

portefølje

N I M A Z A H I R I



## PERSONALIA:

### NIMA ZAHIRI

Sivilingeniør, ph.d. i trekonstruksjon

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LinkedIn: [linkedin.com/in/nimazahiri/](https://linkedin.com/in/nimazahiri/)

Nettside: [nimazahiri.github.io](https://nimazahiri.github.io)

Bernau bei Berlin, Tyskland

## NØKKEL- KVALIFIKASJONER

- Flere års internasjonal erfaring
- Akademisk utdanning på høyt nivå
- Teknisk faglig portefølje
- Bred programvarekunnskap
- Solid produksjonskompetanse
- Praktiske flerspråklige ferdigheter

## AKADEMISK UTDANNING PÅ HØYT NIVÅ

### Doktorgrad i trekonstruksjon

2023 Computational design og  
2020 automatisert produksjon  
NTNU i Gjøvik, NO

### Master i ITECH

2019 Integrative Technologies and  
2017 Architectural Design Research  
University of Stuttgart, DE

### Bachelor i ingeniørfag

2011 Konstruksjons-  
2006 og byggteknikk  
Razi University, IR

## BRED RELEVANT PROGRAMVAREKUNNSKAP

Parametrisk design – Grasshopper

Programmering – Python, C#

BIM-modellering – Revit

FEM-analyse – Karamba3D , Fusion 360

Trekonstruksjon – cadwork, SEMA

Trebearbeiding – Hundegger-Cambium

## FLERE ÅRS INTERNASJONAL ARBEIDSERFARING

### Konstruktør (tre)

d.d. Prosjektering av modulære  
2023 trekonstruksjoner  
timpla GmbH, Eberswalde, DE

### Konstruktør / 3D-spesialist

2020 Computational design av  
komplekse betongarmeringer  
Werner Sobek AG, Stuttgart, DE

### Vitenskapelig assistent

2019 Forskningsstøtte i  
2017 doktorgradsprosjekter  
University of Stuttgart, DE

### Prosjektingeniør

2016 Bygningsinformasjonsmodellering  
2014 og tegning av konstruksjoner  
T.AHA Architecture, Teheran, IR

## SPRÅKFERDIGHETER – FIRE SPRÅK

Persisk – morsmål

Engelsk – flytende på akademisk nivå

Tysk – avansert i arbeidssammenheng

Norsk – selvstendig i kommunikasjon

Denne porteføljen handler om computational design,  
integrerte teknologier og digital fabrikasjon.

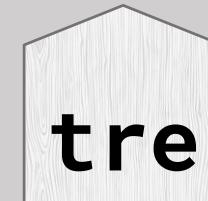
Den består av to kapitler:

KAPITTEL I



teknologiske  
prosjekter

KAPITTEL II



trebaserte  
prosjekter



Vennligst se i fullskjerm

## KAPITTEL I



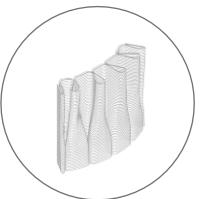
teknologiske  
prosjekter

Det første kapittelet fokuserer på **integrativ teknologi i arkitektur**,  
i sammenheng med **computational design** og **digital fabrikasjon**.

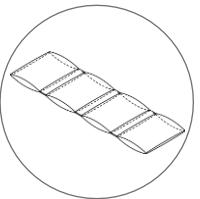
## KAPITTEL I



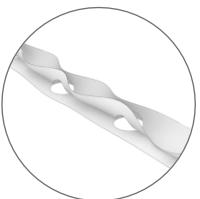
### teknologiske prosjekter



1 FUTURE TRADITION  
Robotic Clay Printing



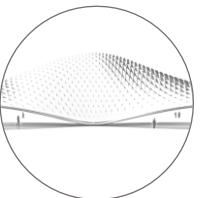
2 JOINT FREE MOVEMENT  
Fiber Composite Production



3 T-BEAM  
Bending Active Plates



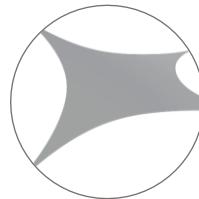
4 FLECTOFOLD  
Frame Steel CNC Fabrication



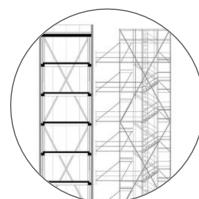
5 TRAIN STATION  
Flectofold Competition Proposal



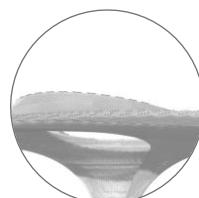
6 ITECH RESEARCH DEMONSTRATOR 2019  
Biomimetic Adaptive Architecture



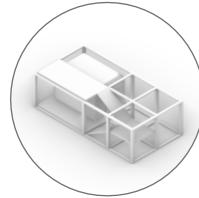
7 ELECTROACTIVE SKIN  
Electroactive - Textile Production



8 ADAPTIVE TOWER  
SFB1244 Demonstrator



9 MAIN STATION STUTTGART 21  
Complex Concrete Reinforcement



10 MODUS HIGH-RISES  
Modular Procedural Assembly

work

## FUTURE TRADITION

Rethink of Vernacular Clay Cooling System

tech

KUKA Robotic Clay Printing, Environmental Analysis

role

Competition: Future Tradition

2016

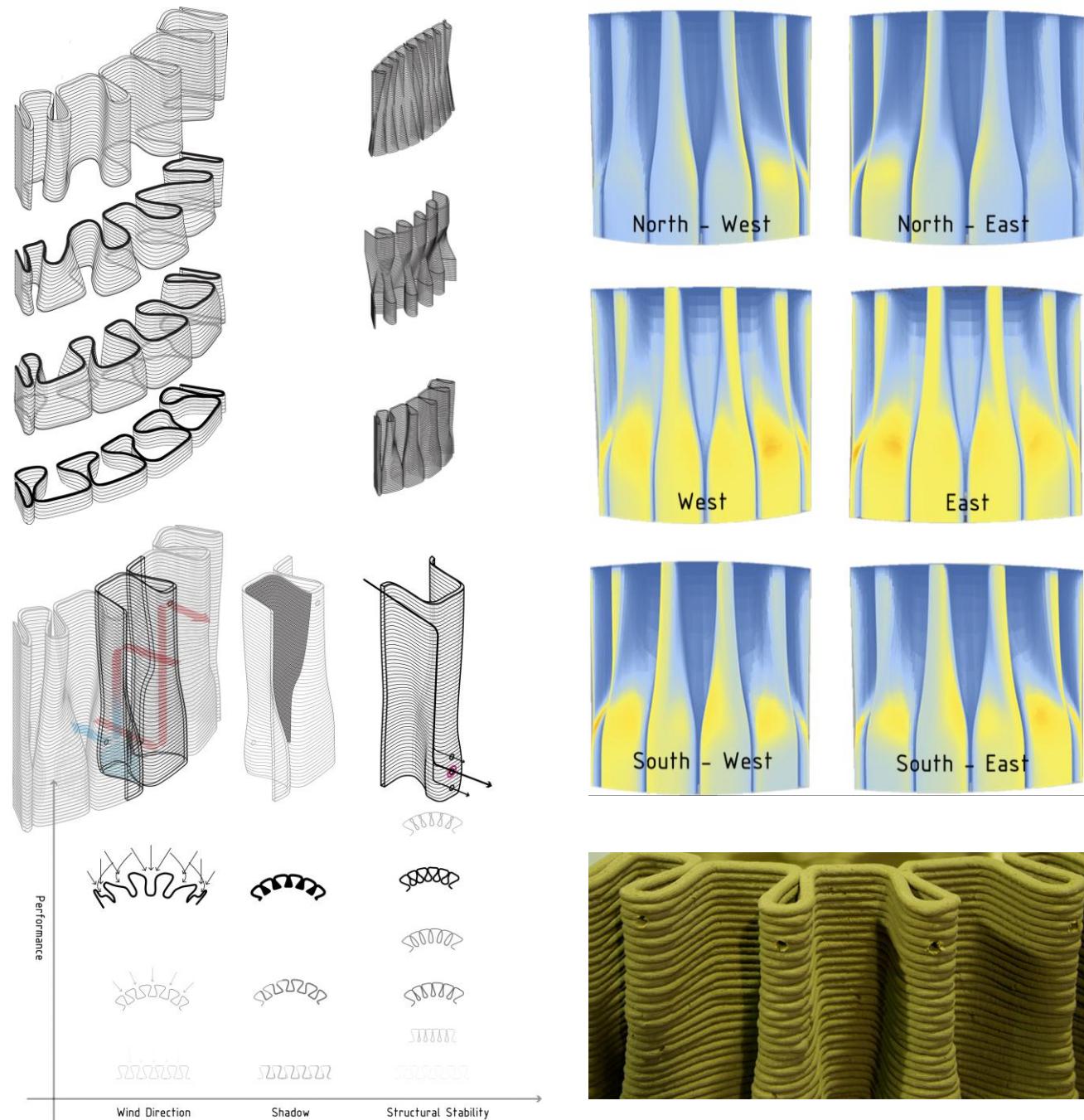
Contemporary Architect Association (CAA), IR

task

Entire Process



The main aim of the project is to reinterpret the environmental mechanism of traditional clay vase in the context of architecture, using robotic fabrication.



work

## JOINT FREE MOVEMENT

Shape-changing Fiber Composite Plates

tech

Pneumatic Cushions, Glass Fiber

role

ITECH Course: Architectural Biomimetic

2017

ICD Institute, University of Stuttgart, DE

task

Entire Process

The aim of this research project is to control the elastic stiffness and bending behavior of a fiber composite plate with pneumatic actuation.

