LAGI)

RENEWABLE OASIS, Kyriakos Chatziparaskevas (LAGI)

INSPIRATION - ASSEMBLY



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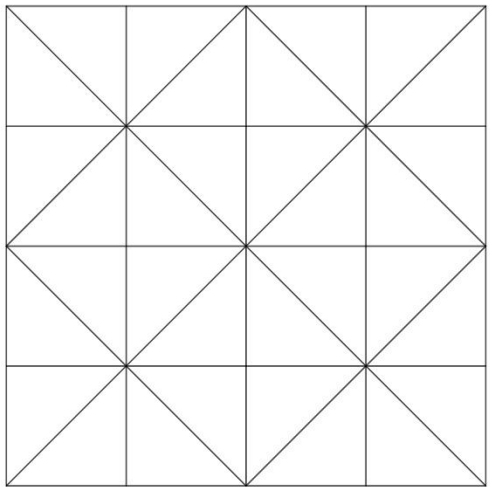
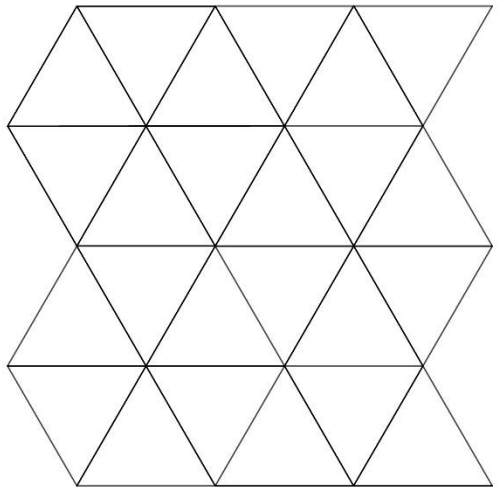
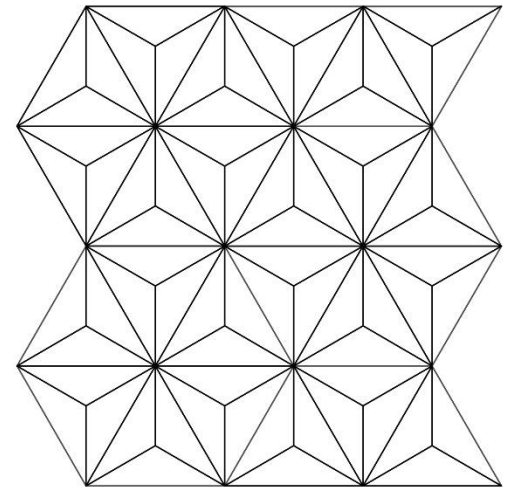
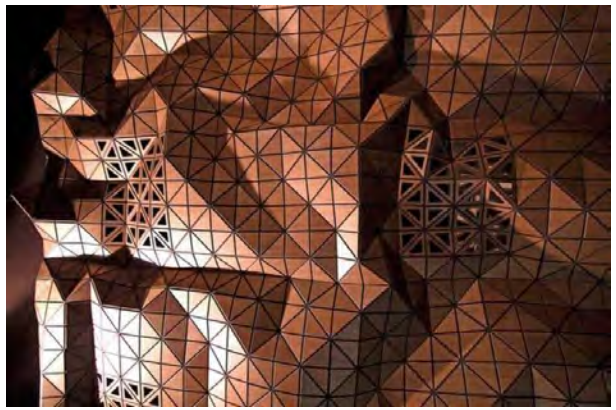


