Architectural Engineering Graduation Studio

SHELTERRA

Reconfigurable Masonry
Settlements for Refugees

Graduation Plan

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Studio		
Name / Theme	Architectural Engineering / 1 Million Homes	
Main tutor	Mo Smit	Circular design, Sustainable buildings and neighborhoods
Research tutor	Pirouz Nourian	Generative design
Building Technology tutor	Paddy Tomesen	Craftsmanship, Natural materials
Argumentation of choice of the studio	Having a background in Structural Design, I was always interested in technical aspects and ensuring the feasibility of the design projects. Architectural Engineering studio seemed the only right choice for me as it combined both of the very important focuses. First of all, it deals with the social problems and encourages to innovate and go beyond what already exists. And secondly, it doesn't stop on the stage of the beautiful concept but forces the students to find out how to actually make the design work by researching all of its technicalities.	

Graduation Project	
Title	ShelTerra
Sub-title	Reconfigurable Masonry Settlements for Refugees
Goal	
Location	Afghanistan
The posed problem	The ongoing wars result in the destruction of homes and settlements and leave the Afghan population with the minimum levels of safety and chances for survival. People are in urgent need for shelters.
The posed problem	How can we design a set of a few polyhedral cells with which we can make many variations of modular shelters (funicular spatial shell-like structures)?
Design assignment	How can we design reconfigurable shelters in Afghanistan that can be constructed from available materials, have easy assembly procedures, accommodate different functions and allow for healthy, safe, sustainable living for refugee communities?

Process – Method Description	
Research	Design
Secondary data analysis / Literature study	
▪ Different types of space tessellations (2D, 2.5D, 3D) ▪ Form finding and shape optimization algorithms (Dynamic Relaxation, Force Density Method, Thrust Network Analysis, Graphic Statics)	Background: ▪ Existing climate and topography ▪ Traditional vernacular architecture ▪ Typical settlements ▪ Cluster and settlement formation Existing solutions: ▪ UN ▪ UNHCR Materialization: ▪ Composition of compressed earth blocks ▪ Construction with CEB ▪ Brick rchitectural expression Detatization: ▪ Water protection of earth elements ▪ Water collection ▪ Low-tech heating systems
2D Sketching	
▪ Pattern generation	▪ Space tessellation ▪ Dimensiality of the shelter structures ▪ Settlement composition
	3D physical modelling
	▪ Physical demonstration ▪ Structural validation
	3D computer modelling and 2D representation
	▪ Digital representation and demonstration (Rchino + Grasshoper, Photoshop, Illustrator, Procreate, InDesign)

Literature

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