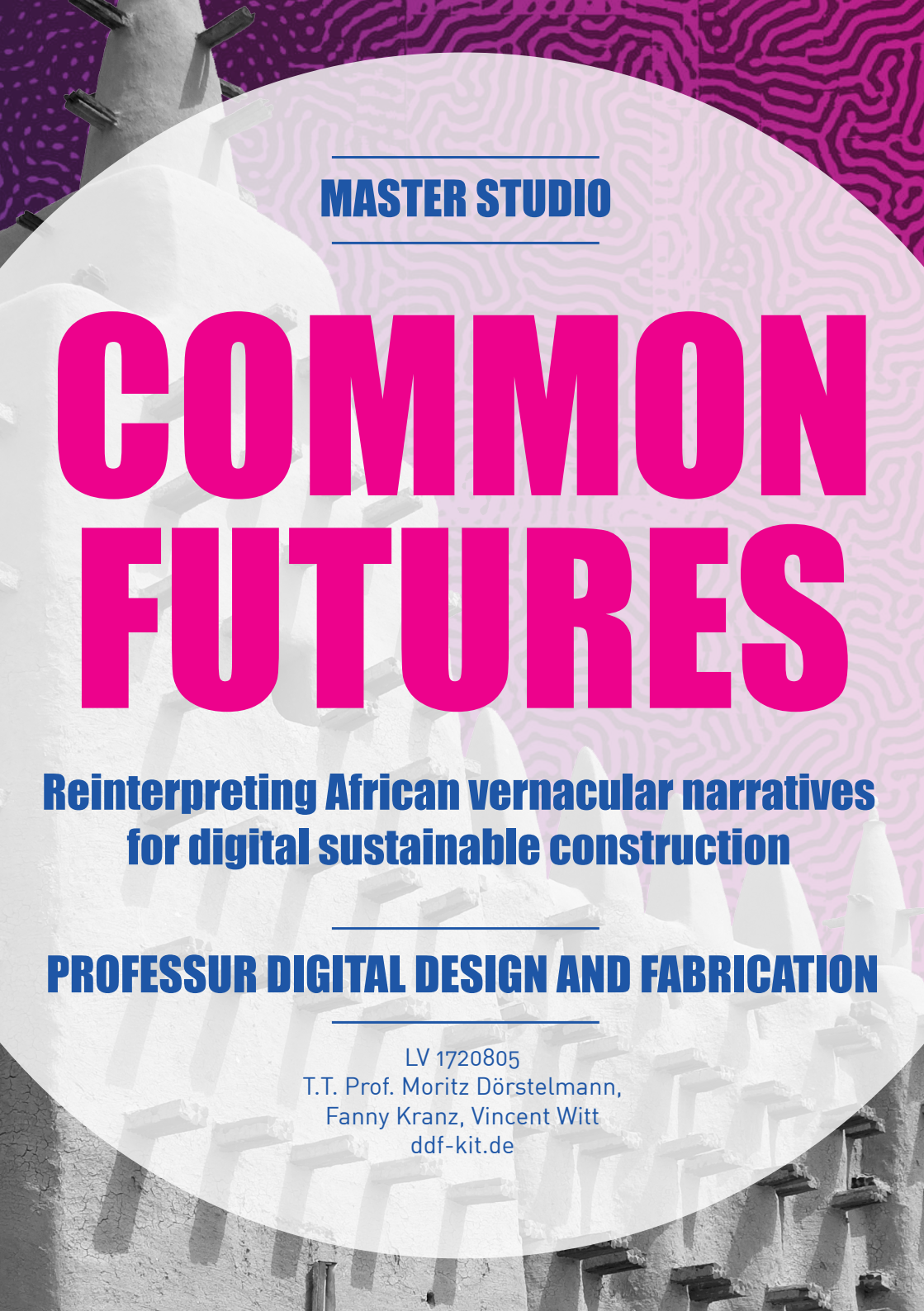

MASTER STUDIO

COMMON FUTURES

Reinterpreting African vernacular narratives for digital sustainable construction

PROFESSUR DIGITAL DESIGN AND FABRICATION

LV 1720805
T.T. Prof. Moritz Dörstelmann,
Fanny Kranz, Vincent Witt
ddf-kit.de

UPDATE PAGE NUMBERS

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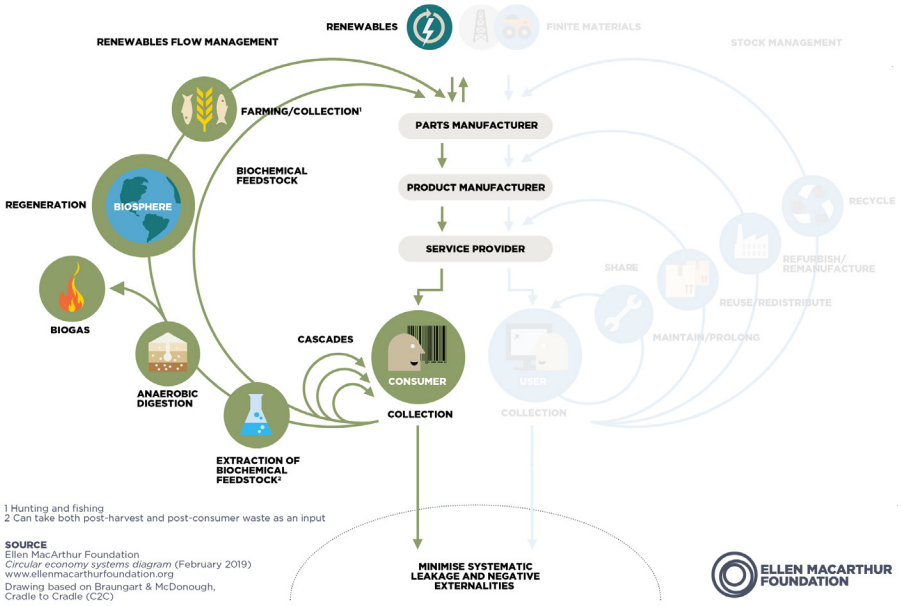
01 INTRODUCTION AND CONTEXT



Circular economy diagram by Ellen MacArthur Foundation, here highlighting the biological cycle

The building sector is responsible for more than a third of the global resource consumption, making it a key sector for the global transformation towards a circular economy (Klep, 2015). Further, most of the future building activity will not take place in developed countries, lending the afican context special importance.

