Chair of Computational Modeling and Simulation
TUM Department of Civil, Geo and Environmental Engineering
Technical University of Munich

Modeling:
Mathematics:
Programming:
Science:

Software Lab:

SenseLab: Quantifying comfort and well-being by biosignals

Description

SenseLab, a laboratory placed in the Faculty of Architecture, is a testbed where we look at the physiological responses of people under different environmental conditions. Through controlled experiments real physiological data (ie. electrodermal activity, cardiovascular data, neural activity) from people are collected and compared against the indoor environment variables. The data produced at the SenseLab offers the building researchers a new layer of insight in order to understand what comfort is, how it changes per person and throughout time, and when it does and does not collide with well-being.

CAMERA
A 360-degree camera with live-feed, video and two-way sound

EEG
Electroencephalography, electrical activity in the brain

ECG
Electrocardiogram, heart rate and heart rate variability

EDA
Electrodermal activity, skin temperature

CONNECTED BIOSIGNALS
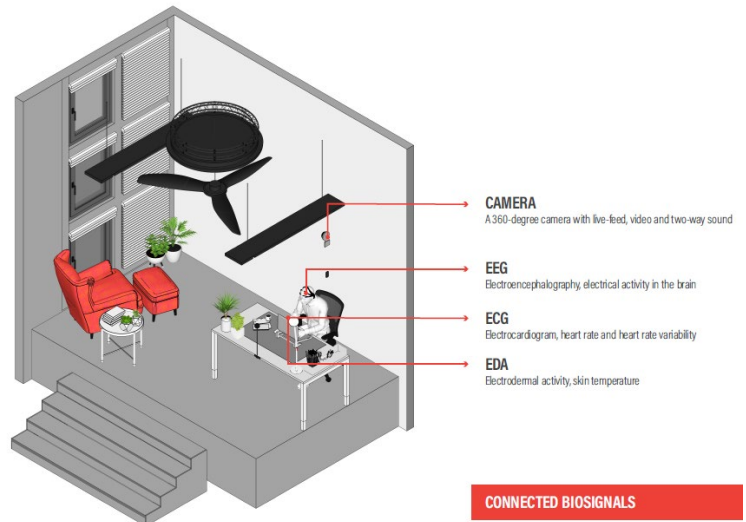
Task

The tasks expected from the students are;
- *to be a part of upcoming experiments,*
- *to create an automated pipeline connecting data acquisition nodes,*
- *running preliminary filtering and normalising algorithms,*
- *establishing a robust AI model to correlate the variables and*
- *proposing a workflow to integrate the AI model using energy simulation tools.*
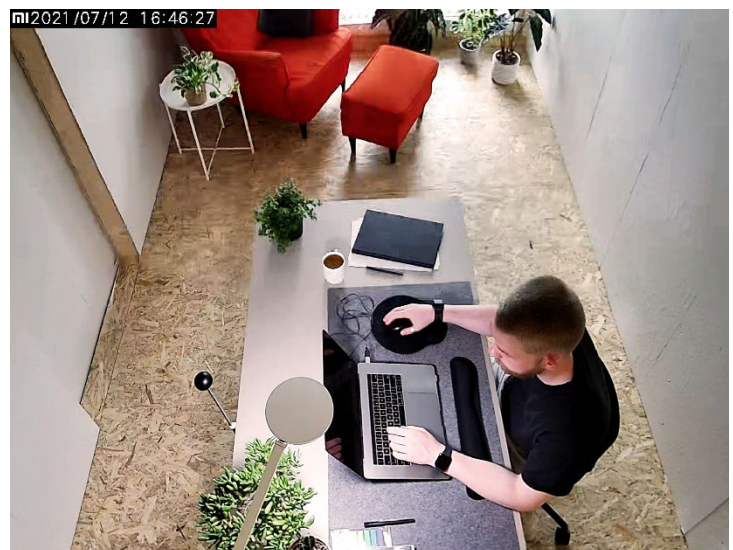
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References

[1] Kobas, B.; Koth, S.C.; Nkurikiyeyezu, K.; Giannakakis, G.; Auer, T. Effect of Exposure Time on Thermal Behaviour: A Psychophysiological Approach. *Signals* **2021**, 2, 863-885. https://doi.org/10.3390/signals2040050

[2] Persiani, S.G.L.; Kobas, B.; Koth, S.C.; Auer, T. Biometric Data as Real-Time Measure of Physiological Reactions to Environmental Stimuli in the Built Environment. *Energies* **2021**, 14, 232. https://doi.org/10.3390/en14010232

BY LOOKING AT BIOMETRIC DATA — under — DIFFERENT ENVIRONMENTAL CONDITIONS — how to — PROMOTE PERFORMANCE AND WELL-BEING

NEURAL ACTIVITY
HEART RATE
RESPIRATORY RATE
ELECTODERMAL ACTIVITY
EYE MOVEMENT
BLOOD FLOW

ACOUSTICS
DAYLIGHT
TEMPERATURE