

Study Plan

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Studio	
Theme	Hyperbody: NS&IA
Teachers	Nimish Bioria, Henriette Bier
Argumentation of choice of the studio	There are two main reasons for choosing this studio: -compared with most of other studios, this studio does not only focus on architecture design, but design in a more logical way; -the interest into building computational frameworks that allows architecture more adaptive to the ever-changing environment.
Title	
Title of the graduation project	Urban Vertical Farm
Product	
Problem Statement	
The posed problem, research questions and design assignment. This should be formulated in such a way that the project can answer these research questions. The definition of the problem has to be significant to a clearly defined area of research and design.	
<p>The project aims to solve the problem of food production in an 'negative' urban space. In Rotterdam, more than 44% of its population is immigrants, and the per capita income of the city is quite low. That is to say, this multi-ethnic city has greater demand on variety of cheap food production. However, even though the quantity of food production in Holland is large, the diversity is quite small, and most of the food productions are exported, so this means the food with high price.</p> <p>The site is an overpass located in Kleinpolder, which is one of the districts in Rotterdam. Kleinpolder is a district with high population density, low average income, and high percentage of immigrants from non- industrialized countries.</p> <p>For the site itself, there are three main problems of it:</p> <ul style="list-style-type: none"> -First of all, the unused space under this overpass is wasting urban resources like land, water and money. -Secondly, this overpass does not give full consideration on pedestrians, especially the old people just live next to it; -Lastly, the centralized traffic system leads to large amount of car emission and noise. <p>According to defined problems above, the research questions are:</p> <ul style="list-style-type: none"> -in what way it is possible to insert food production system in city and have various food production; -which is the most appropriate and efficient way to transform this unused overpass space into an 'eco- 	

installation' which can deal with problems of the pollution, pedestrian traffic and resources.

Goal

The goal of this project is to adapt the negative space of overpass for a vertical farm, to transform it into an engine of this district, powering this district through food production. At the same time, the construction should include the solutions to block noise, to organize pedestrian traffic, to proceed commercial and educational activities for attracting people. In terms of the public space design, the project will cooperate with another graduation project by Li Jingyi.

Process

Method description

Description of the methods and techniques of research and design, which are going to be utilized.

The process starts with site selection. After selecting the site, various analysis in an urban scale and in an local scale are conducted to figure out what parameters (social, ecological and programmatic) could be possibly applied in the design. Based on the analysis(the defined problems of the site and of the city), the building type is decided--vertical farm. Then researches on the food production and consumption in the country and on the technology in advanced agriculture are conducted, so that parameters about farming part (light, water, temperature, etc.) could be sorted out. Also, in consideration of sustainable development, researches on the technologies on eco-agriculture are carried on.

Based on the analysis, the simulation and the generative systems are decided and implemented on the site. This process focuses on applying the parameters concluded in the analysis to the systems, influencing the generation of geometry. The structure part is conducted after generating the building form.

After generating the geometry, definition of different spatial qualities like light environment, sound environment and temperature condition should be correspondent with each function. And then according to these criteria, multi-objectives optimizations are conducted in Karamba, Galapagos, Ecotect, etc..

Lastly, in order to make the design feasible and realizable for fabrication, aspects like element design and material should be considered about.

Theoretical and practical references

Theoretical (historical, socio-political, scientific and technical research) and practical knowledge that will be consulted.

First of all, in order to have a better understanding of the site, the beginning research focuses on the district, the city and the country the site located. The data of the population structure, infrastructure distribution, related cultural and economic figures and traffic networks are collected for deciding the type of the building and for parameters.

As the building type is vertical agriculture, references related to urban agriculture are indispensable. Based on the urban context study, the reference research also explores the potential sustainable technique to solve the time, space and context problems in cultivating crops.

In terms of the computational tools and techniques for the design, I have investigated the possible behaviors and systems I may use in the design, knowing the logic of them and experimenting them in the design.

Also, I will explore the information on building technology for the the structure design and material choosing.

Reflection

Relevance and output

The value of the graduation project within the larger socio-cultural and scientific context. List of output with respect to conceptual and design development as well as materialization and construction documents.

-a real time simulation system responsive to the problems of the site

-a sustainable food production system which satisfies the certain number of people

-an optimized prototype which has a better performance in structural and climatic aspects

Time planning Scheme of the division of the workload of the graduation project in the 42-week timeframe (P1-5). Compulsory in this scheme are the examinations at the middle and end of the semester, if required, the minors you intend taking and possible exams that have to be retaken. The submitted graduation contract might be rejected if the planning is unrealistic.

MSc3:

1. Model of MSc2 disassembly
2. Workshop on generative system
3. Workshop on multi-objective optimization and genetics in detail
4. Research on Kleinpolder district and Rotterdam city
5. Data collection for the development of simulation
6. Research on food production and consumption in Holland
7. Development of the concept and preparation for P1
8. **P1: October 30th, 2013**
 - Thematic research
 - Situational research
 - Computational models and experiments developed during the workshops and strategies of implementing them in the chosen site
 - Subsequent direction of research
9. Reflection on progress and future development
10. Experiments on the computational part, decision on the generative systems
11. Workshop on multi-optimization problem solving
12. Implement of the systems on the chosen site
13. Reflection on the outputs
14. Initial ideas on form finding
15. Integrated design
16. Work on form finding part
17. Computational Model making
18. Improvement on the model
19. Preparation for P2
20. **P2: January 22nd, 2014**
 - Urban draft 1:1000/1:500
 - Program of requirements
 - Graduation plan
 - Interactive presentation showing concept, information models, and behavioral diagrams.
 - 3D-4D parametric models showing the design within the site at the phase of schematic design
 - From 3D model obtained schematic sections, plans, and views at 1:200
 - Digital documentation of all above including 300 words abstract describing project on CD-ROM.

MSc4:

21. Reflection on progress and future strategies
 22. Improvement on the building form
 23. Defining the project (architecture)
 24. Considerations about the project in a micro scale: structure and structural element, facade element
 25. Develop the structural design
 26. Architectural refinements
 27. Architectural refinements
 28. Work on building technology part of the design (details)
 29. Improvements on the detail design
 30. Consideration about the strategies for developing physical model
 31. Development of the structural part and of the physical model
 32. Preparation for P4
 33. Preparation for P4
 34. Physical model making
 35. Physical model making
 36. **P4**
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37. Reflection on progress and future development
 38. Improvements on the design
 39. Improvements on the design
 40. Preparation for P5
 41. Physical model making
 42. **P5**

Attention

Part of the graduation (especially in the MSc 4) is the technical implementation of the building design. Therefore a Building Technology teacher will be involved in the tutoring team from the P2 presentation on. This should be taken into account when writing the study plan / personal graduation contract, with respect to the time planning as well as in the relation to the content (e.g. statement, method and /or relevance).