

# 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](mailto: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	
Name	William Kosta
Student number	5941369

Studio		
Name / Theme	Explore lab 39	
Main mentor	-Geert Coumans -Seyran Khademi	-Architecture -Research
Second mentor	-Rico Heykant	-Building Technology
Argumentation of choice of the studio	<p>I chose to do Explore Lab because of my interest for the graduation project. It stems from a combination of my MSc 1 (Forms, Structures and Aesthetics) where architecture is practiced considering both the practicality and the aesthetics of the project, and the elective I took (AI in Architecture), which demonstrated the use of AI tools, applied in architecture.</p> <p>One factor that was important to me was that Explore Lab allowed me to take the stance I wanted regarding the topic. I wanted to examine the current state of artificial intelligence, investigate how it works, examine if it is applicable in architecture as a tool, and how much users can trust it (in terms of how accurate it is). This will all be done, while attempting to remain objective, not losing sight of the role of the architect and that AI tools will be utilised to support architecture but not over-exaggerated in its significance and capability.</p>	

Graduation project	
Title of the graduation project	Re-imagining the Hospice
Goal	
Location:	Terschelling, Netherlands
The posed problem,	At present, atmosphere-driven design, is becoming a niche within architecture. When atmosphere is neglected,

	<p>we have less control over it, leaving the outcome to chance.</p> <p>Without a systematic way to approach atmospheres, we risk losing the ability to create spaces with prominent atmospheres—such as those that approach the sublime, like churches or monuments—which are essential to human culture and expression, or hospices (which is something I will design in this graduation).</p> <p>My research aims to solidify atmospheres as an important quality to be considered in design by making it more accessible. The nature of atmosphere being an abstract quality that humans feel, does not mean that it is born out of purely immeasurable elements.</p> <p>Atmosphere is conceived through a combination of measurable elements in the building that humans perceive. These perceived elements are then processed on an abstract level in the brain, which is then felt as atmosphere. This process of recognising implicit and abstract concepts out of measurable input is something that foundation models do well. Foundation models are AI models trained on broad data that can be adapted to a wide range of tasks. They effectively convert input data into representation that can be used for classification. In addition to that, foundation models gives access to investigating this topic in a large scale of data. This is important because there are patterns that can only become apparent when a large dataset is being used, such as similarities and trends. This makes foundation models an appropriate tool to explore for this research.</p> <p>This research aims to systematically approach the theme of architecture atmospheres using AI tools, and therefore in the process, reveal the effectiveness of AI tools when applied to the design and creative side of architecture.</p>
research questions and	<ul style="list-style-type: none"> <li>- Main research question: To what extent are foundation models an effective tool to approach and address atmospheres and the role of natural light in architecture?</li> </ul> <p>Sub questions:</p> <ul style="list-style-type: none"> <li>- How can we systematically approach the topic of atmospheres?</li> <li>- Can atmospheres be clustered into different groups? What are the main groups?</li> </ul>

	<ul style="list-style-type: none"> <li>- How can we effectively collect a large dataset of images that visually convey atmosphere?</li> <li>- What are the different ways natural light can be used to contribute to the creation of atmospheres?</li> </ul>
design assignment in which these result.	<p>The research is done in a way where it is an experiment with the goal of exploring architecture atmospheres, but using AI as a tool to approach it. The results from the research paper will reveal the effectiveness of AI tools in the design side of architecture, but will also be directly useful for the design project. This is because the result of the experiments will be a 2D plot, which directly interacts with architecture atmospheres by attempting to classify them.</p> <p>The design project for the graduation will be to re-imagine the hospice. At present, many palliative care centres are almost an extension of the hospital. Some places, such as the Maggie's Centres (cancer centres) have an approach where architecture is being used to create a domestic and welcoming atmosphere to approach the issue. However, there are many different ways to approach the difficult topic of terminal illness. The aim of the design is to re-imagine the hospice as a medium or a liminal (transitional) space to face the unfathomable concept of death.</p> <p>In order to achieve this with the hospice as a medium, different architectural atmospheres has to be appropriately used in the different spaces of the building. The effectiveness of the AI tools in the research phase will directly affect the process of identifying, finding, and creating the appropriate atmospheres in the various spaces.</p> <p>The site chosen for the design is located in the island of Terschelling, surrounded by nature. Its remote location makes it appropriate for the hospice as it would not be disturbed by cars and people passing by. Having visited the site in person, I feel that the landscape evoked emotions ranging from fear, to awe, making the site and what it offers be compatible with the goal of creating a design that attempts to address the concept of death and be a liminal space.</p>

[This should be formulated in such a way that the graduation project can answer these questions.