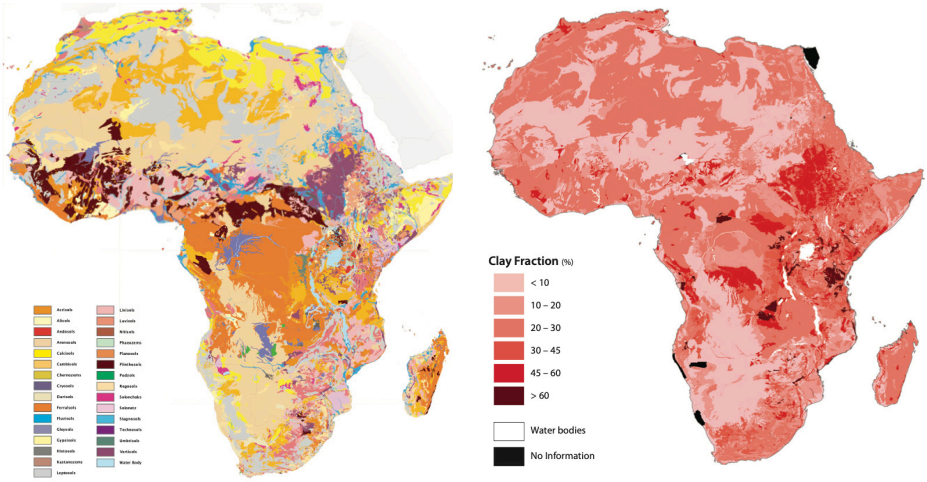
A paradigm shift towards natural and regenerative material sources and the implementation of biological cycles as well as rediscovery of vernacular building traditions represent a major opportunity for the construction industry to curtail the depletion of raw materials as well as CO2 emissions.

Digital design and fabrication methods can address these global challenges and enable novel concepts of digital circular construction through tailored processes for renewable and natural materials.

“Common Futures”

This studio wants to explore african local, renewable and verancular building traditions that used to be part of the architectural and construction repertoire but have been sidelined since the first industrial revolution.

In light of the fourth industrial revolution, which is envisioned as a fusion of technologies blurring the lines between the physical, digital and biological spheres (Schwab, 2017), we want to combine vernacular buiding technologies with digital design and fabrication, yelding new circular buidling technologies for sustbainable construction. Digital design and Fabrication in particular can sustain the industrialisation of



Prevalent types of soils and clay percentage in soil in Africa

natural materials thanks to their flexibility and versatility. In particular, they can accommodate for deviations and abnormalities, which currently represent one of the biggest obstacles in standardised serial production systems. Digital fabrication techniques can significantly increase the performance of traditional building materials such as clay, wood and natural fibres by combining them into new material systems with functionally graded properties.

Besides, traditional construction methods, which made use of natural materials, are often not structurally scalable and, due to their complexity and dependence on craftsmanship know-how, cannot be used economically on a large scale. Digital fabrication can enable the large-scale, automated production of such components, and thus their implementation in construction, both in terms of construction technology and economics.

Circular Economy in Construction - the biological cycle

As described by Ellen MacArthur Foundation, the concept of circular economy distinguishes between technical and biological cycles.

Use of rapidly renewable materials and earth-based materials in vernacular repertoire

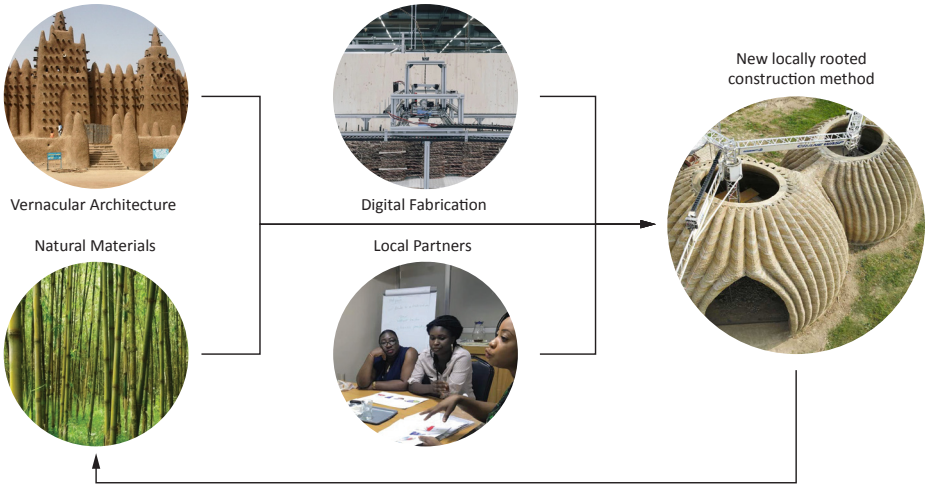
Robotic fabrication of willow components

"Common Futures" consideres both cycles. Within the biological cycle renewable and plant-based resources will be studied, regenerated and turned into construction methods. The Technical cycle with production residues and plastics from landfill will be considered in the concepts alike.

While other sectors, particularly the food industry, have already reflected this urgency of change, the construction industry is still "permeated by a number of detrimental factors such as the use of high impact materials, non-reversible building solutions, low-efficiency processes and manufacturing"(Cara et al., 2017). The development and use of building practices routed in traditional materials and pracitces and thier combination into hybrid materials on a global scale, would trigger a new paradigm for construction. Utilizing hyper local ressourcec for local challenges and not relying on globally standardized building technologies from the fossile economy.

Diagram showing the positioning of DDF's research

02 AIM



Overarching goal of Common Futures

The studio “Comon Futures” aims at developing construction solutions that are sustainable, circular and made from locally sourced material as well as deeply embeded into their local biological, economical as well as sociatal context. By combining traditional, local and vernacular building technologies with digital fabrication techniques new concepts will be developed ultimately resulting in a proof-of-concept for an envisioned construction method and architectural application. The goal is to implement the developed construction system in a construction week with local partners in summer 2025.

The proof-of-concept is based on an integrated concept that considers design, digital fabrication, assembly and reconfiguration, as well as disassembly and recycling. It will serve as a base to conceptualise the transfer of the developed buidling technology to large-scale architectural and construction concepts, through locally integrated production in the form of modular, reusable components or as structures fabricated on-site.

03 METHODS

At the intersection of research and teaching, the studio offers students the opportunity to develop their own concepts and inform them through an understanding of vernacular architecture, material, construction and digital fabrication processes.

The studio uses a series of development phases (see chapter 04), meant to guide the students through the implementation of the studio methodology, starting from contextualization, materiality and fabrication and leading to design and large-scale architectural and construction applications.