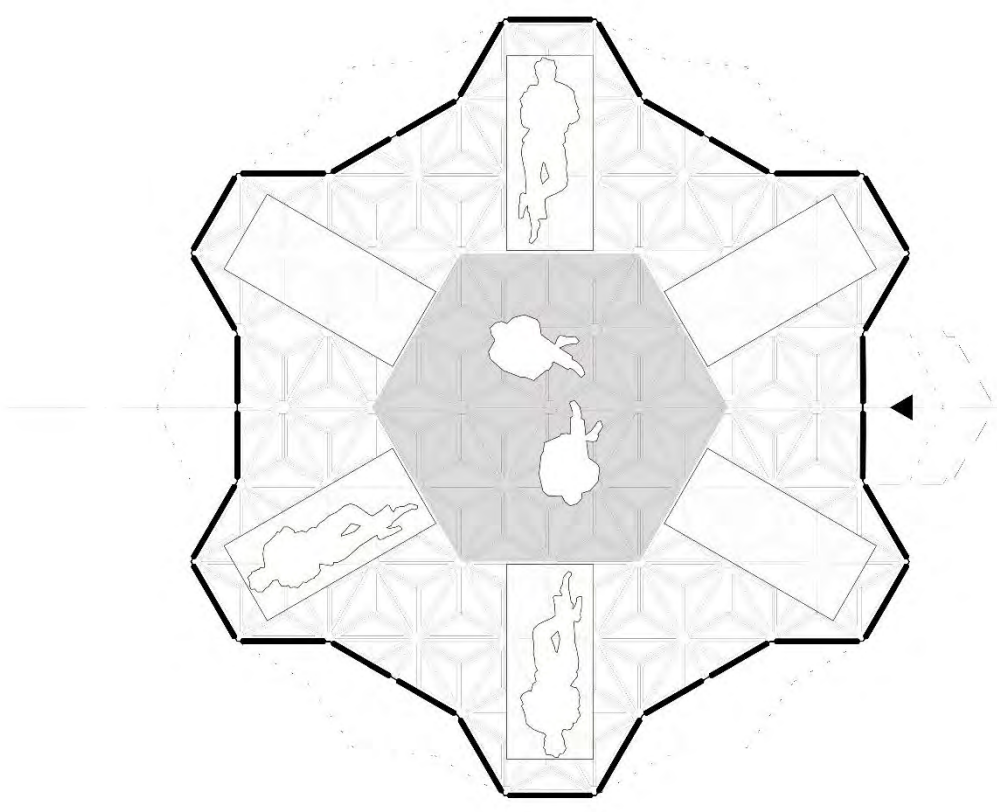


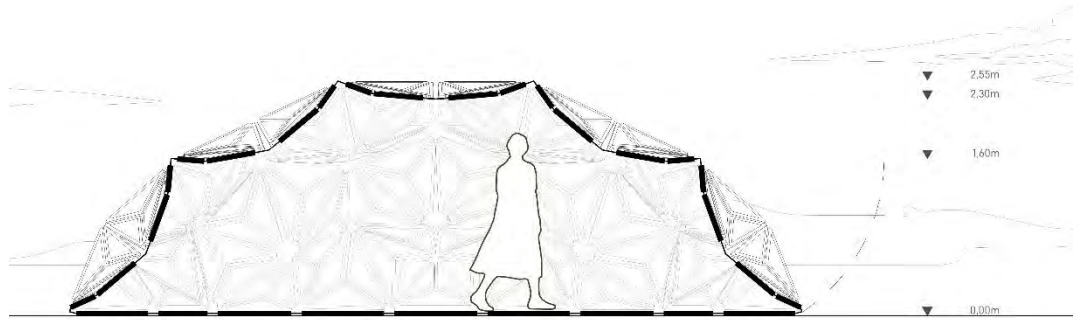




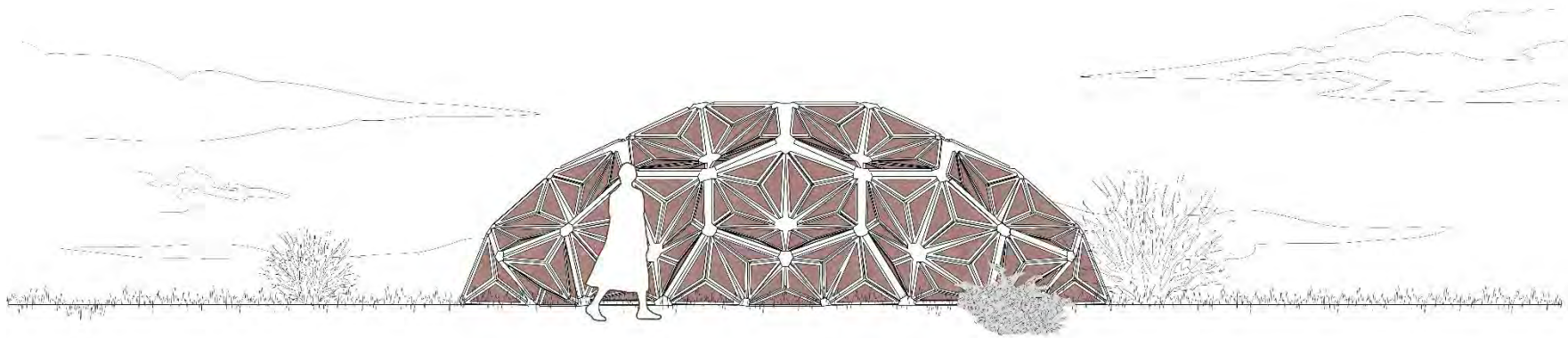
DESIGN

GROUND PLAN AND SECTION

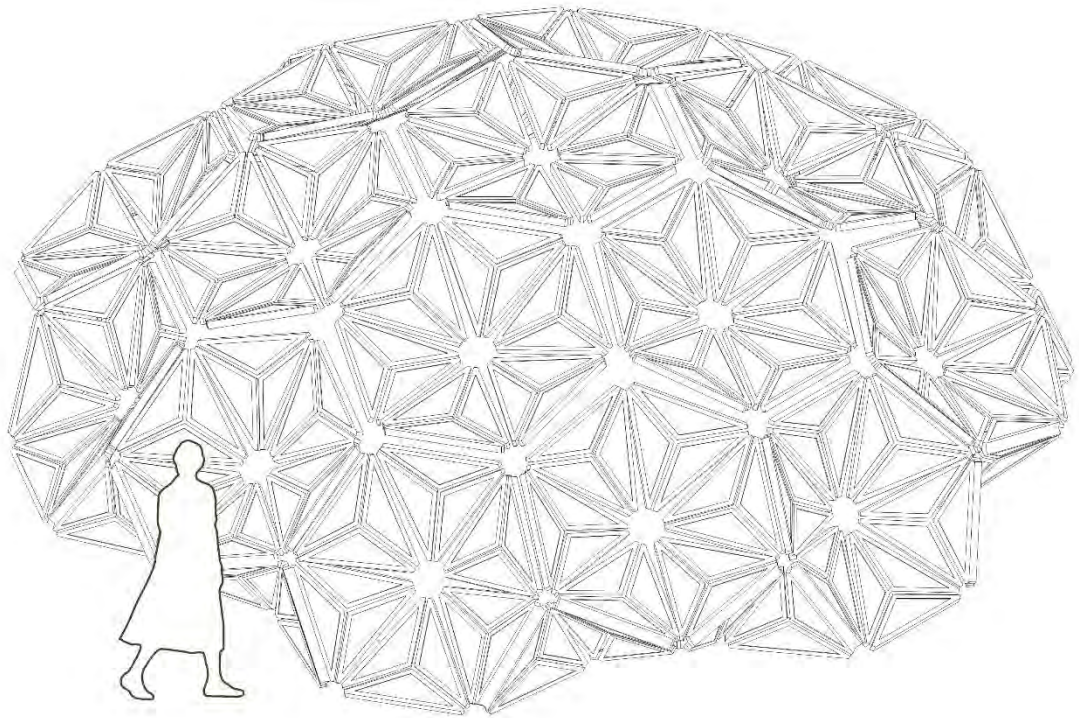




ELEVATION



AXONOMETRY



DEPLOYMENT

DEPLOYMENT

KIT OF PARTS SYSTEM

PREFABRICATION

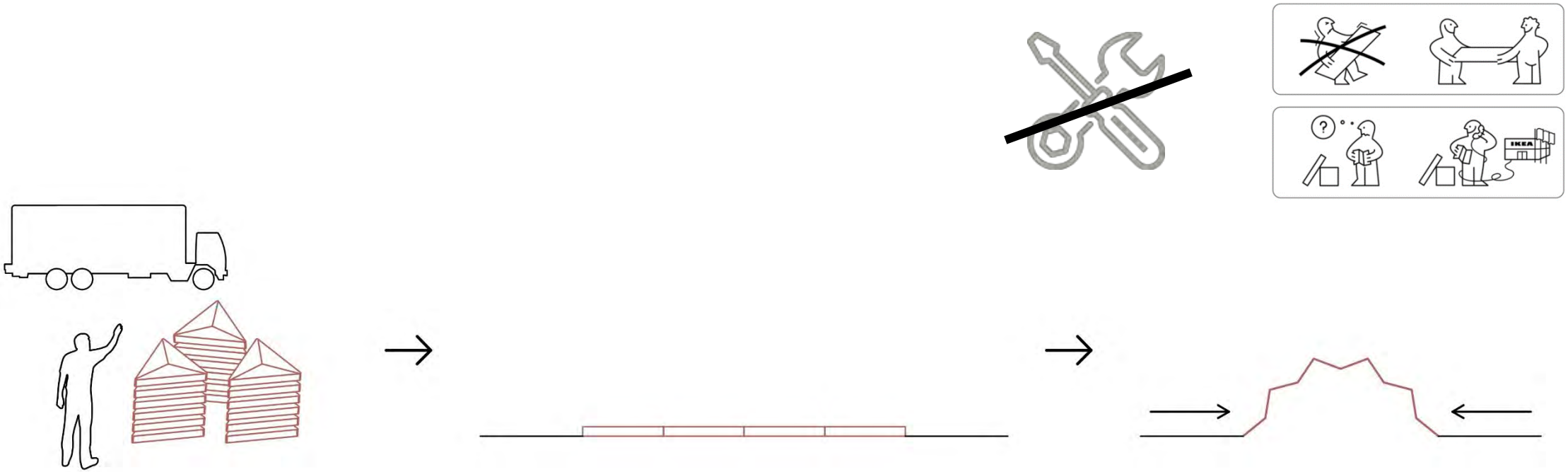
LIGHTWEIGHT

EASY & QUICK ASSEMBLY

PASSIVE ADAPTIVE

MULTIPLE TYPOLOGIES

DEPLOYMENT



DEPLOYMENT KIT

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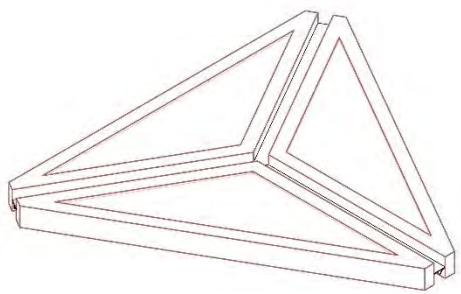

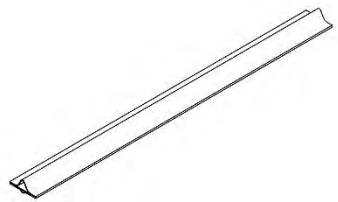

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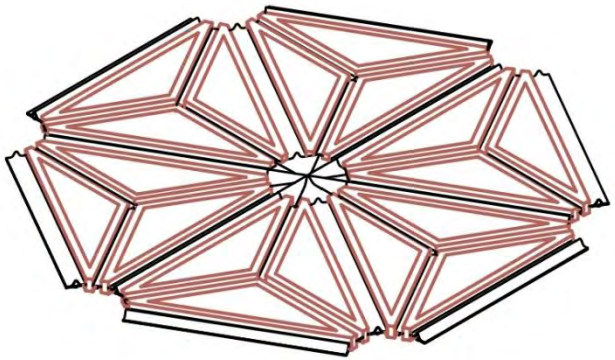

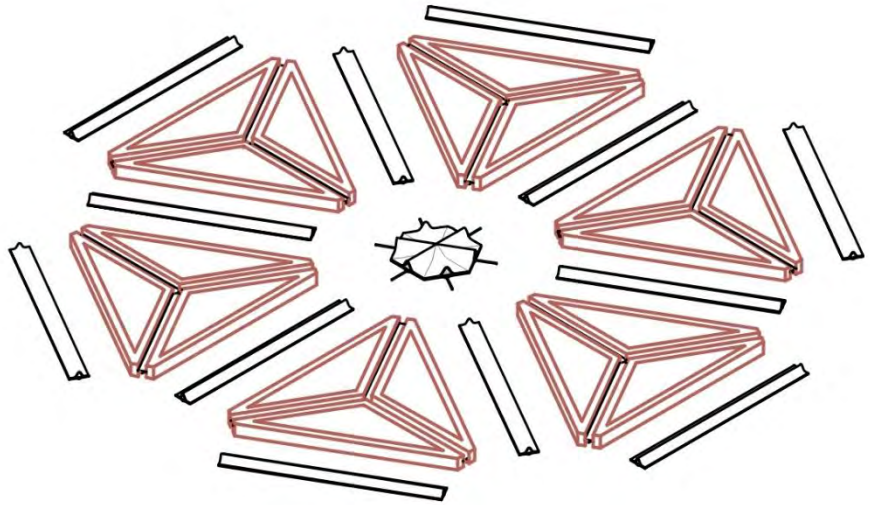

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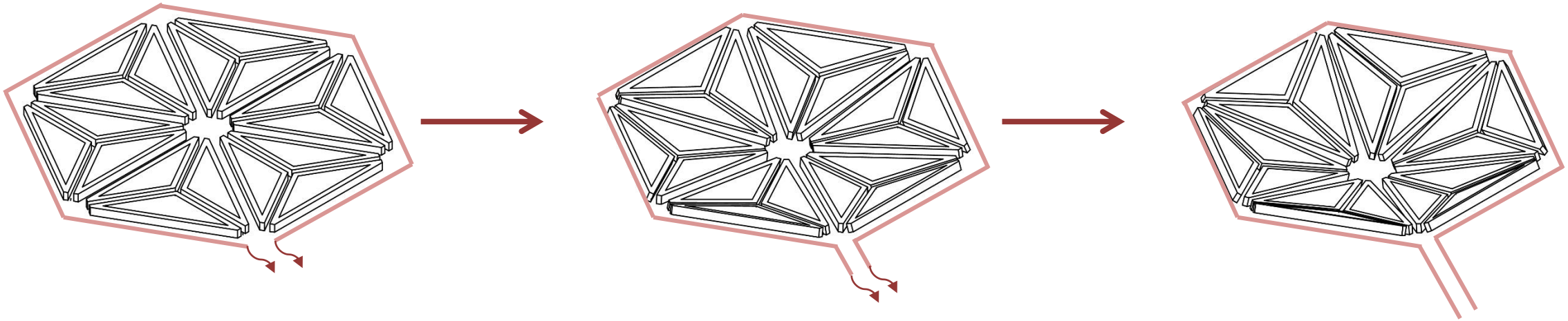

