TUM SENSELAB
Quantifying Spatial Wellbeing

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

SUPERVISION
Prof. Dipl.-Ing. Thomas Auer
M. Sc. Bilge Kobas | bilge.kobas@tum.de
M. Sc. Sebastian C. Koth | sebastian.koth@tum.de

Lehrstuhl für Gebäudetechnologie und klimagerechtes Bauen
Arcisstraße 21, 80333 München
arc.ed.tum.de/en/klima/forschung/forschungslabore/senselab

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

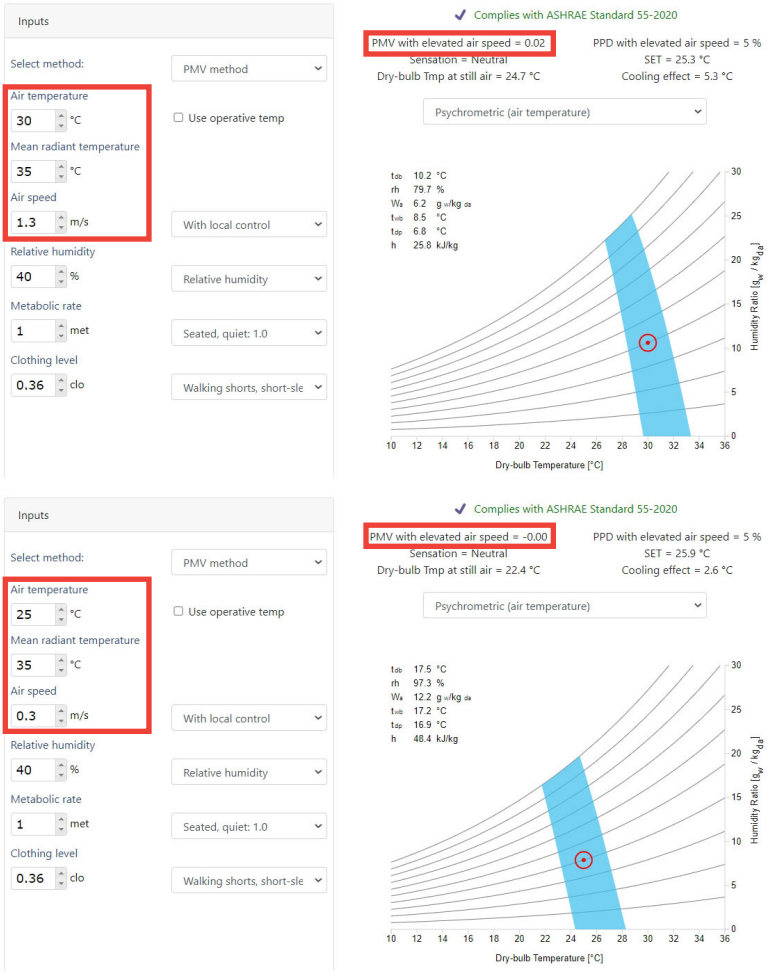
DOES SAME PMV MEAN THE SAME THERMOREGULATION?

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

A widely accepted thermal comfort metric is PMV, Predicted Mean Vote; in which the combination of temperature, radiation, air velocity, clothing, metabolic rate and relative humidity are taken into account to form a singular value to inform the comfort level of a person at a given time. PMV is presented on a scale from -3, being cold, to +3, to hot. In current standards, there is a given PMV range that the indoor spaces should provide, which is usually a band of -0.5 to +0.5, or similar.

While the PMV method makes it easy to represent different factors that make the *perception of comfort,* how the human physiology responds to these factors are diferent. Image on the left shows such a case - more of which can be generated.

The tasks in this call are;
a. Deciding the scenarios to be tested together with the SenseLab team,
b. Running experiments in the SenseLab using few of these scenarios,
c. Comparing the physiological data,
d. Analysing the data to draw correlations between climatic parameters and physiological parameters.

For the data collection phase, no specific experience is required. For the analysis and visualisation part, some preliminary knowledge of Python with relevant libraries (ie. Pandas, NumPy, SciPy Matplotlib/Seaborn, etc.) would be beneficial.