TUM SENSELAB
Quantifying Spatial Wellbeing

Announcement for Architecture, RNB, or Biomedical Engineering Students*
Master Thesis or Study Project

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* Students from other disciplines are still encouraged to apply. Please make sure that we can officially supervise your studies.

SAVING POTENTIALS OF A DYNAMIC THERMAL ENERGY DEMAND IN OFFICES BUILDINGS/RESIDENTIAL HOUSING

CONTEXT

Definition of "comfort" has long been a question for professionals of the built environment. Particularly the numerical definition of it, not only decides how we operate our buildings, therefore manage resources but also how the buildings impact our well-being in return. However, this reciprocal relationship still lacks clarity on certain aspects, as research shows that occupants are consistently dissatisfied with the indoor climate and that most buildings struggle with huge performance gaps between simulations and actual measurements.

As the majority of data acquired in the comfort literature comes from user feedbacks, there are concerns with bias, data resolution, or scalability. Furthermore, it is proven by the research that maybe comfort is not what we should be after, but rather health - and not always these two mean the same thing.

Therefore, research project SenseLab aims to tackle the comfort definition from a newly emerging point of view: Directly looking into the human body. By doing so, we believe that we might not only identify the link between perceived comfort and its physiological markers, but also collect long-term data to observe how the indoor environment impacts our health and well-being.

TASKS

An essential part to the necessary Climate Goals of the Paris Agreement lies in the responsibility of the energetic building renovation and more concretely in the reduction of the mechanical cooling and heating energy. One, often-overlooked reason for their high energy consumption is the usage according to the current building standards of indoor environments, that define the acceptable temperature range of indoor environments (PMV-PPD). While maintaining a relatively tight range of acceptable indoor temperature demands a relatively high energy consumption, accepting a wider range does the opposite. When evaluating the energy efficiency within the building sector we must therefore address the question why we are heating and cooling entire buildings as strictly as we do.

The task of this call is to create and compare dynamic thermal models of either office buildings or residential buildings, that take behavioral adaptation (change in window, fan, clothing, activity) into account. Preliminary knowledge in Rhino-Grasshopper and thermal simulation are beneficial. It is possible to work on this call entirely remotely. The preferred publication language is English, however if the students prefer writing in German, it is also possible to do so.