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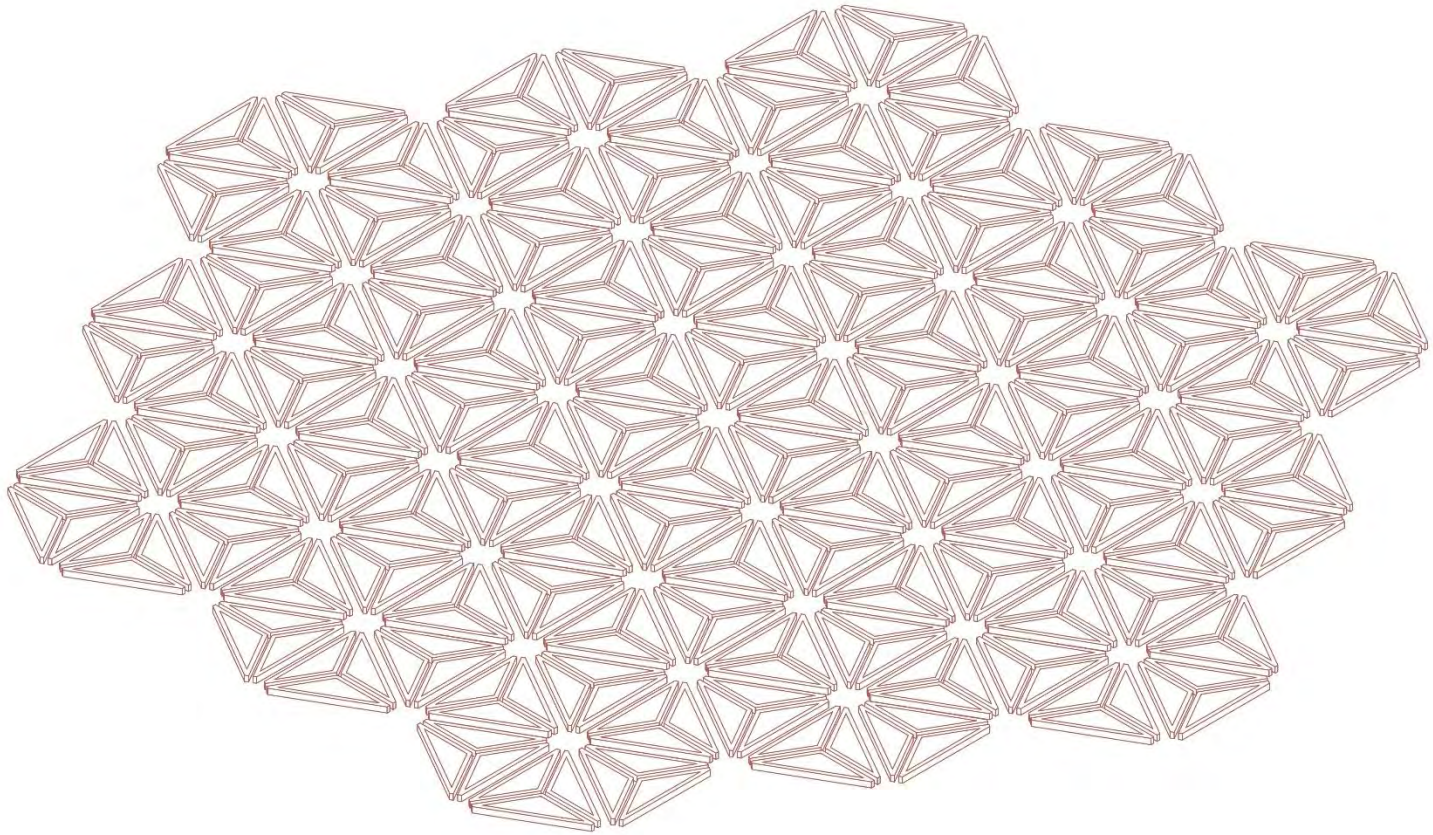

DEPLOYMENT

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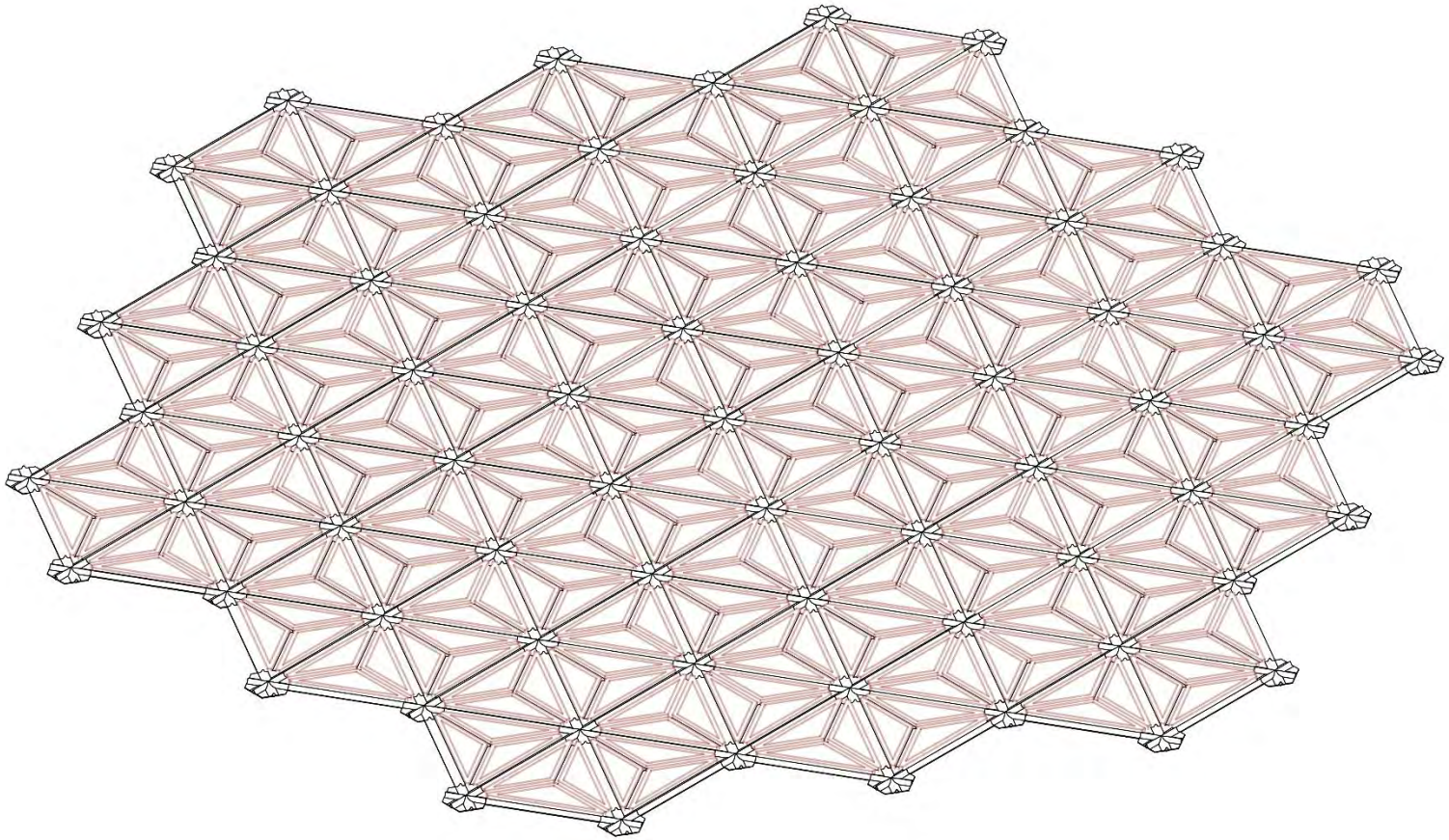