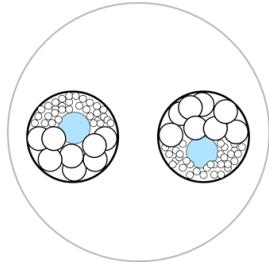
Biological Role Model: Mimosa Pudica



One branch

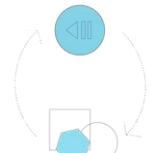


Petiole with leaves



Cells in Pulvilli

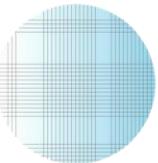
### RELEVANT PRINCIPLES FOR ABSTRACTION



Fusion of  
actuators



Pressure  
change



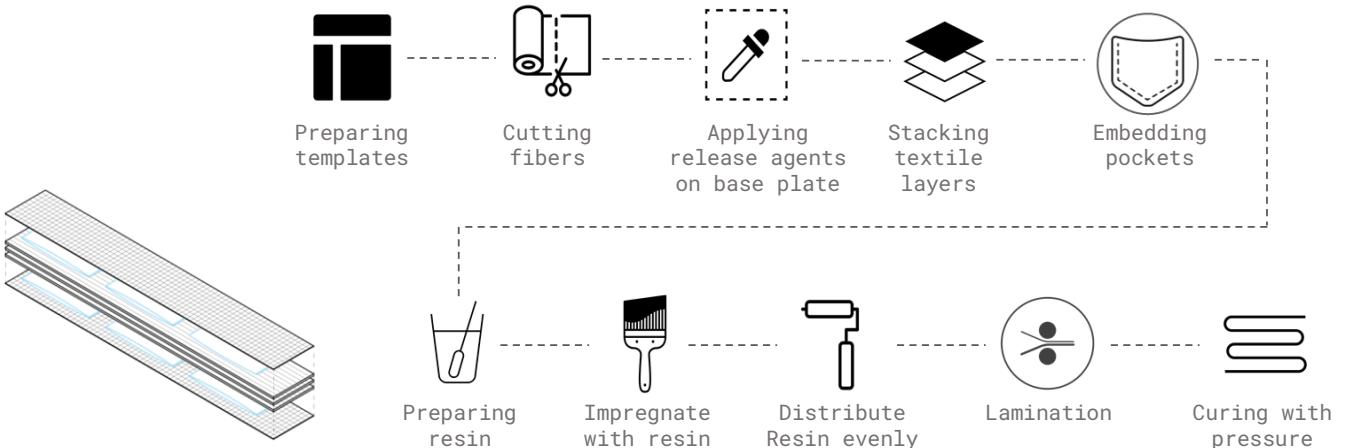
Material  
gradient



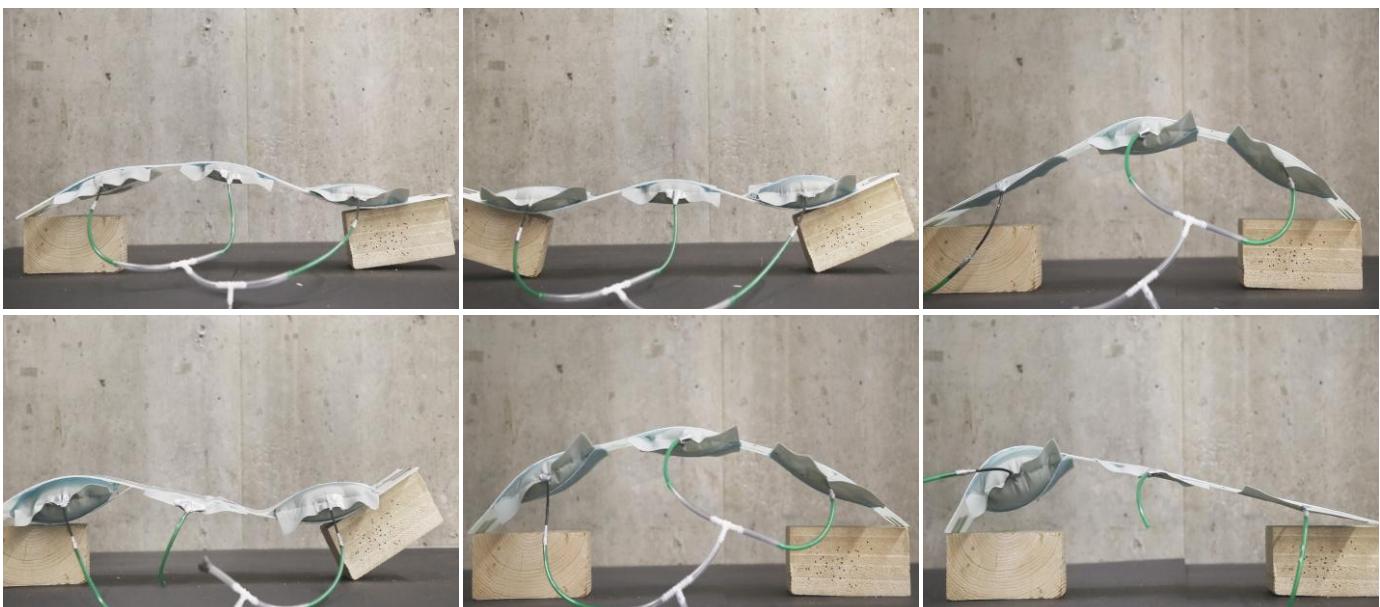
Compliance



Reversibility  
and freedom



1x Glass fiber woven fabric 0/60  
2x Plastic (pocket)  
3x Glass fiber fabric, unidirectional  
2x Plastic (pocket)  
1x Glass fiber woven fabric 0/60



work

## T-BEAM

Curved Bending T Cross-sections

tech

Typology Optimization and Manual Prototyping

role

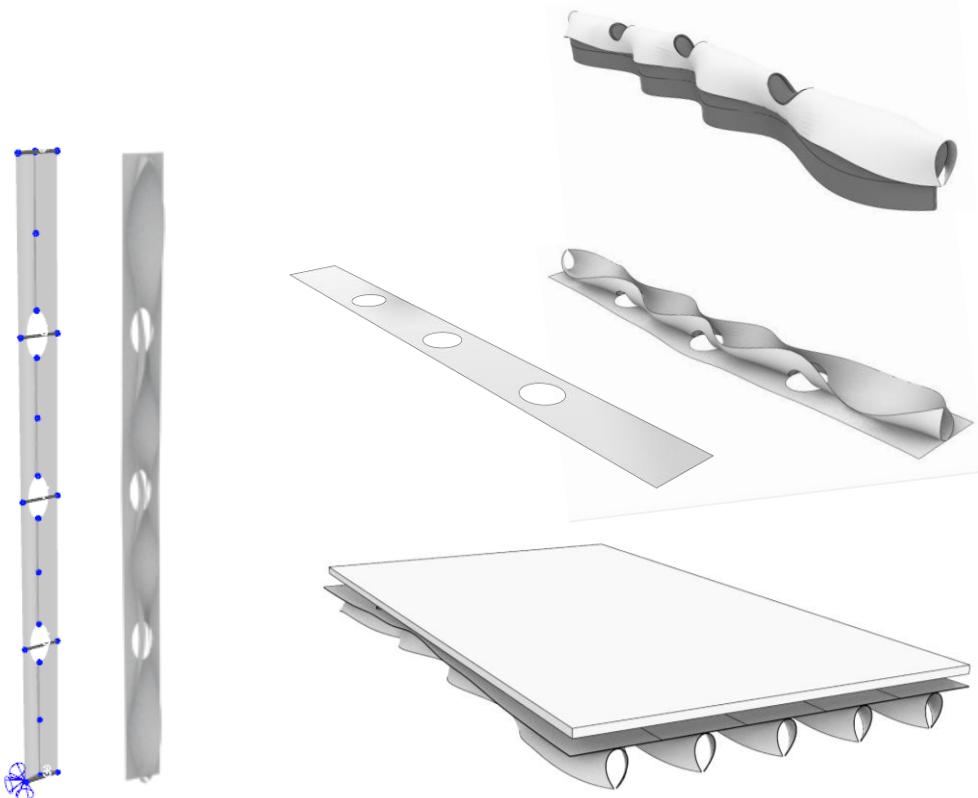
ITECH Course: Material and Structure

2018

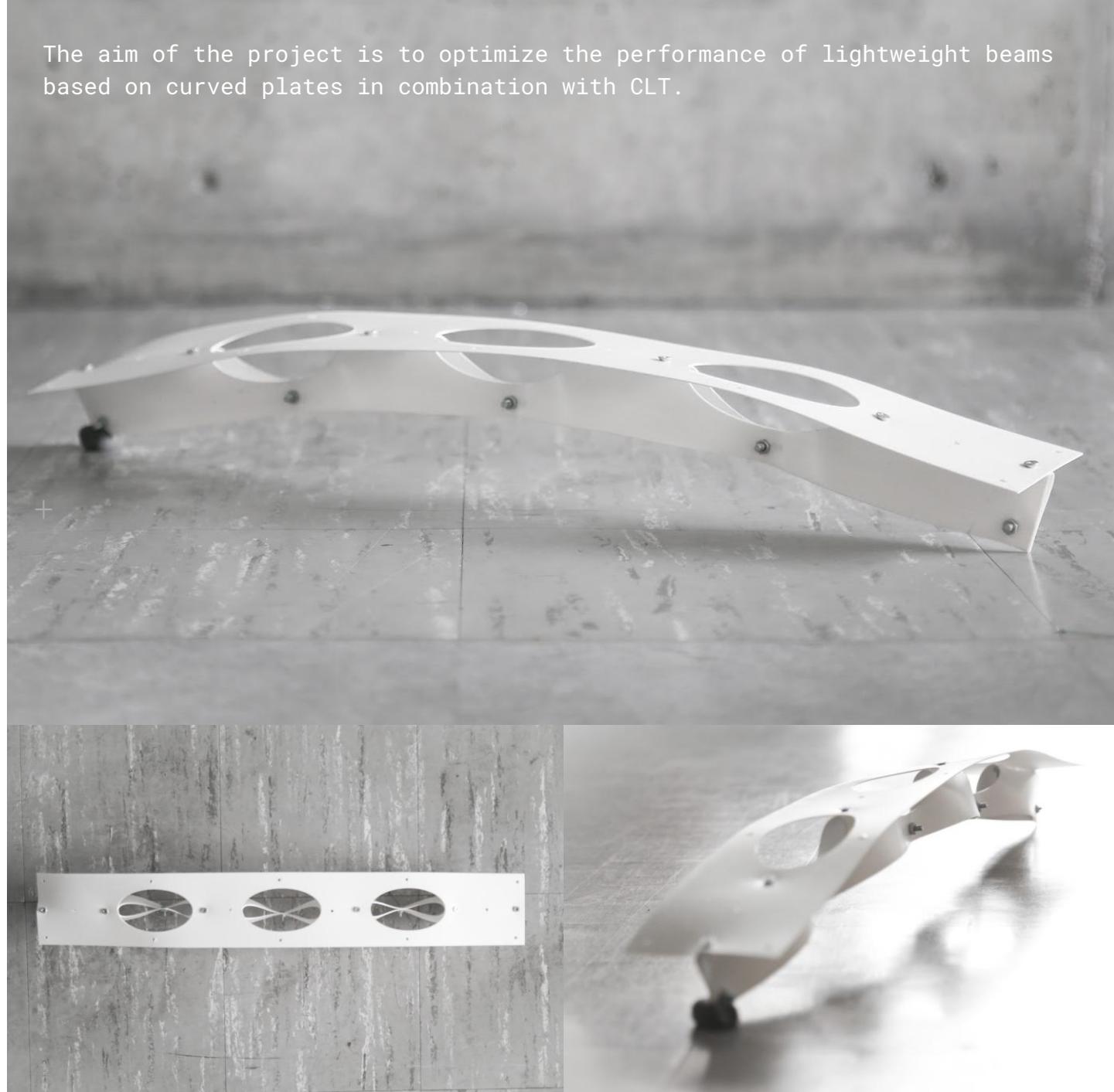
ITKE Institute, University of Stuttgart, DE

task

Entire Process



The aim of the project is to optimize the performance of lightweight beams based on curved plates in combination with CLT.



work

## FLECTOFOLD

Demonstrator & Performance Monitoring Device

tech

Compliant Mechanism

role

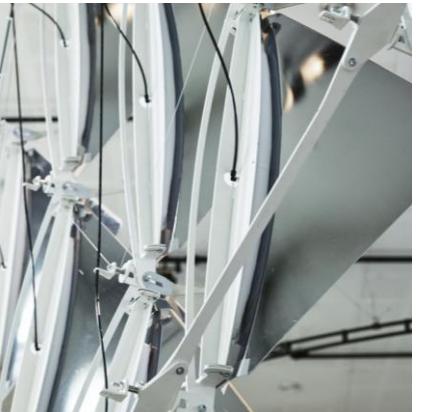
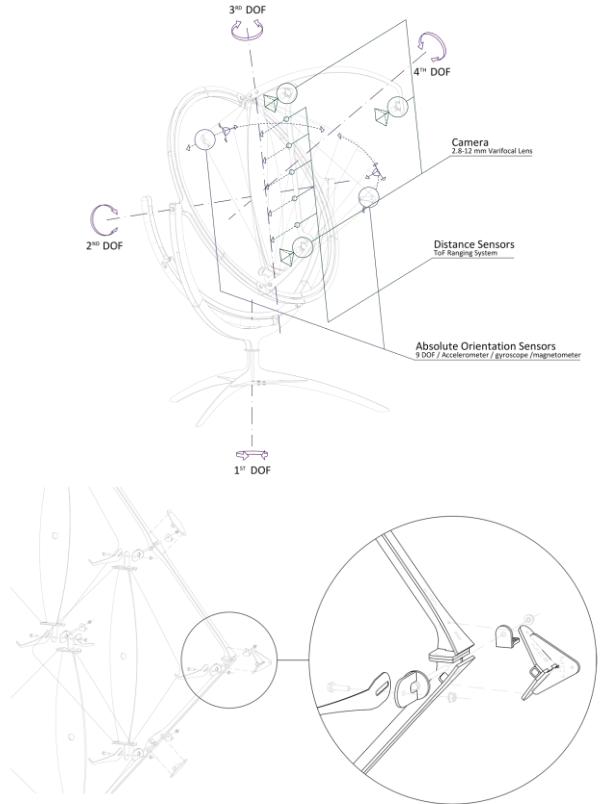
Student Assistant (HiWi)