The definition of the problem has to be significant to a clearly defined area of research and design.]

## **Process**

### **Method description**

[A description of the methods and techniques of research and design, which are going to be utilized.]

1. I will prepare a dataset of ~2500 architecture photos that display a variety of atmospheres. The method of collection will be both finding images by myself manually, and also setting up an automatic web scraper that collects photographs from websites such as Archdaily and Divisare.
2. I will investigate whether the foundation models available today are able to recognise atmospheres from an image and therefore cluster them into different groups. I will use several different foundation models such as DINOv2 (Caron et al., 2021), EfficientNet (Tan & Le, 2019) and CLIP (Radford et al., 2021) to increase the chance of success. In doing so, the vector embeddings for each instance in the dataset is calculated. These are then passed to dimensionality reduction algorithms such as t-SNE (Van Der Maaten & Hinton, 2008) so that the outcome can be presented in the form of a scatter plot (2D representation).
3. I will analyse the resulting plot. In this plot, instances that are placed closer together are the images that the foundation model deems similar. The analysis will be done in two stages. The first stage is to judge the output to determine if the model is clustering the instances based on atmosphere or not. If not, the experiment will be repeated, changing variables such as the foundation model itself, isolating or culling parts of the dataset, etc. Then, when an acceptable result is achieved, the clusters will then be investigated, looking for patterns, overlap and trends. This can be done selecting the cluster of interest, and then creating another plot, with a setting more suited for smaller datasets, providing a more 'fine grain' result of the particular cluster. The corresponding buildings of the images that are clustered together will also be analysed to see if there are any architecture elements that are in common, which contributes to the creation of a specific atmosphere. Special attention will be given to natural light, its creation through architecture and its relation to atmosphere.

In the design phase, the result of the experiment will be used as a starting point to help design the different atmospheres for specific spaces, providing further evaluation of the method. The design itself would be a mix of the more

traditional architectural method (such as using models, sketches, and drawings) but also open to using AI tools (such as foundation models, image generation models, and building performance prediction models)

## Literature and general practical references

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]

Ananthaswamy, A. (2024). *Why machines learn: The Elegant Math Behind Modern AI*. Penguin.

As, I., & Basu, P. (2021). *The Routledge companion to artificial intelligence in architecture*.

Bachelard, G. (2014). *The Poetics of Space*. Penguin.

Carta, S. (2022). *Machine learning and the city: Applications in Architecture and Urban Design*. John Wiley & Sons.

Pallasmaa, J. (2005). *The eyes of the skin: Architecture and the Senses*. Academy Press.

Zumthor, P. (2006). *Atmospheres: Architectural Environments, Surrounding Objects*. Birkhäuser.

Zumthor, P. (2010). *Thinking architecture*. Birkhauser.

## 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)?

The graduation project being a re-imagined hospice is closely related to the architecture track because of the motivation behind the project. The aim of wanting to redesign the hospice is motivated on one hand, in wanting to explore the possibility of using architecture as a medium to process the concept of death. But on the other hand, the design of a hospice in this manner also allows and even requires the attention of architectural atmospheres in order for the building to be successful.

To a certain extent, atmospheres can be seen as the result of all the elements of architecture working together, in a coherent way. This has implications in the design of the plans, material, and even details and requires all of these elements to act in a coherent manner and contribute to a consistent atmosphere.

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

In terms of the larger social framework, the re-imagined hospice, at the very least, will provide a prototype showing what hospices can be when approached differently. The design project will show a more extreme case, where the hospice really tries to address the psychological part of facing death. It is likely that not everything that is designed in the project can be implemented in a real world scenario, however it will encourage thinking of hospices in the real world also in this manner instead of only the medical side.

In terms of the larger professional and scientific framework, the design project will also be relevant because of the chosen site being dynamic and having water periodically coming in and out. This can also be seen as a prototype in how we can build when the site given is not typical and there is a need to be delicate.

Furthermore the research part of this project and the aim of utilizing AI tools in the project will also be relevant to the larger professional and scientific framework. The rise in prominence of AI will be something that cannot be ignored and therefore it is important to be objective, and explore its capabilities in the field of architecture.