

With the writing of this thesis comes an end to the years of study on the faculty of architecture. Entering with little knowledge but with a lot of drive to challenge myself and create, I have found myself in a path I would have never guessed I would have taken, quite far away from the conceptual and creative architecture, but on a path of designing for the improvement of human lives in a subtle manner, making small scale impact on large scale interventions.

The motivation to actually make positive impact on the quality of life of many has been my motivation to pursue this path of working through all scales in the built environment. This thinking between scales is something that pointed me towards this interdisciplinary topic between Climate design and Geoinformation.

*What is the relation between your graduation project topic, your master track, and your master programme (MSc AUBS)?*

This graduation project aligns well with my master track of Building Technology (BT) of the MSc Architecture, Urbanism, and Building Sciences (AUBS). The project moves beyond traditional architectural design and has a foundation of engineering for increasing sustainability, comfort and especially health. Due to the interdisciplinary approach, it also relates to the field of Geoinformatics with its' large scale approach and the aim for designing open data and open source solutions to model cities and buildings in 3D.

My work bridges different scales, from the individual level to the city-wide and potentially national scale, by developing an open-source, workflow that integrates 3D geoinformation and climate design. This intersection of disciplines has helped me apply building technology in ways that make real-world, large-scale impacts.

*How did your research influence your design/recommendations, and how did the design/recommendations influence your research?*

My research heavily influenced the design recommendations of this thesis. The study of circadian rhythms and the effects of light on health guided my recommendations about window placement, window-to-wall ratios, and urban lighting strategies. The search for these recommendations, in turn, highlighted gaps in the available tools and data, pushing me to further refine the methods of designing this workflow, bringing together a range of programs, plugins and languages that turned out to be relevant for this scope of work. For example, the challenge of integrating picture-based data into 3D models has turned out to be a robust basis or simulating urban lighting effects with more accuracy, which directly impacted the recommendations I could make about optimizing urban design for circadian health.

*How do you assess the value of your way of working (your approach, your used methods, used methodology)?*

My approach to this project, which involved an interdisciplinary method that combines geoinformation and climate design with circadian health principles, programming and even some mathematics, has proven valuable for achieving the project goals and for enriching the knowledge in the field, especially by finding methods to integrate these various fields. The use of open-source tools and data, along with Rhino and Grasshopper for 3D simulations, allowed me to develop a scalable workflow applicable to large urban settings, for measurements on an accuracy of the individual. However, the complexity of working across disciplines also presented challenges—particularly in maintaining focus on the larger goals while working

through technical details. Overall, the approach was effective but required constant balancing between deep, detail-oriented work and keeping sight of the project's broader objectives.

*How do you assess the academic and societal value, scope, and implication of your graduation project, including ethical aspects?*

The academic value of this thesis lies in its contribution to a relatively underexplored interdisciplinary area: the impact of urban and façade design on circadian health, using 3D geoinformation tools. Academically, it advances understanding in both the fields of Climate Design and Geoinformation, offering a methodology of improving building design for circadian health and designing a method to improve the accuracy of 3D building information, which could be adopted in future research. It proposes practical ways to improve urban living environments by making circadian health a factor for architects and urban decisionmakers to keep into consideration. The thesis underscores the responsibility of these groups to consider how design choices affect the health of individuals, particularly in terms of the effect of design on natural lighting availability and of circadian disruption caused by artificial light at night.

*How do you assess the value of the transferability of your project results?*

The methods and findings of this thesis are highly transferable. The workflow I've developed for integrating picture-based data into 3D models can be scaled up and applied to city- or national- level datasets, making it a valuable tool for urban planners, architects, and policymakers. Although the picture-information is not available on the level of this scale yet, this thesis proves the effectivity of the method and because of the original source of these picture-dataset, the potential for it to be used across all sorts of urban contexts: it is not limited to a specific region or building type.

How does the interdisciplinary nature of this project enhance my understanding of the societal value of architecture not only for design or practicality, but especially for human well-being?

*How did the interdisciplinary nature of this project challenge or enhance my understanding of both architectural design and its broader impact on human health?*

The interdisciplinary nature of my project, which combined architecture, geoinformation, computer science and a bit of a biological background, enhanced my understanding of how architectural design impacts human health. Working across these fields was both challenging and rewarding: it required me to step beyond the conventional boundaries of design, think about the scientific principles behind circadian rhythms and the application of design for circadian health in urban context. By exploring these connections, I developed a deeper appreciation for how architecture and urban planning can subtly yet powerfully affect the distribution of health factors among humans, and with the knowledge of designing for good circadian health conditions, improve the accessibility to appropriate circadian design.

*How has your personal experience with circadian health shaped your view on its importance for large-scale architectural applications?*

My own struggles with seasonal fluctuations in daylight, particularly during winter, have made me very aware of how light affects mental health. Like many others, I find it harder to wake up

and experience lower mood when daylight is scarce, especially in winter or when the weather is bad. During the development of the research direction for this thesis, the winter months, this link between mental health and daylight became especially evident. This personal experience pointed me in the direction of circadian lighting in our environments.

Natural light regulates our circadian rhythm, but in cities with high latitudes, like the Netherlands, people often don't receive enough daylight due to indoor-focused lives. As designers, we have a responsibility to create healthier environments that support circadian health, ensuring that urban lighting and façade design provide the right light exposure. Integrating circadian health principles on a larger, urban scale can greatly improve the well-being of city dwellers and make circadian health a more common theme.

The process of working through multiple scales—from detailed façade designs to city-wide simulations—has made me more aware of how urban decisions like lighting placement can influence personal health effects. It has taught me to consider the broader implications of design choices and how they fit into the urban context as a whole.

Reflecting on the process, one of the key things I've realized is how much I miss working in a team. While I've grown and learned from this independent work, I know that my motivation, inspiration, and creativity are greatly enhanced when I collaborate with others. It's something I am eager to pursue in the next stages of my career.

I am very glad to have Nima Fourouzandeh as my weekly supervisor, whom I can talk to on a low-key basis, who has a lot of in-depth knowledge of the tools and methods and who seems to seriously enjoy this project as well. The combination of having someone that I can ask my 'stupid' questions to and to whom I can try to formulate my thought processes to see where the leaks are, with two supervisors who are involved from a bit more distance (Eleonora Brembilla and Giorgio Agugiaro), helps me translate between cloudy thoughts and clear presentation moments with questions and discussions, to make each meeting a fruitful one.