A first research on specific topics of the studio will be conducted by students individually. Subsequently, students will merge into groups of 2-3 people, combining knowledge from the different fields and develop initial concepts through exploratory physical prototypes, which are used as a medium to explore ideas related to materiality and fabrication. Based on a research-led and design-through-making approach, these experiments are carried out in rapid iterations, with rigorous and iterative refinements.

The architectural potential of these concepts is then explored by groups of 4-5 people through design iterations for experimental structures and a research demonstrator, and a final full-scale prototype, merging the knowledge developed in the previous phases.

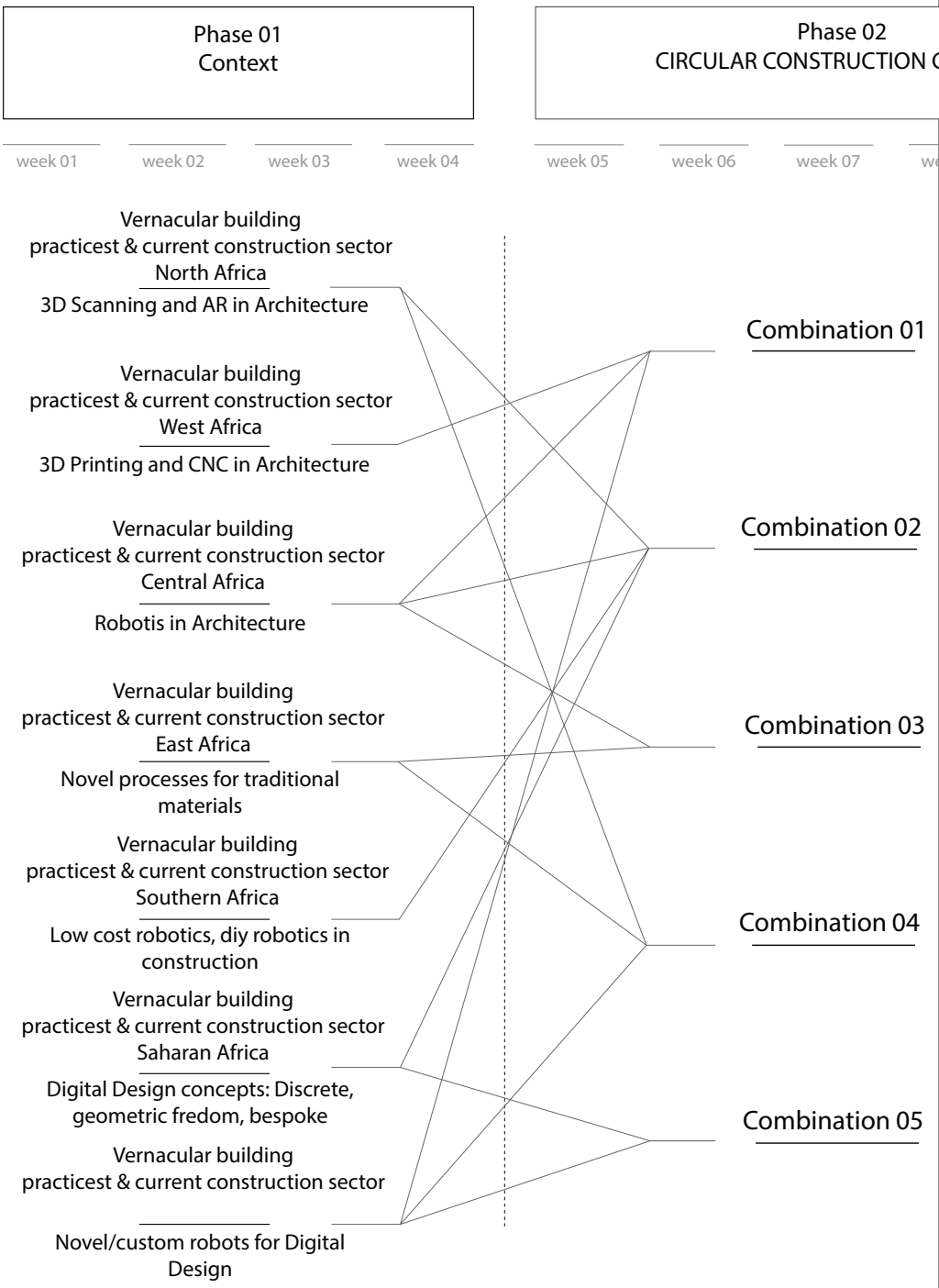
The methodology of the studio is meant to create a novel design and construction repertoire, while progressively selecting the best concept.

Through several lectures by local experts and stakeholder at the beginning of the semester students will gain insight into the local buidling sector as well as vernacular architecture of the regions.

A series of skill-building tutorials will introduces students to selected topics, processes and workflows in computational design and digital fabrication.

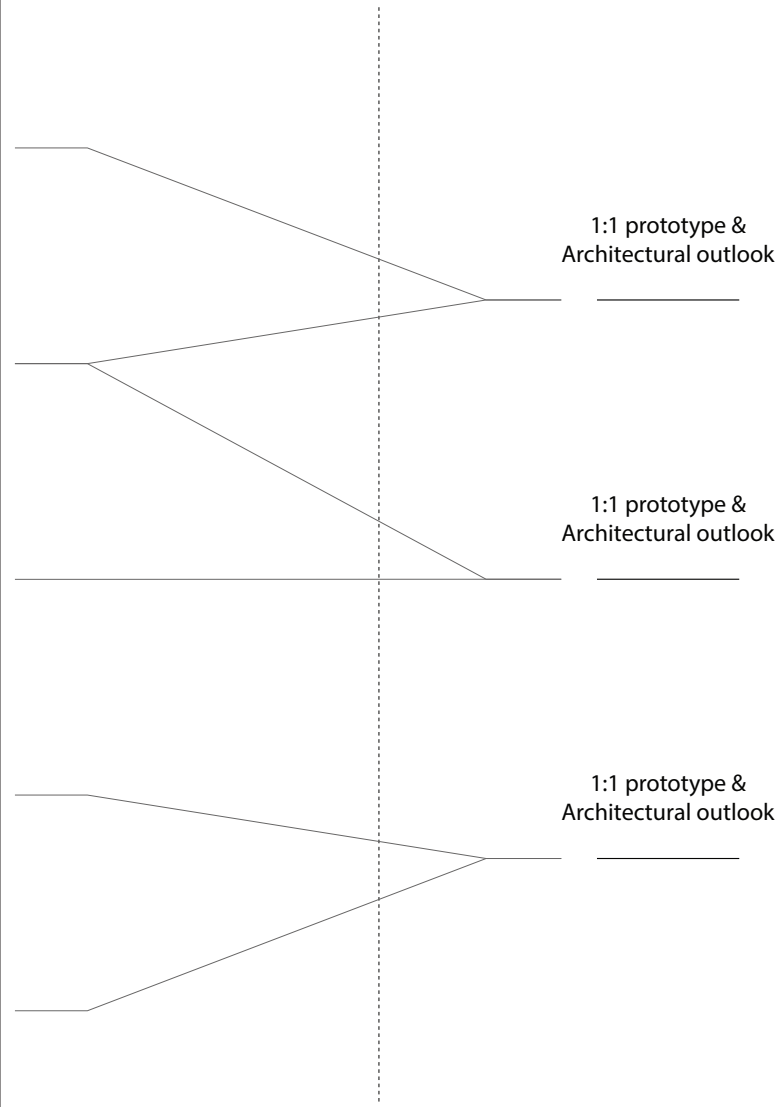
No pre-knowledge is required.

