User Experiences and Energy Consumption in Homes

**Keywords:** energy consumption, occupant behaviors, habits, health, control

**Architectural Engineering + Technology Department (Indoor Environment)**

**Area of Research:** Residential Comfort and Wellbeing and Energy Consumption

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**Research Summary:** Comfort behaviours at home are linked to increased energy consumption: higher comfort standards tend to translate into higher energy consumption. Currently, comfort in the indoor environment is defined as thermal, acoustical, visual, and air quality, while occupants perceive the experience of comfort in a more holistic manner. Literature on comfort and energy demand in the indoor environment field is dominated by thermal comfort and physical and physiological factors, which leaves blind spots in the behavioural aspect of comfort and its influence on energy expenditure. The aim of this research is to reveal occupant archetypes based on occupant energy-consuming comfort behavioural patterns, and to link them to respective building characteristics, in order to develop an occupant-building system that optimizes both comfort and energy savings, and therefore reducing performance gaps.

**Research Methodology:** The research will be carried out with an interdisciplinary mixed methods approach, which is organized in three parts. The first part consists of an explanatory study, in which a survey based on findings of the literature review is conducted, whose results will serve to create an interview. Analysis of both results will reveal the first outcome. The second part is consists of convergent parallel methods, where the results of observations and a time-use study will be compared and related to the quantitative analysis of building characteristics, IEQ factors, and walkthroughs. This step will result in two outputs. The final part of the research will be a series of generative sessions, which results will be incorporated to the three previous outcomes, in order to create with the final

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**Main Question:** What are occupant behavioral profiles as determined by the occupant's comfort and energy behaviors in their homes?

**Deliverables:** Development of occupant profiles and environmental design guidelines to optimize comfort and energy savings.
occupant archetypes and optimal building characteristics.