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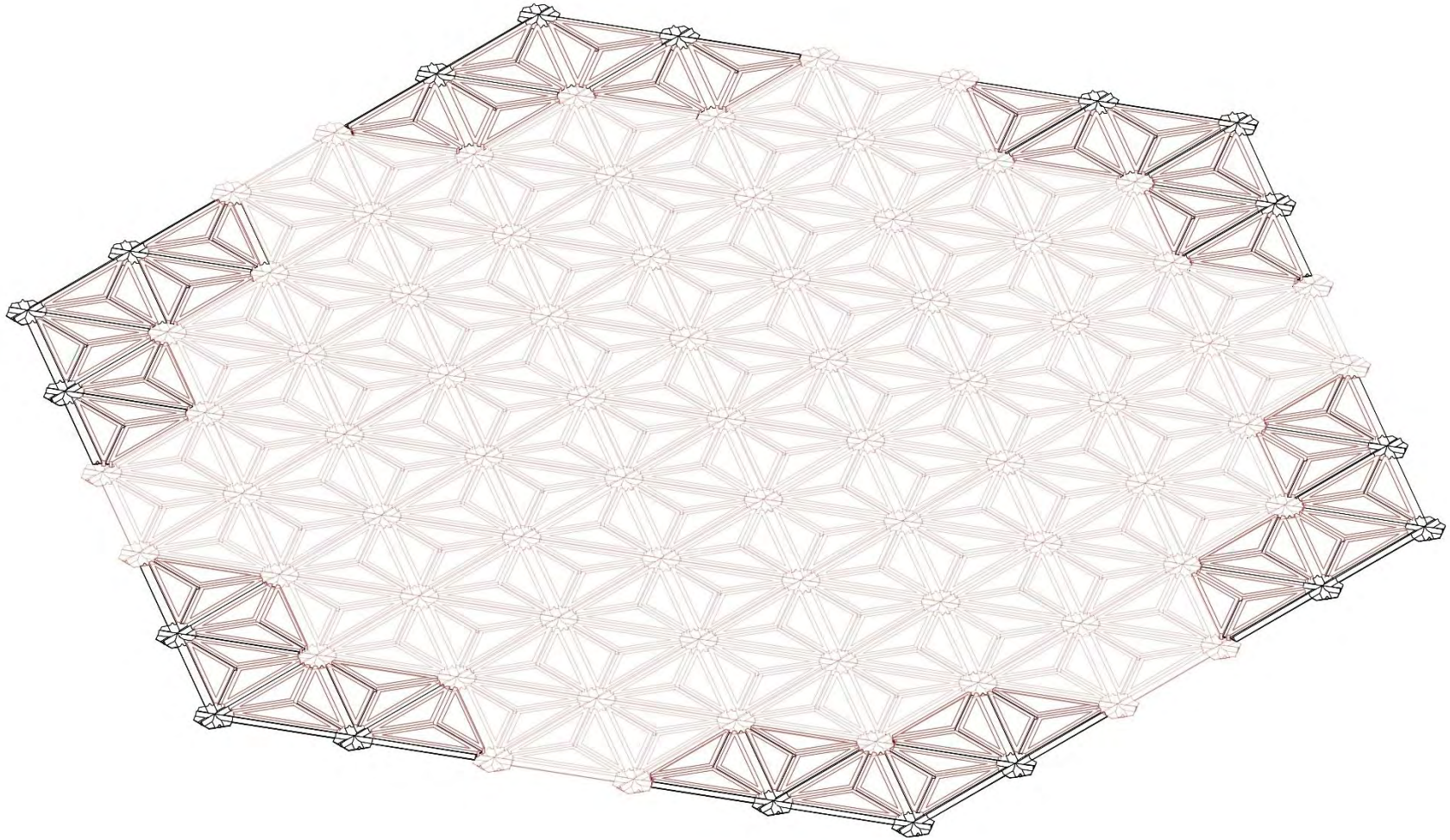

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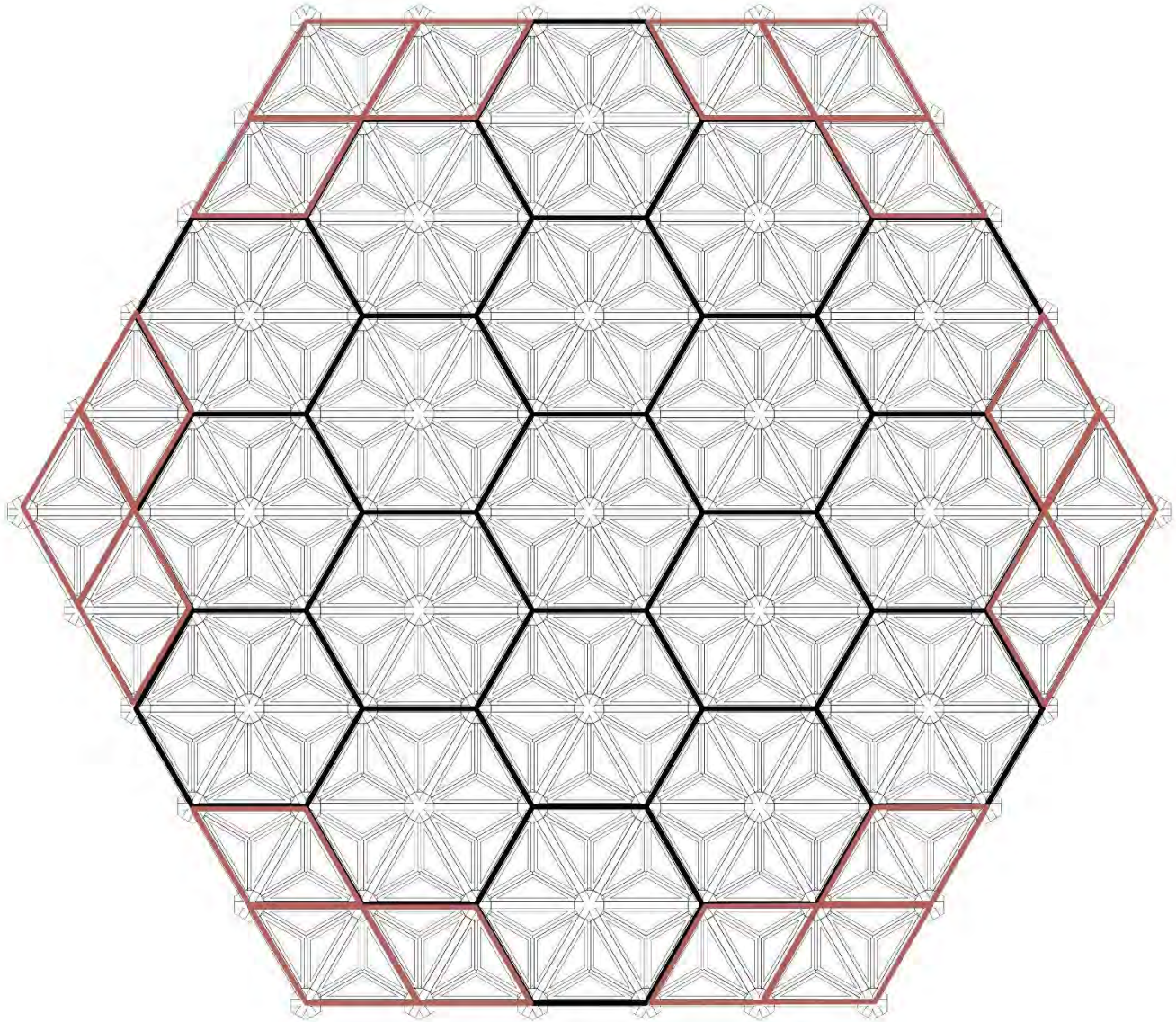

