

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

| Personal information | |
|------------------------|----------------|
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| Studio | | |
|---------------------------------------|---|---------------------------|
| Name / Theme | Architectural Engineering Robotic Building Cyber-physical space | |
| Main mentor | Henriette Bier | [Academic field involved] |
| Second mentor | Arwin Hidding | [Academic field involved] |
| Argumentation of choice of the studio | At the second semester I attended the course of Henriette Bier, and it motivated me to choose robotic building for my graduation project. I think it is a perfect place for exploring my fascination about computation methods in design process. | |

| Graduation project | |
|---------------------------------|--|
| Title of the graduation project | Adaptive inflatable architecture. |
| Goal | |
| Location: | Wrocław, Kościół Chrystusowy, Katowice, Huta Miedzi "Silesia", „Torpedowania", Gdańsk |
| The posed problem, | In today's rapidly changing world of new technologies, automation, digitization and artificial intelligence, we should consider possible alternatives to shaping architecture. Architecture can be more kinetic, evolutionary over time, embody robotics solutions, and become responsive to our changing needs. What is needed is to identify the materials and systems that are best suited to create new forms that make adaptable architecture. In this work, I hypothesize that inflatables, whose potential has not yet been fully utilized, still have a role to play in the area of more interactive and evolving architecture |
| research questions and | Can and how do inflatables can be used to create an architecture capable of adapting to it surrounding, external conditions and changing user needs? |

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| <p>design assignment in which these result.</p> | <p>By analyzing implemented examples of inflatables, mainly from the 1960s and 1970s, when this architecture was experiencing its golden age, its strengths and disadvantages are identified. As a result, it is proposed to create a light type forms, easy to build, which could be implemented in various locations and for various functions. This architecture would not only exist in a given place for a relatively short period of time but would only arise when the need arises. The process of the appearance and disappearance of architecture would be the foundation for a more interactive environment. Trying to make the most of the features of inflatable architecture, it is proposed to create ethereal forms with computer-managed internal conditions that would fit into the context of the location and at the same time offer a new attractive space.</p> |
| | |
| <p>Process</p> | |
| <p>Method description</p> | |
| <p>I carry on my graduation project under the supervision of my tutor Henriette Bier at the Robotic Building Studio, which has its own original methodology. For example, the workshops in my studio allow to test ideas and hypotheses and quickly draw the first conclusions from experiments. Typical for the "Robotic Building" studio is choosing one construction technology for which the technical properties are then analyzed in order to find the innovative application of the material in architecture. Another important aspect is combining the design and production stages into one coherent process, so that modern design methods are reflected in production. In other words, the studio is looking for alternatives to current design processes in which it happens that the architecture generated using modern computer techniques is finally constructed using traditional building techniques, or vice versa, that despite the use of modern production technologies, their potential is not fully used through an inadequate design method.</p> <p>In case study method style I have analyzed this not so narrow trend of inflatables in architecture. I tried to get to know more than a hundred examples of inflatable architecture and classify them according to certain qualitative properties. Due to the number of examples I tried to analyze, I was not able to familiarize myself with all these projects in every possible detail. However, due to the fact that all projects have gained equal weight in my research, I have obtained the fullest possible picture of the phenomenon.</p> <p>Finding such a large number of interesting projects was not difficult because of the emotions that they always aroused. Each such object has always been a sensational event that people did not pass by indifferently. On the other hand, due to their nature, these are almost exclusively temporary projects, which I could not visit because of the fact that they usually functioned for a short period of time.</p> <p>Fortunately, due to the unusual occurrence of this type of architecture to the architectural society, local community and journalists, there was always a very good report in writing and numerous photographs, thanks to which there is no lack of information on how these objects functioned.</p> | |

Through drawings and simulations I try to explore the potential of inflatables structures in different test sites. Using the advanced computer software and developed programming skills I was able to produce 2D/3D/4D representations of the different sketch design proposals, which then allow to evaluate the design. Additionally during organized workshops, together with two colleges I have developed an interactive wall. That exercise was very informative and gave me a lot of feedback. For example the test of an interactive wall allowed me to confront my expectations with given results, explore the general nature of interactions between human and architecture and most importantly confirm my belief that a more responsive environment is needed.

Literature and general practical preference

Fox, M. (2016). Interactive Architecture: Adaptive World. New York: Princeton Architectural Press

Topham, S. (2002). Blow-up: Inflatable art, architecture and design. Munich, Germany: Prestel Pub.

Neufert, E., Neufert, P., Baiche, B., & Walliman, N. (2000). Architects' data. Oxford: Blackwell Science.

Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I., & Shlomo, A. (1977). A pattern language: Towns, buildings, construction.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

When I have chosen my topic I tried to match it with the approach of Robotic Building studio. My tutor Henriette Bier also helped with setting the direction of my work. I have the impression that my work follows methodologically the practice of the Robotic Lab studio on two levels. First, it contains a creative visionary aspect by trying to answer the question about alternative ways of shaping space. Secondly, technology is in the center of my interests, how it can be used and how it can affect architecture, which seems to be a typical approach in this studio. Moreover, the subject Cyber-Physical space of my studio for me is a source of constant inspiration.

This matter is relevant to the entire architectural industry. New technologies change how society works. Man spends more and more time in the virtual world - outside the space that architects usually deal with. Our society must at least try to respond to the changing reality. First of all, it is necessary to try to answer the question what are the consequences of these changes? What environment does the 21st century man want to live in? Do we as designers respond to all their needs? How new technologies can help all different sorts of designers of the space in which we live. To what extent can we adopt them to be able to reflect on the evolution of all other disciplines which are having an impact on how the world looks like.

What is more, inflatables are not only about a very particular technology, nor are they some narrow area of architecture. Inflatables in fact touch all possible aspects

of architecture, design and space creation. If you study pneumatic architecture through the prism of user behavior in the object, it is quickly noticeable that man has always been in the center of attention of the creators of pneumatic architecture. What's more, it seems that the architects consciously or not designed not only the object but also a kind of spectacle that the architecture played before the user and the interaction between the user and his surroundings. The creators of this architecture not only developed forms corresponding to physical properties but also created a whole set of meanings for this architecture. Inflatable architecture can appear as a manifestation of changes taking place in society, these were not only technological advances at the beginnings of digitization but also a sign of sudden rebellion of new society which spawned counterculture. Although users were definitely subjected to very strong stimuli, their impressions had to be very diverse and alleviated by many factors. While the average recipient usually does not think much about the space in which he arrives, and which the architect designed, in the case of pneumatic architecture it is impossible to imagine that the user would not contemplate the space in which he found. The connotations associated with these forms, the way they interact with human consciousness and the subconscious can be very diverse. The question, therefore, what exactly all these users have experienced and which stimuli were the strongest for them is a more phenomenological approach to the analysis carried out. In any case, it was a full spectrum of sensations from the loss of spatial orientation, the reception of intense colors of the surface and the light colored by it, visual distortions created by flexible transparent surfaces, the smell of plastic, variable temperature, a soft surface and sometimes the sensation of unstable ground.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

I always try to learn from other fields, and especially in my master's thesis. As part of my review I have repeatedly dealt with the analysis of the latest achievements of robotics, in particular soft robotic, the achievements of space agencies, or take into account what IT has to offer to architects.

I hope that in the end I will be able to translate these different non architectural phenomena into the language of architecture. What's more, as I said earlier, my highly speculative approach to this subject, by drawing inspiration from the technology that surrounds us, must in the end turn into a project regarding social issues, because societies today are mainly evolving as a result of technological progress. In fact, pneumatic architecture has always wanted to be the epitome of change. I hope that my work is part of this trend.