04 DEVELOPMENT PHASES


Phase 01
Context
Phase 02
CIRCULAR CONSTRUCTION
week 01
week 02
week 03
week 04
week 05
week 06
week 07
Vernacular building
practicest & current construction sector
North Africa
3D Scanning and AR in Architecture
Vernacular building
practicest & current construction sector
West Africa
3D Printing and CNC in Architecture
Vernacular building
practicest & current construction sector
Central Africa
Robotis in Architecture
Vernacular building
practicest & current construction sector
East Africa
Novel processes for traditional materials
Vernacular building
practicest & current construction sector
Southern Africa
Low cost robotics, diy robotics in construction
Vernacular building
practicest & current construction sector
Saharan Africa
Digital Design concepts: Discrete, geometric fredom, bespoke
Vernacular building
practicest & current construction sector
Novel/custom robots for Digital Design
Combination 01
Combination 02
Combination 03
Combination 04
Combination 05

CONCEPT | Midterm | Phase 03 ARCHITECTURAL OUTLOOK | Presentation

eek 08 | week 09 | week 10 | week 11 | week 12 | week 13 | week 14 | week 15



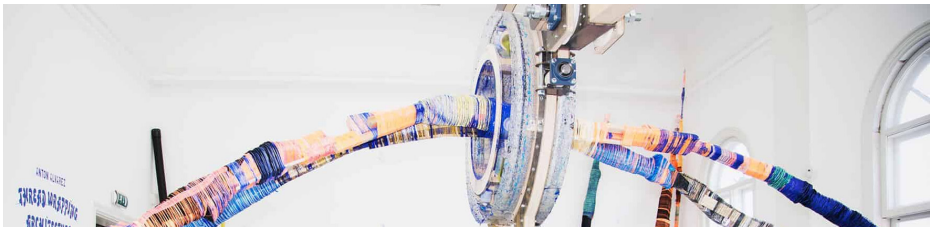
DEVELOPMENT PHASE 01: CONTEXT
Research on natural materials and digital fabrication techniques

The first development phase consists of a range of investigations on materials, techniques and historical and contemporary references to create a varied repertoire on which to base the following research. These investigations will be guided through a series of specific research questions.

To familiarise students with the underlying themes of the studio, this first phase will be complemented by tutorials, during the studio times, on computational software as well as introductory lectures on computational and digital fabrication thinking. Further there will be lectures by local experts and stakeholders on vernacular architecutre and the current building and start-up sector.

Investigation 01: Plant-based materials (page 18)

Investigation 02: Earth-based materials (page 20)



Investigation 03: Digital fabrication techniques (page 20)

Investigation 04: Historic references (page 22)

Investigation 05: Contemporary references (page 24)

DEVELOPMENT PHASE 01: CONTEXT
Research on natural materials and digital fabrication techniques

INVESTIGATION 01: LOCAL PLANT- AND EARTH-BASED MATERIALS

Among the natural materials, plant-based materials have one of the highest potentials for introducing sustainable and circular principles into construction: as renewable materials, defined as “materials that are continually replenished at a rate equal to or greater than the rate of depletion”, they can replace the portion depleted by usage and consumption.

At present, wood is the only significant renewable building material but its regeneration rates are slow and the wood industry is already struggling to keep up with demand (Rademaker, 2021).

A solution is provided by rapidly renewable materials, such as willow, cottonwood, bamboo, cork and straw, which can be grown and harvested within one to ten years through the implementation of agricultural methods such as short rotation forestry and short rotation coppice.

Construction sand and gravel are being extracted faster than they can be replaced (Bendixen et al., 2019). In some countries beaches are used for sand extration further accelerating land errosion.

Materials such as earth, loam or clay are found abundant in nature and used to be part of the vernacular repertoire but have yet to be translated into modern and localy relevant construction methodologies, possibly becoming alternatives to the currently predominant aggregate materials. Such materials offer alternatives for sustainable, zero-waste, locally-sourced and fire-resistant construction options in addition to advantages at the architectural level, especially for climate control (e.g. self-moderating humidity) and energy efficiency (e.g. naturally maintaining a stable internal temperature throughout the seasons through its thermal mass).

Such materials are of interest for combinations with renewable materials, to harness the potentials of both: for example, the lightweight properties of the renewables and the fireproof properties of the non-renewable.


YEAR 1
YEAR 2
YEAR 3
YEAR 4

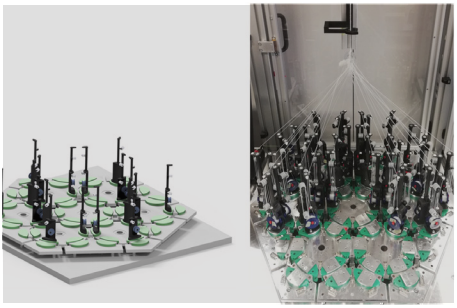
INVESTIGATION 02: DIGITAL FABRICATION TECHNIQUES

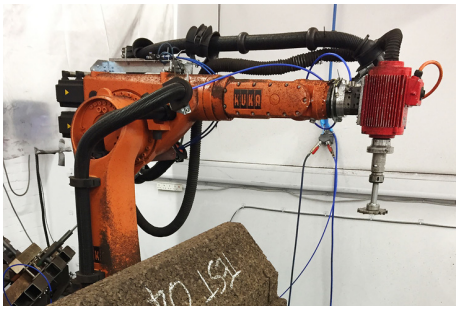
Digital fabrication enables bespoke solutions, in addition to complex high-performance designs that can be guided by a variety of priorities such as optimisation of material properties, creation of specific forms or transfer of specific craftsmanship to industrial contexts.