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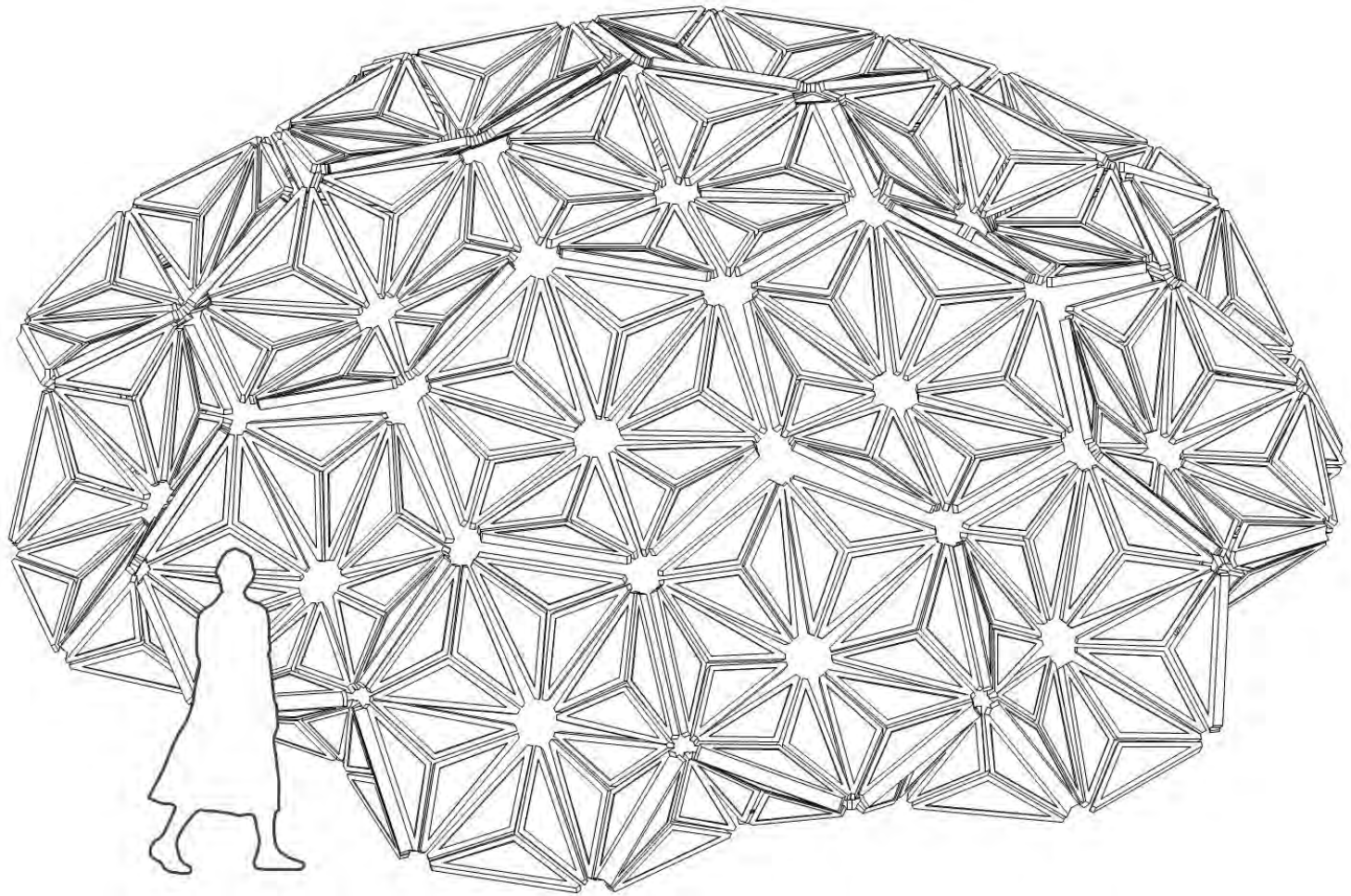
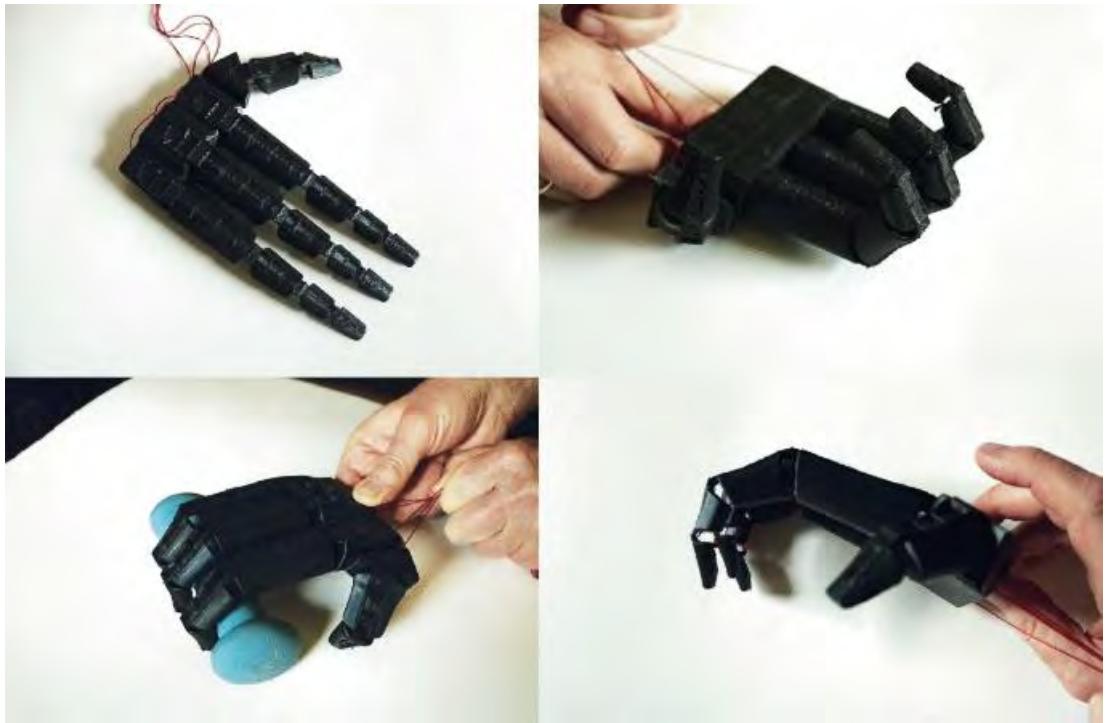
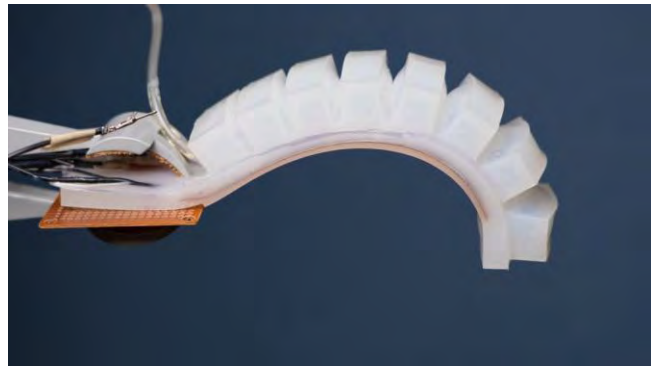
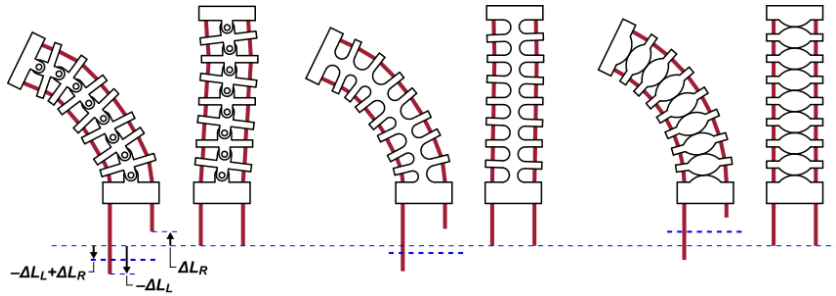


