Modelling the Dynamic Interaction between Building Performance and Occupant Well-being

By

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**Space-Mate:**

**Computational Modeling for Building and Occupant Cooperative Sustainable Performance**

Stage 2 Project Report

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**Overview and Research Objective**

Building performance simulation tools model and predict building performance, but their accuracy is compromised by simplified simulated occupancy. Occupant behavior is complex yet energy modeling software represents it as deterministic and unchanging in hour-long periods of time, which leads to discrepancies between model results and measured performance. These discrepancies limit the use of the models both as a predictive tool and real time post occupancy evaluation of the building.

*What if the building space becomes a silent teammate to occupants’ activities as a continuous real-time dialogue between building energy performance and occupant state as they dynamically interact and affect each other through co-simulation?*

Space-Mate is an ongoing research project aimed to (1) define a computational modeling framework for building and occupant cooperative sustainable performance; (2) collect correlated occupant and building performance data sets in real time (3) develop a computational spatial-temporal-physiological occupant model and a preliminary prototype **Space-Mate**. Real-time occupant state and building performance data feeds will generate dynamic occupancy information for building energy performance simulation and building space adjustment to respond to the evolving occupant’s energy needs and provide feedback to the occupant for potential sustainable behavior changes.

The Space-Mate Stage 2 project reports preliminary results and presents the Space-Mate framework. These were presented and published in a paper entitled:

**Modelling the Dynamic Interaction between Building Performance and Occupant Well-being**

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(see attached PDF document)

at the ASCE 2017 IWCCE in Seattle, WA.