2018

ITKE Institute, University of Stuttgart, DE

task

Design Development, Fabrication, Assembly



Pictures © ITKE University of Stuttgart

The aim of this project was to monitor, evaluate and showcase the potential of materially graduated FRP as a material solution for climate adaptive building envelopes. To read more, click [here](#).



work

## TRAIN STATION

FlectoFold Design Development

tech

Compliant Mechanism

role

Competition

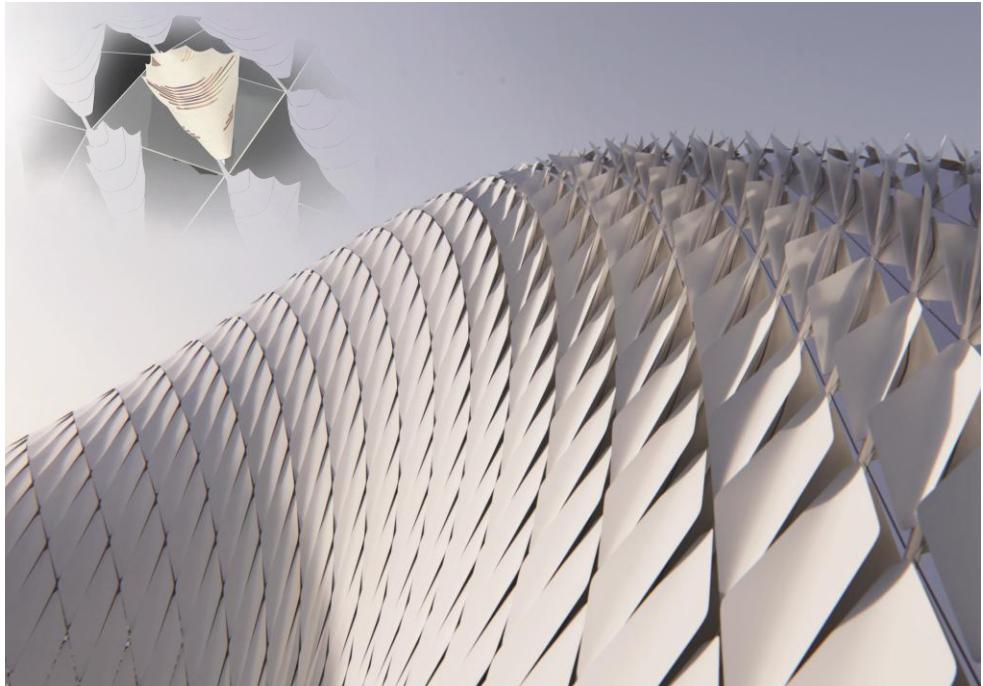
2018

Saman Saffarian Architecture Office, CZ

task

Circulation Design and Functioning Diagrams

The aim of this project was to propose an airport using segmented Flectofold shell for environmental adaptation.



Pictures © Saman Saffarian



work

## ITECH RESEARCH DEMONSTRATOR 2018-19

Biomimetic Adaptive Architecture

tech

Robotic Carbon Fiber Placement, Haptic Adaptive

role

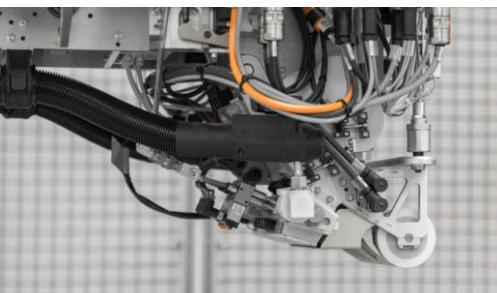
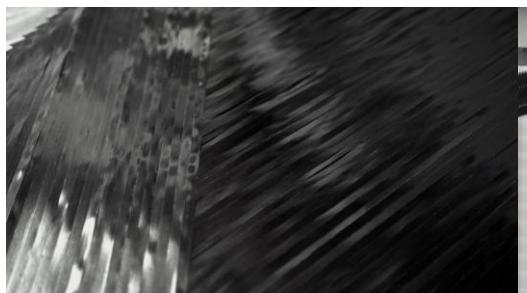
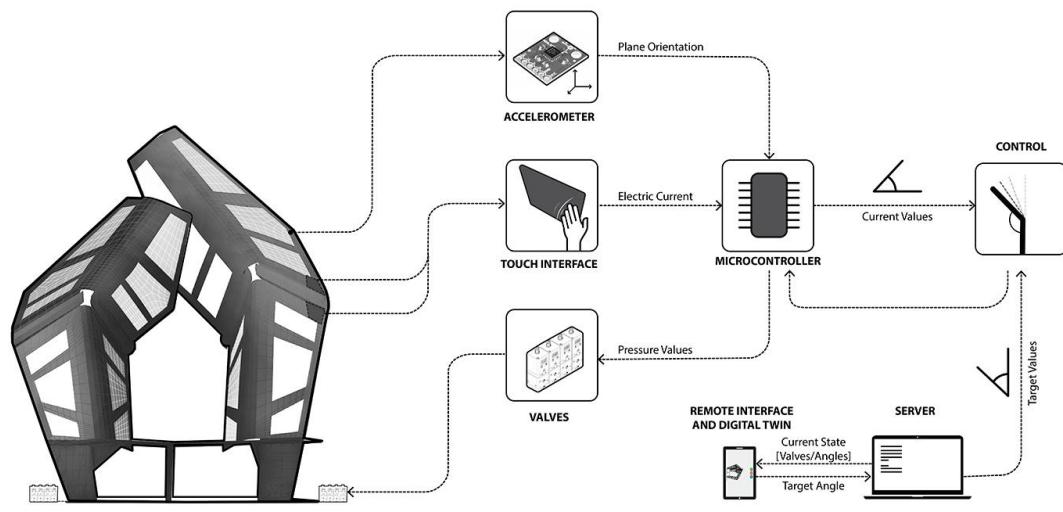
ITECH Studio Project (2019)

2019

ICD / ITKE Institutes, University of Stuttgart, DE

task

Simulation, Fabrication



Pictures © ITKE / ICD University of Stuttgart



The ITECH research demonstrator 2018/19 investigates large-scale compliant architecture inspired by the folding mechanisms of the Coleoptera Coccinellidae (Ladybug) wings. To read more click [here](#).

work

## ELECTROACTIVE SKIN

Towards Bio-inspired Responsive Envelopes

tech

Integration of EAP with Textile

role

Master's Thesis (2019)

2019

University of Stuttgart (*BioMat/ITKE, ICD*), DE  
Fraunhofer Institute (*IPA*), DE  
Institute of Aircraft Design (*IFB*), DE

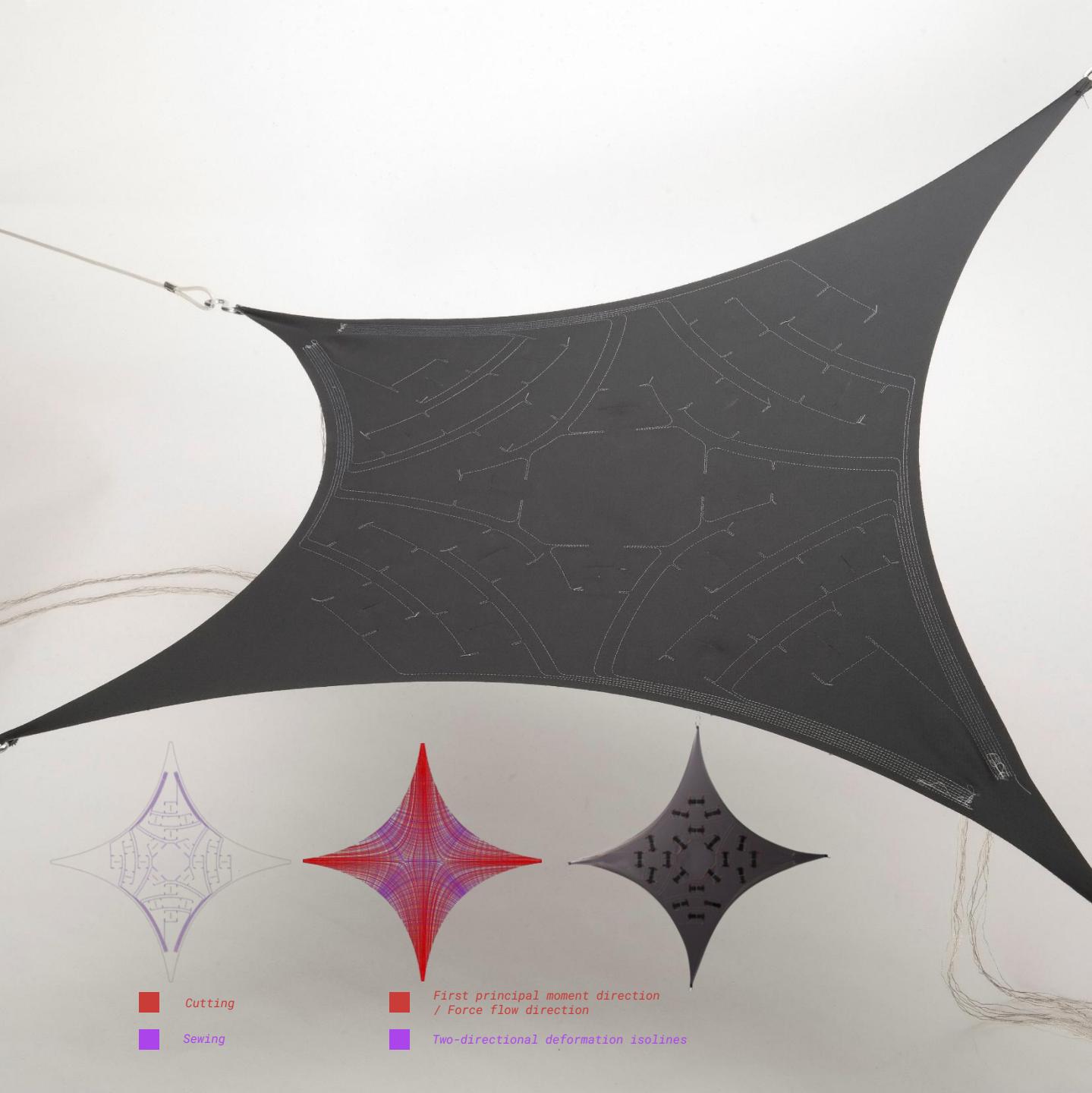
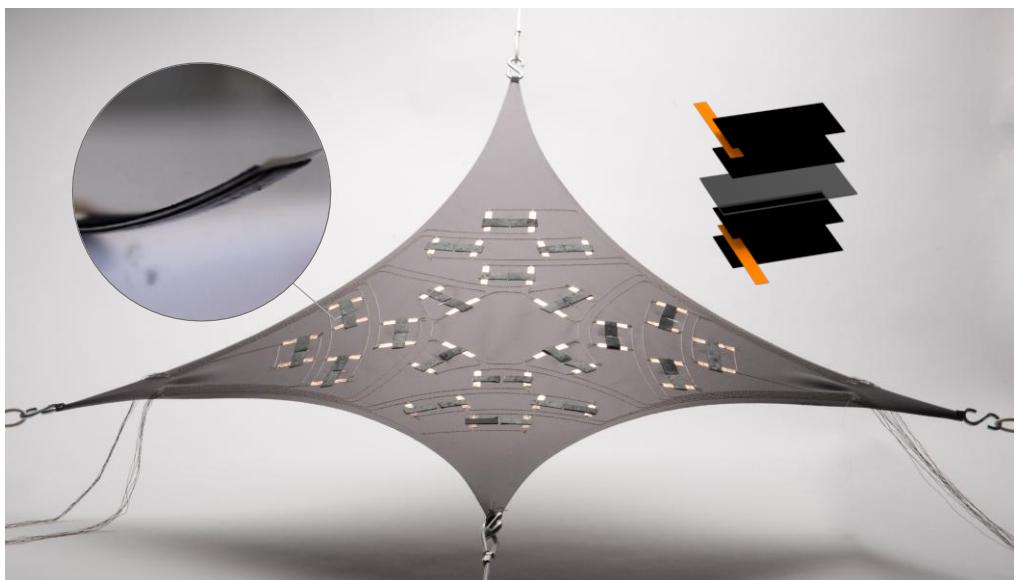
task

Entire Process

The aim of this research is to investigate actuatable apertures in architectural skin through incorporation of ionic electroactive polymer.

