

Graduation Plan

Studio

Name of studio AR3AE100 Architectural Engineering Graduation Studio

Theme Shared Heritage

Teacher / mentor 1 (main mentor)

Prof. ir. Thijs (M.F.) Asselbergs

Teacher / mentor2 (research mentor)

Mo Smit

Teacher / mentor 3 (BT mentor)

Paddy Tomesen

Argumentations of choice of the studio

The architectural engineering graduation studio creates an opportunity to address the emerging social, cultural, urban, environmental and infrastructural challenges facing the global context today. Issues of material resource cycles through vernacular means, creating healthy and eco-friendly environments through sustainable and technical architectural interventions fascinates me as an aspiring architectural engineer. I seek to develop my architectural engineering graduation project as a step to embrace the culture of circular building concepts and methods through materialization and vernacular principles in addressing social and urban pressing needs. Specific keywords such as circularity, climate resilience, modularity, re-purposing, local building materials and techniques were considered as a guideline to define my graduation project. The afore-mentioned principles corresponds with the core objectives of the architectural engineering studio, thus, my choice for this studio.

Title

The title of my graduation project is “STUDIE-TAINER”, (conceived from the concept of students living in a shipping container). An architectural composition and exploration of repurposed shipping containers and local building materials and techniques to create a micro and eco-friendly living experience for students in Ghana, West Africa.

Project location

The design proposal will be located on Central University campus, Tema, Ghana, West-Africa

Graduation Project

Problem Statement

The overarching problem statement was addressed from a cultural, urban and material-use perspective to give a clear picture of the context in which the graduation project is proposed. Ghana is endowed with a rich cultural heritage and this is evident in the vernacular architectural disposition within the rural areas. The use of local materials has been creatively used by local craftsmen in building their structures. These vernacular building approaches has over the years reflected the cultural identity of the Ghanaian people. Unfortunately, the cultural identity of Ghana seems to be lost in the way contemporary architecture is composed by architects in the major cities of Ghana. This is because most of the architecture exhibited are highly influenced by westernized ideas and building technologies. Indigenous Ghanaian materials, building techniques and ideologies such as bamboo and earth construction seem to be fading away and replaced with contemporary materials like glass and concrete.

The vernacular building approach in Ghana seems to engage more of unskilled labour force which includes local craftsmen and artisans. However, the modernized approach to building mega-structures and buildings within the cities tends to create an avenue for a greater percentage of skilled labour force only, especially during construction, hence, causing instances of unemployment of unskilled workforce within the local communities. For this reason, local builders are not given the chance to showcase their indigenous craftsmanship during the construction of buildings in the major cities like Accra, Ghana’s capital.

On an urban and material-use level, Ghana’s current population stands at 31,228,180 with 56.7 percent of the population living in urban areas (Worldometer, 2020). Rapid urbanization of

major cities in Ghana such as Accra, the capital city and Tema is as a result of rural-urban migration by inhabitants in search for an avenue for improved standards of living. This migration to urbanized centers has created an avenue for development of slums or informal settlements through wooden “kiosk” structures as well as shipping containers as a means of accommodation. The encroachment of these container structures or shacks has created pressure on land use as a means for residential and commercial activities by low income groups (Dade and Tsifodze, 2019).

The port of Tema which acts as the gateway to international trade has undergone severe pressure over the years due to its inflow of containers which has created congestion at the terminals and created problems for the movement of heavy duty equipments (Ghanaweb, 2003). These shipping containers are then purchased cheaply by low income-earning groups to build shelters to be used as both residential and commercial spaces which are eventually turning the cities into a chaotic environment due to encroachment of these steel structures. Unfortunately, these shipping containers are either sold as scrap metal or end up at dump sites causing unfriendly environmental hazards as the material life cycle is terminated and not addressed in a circular way.

According to Addo (2015), these container structures are sited too close to the major roads or pedestrian walkways and create unfavourable conditions in the cities as there has not been any proposed governmental policy to regulate the architecture of these shipping containers to respond to the climate and culture of the people. It is clearly evident that container architecture has become part and parcel of the architectural language of the cityscape as these “steel boxes” are seen dotted around the urban landscape. The problem of creating an awareness on how these steel structures can be harnessed into intelligent and eco-friendly architecture still hasn’t been addressed to its fullest.

Again, the percentage of the tertiary student population increased from 13 percent to 16 percent between 2007 and 2017 (Roach, 2019). The Ghana government has announced to subsidize tertiary level education to a 100 percent, thus, free tertiary education from 2021 (Ola-Morris, 2020). This shows that there will be more pressure on Ghana’s existing housing deficit for students in the coming years. Considering these prevailing environmental, social and economic issues in Ghana, I conceived a trajectory which will enable me develop an architectural approach to address these pressing demands in a circular and sustainable way.

Objectives

- The proposal of the “Studie-tainer” student housing project in Tema, seeks to create an awareness of how materials (shipping containers) can be scaled up in a circular and creative indigenous way to provide a healthy and eco-friendly living environment to meet the growing housing need for students in Ghana.
- This project pivots on my fascination about exploring how shipping containers can be re-purposed through technical compositions with available local building materials to create a hybrid design that responds to the tropical climate and cultural ideologies of Ghana.
- Addressing the need to add value by repurposing unused shipping containers which usually end up in dump sites or encroached sites within the city as informal settlements by low income groups.
- A step to take advantage of unused container congestion at the Tema port.
- An opportunity to create a pilot project for future student housing solutions and thus reduce the haphazard management and unsustainable life cycle of shipping containers.

Overall design question

What architectural interventions can be explored through vernacular building materials/ techniques in conjunction with modular repurposed shipping containers to create a climate and culturally responsive and adaptable student community in Ghana’s fast growing economy?