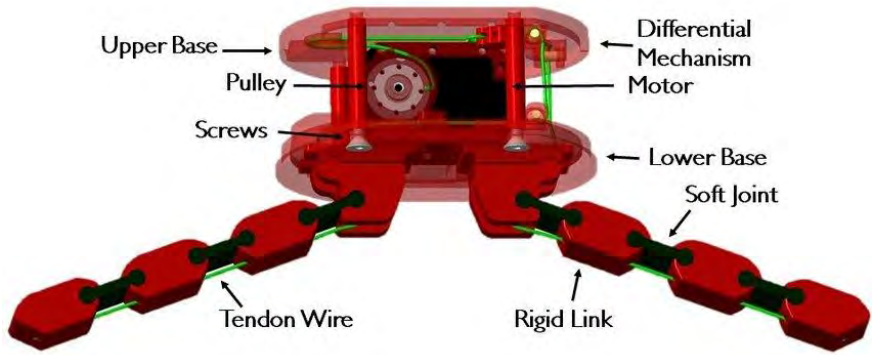
DETAIL

INSPIRATION FLEXIBLE HINGE JOINTS

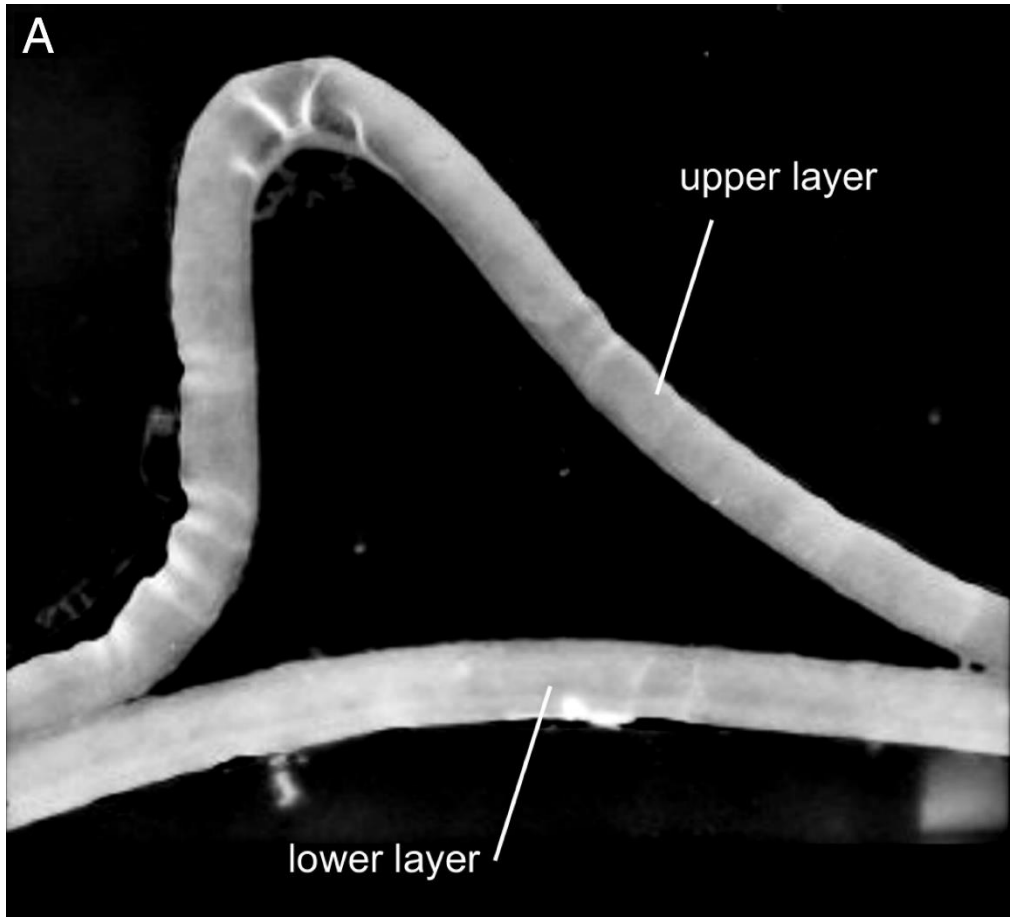








HINGE INSPIRED BY BEETLE WING



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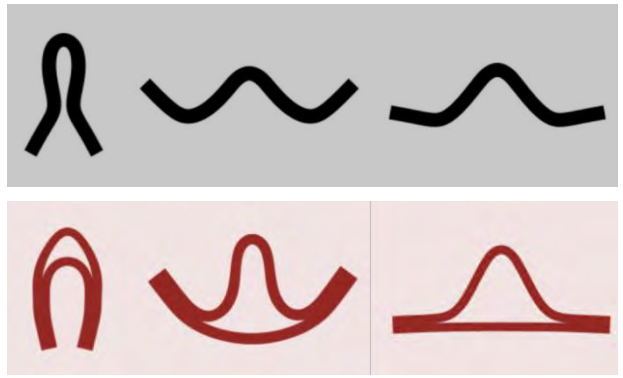

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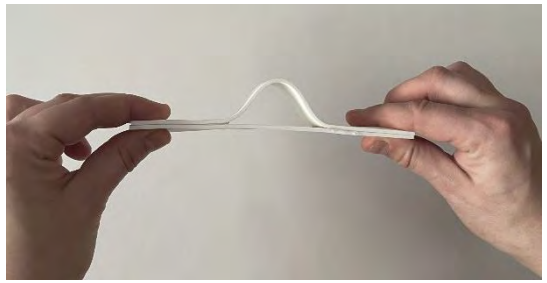

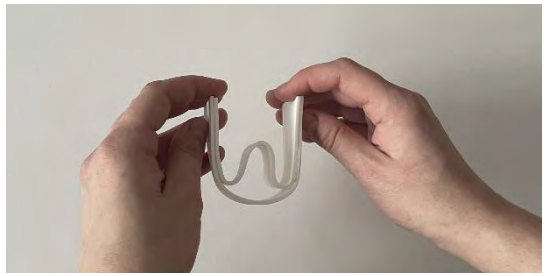


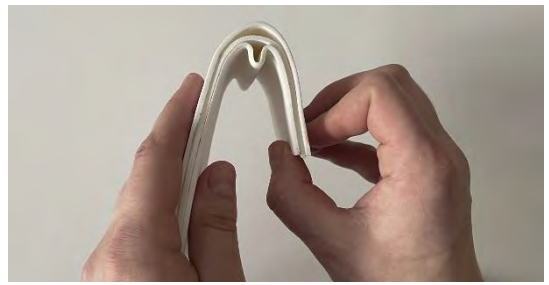
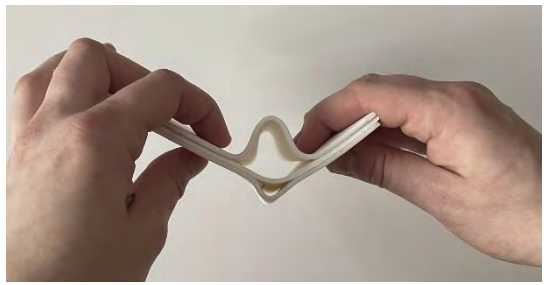
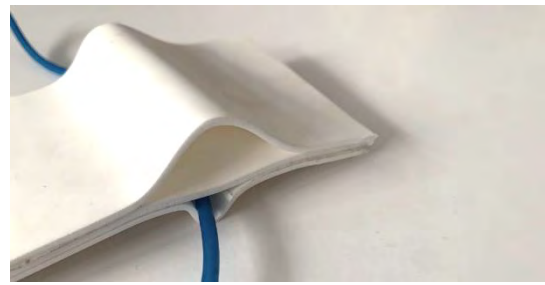

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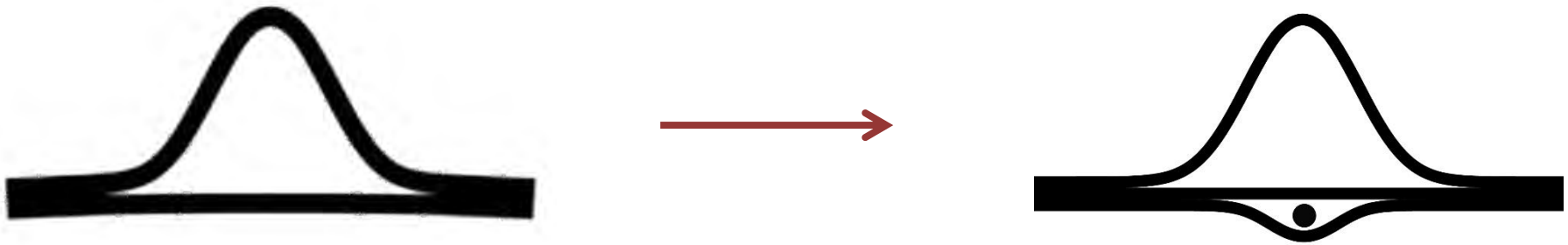
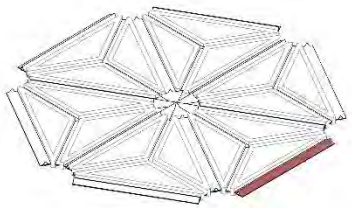
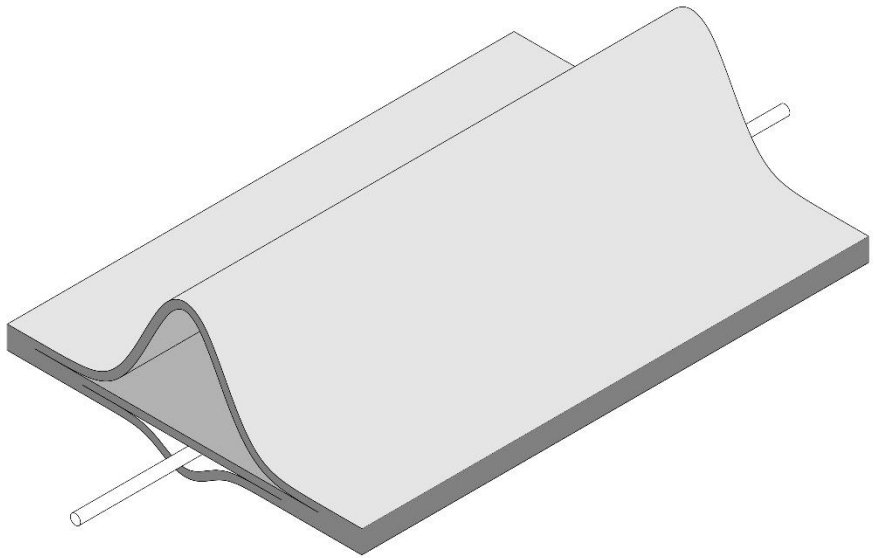