In addition, robotic fabrication enables digitally controlled strategies that achieve higher levels of construction precision, and mini or swarm robotics can create scalable strategies for collaboration through specialised tasks.

This investigation aims to create a repertoire that includes examples of the advantages of each technique, from additive manufacturing, which allows tailoring of material distribution, to textile fabrication techniques, which can provide structural stiffness not otherwise inherent in materials.

The results of this investigation will help students to familiarise themselves with the variety of digital fabrication techniques and their potential, thus enabling them to choose the appropriate techniques in the subsequent development phases.




KUKA

DEVELOPMENT PHASE 01: CONTEXT
Research on natural materials and digital fabrication techniques

Understanding the precedents for the plant- and earth-based materials in investigation 01 can help us understand vernacular craftsmanship and techniques, with a lookout to possibilities of transferring them to digital fabrication techniques or other materials, but also to reconsider their architectural advantages but also the challenges to their industrialisation and application in the modern context.

Soils or earth were widely used in the past, as a primary resource to manufacture materials and structures of vernacular architecture. Centuries of empirical practices have led to a variety of techniques to implement earth, such as rammed earth, cob and adobe.

INVESTIGATION 03: VERNACULAR REFERENCES

In combination with plant-based materials, particularly thin branches, they were used for the wattle and daub. A technique known from many European vernaculars.

Other plant-based materials typical of the vernacular are for example straw, water reed or wheat reed, which were widely employed for roof thatching.

Through a series of input lectures by local stakeholders and researchers, the students will gain an insight into African vernacular architecture, current and past building practices, and current nuclei for new social and economic developments. These insights will be used in later development phases.

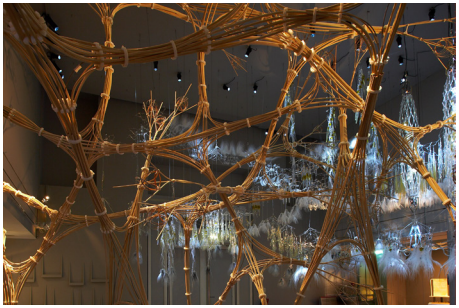





DEVELOPMENT PHASE 01: CONTEXT
Research on natural materials and digital fabrication techniques

INVESTIGATION 04: CONTEMPORARY REFERENCES

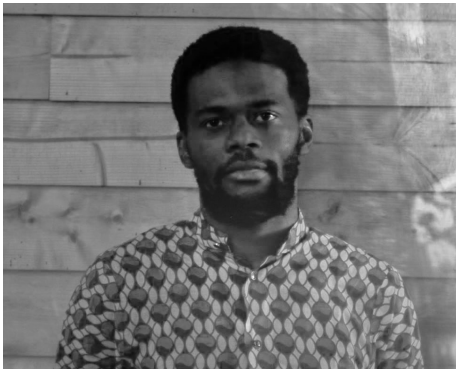
Focusing on contemporary applications of the materials analysed in Investigation 01, the aim is to create a state of the art, which is used as a starting point for the developments of “Common Futures”. Considering both architectural projects and research applications, this investigation concentrates on their innovation value.



DEVELOPMENT PHASE 01: INPUTS

INPUTS BY LOKAL EXPERTS AND RESEARCHERS

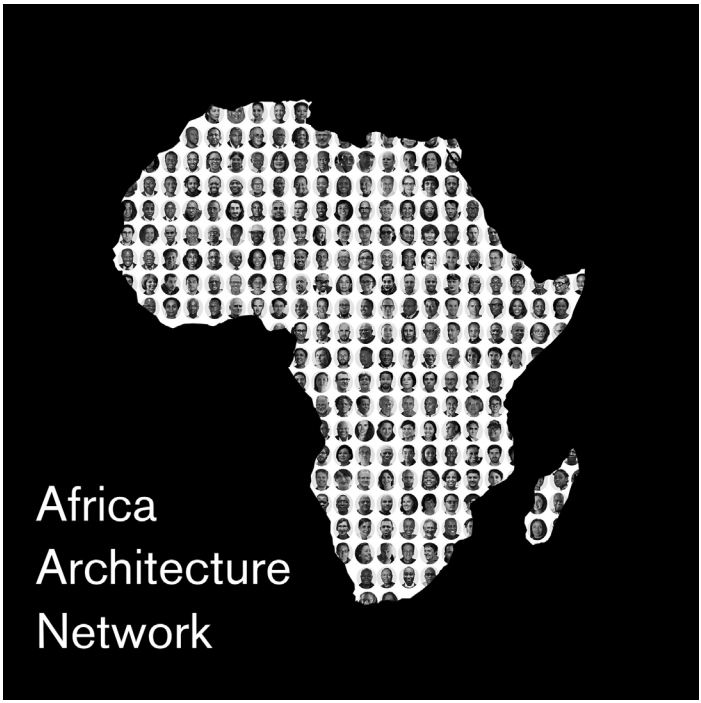
As part of the first phase of development, local experts and researchers will give introductory talks on different countries and their local context, current challenges and the history of architecture in Africa, urban planning, as well as the start-up landscape and digital integration in society.



ADIL DALBAI

Adil Dalbai graduated from Humboldt University of Berlin with a Master's degree in modern history and cultural theory, specialising in the architectural history of Eurasia and (post) colonial contexts. He worked as an editor and author for DOM publishers, focusing on architecture and urbanism. He went on to study architecture at the Technical University of Berlin (M.Sc.) and worked on architecture projects in Central Asia and Western Africa. Currently he is working as architect for the United Nations in Cameroon, heading the World Food Programme's Engineering team. He researches and writes about architecture in Central Asia and Africa and its global interconnections. Additionally, he is a guest critic and lecturer, as well as (co)editor and author of several articles and books on architecture, including Theorising Architecture in Sub-Saharan Africa (Berlin 2021) and Architectural Guide Sub-Saharan Africa (Berlin 2021), a seven-volume documentation of the architecture of all 49 African countries south of the Sahara.