Thematic Research Questions

- What are the different climatic zones in Ghana, which landscape typologies do they consist of and which building materials do they supply to local communities?
- What are some examples and physical properties of available local building materials within the Ghanaian context?
- What vernacular cultural ideologies have been explored by local artisans in Ghana?
- What vernacular building methods and materials are used by local craftsmen with respect to their culture and climatic position in Ghana?
- How are specific building components and elements like walls, roofs, floors constructed by these local artisans in Ghana?

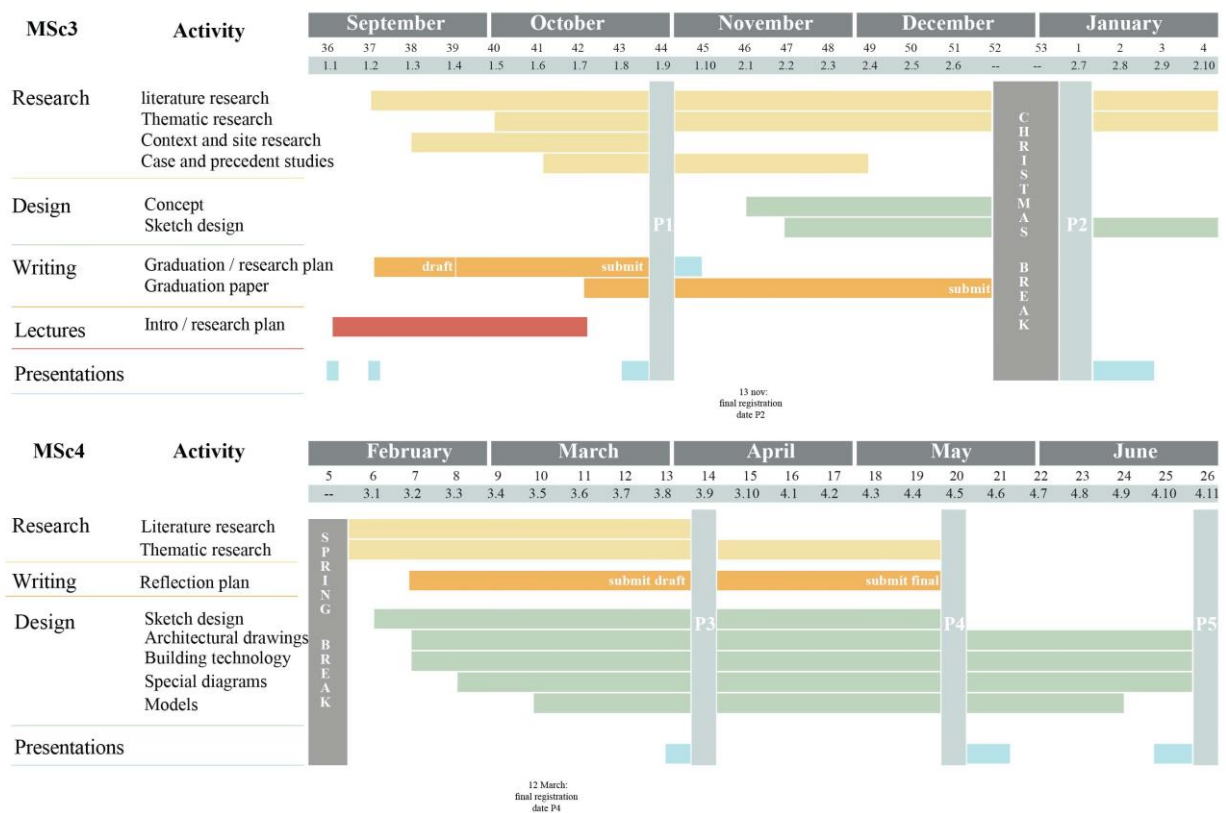
Methodologies

With respect to the subject of study, both qualitative and quantitative methods of data collection was used. Some qualitative approaches were adopted by way of case studies, literature reviews, group discussions and desktop studies. Considering the highly technical nature of the modular shipping containers, an in-depth study was done into the standards of design and technicalities involved in the successful design and function as a building element. A research by design method was adopted to experiment the idea of combining shipping containers and vernacular building materials into a hybrid architectural design. Due to the growing demanding need for housing in Ghana, a quantitative approach was adopted by way of data sampling and analysis to cater for projected future housing demands of students.

Planning

My planning scheme for the graduation project exhibits an extensive and evenly distributed workload to meet the submission requirements for all assessment stages.

Planning



Relevance / Reflection

My graduation project has a strong coherent relation with the objectives of the architectural engineering studio, architecture master track and the overall MSc architecture, urbanism and building sciences programme. This is evident in the clear definition of my graduation project which seeks to focus on experimenting and implementing ideas of technical innovation, circularity, sustainable development, vernacular design principles, climate and cultural fascinations. These factors are all inter-connected with an aim of developing an innovative building project which pivots on the use of research and design to tackle technical, social and urban challenges facing the built environment.

The proposed graduation project addresses the specific needs and future aspirations of the Ghanaian built environment on an urban, socio –cultural, climatic and economic level. The student housing project seeks to create a vibrant student community in a sustainable way by encouraging micro-living in modular units. Cross-cultural relationships amongst students will be facilitated by introducing a socio-cultural, economically viable and flexible design programme. The vernacular design expressions of materiality and cultural ideologies relating to Ghana will reflect a sense of cultural identity and contribute to place making on a social and urban level.

With respect to the scientific framework, technical aspects of materiality, climate, culture and circular building methods comes to play. This was addressed by exploring and experimenting the repurposed steel modular units with vernacular building materials and techniques into a hybrid architectural language to respond to the tropical climate and cultural aspirations of Ghana.

Literature

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