To see the video, click [here](#).

To read the published paper, click [here](#).



work

## ADAPTIVE TOWER

SFB1244 Adaptive Building Skin Demonstrator

tech

Integration of EAP with Textile

role

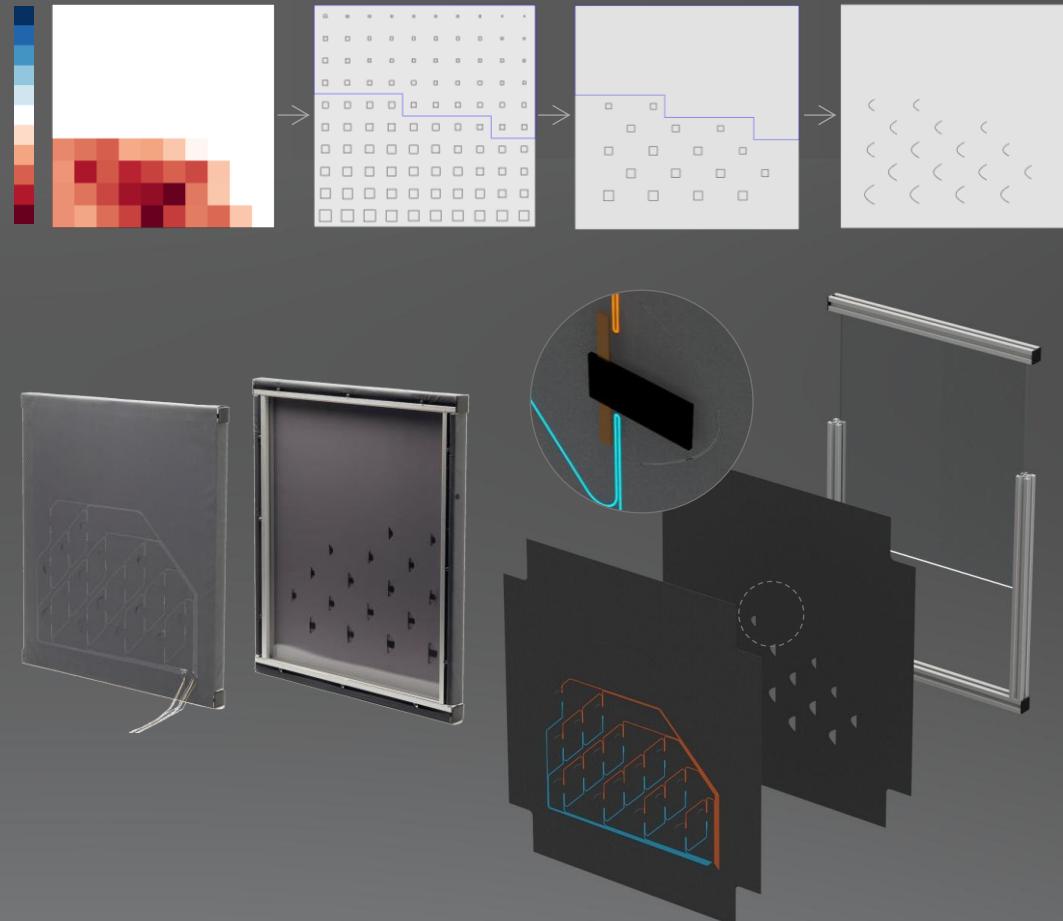
Master's Thesis (2019)

2019

University of Stuttgart (*BioMat/ITKE, ICD*), DE  
Fraunhofer Institute (*IPA*), DE  
Institute of Aircraft Design (*IFB*), DE

task

Entire Process



This research contributes to the ongoing SFB1244 "Adaptive Building Skins and Structures for the Built Environment of Tomorrow", funded by the German Research Foundation (DFG) under the following schema:

C03 – Electroactive polymer actuators and arrays for switchable breathability in building skins

To read more, click [here](#).



work

## MAIN STATION STUTTGART 21

Reinforced Concrete Shell

tech

Computational

role

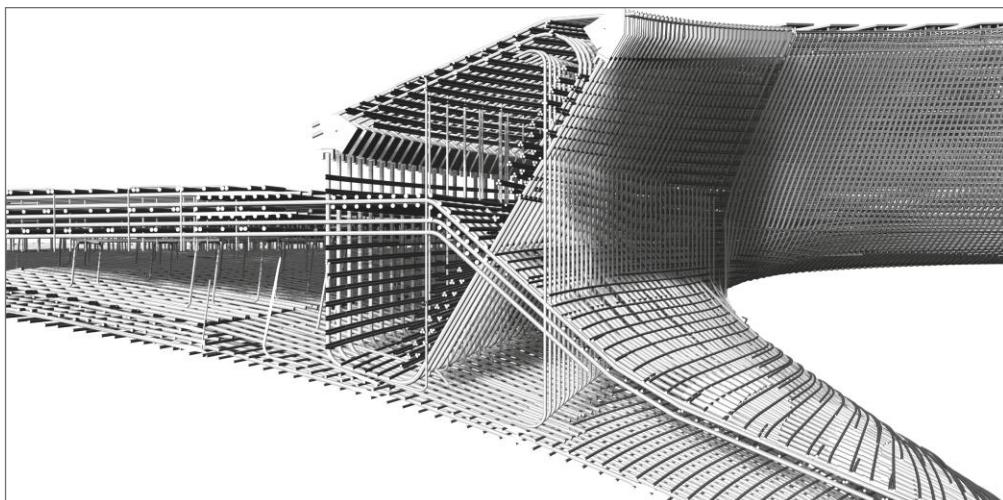
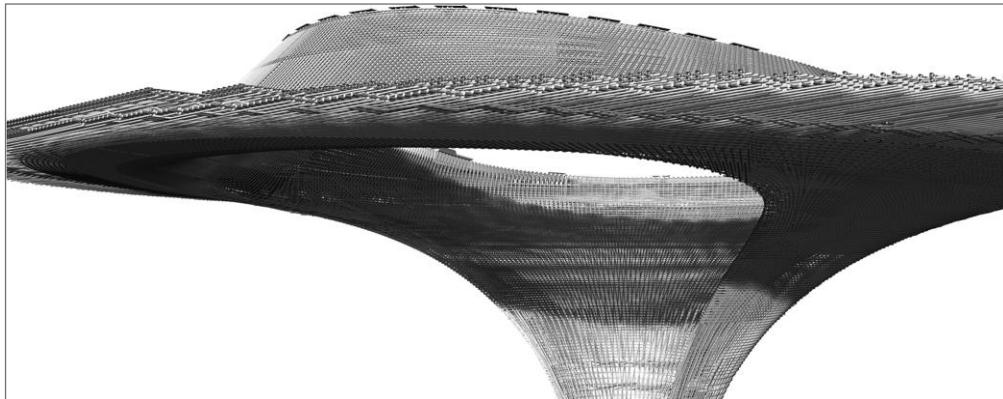
Full-time Employment

2020

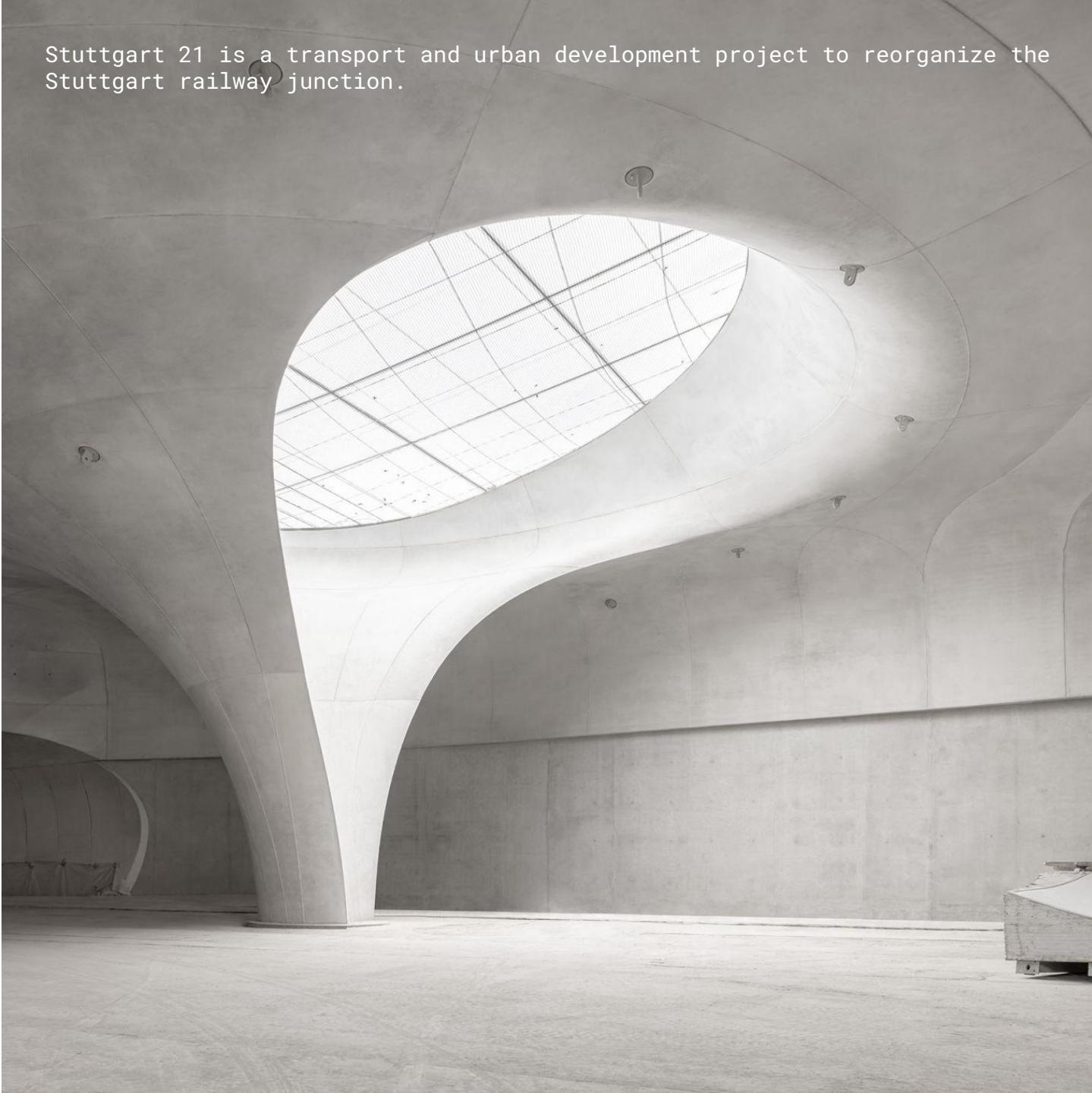
*Werner Sobek AG Stuttgart, DE*

task

Computational Design



Stuttgart 21 is a transport and urban development project to reorganize the Stuttgart railway junction.