Architectural Guide
Sub-Saharan Africa
DOM publishers


Africa
Architecture
Network

DR. ZEGEYE CHERENET

Dr. Zegeye Cherenet is a practising architect and runs OADUS Architecture & Engineering with his partners based in Addis Ababa. He is a guest lecturer at various universities in Ethiopia and internationally, including visiting academic in the Department of Architecture at the Swiss Federal Institute of Technology (ETH Zurich) (2006/07). He was Chair of Architecture & Design at EiABC (2009-11). He was General Secretary of the Association of Ethiopian Architects (AEA) (2004-08).

He studied architecture and town planning at Addis Ababa University and holds a Master of Architecture from the Indian Institute of Technology (IIT Roorkee). He holds a PhD summa cum laude on designing the informal-searching strategies for waster-sensitive urbanization from HafenCity University (HCU) in Hamburg, Germany (2015). He is co-author with Helawi Sewnet of Building Ethiopia: Sustainability and innovation in architecture and design (EiABC, 2012).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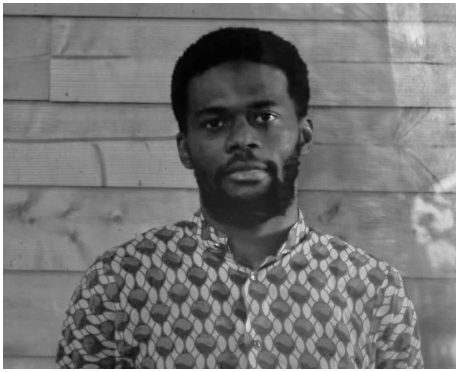
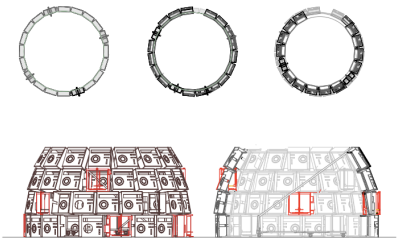
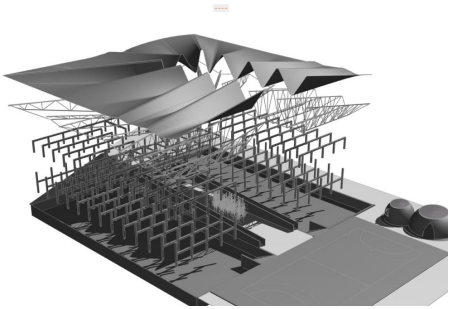
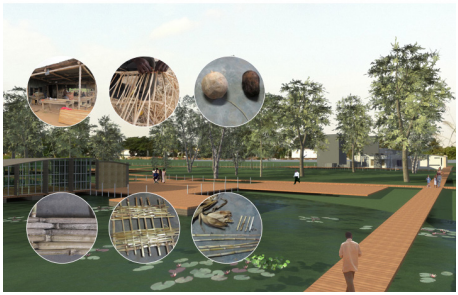


SENAME KOFFI AGBODJINOU

Sename Koffi Agbodjinou is a thinker, author, tech activist, and multi-award-winning social entrepreneur. With a background in industrial design, architecture, and anthropology, he now curates exhibitions and gives lectures and workshops worldwide. He is a jury member for various artistic projects, foundations, and corporate boards. He is co-founder of L'Africaine d'architecture, a collaborative platform for experimentation and research on L'African architecture and urbanism, and of HubCity/ WoeLabs, a network of Togolese technology hubs aimed at promoting equity in the face of the digital revolution. He works with concepts that incorporate indigenous elements into modern design, which he then implements as an inventor, designer, and entrepreneur at the level of product, building, and urban planning. His work develops alternative visions around issues of holistic architecture, primitive computationalities, democracy in technology, and urban sustainability.







PROF. JULIA GALLAGHER

Julia Gallagher is Reader in International Development at King's College London.

Her research is about state-building, with a focus on how citizens' understandings of the state are shaped by colonial legacies and international relationships. She is currently finishing an ERC-funded project on African State Architecture.

Julia served as a specialist advisor to the House of Lords' Inquiry into UK-Africa relations in 2019-20. She has worked as a science teacher in Zimbabwe, as a political journalist and editor, and for the UK government and a number of NGOs. She has a PhD in Politics and an MSc in Development Studies, both from SOAS, and a BSc in Physics from the University of Manchester.

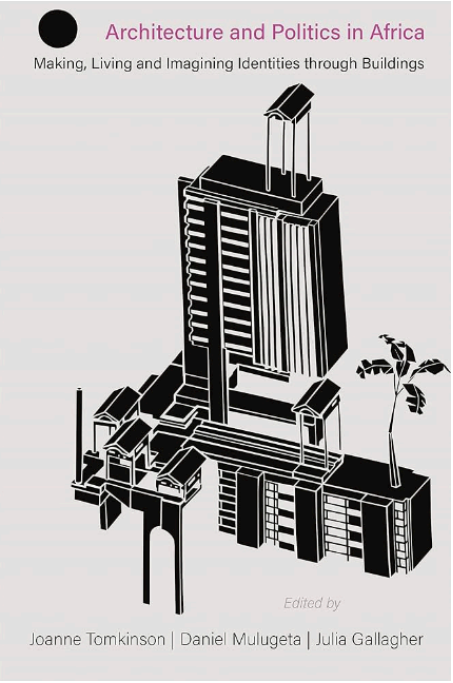
Her published work includes:

Joanne Tomkinson, Daniel Mulugeta and Gallagher (eds) Architecture and Politics in Africa: making, living and imagining identities through buildings, James Currey, 2022 – available as a free download.

Zimbabwe's International Relations: fantasy, reality and the making of the state, Cambridge University Press, 2017

Britain and Africa under Blair: in pursuit of the good state, Manchester University Press, 2011

She is currently finishing a new book, State-Building: Architecture and Authority in Africa (out with James Currey in 2025).


