ORGANIC ADDITIVE MANUFACTURING

ABSTRACT PROPOSAL I

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RESEARCH FRAMEWORK

A projection made into the future, an estimation is made that by 2050 the total population on earth will be around ten billion people. Due to the emancipating and prosperous behavior, it is estimated that around 70% of the people will be living in the city. This means that in the coming years there will be a considerable expansion of the city as we know it.

Throughout history, urban development with its specific architectural language has increasingly distanced itself from nature. As a result, we live in a solidified urban environment, where the human relation with nature is almost non-existent.

Indirectly, it can be assumed that the distance between the city resident and nature has led to a non-existent sense of responsibility. This lack of consciousness is part of the overall problem in the context of environmental issues.

As an architect , I believe that advanced architecture must formulate an answer to this problem. In doing so, the architect has the opportunity to break down the division between architecture and nature and bring the existing qualities together to increase the liveability of our cities.

QUESTION | HYPOTHESIS

Starting from an **ecological** approach, can an **architectural language** be created that houses **nature** in a **self-sufficient** way? Is there a symbiosis to be found between the organic and Inanimate materials, using **robotic additive manufacturing** techniques? Aiming to create an ecological, social and economic sustainable build environment.

KEYWORDS: ecological, architectural language, nature, self-sufficient, robotic additive manufacturing

OBJECTIVES | EXPECTED RESULTS

The objective of the thesis is to develop a design/manufacturing strategy that enables the designer to incorporate nature within the building context instead of nature as an additive element into an architectural language. This is to be achieved by incorporating greenery into natural raw material, like clay, that accommodates the growth and habitat of the plants.

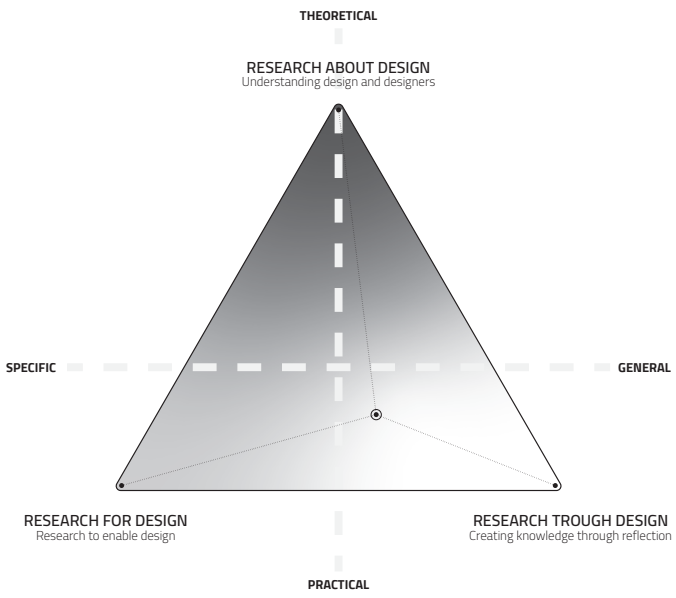
The adaptable qualities of plants are merged with the structural qualities of additive 3D-printing to form a new architectural language that looks for different qualities for the human habitat and the ecological system in which the habitat is located. Instead of a static architecture, the aim is to create a reactive architecture based on natural processes.

The qualities of various natural elements like plants, returning wildlife, energy efficiency, noise reduction, etc., are merged with the ecological qualities of additive manufacturing/3D-printing. Various natural elements that work together in a self-sufficient cycle that requires non or little maintenance.

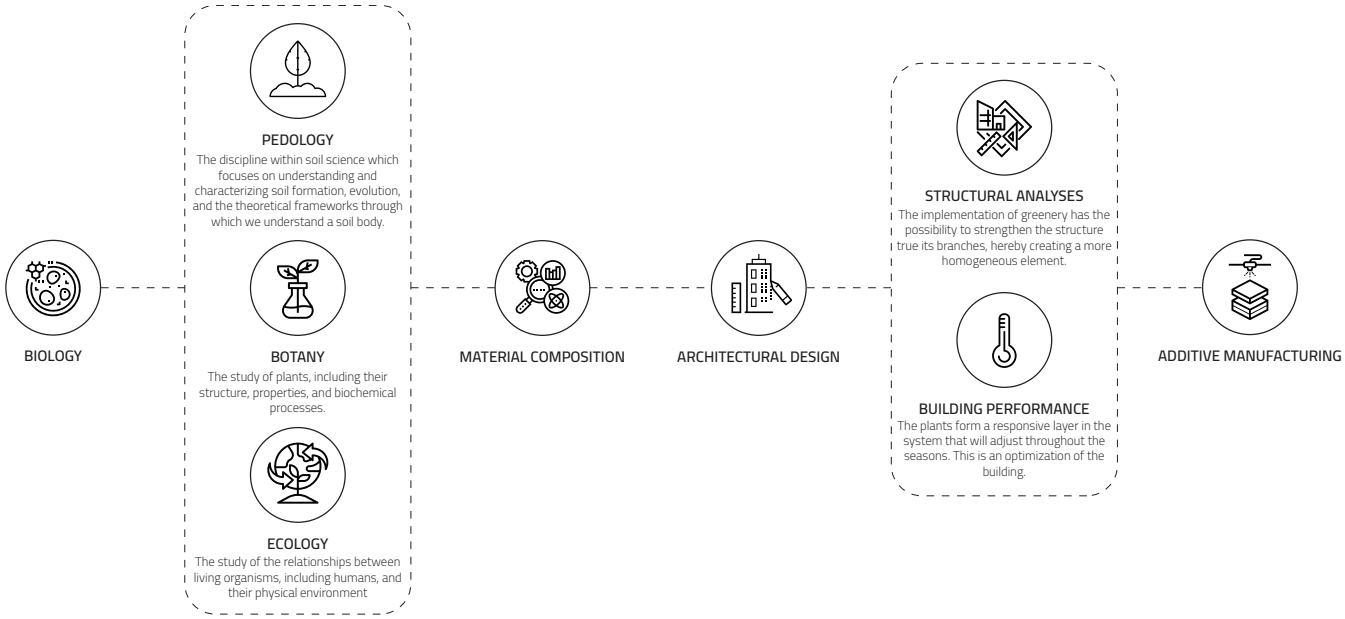
RESEARCH METHODOLOGY | APPROACH

This is a first estimate of the possible attitude in the course of the development of this thesis.

For the research method, a balance is sought between the three forms of design and research. There is likely to be a tendency towards “research for design” and “research by design”. A practical approach seems most appropriate.



RESEARCH AREAS



HYPOTHETICAL RESEARCH PROGRESSION

A first structural estimation for the course of this research to the intended result. Consequently, this structuring of the course of the research will take place in a cyclical reflective way.

1. The **biological study** of the different mechanisms that work together in an overall ecosystem. The results of this research will depend on the type of climate.
   - 1.1 Research **pedology** on the soil composition for the housing of certain plants.
   - 1.2 Research **botoany** of a composition of plants for intended architectural and architectonic qualities.
   - 1.3 Research **ecology** for the interactive relationship between previous elements in the natural cycle.
2. Development of **material compositions** that can house plants and be used for additive manufacturing.
3. Development of an **architectural design** form that conveys the intended qualities of a building material.
   - 3.1 Research into the **structural qualities** of the intended building material.
   - 3.2 The overall composition will introduce a new **performative behavior**. This part of the research looks for the performance for an optimal climate.
4. The **manufacturing** and reflection on the created model. An iterative process with an evaluation looking back at previous factors.

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