work

## MODUS HIGH-RISES

Modular Procedural Assembly

tech

Computational Design

role

Individual Project

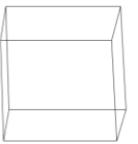
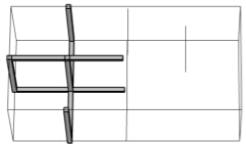
2020

*DesignMorphine Workshop*

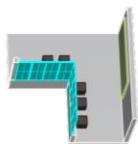
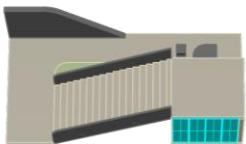
task

Computation

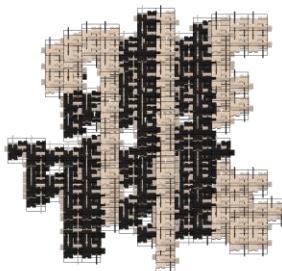
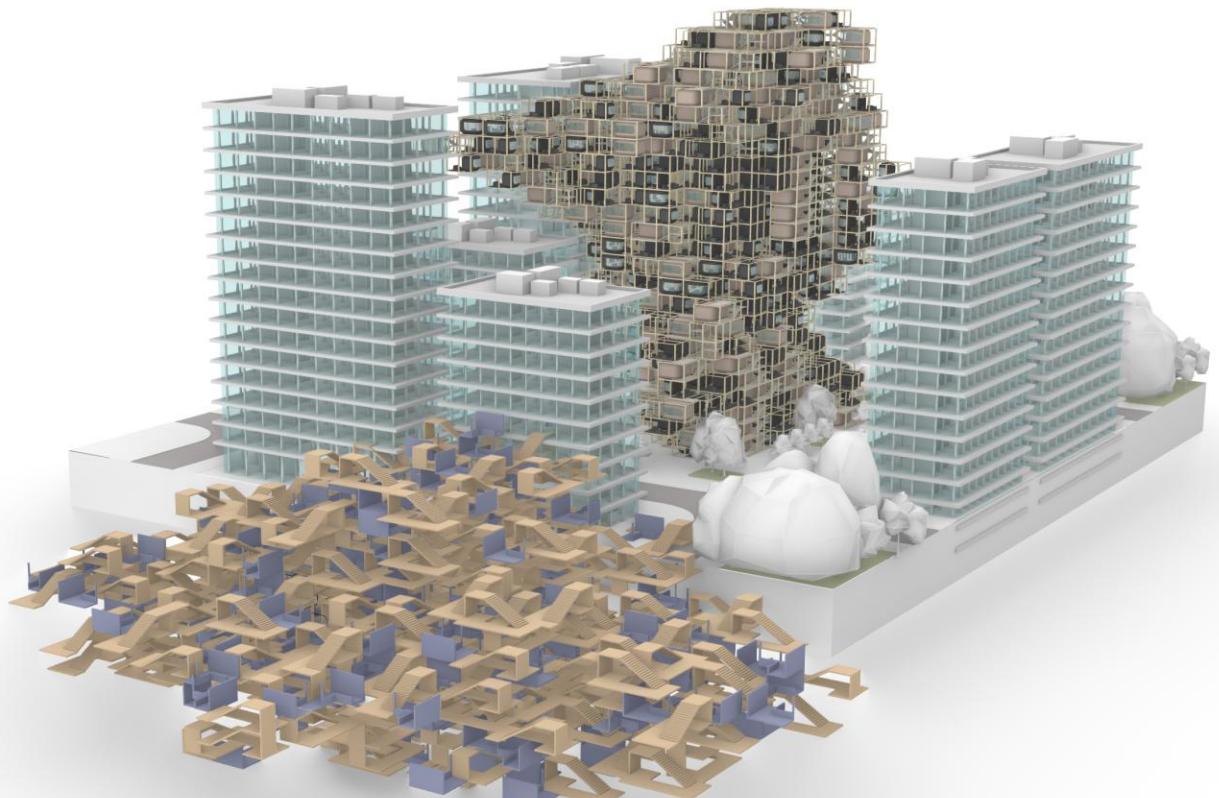
The aim is to create modular procedural modules via WASP within growing transformative spaces, that can react to the changing streams of the information society.



Modules Option 2



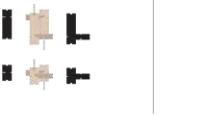
Modules Option 1



Two Components Aggregation



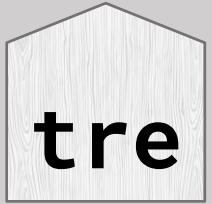
One Component Aggregation



Component 2

Component 1

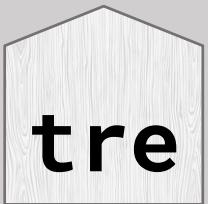
## KAPITTEL II



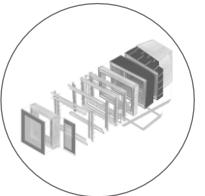
trebaserte  
prosjekter

Det andre kapittelet inkluderer **utvalgte innovative treprosjekter** som viser et aspekt ved tre og dets tilhørende **fabrikasjonsteknikker**.

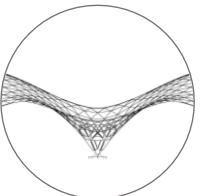
## KAPITTEL II



trebaserte  
prosjekter



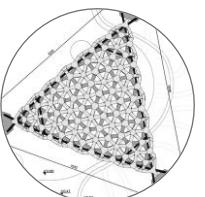
1 IBA TIMBER PROTOTYPE HOUSE  
Advance CNC Fabrication



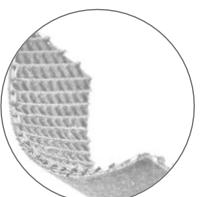
2 FUNICULAR TIMBER GRIDSHELL  
Form-finding



3 SHINGLE WALL  
KUKA Robotic Fabrication



4 BIOMAT PAVILION  
Vacuum Molding Bio-material



5 SMART BIO-STRUCTURE  
Wood Filament 4D-Printing



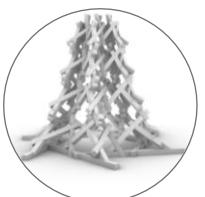
6 ODIN CHAIR  
Bending Active CNC Plywood



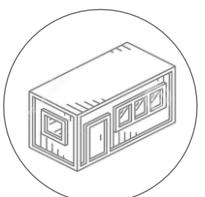
7 HEXA TOWER  
Triple Scarf Timber Joinery



8 INTER-HYGRO-JOINERY  
Hygroscopic Analysis via CT Scanning



9 INTERLOCKING TOWER  
Hundegger Production and AR Assembly



10 MODULAR HOUSING  
Timber Construction and Manufacturing

work

## IBA TIMBER PROTOTYPE HOUSE

Digital Log Cabin

tech

Computational Design and CNC production

role

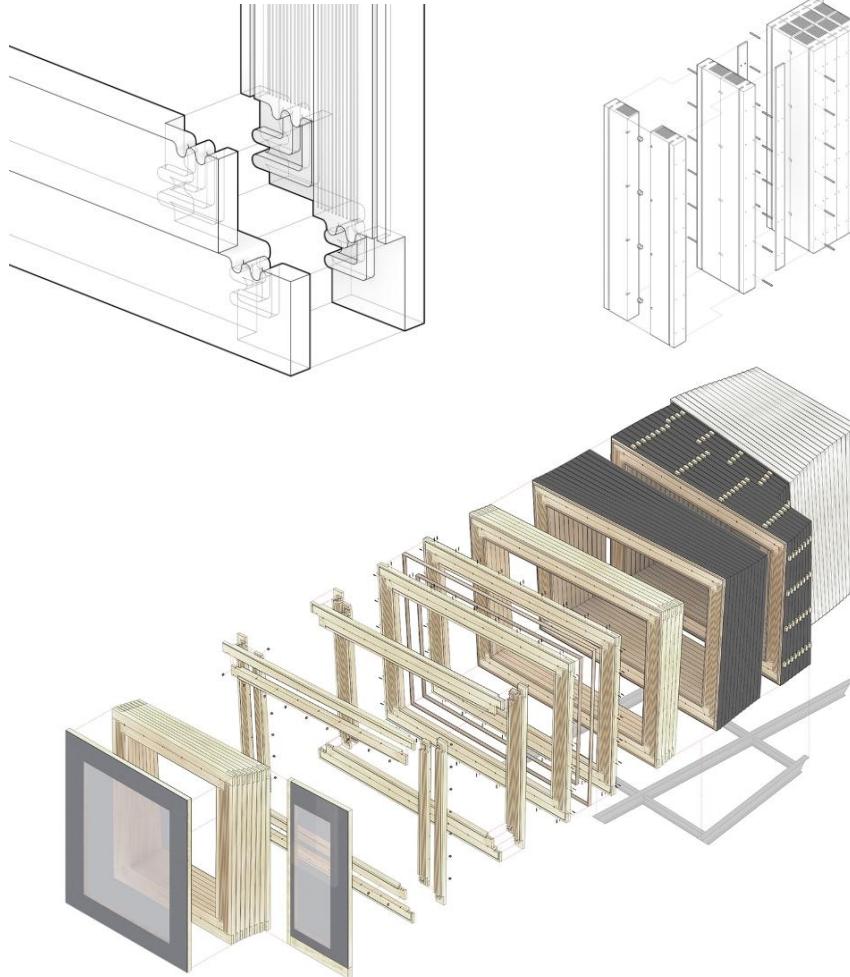
Student Assistant (HiWi)

2017

*ICD Institute, University of Stuttgart, DE*

task

Construction



Pictures © ICD/ITKE University of Stuttgart

The IBA Timber Prototype House combines the benefits of traditional low-cost timber construction with advances in computational design and fabrication technologies. To read more click [here](#)



work

## FUNICULAR TIMBER GRIDSHELL

Timber Grid-shell with Steel Connectors

tech

Form-finding and Optimization for 3D-printing

role

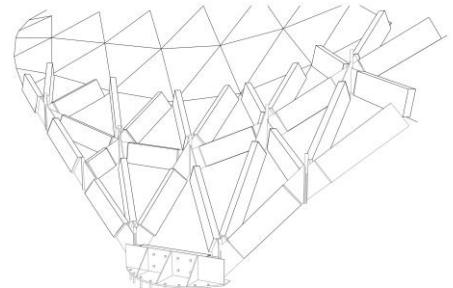
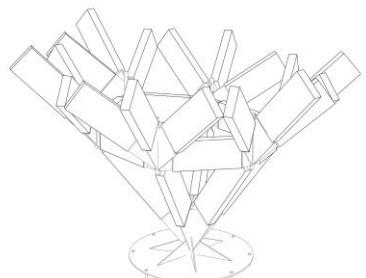
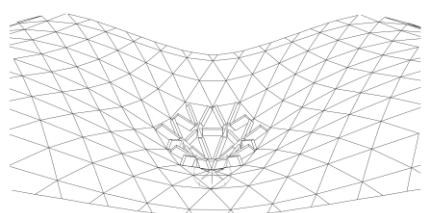
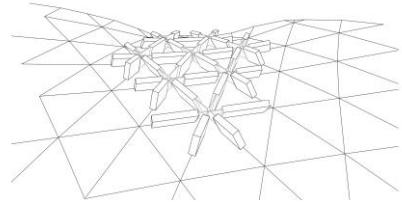
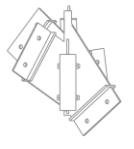
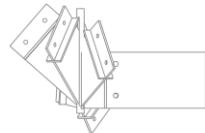
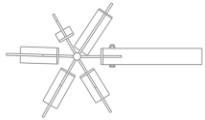
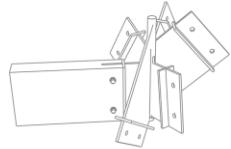
ITECH Course: Form-finding