Architecture and Politics in Africa
Making, Living and Imagining Identities through Buildings
Edited by
Joanne Tomkinson | Daniel Mulugeta | Julia Gallagher


Building Africa
an exhibition about how architecture shapes politics
11 JANUARY - 16 MARCH, 2024 | FREE ENTRY
BRUNEI GALLERY, SOAS UNIVERSITY OF LONDON
OPEN TUESDAYS - SATURDAYS 10:30 - 17:00
closed on Mondays, open till 20:00 on Thursdays
The Building Africa Exhibition explores how architecture reflects and shapes African institutions and identities. It is curated by Prof Julia Gallagher and Dr Kuukuwa Manful and has been created in a collaboration between the African State Architecture research project and architects/designers Nahom Teklu (Ethiopia), the Matri-Archi(tecture) collective (South Africa) and Augustine Owusu-Ansah & Lois Quartey (Ghana).
FULL LINEUP OF EVENTS AND ADDITIONAL DETAILS AT:
WWW.AFRICANSTATEARCHITECTURE.CO.UK/BUILDINGAFRICALONDON

KRISTINA ZIADEH

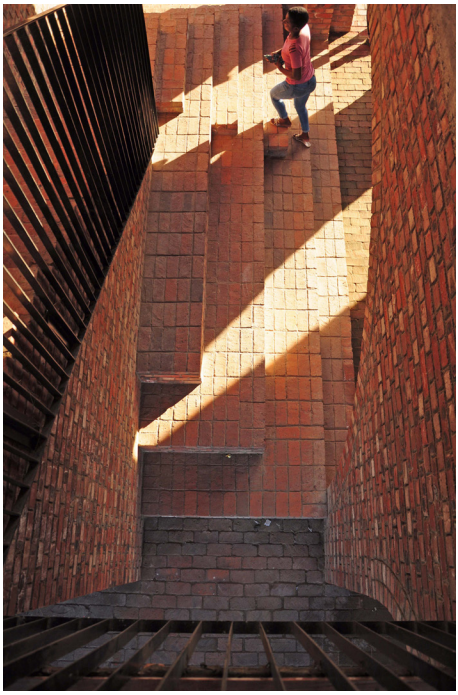
since 2022 studio*k, Founder and Architect

2008-2013 University of Stuttgart, Diploma (Dipl.-Ing.) in Architecture

ANGEPASSTES PLANEN UND BAUEN AN

MENSCH. KULTUR. ORT. MATERIAL. KLIMA.

Bauen an unbekannten Orten – in der Nähe oder Ferne – bedeutet Eintauchen in Neues, sich kundig machen und den Kontext verstehen. Nicht nur bezogen auf offensichtlich baurelevante Themen, sondern auch auf Lebenseinstellungen der Menschen, die dort wirken, ebenso auf historische Momente und Einflüsse. Ortsangepasst und an die Bedürfnisse der Bewohner*innen und Benutzer*innen geplant, mit lokal verfügbaren Materialien gebaut, entstehen Gebäude, die im gemeinsamen Entwurfs- und Bauprozess erarbeitet werden. Kulturelle Hintergründe von Ort und Mensch, Details wie die Anordnung eines einzelnen Ziegels oder die Verbindung zweier Holzprofile beeinflussen den Entwurfsprozess und die Gestalt und Proportion des geplanten Gebäudes. Der Reiz besteht darin, vorhandene Standards zu nutzen, neu zu denken und umzuwandeln in individuelle Lösungen für Verbindungen – zwischen Menschen und Materialien.



DEVELOPMENT PHASE 01: INPUTS

PROF. FABIENNE HOELZEL

Prof. Fabienne Hoelzel lehrt seit 2017 als Professorin für Entwerfen + Städtebau an der Staatlichen Akademie der Bildenden Künste Stuttgart und gründete 2013 FABULOUS URBAN, ein Think-Tank und Stadtplanungsbüro, das in südlichen Regionen aktiv ist und einen forschungsgeleiteten sowie aktivistischen Entwurfsansatz verfolgt. Zuvor leitete sie das Städtebau- und Planungsteam der Stadtentwicklungs- und Wohnbaubehörde São Paulo, Brasilien, die für das städtische Slumaufwertungsprogramm zuständig ist.

Zwischen 2008 und 2010 sowie zwischen 2013 und 2017 war sie wissenschaftliche Mitarbeiterin am Institut für Städtebau der ETH Zürich. FABULOUS URBAN ist in Zusammenarbeit mit lokalen Anwohner*innen- und Menschenrechtsorganisationen in verschiedene Mikro-Slum-Aufwertungsprojekte sowie Workshops zu dekolonialen und feministischen Praktiken in Lagos, Nigeria, involviert. Fabienne forscht und publiziert zu postkolonialistischen Studien in der Infrastruktur- und Stadtplanung, mit speziellem Interesse für feministische Alltagspraktiken und poststrukturalistische Infrastrukturgovernance-Ansätze in Städten des Südens.

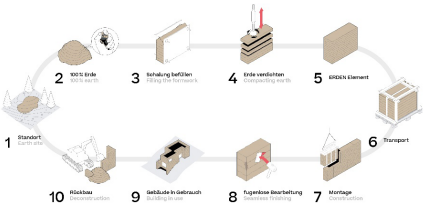
DEVELOPMENT PHASE 02: CIRCULAR CONSTRCUTION CONCEPT

Exploratory prototypes are small experiments that can be used to gain insights into materials, systems and structures as well as test key assumptions, strengths and weaknesses of a concept.

Fabrication choices and construction strategies are developed through hands-on physical project-based learning and are at the base of design-through-making, a process in which concept design and prototyping alternate back and forth in rapid iterations, prompting unified thinking about conceptual, material and production aspects. This process helps to discover further research questions and solve them in the next evolution, but also to narrow the concept through research-based decision-making.

These early-stage, handcrafted models will focus on exploring material system behaviour and production concepts. They are an essential first step towards the ideation of a novel digital fabrication strategy and should therefore be conducted rigorously, considering the potential as well as constraints of the construction concept. The following semester will build on these explorations to and further develop the explorations in preparation of a build workshop in africa.

In conjunction with early-stage prototyping, different circularities are considered, circularity in terms of construction methods and materials, as well as social and economic circularity, ensuring early consideration of feasibility and impact of the concepts.


1 Standort
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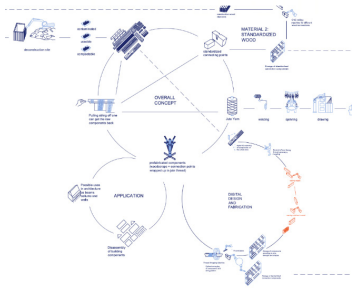
4 Erde verdichten
5 ERDEN Element
6 Transport
7 Montage
8 Fugenlose Bearbeitung
9 Gebäude in Gebrauch
10 Rückbau


OVERALL CONCEPT
APPLICATION


DDF
1.3.3

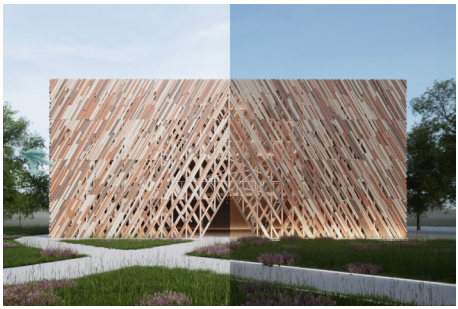

DDF
1.3.1

DEVELOPMENT PHASE 03: ARCHITECTURAL OUTPUT
1:1 prototype development and architectural outlook

A research demonstrator is a medium-sized structure that showcases the possibilities and architectural potential harnessed by the novel digital circular construction concept developed in the previous phase.