HINGE DETAIL





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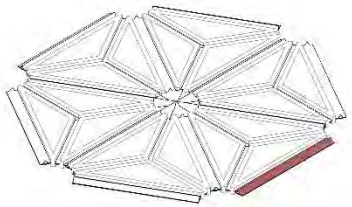
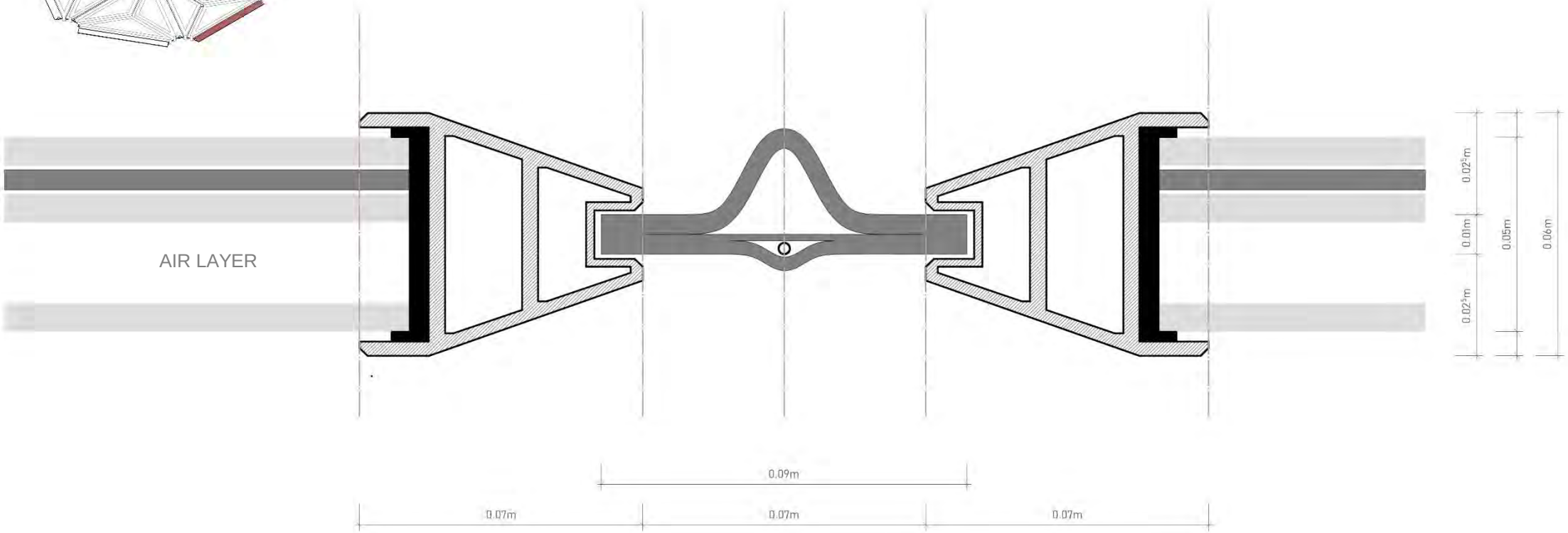
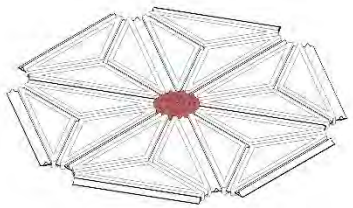
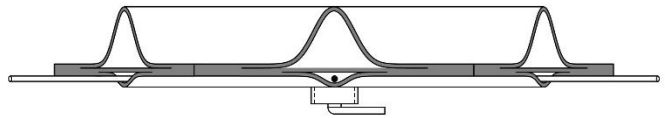
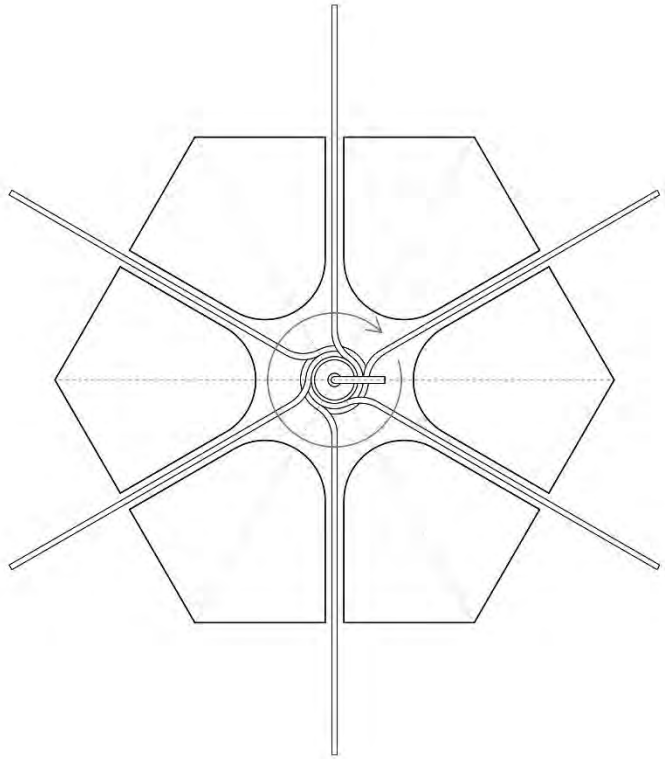


