

Towards Comfortable and Walkable Cities

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ABSTRACT

Outdoor thermal comfort can influence human powered mobility choices, namely walking and biking. As more people are living in cities than ever before in human history, the urban environments we erect and populate are unfortunately contributing to phenomena such as climate change, which is negatively affecting urban life. Our understanding and creation of comfortable environments that are conducive to human powered transport can significantly influence carbon emissions, energy efficiency, and human health, as well as have considerable economic and time saving impacts. With the continuous integration of computer-based decision support systems in design processes, there is a need for developing simulation frameworks that aid architects, urban designers and planners in making informed sustainable design decisions. The focus of this presentation, therefore, is the demonstration of computer tools and workflows that promote the design of walkable and bikeable cities through comfortable outdoor spaces. This session presents firstly, simulation methodologies for spatially and temporally resolved Mean Radiant Temperature (MRT) simulation and consequent outdoor thermal comfort assessment. A case study in Copley Square, Boston will be demonstrated, as well as coursework outcome of a seminar instructed previously by the presenter at MIT. Secondly, Building Performance Simulation (BPS) occupancy and trip schedules generation through data clustering techniques applied to activity-based travel surveys. Finally, an assimilation of both workflows is presented to generate "Trip Comfort" metrics for human powered mobility assessment, in the context of existing or newly designed urban structures. The goal is to give designers the ability to comprehend the impact of their built environment interventions on human-powered travel behavior from a comfort perspective.

BIOGRAPHY

Tarek Rakha is an architect, building scientist and educator. He is Assistant Professor of Architectural Design and Building Technology at Syracuse University, and Faculty Research Fellow at the Syracuse Center of Excellence. His primary scholarly expertise are in the fields of modeling urban energy flows & human-powered mobility, daylighting & energy in buildings, as well as generative design & optimization. Prior to joining Syracuse University, he was Adjunct Professor at Rhode Island School of Design (RISD). Tarek completed his PhD in Building Technology at the Massachusetts Institute of Technology (MIT), where he was an instructor and part of the Sustainable Design Lab as a member of the developing team for umi, the urban modeling and simulation platform.