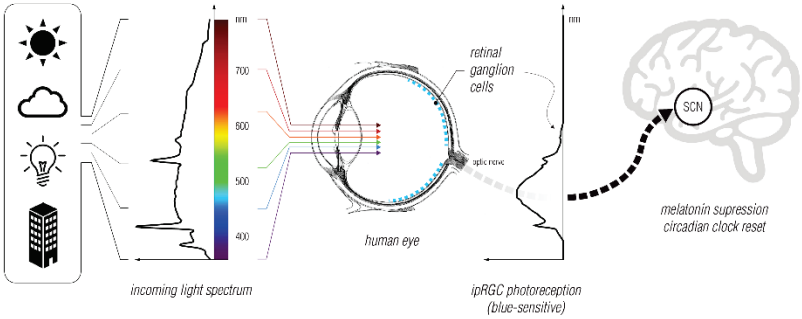
Master project

Assessment & simulation of non-image forming effects of light in an office space

Background

The human eye is not just for vision. It also contains special photoreceptors that regulate alertness, sleep, and circadian rhythms. When we benefit from an optimal exposure to light throughout the day, our internal clock – which regulates many biological functions in our body - is well synchronized to the outside world.
Nowadays people spend most of their time inside buildings, where they often receive poor quality and quantity of light to entrain their biological clock. Misalignment of the internal clock can cause several health problems, from compromising sleep quality and performance, to depression and cancer.
ALFA – Adaptive Lighting for Alertness – is a software that lets architects, lighting designers, and health professionals predict and control these non-image forming effects of light.
The aim of this project is to simulate the biologically effective lighting in an existing open-plan office in the NEST SolAce unit in Dübendorf, Zurich. The unit was set-up in October 2018 to meet the highest standard of luminous, thermal, acoustic and air quality comfort, with a unitary and appealing aesthetic appearance.



Objectives

- Refine the existing 3D model of the unit with furniture and materials
- Model and render the natural and artificial lighting features and lighting control system
- Perform simulations of the biologically effective illumination experienced by users in the open-plan office using a specific software to extract melanopic illuminance and other variables
- Calibrate the simulation with onsite spectral measurements
- Check and discuss the compliance of the results with the recommendations of the international WELL certification for buildings

Profile

- Interest in lighting design, engineering and simulation
- Experience with 3D modeling software is an asset (e.g. Rhino)
- Experience with building/lighting simulation tools is an asset (e.g. Radiance)

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