2017

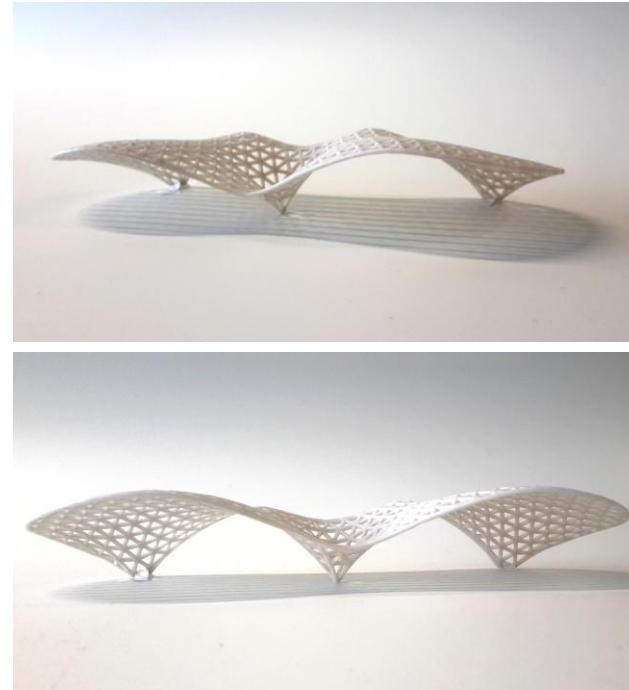
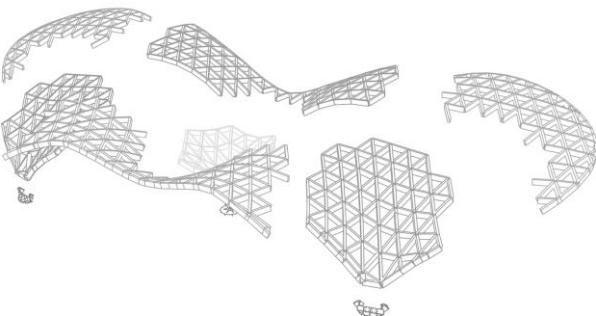
ITKE Institute, University of Stuttgart, DE

task

Entire Process



The aim of this project is to create series of bus stations as a part of VVS in Stuttgart based on funicular timber grid shell.



work

## SHINGLE WALL

Shingle Component

tech

Computational Design and Robotic Fabrication

role

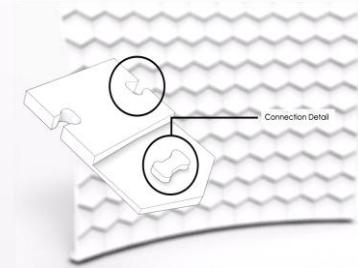
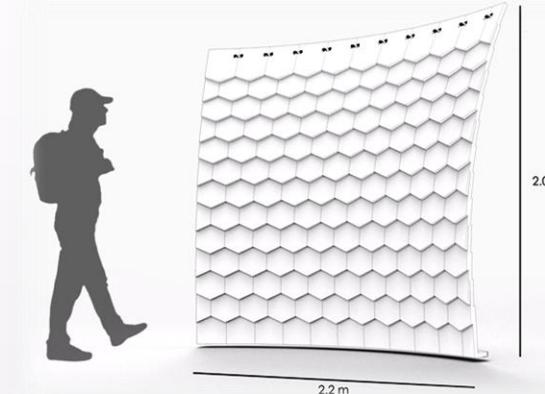
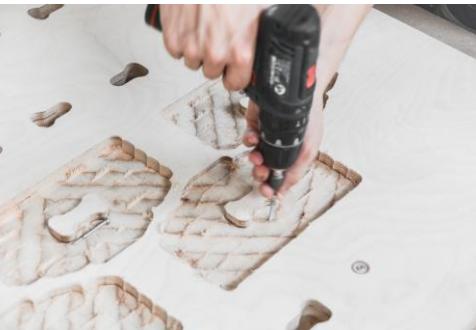
ITECH Group Project

2018

ICD Institute, University of Stuttgart, DE

task

Entire Process



The Shingle Wall is a robotically fabricated segmented synclastic shell, which is the outcome of the robotic milling assignment of ITECH's Computational Design and Fabrication Seminar 2018.



work

## BIOMAT PAVILION

Bio-composite Flexible Wood Segmental Shell

tech

Vacuum Molding Bio-material

role

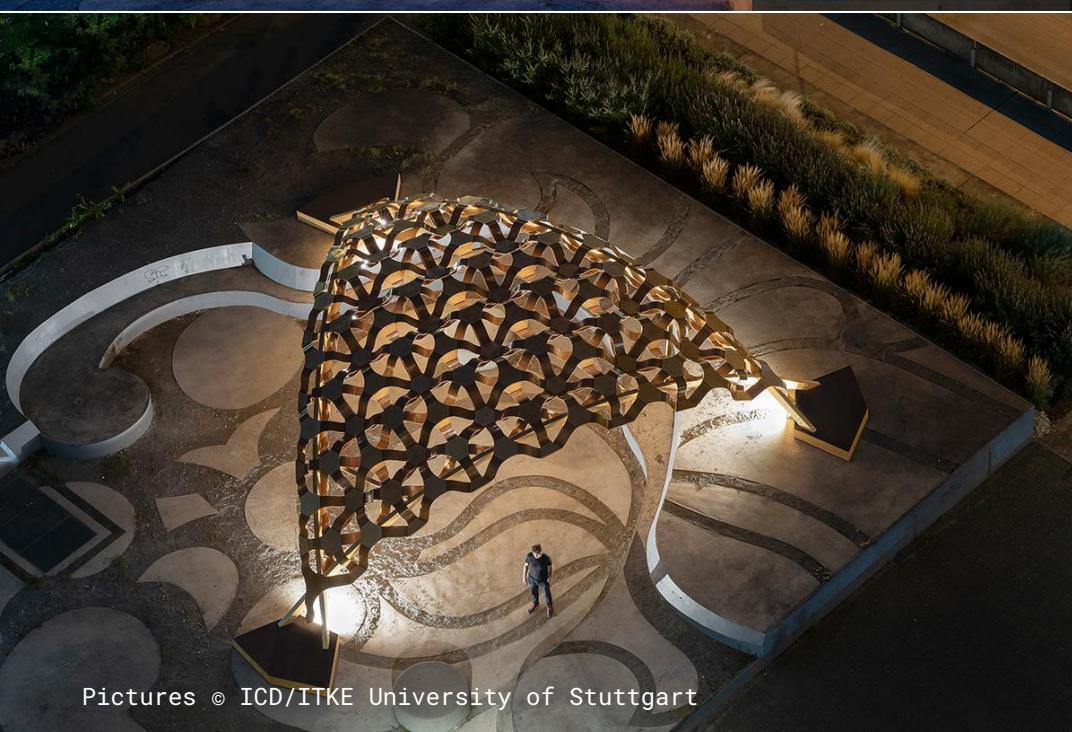
Student Assistant (HiWi)

2018

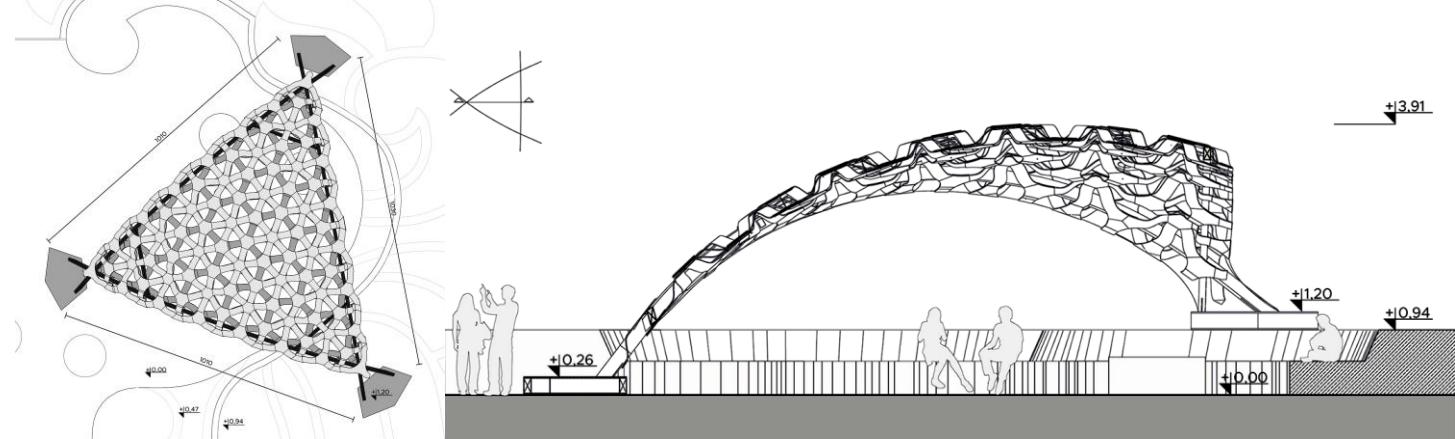
*BioMat Institute, University of Stuttgart, DE*

task

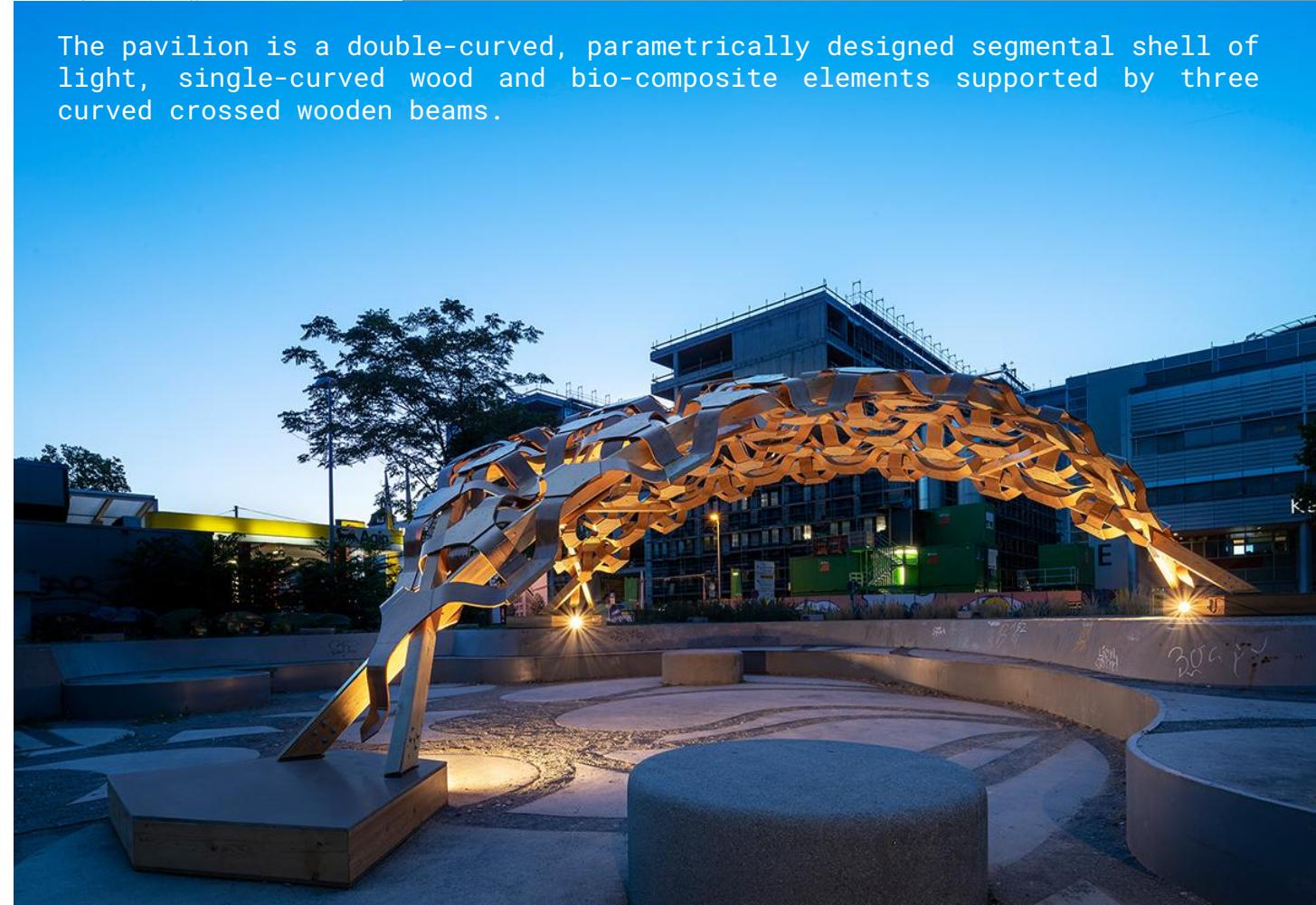
Manufacturing and Assembly



Pictures © ICD/ITKE University of Stuttgart



The pavilion is a double-curved, parametrically designed segmental shell of light, single-curved wood and bio-composite elements supported by three curved crossed wooden beams.



