Simulating Human Behavior in Built Environments

Predicting the impact of a built environment on the behavior of people who will inhabit it is one of the most fundamental challenges of architectural design.

Despite the fact that architects now have at their disposal many computational tools that can help them predict and evaluate several building performance aspects (e.g. cost, energy consumption, and structural stability), they have no means to help them predict how well the proposed building will impact end-users’ behavior. In particular, current Computer Aided Design (CAD) tools fail in providing a dynamic representation of human activities in a not-yet built setting.

To address this problem, the research presents a comprehensive framework to simulate human behavior in built environments.

The research methodology involves: (1) utilizing ethnographic methods to observe and document human activities in physical settings; (2) developing a computational model to represent the observed activities as a network of Events involving users’ individual and group activities; (3) simulating the Events by means of Virtual Users – anthropomorphic, goal-oriented agents that mimic real users’ individual and group behavior; and (4) evaluating the simulation results to determine to what extent they match some predefined design goals.

The simulation of human behavior narratives allows predicting the outcomes of “what-if” scenarios, which include modifications to the building’s layout, on one hand, and of users’ activities, on the other hand.

This framework is currently implemented and tested in the domain of hospital environments, which provides a comprehensive, yet agreed-upon, set of behavior patterns on which to build the simulation model.

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