Towards cybernetic buildings: integrated intelligent sensing to create responsive environments

Junsong Yuan, PI, Edward Steinfeld, Co-PI, Shira Gabriel Klaiman, Co-PI, University at Buffalo
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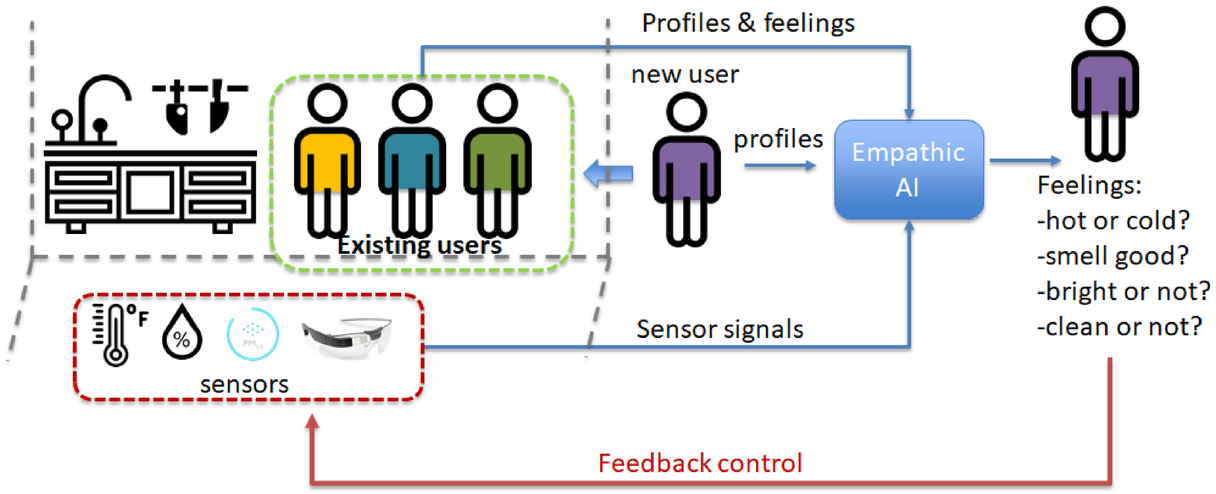

An affordable, proactive "cybernetic" system that addresses three challenges of evaluating building performance

- Computational model for multi-sensor systems needed for instrumenting buildings to track performance
- Affordable human response prediction for different people at different environment
- Online community for building performance feedback and policy making

A computational model has been built to leverage (1) human profile, such as age, gender, race etc., (2) environmental sensor signals, such as temperature, humidity, noise level, to infer the human feeling of the real environment, such as the comfortability, wellness, awareness, social integration etc. As the computational model can predict feeling of any user, it can help to better understand marginalized users who may have opportunities to voice out or influence the policy making and implementation in the real situations. The desired product will be able to predict human feeling environment settings given the input of human activities, profiles and digital sensor signals.

Leveraging smart phone and environment sensors, our proposed sensing from user's perspective can better infer the user's feeling in various environments. The system proposed will have direct benefits to building inhabitants, owners and operators.

Using a ubiquitous computing model and harnessing the volunteer labor of building inhabitants as "citizen scientists" will drastically reduce the cost of monitoring by moving the sensing function from the building to the person to provide a "first person" perspective and result in portable and flexible data collection at low cost.

Our intelligent human and environment sensing will generally work for any built environment, and will be easy to scale up. The same technology can be adapted to outdoor spaces and be scaled up, without any special infrastructure, to the community at large.

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