# PROMOVENDI AAN HET WOORD

## IMPLEMENTING THE EFFECTS OF LIGHT ON HUMANS IN THE LIGHTING DESIGN PROCESS

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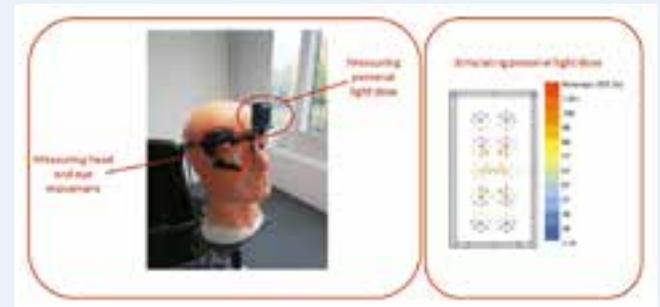### WHAT IS THE TOPIC OF YOUR RESEARCH?

The transition to energy-efficient and low-carbon dwellings is the topic of the day. However, during the thermal renovation of houses, targets are not reached. One of the reasons for this is the poor assumption of the building characteristics before renovation. In recent years, smart meters and home automation systems are becoming prominent in Dutch dwellings. The idea is to leverage the data from these sources to find a way back to determine the actual characteristics of the dwellings. Some of these characteristics include the ability of the dwellings to store heat, resist heat exchange through the building envelope, resist heat exchange through infiltration and ventilation and, gain heat from solar irradiation. The biggest challenge in this research is the uncertainties associated with the data itself.

My research will study the impact of each input data on the estimated characteristics. And, eventually, develop a modelling approach that determines characteristics reflective of the actual dwellings.

### WHY IS YOUR RESEARCH IMPORTANT FOR THE READERS OF BOUWFYSICA?

Most existing studies are limited to experimental houses and often few. My research will throw insight into models developed from actual data obtained from more than 100 occupied dwellings. By doing so, my research will eliminate the need for intrusive measurements and poorly documented construction data to determine these characteristics. The characteristics thus determined will reduce the gap between predicted and actual energy performance. Hence, leading to a renovation that achieves the set targets and cheers the occupants. ■

### WAT IS THE TOPIC OF YOUR RESEARCH?

My project aims to implement the knowledge on how light received at eye-level affects non-image-forming (NIF) human responses in lighting simulation tools. The current lighting design practice is dominantly considering visual lighting criteria focusing on providing adequate illuminance on a horizontal plane. However, recent research discovered that light does not only stimulate the human visual system, but also instigates NIF responses, such as the regulation of our circadian rhythms, mood, motivation, attention and perception. Since it is the eye that mediates the response to light, lighting conditions received at eye-level are important. This means that the currently used lighting design tools require another set of light indicators. A shift is required from task-based metrics, such as horizontal illuminance, to eye-position or view-based metrics. We aim to support this shift by investigating how office occupants change their gaze and the effect this has on the light they receive on eye-level.



### WHY IS YOUR RESEARCH IMPORTANT FOR THE READERS OF BOUWFYSICA?

My research aims to help architects and lighting designers with making buildings that consider the needs and well-being of occupants. Light is an important environmental factor that affects our health and, since we spend most of our time indoors, the light levels to which we are exposed are mostly defined by architecture and artificial light sources. Therefore, the light dose that people receive is an important factor to take into consideration when designing indoor spaces. ■

## DETERMINATION OF BUILDING AND HVAC CHARACTERISTICS OF DWELLINGS USING ON-BOARD MONITORED DATA

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