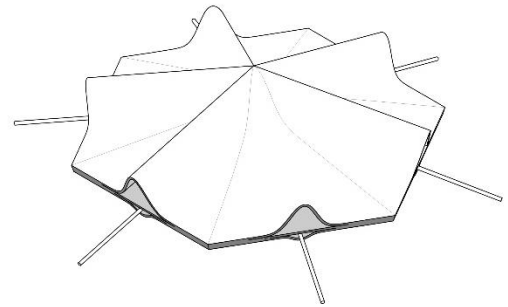


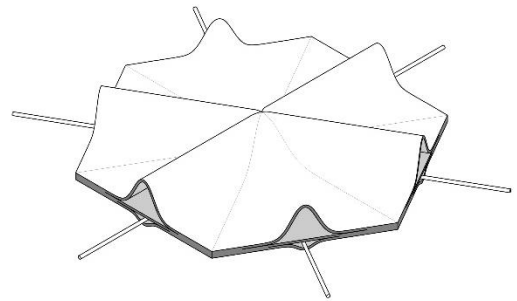
CROSSPOINT DETAIL



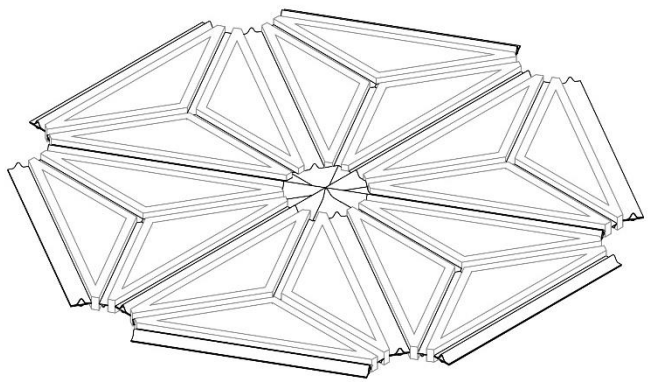


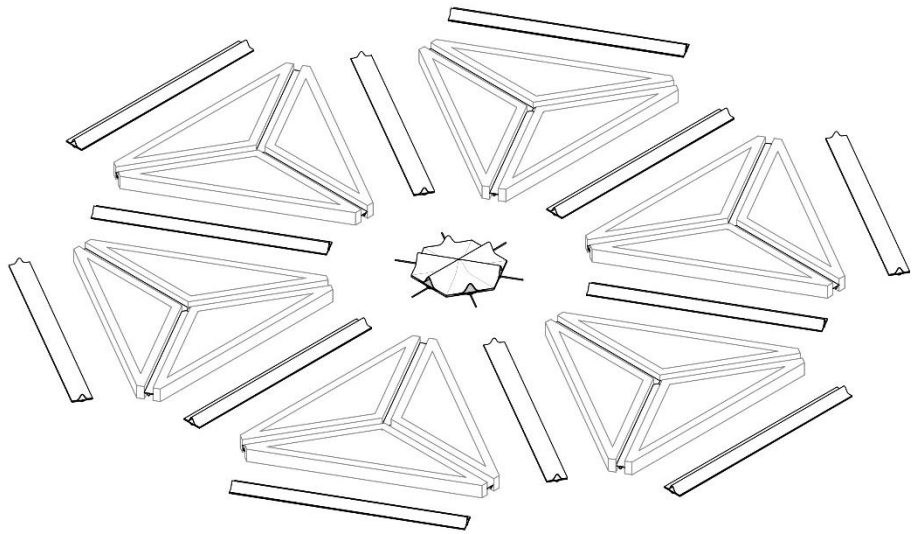






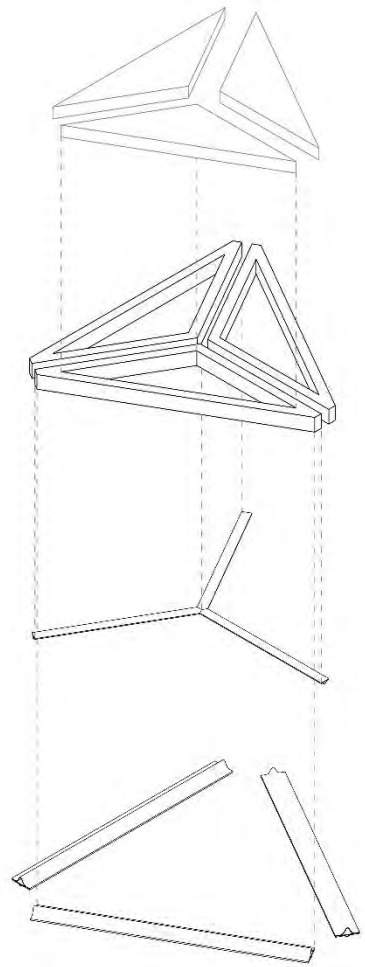
CONNECTION

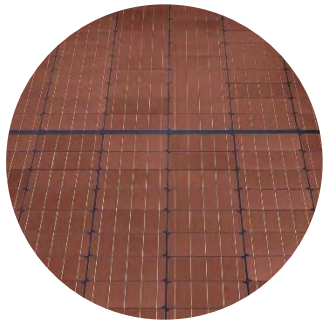




REUSABILITY

MODULE STRUCTURE





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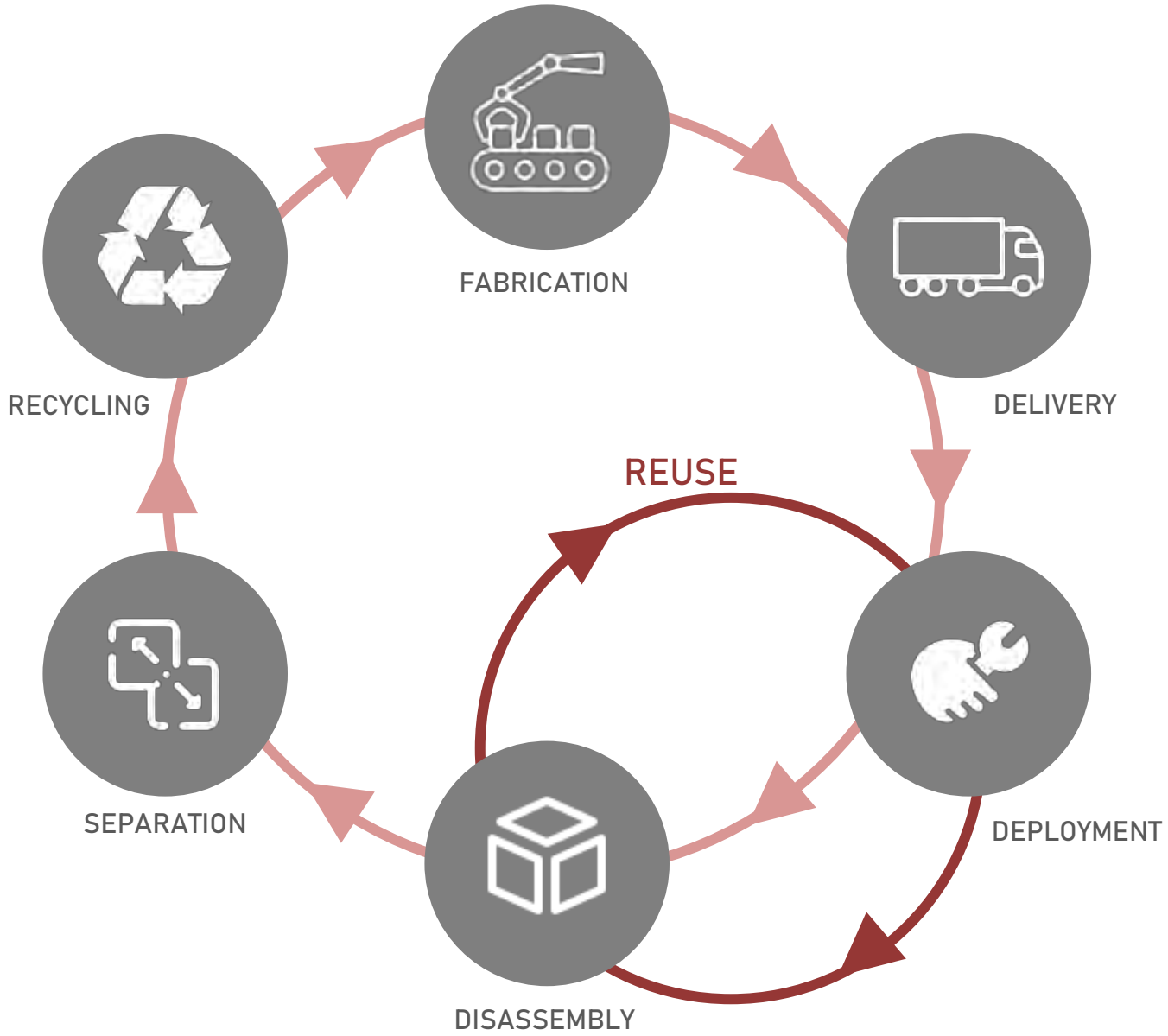
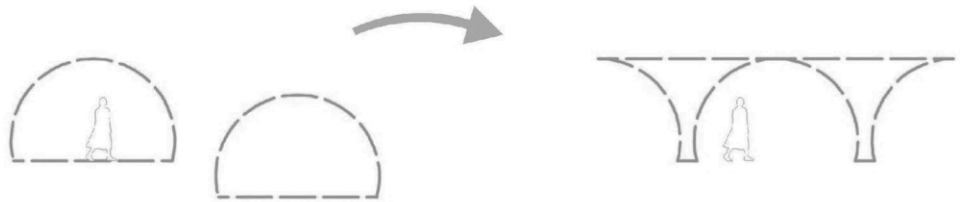

FABRICATION
DELIVERY
DEPLOYMENT
DISASSEMBLY
SEPARATION
RECYCLING
REUSE

DESIGN FLEXIBILITY



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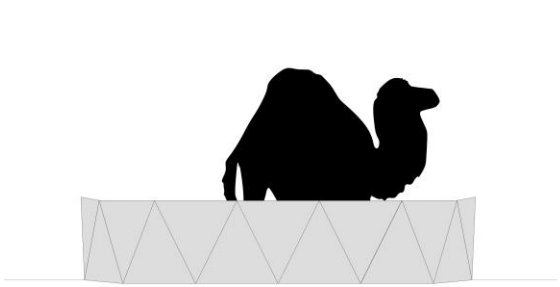
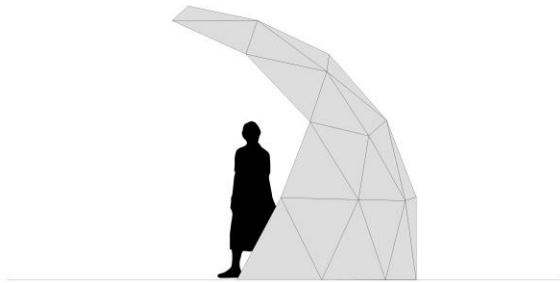
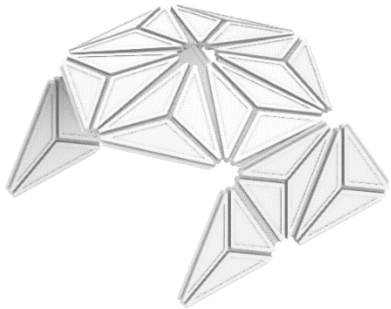
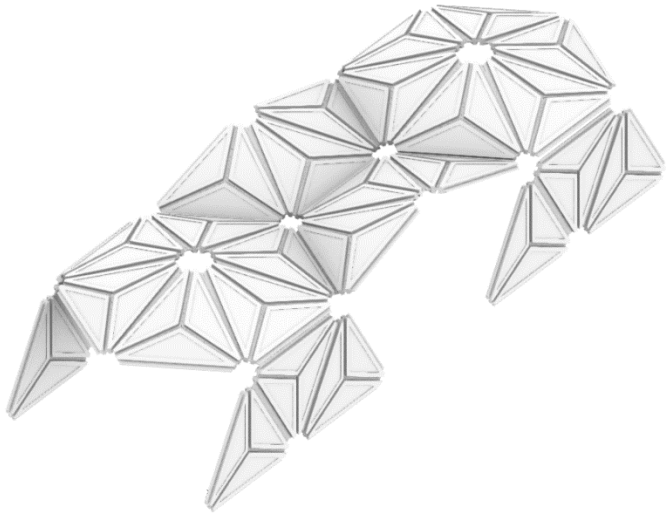
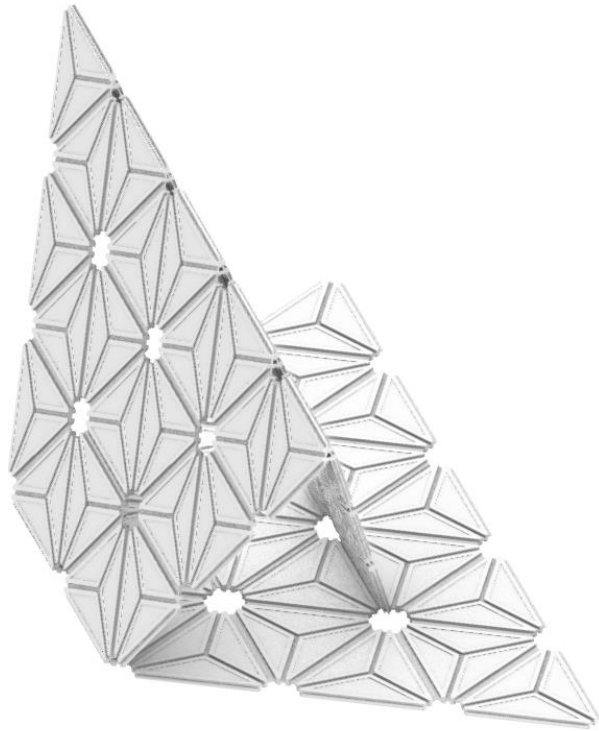




DESIGN FLEXIBILITY







VISUALIZATION

VISUALIZATION

THANK YOU FOR YOUR ATTENTION!

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