work

## SMART BIO STRUCTURE

Passive Adaptive Façade System

tech

4D Printed Programmable Hygroscopic Wood

role

Student Assistant (HiWi)

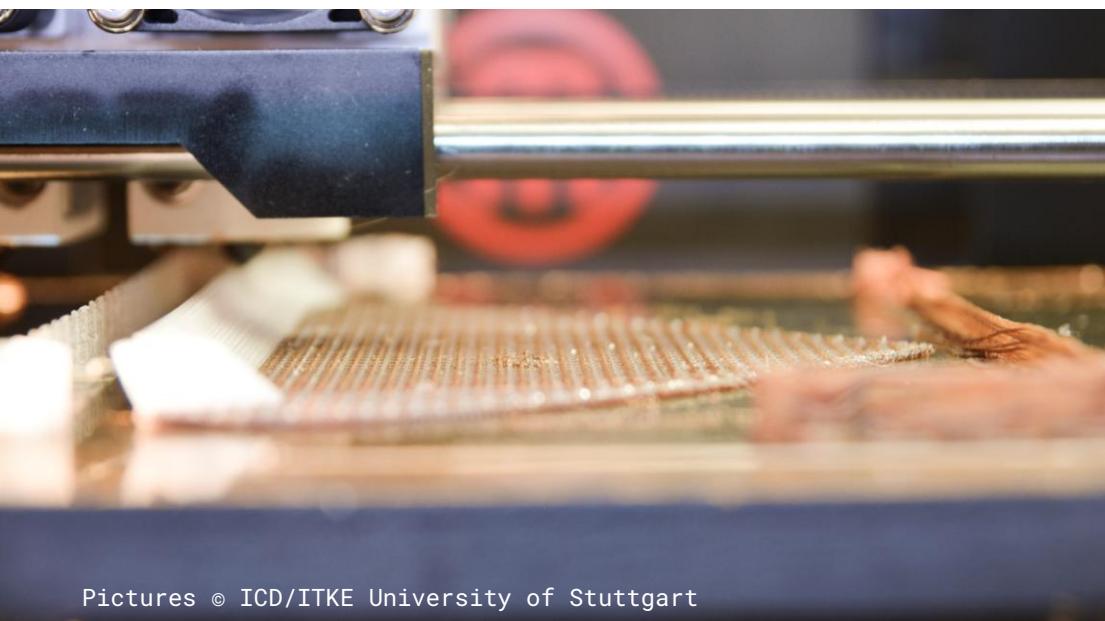
2019

*ICD Institute, University of Stuttgart, DE*

task

Simulation and Production

The potentials of programmable 4D-printing of wood filament to create environmentally passive responsive facade systems.



work

## ODIN CHAIR

Bending-active Structure

tech

Experimental Prototyping of CNC Plywood

role

ITECH Course: Chair Design

2019

*BioMat Institute, University of Stuttgart, DE*

task

Entire Process



The prepared CNC plywood layers were bended and connected in specific points leading to a 3D deformation from 2D sheets which, as a result, provided structural stiffness. To see the video, click [here](#).



work

## HEXA TOWER

Triple Scarf Timber Joinery

tech

FEA and Fabrication Method

role

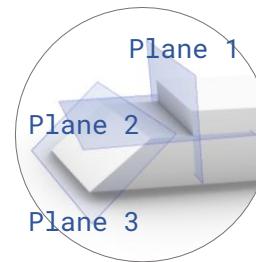
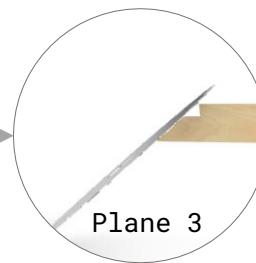
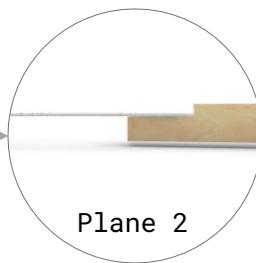
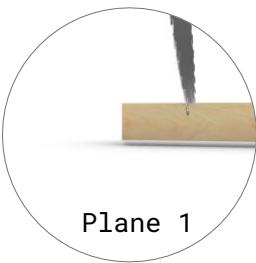
Research Project

2020

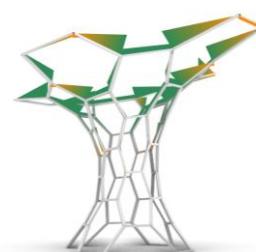
IVB Institute, NTNU i Gjøvik

task

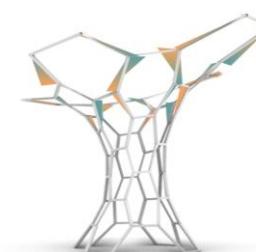
Entire Process



$M_x$



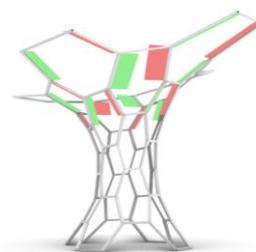
$M_y$



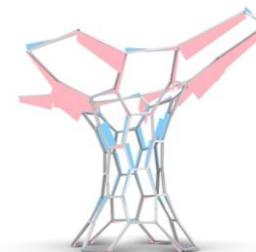
$M_z$



$N_x$

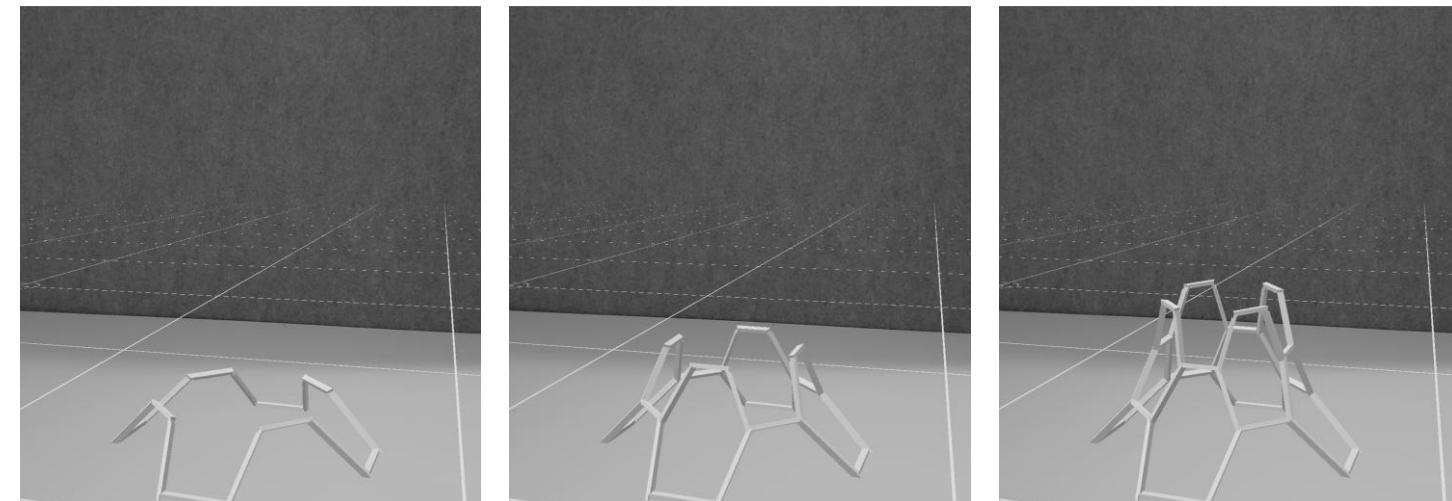
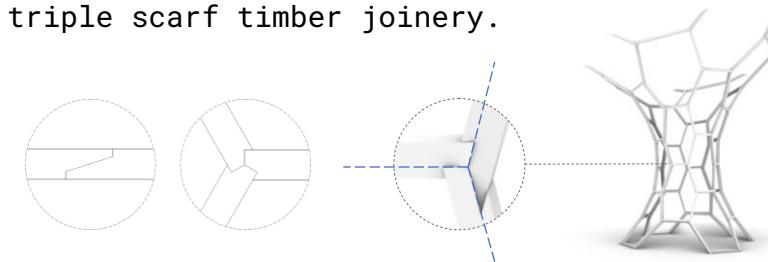


$N_y$



$N_z$

The aim of this project is to rethink of vernacular scarf joinery and extend it for triple scarf timber joinery.