The 1:1 scale prototype, will be a proof-of-concept model that results from the evolution of the exploratory prototypes and demonstrates the design, material and fabrication aspects of the project and validates their architectural potential.

In this phase, students will speculate on the underlying architectural design repertoire emerging from the proposed construction concepts as a way to reflect on the impact of the novel construction system along the continuous line of investigation developed thus far.



05 DELIVERABLES
subject to change

FINAL EXAMINATION

FINAL PRESENTATION – 20.02.2025
Group presentation – max. 20 minutes

- Storyline of each project, from research to design
- 1:1 prototype and exploratory prototypes
- Detailed design and implementation proposals for the construction week building
- Large-scale architectural and construction concept

BOOKLET – Deadline: 27.02.2025
Individual and group hand-in
- Documentation of the progress at the different phases based on template by DDF

PER DEVELOPMENT PHASE
DEVELOPMENT PHASE 01: Research on natural materials and digital fabrication techniques as well as african vernacular architecture
14.11.2024 - Individual presentation – 10 minutes

- Presentation on the results of the investigations (depending on the topic; e.g. data for comparative studies on material properties, slides presenting advantages and current obstacles for the implementation of the material or process in construction, current or historical architectural and construction application)
  Followed by group discussion on findings and relevance for further developments

DEVELOPMENT PHASE 02: Exploratory prototyping
19.12.2024 Group presentation (2-3 people) – 15 minutes

- Presentation (e.g. videos of prototype making, slideshows showing step-by-step development, pictures of tests showing progression, economic and material cycles, integration in local economy)
- Material samples, random findings and comparative studies
- Initial proposals for 1:1 prototype and related architectural and construction application according to prototyping iterations (e.g. sketches showing different directions)

DEVELOPMENT PHASE 03: 1:1 prototype development
20.01.2022 Group presentation (4-5 people) – 20 minutes

- 1:1 prototype
- Detailed design of research demonstrator for building week in 2025 based on the architectural and construction concept developed in the prototype (site plan, sections, details, rendering, site logistics, assembly)
- Speculation on the underlying architectural design repertoire emerging from the proposed construction concepts (e.g. rendering, diagram)

06 SCHEDULE

Studio dates:
Thursday, 10.00 am – 5.30 pm

Studio room:
Studio room 134- 1st floor- Building 20.40

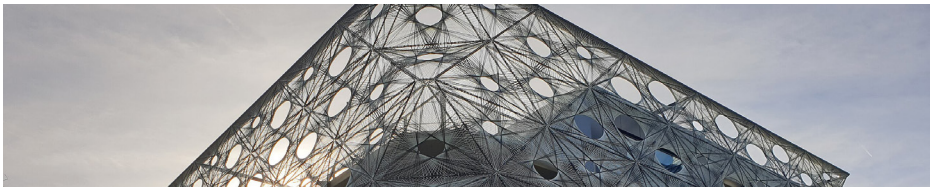
Month	KW	Week	Nr.	Day	Studio dates	Description	Studio phases
Oktober	42	14.10-20.10	-	Mon.	**14.10**	Vorstellung Entwurfsthemen	
	43	21.10-27.10	1	Th.	24.10	10:00 - 12:00 Intro to the course and Phase 1 Input: What is Digital Design and Fabrication Input: African Future Institute Input Excellenzcluster African Studies	
November	44	28.10-03.11	2	Th.	31.10	09:00 - 10:00 Desk crits 10:00 - 11:00: Input Adel Dalbei 11:00 - 13:00 Desk crits 14:00 - 15:00: Input Zegeye Cherenet 15:00 - 16:30: Input: Julia Gallagher: Africa. Politics, Society, Economy	**PHASE 01: Context**
	45	04.11-10.11	3	Th.	07.11	Desk crits Presentation Vertiefung Input: Sename Koffi Agbodjinou Input: Kristina Ziadeh Präsentation Freie Studienarbeit	
			-	Sa.-Mo.	09.-11.11	Exkursion	
	46	11.11-17.11	4	Th.	14.11	Presentation Phase 01 & Intro Phase 02 Introduction to 3d scanning & Augmented Reality and Robotic fabrication	
	47	18.11-14.11	5	Th.	21.11.	Desk crits	
December	48	25.11-01.12	6	Th.	28.11	Desk crits	**PHASE 02: Exploratory prototyping**
	49	02.12-08.12	7	Th.	05.12	Desk crits	
	50	09.12-15.12	8	Th.	12.12	Desk crits	
	51	16.12-22.12	9	Th.	19.12	Midterm	
	52	23.12-29.12	-	Th.	26.12	Holidays	
January	1	30.12-05.01	-	Th.	02.01	Holidays	
	2	06.01-12.01	10	Th.	09.01	Intro Phase 03	
	3	13.01-19.01	11	Th.	16.01	Desk crits	**PHASE 03: Concept development**
	4	20.01-26.01	12	Th.	23.01	Desk crits	
February	5	27.01-02.02	13	Th.	30.01	Desk crits	
	6	03.02-09.02	14	Th.	06.02	Desk crits	
	7	03.02-09.02	15	Th.	13.02	Desk crits	**Presentation Preparation**
	8	17.02-23.02	-	Th.	20.02	Final presentation	

07 EXCURSION

STUTTGART 09.11.2024

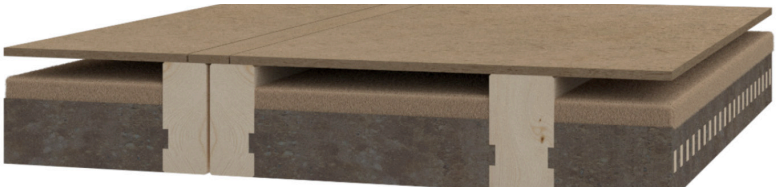
FibR GmbH

Prof. Fabienne Hoelzl, abk- Stuttgart



Texoversum, Hochschule Reutlingen

MUNICH 10.11.2024



Lehm Orange, Pfeffenhausen

Pile Drewlling Museum, Unteruhldingen

VORARLBERG 11.11.2024

Lehm Ton Erde, Schlins