work

## INTER-HYDRO-JOINERY

Encapsulating Interlocking Timber Joinery

tech

Hygroscopic Study of Wooden Joinery via CT Scanning

role

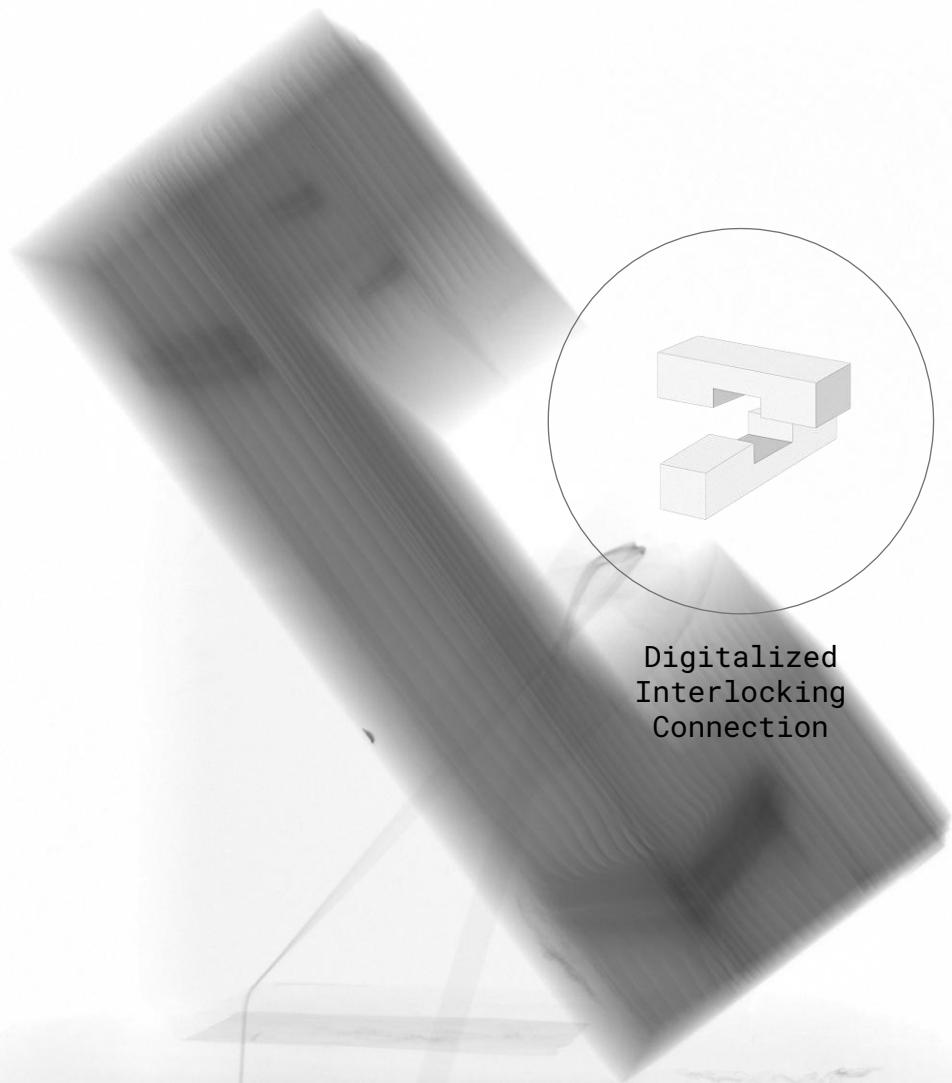
Research Project

2021

IVB Institute, NTNU i Gjøvik, NO

task

Entire Process

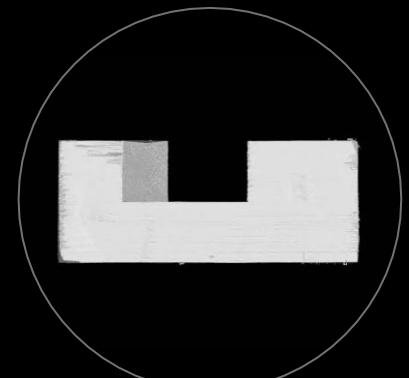
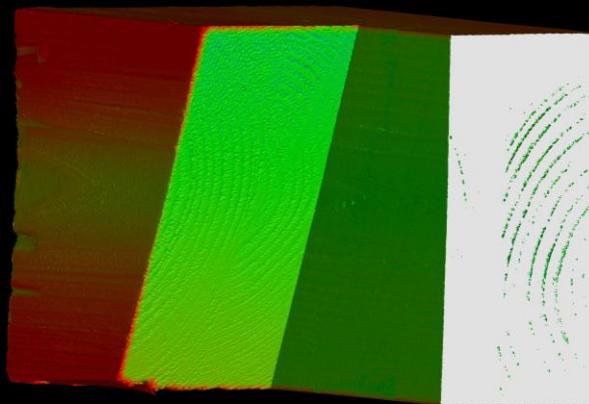
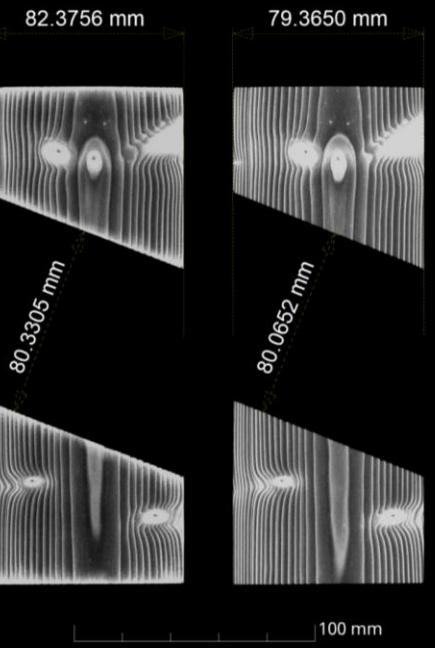
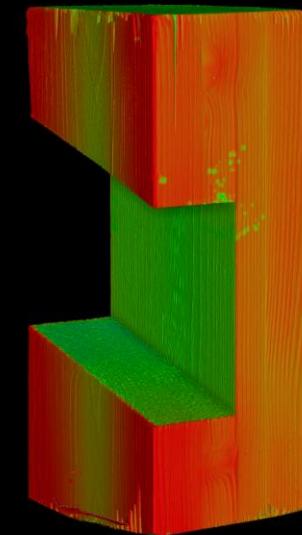


Investigation of wood's hygroscopicity via CT scanner to reinforce the structural capacity of interlocking connections.

Deviation [mm]

2.0000  
1.6000  
1.2000  
0.8000  
0.4000  
0.0000  
-0.4000  
-0.8000  
-1.2000  
-1.6000  
-2.0000

Y  
Z  
X



work

## INTERLOCKING TOWER

Sequential Circular Augmented Construction

tech

Hundegger Production and Sequential AR Assembly

role

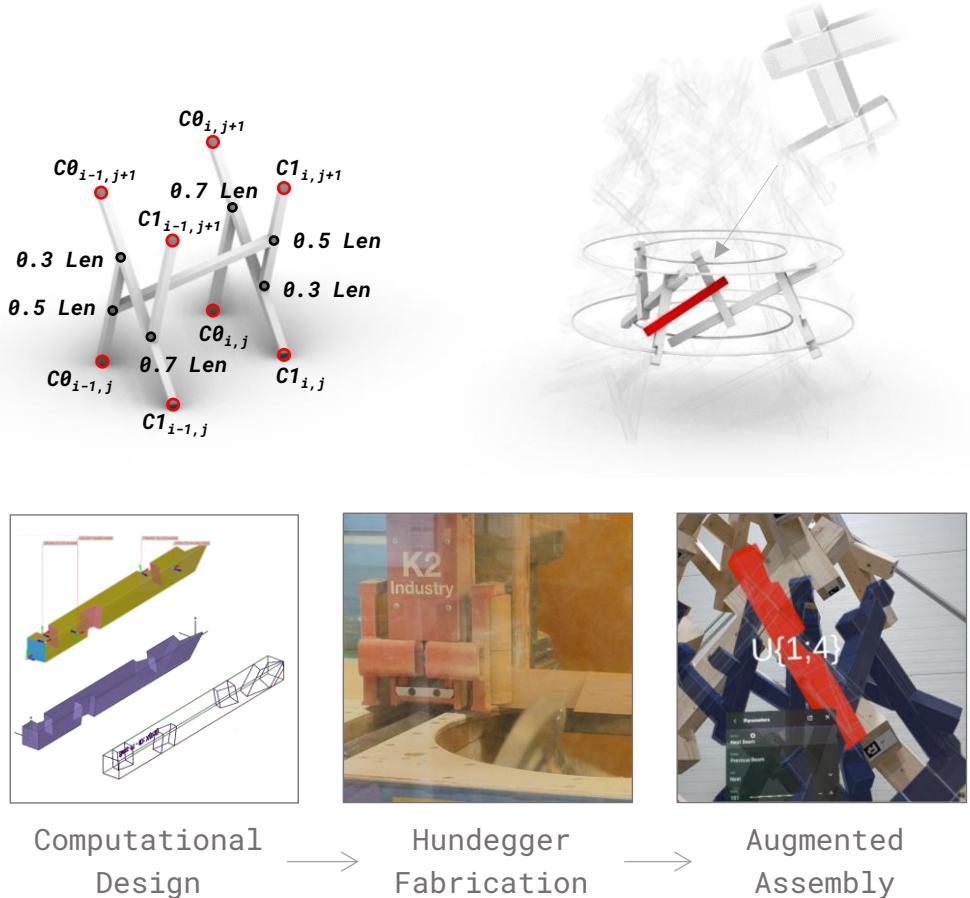
Research Project

2022

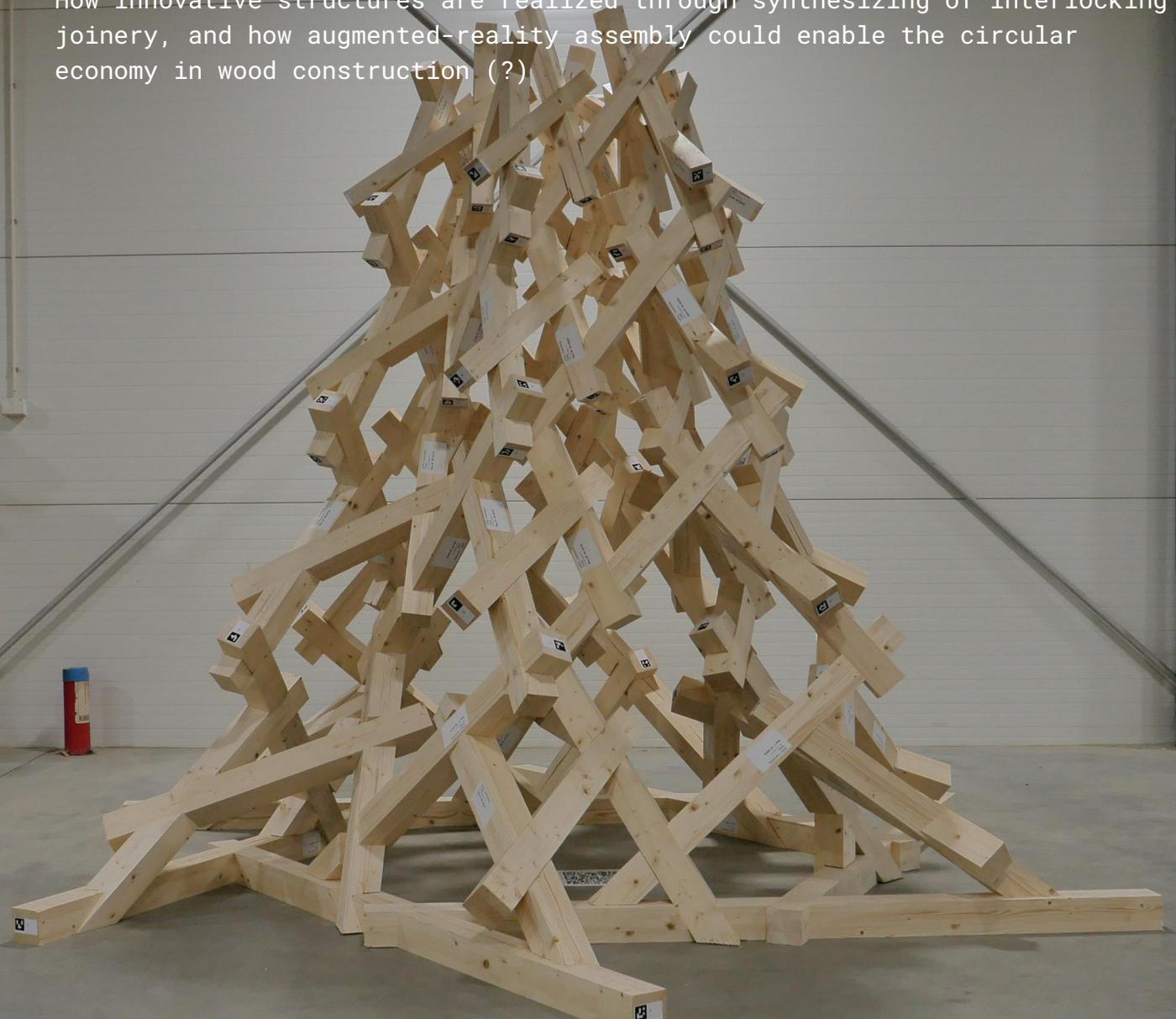
IVB Institute, NTNU i Gjøvik & Østlaft AG, NO

task

Entire Process



How innovative structures are realized through synthesizing of interlocking joinery, and how augmented-reality assembly could enable the circular economy in wood construction (?)



work

## MODULAR HOUSING

Serial Timber Housing

tech

Modular Timber Construction and Production

role

Full-time Employment

2023

*timpla GmbH, Eberswalde-Berlin, DE ([timpla.eu](http://timpla.eu))*

task

Timber Construction Design

Germany's largest wooden module factory ...

We are industrializing wooden modular construction to establish it as the strongest and most sustainable alternative for residential and commercial construction.



Foto: Gataric Fotografie



Foto: Ruedi Walti



Foto: Stefan Hofmann, Biel