InSleepers

User experience as a method for reducing consumption in domestic buildings.

The thesis originated from a will to reduce domestic resource consumption, via the less explored method of user motivation. Most effort in the building and appliances industries is directed to the improvement of performance of the machines installed in dwellings and the passive qualities of the envelope, while neglecting the significant effects the inhabitants have on the overall consumption.

Initially, domestic consumption was mapped and potential for reduction in various fields was identified. Then, an extensive review was conducted to identify existing approaches to personalized consumption optimization, specifically in the field of thermal comfort, which was proven to be responsible for a substantial amount of the energy consumed in the common household. The home automation system was targeted as the interface between the inhabitants and the appliances, and where the potential for improvement was greatest. The contemporary home automation system serves as a hub, binding all mechanized operation in the house. Therefore, embedding a system that would promote resource consumption reduction in it would be most effective.

The main concept explored in this work was guided by the notion that the most effective method to reduce demands in a domestic environment is to improve the method through which the inhabitants are experiencing the interaction with the appliances. It seems to be the missing piece in the ‘sustainable home’ puzzle – While appliance manufacturers put their emphasis on improving the performance of the machine, the user is neglected. This work aimed at changing the paradigm of communication with the home appliances – instead of the conventional one-sided communication of giving operation commands, a bilateral communication that would react to the users’ action in corresponding stimuli, encouraging them to change their behavior.

When it comes to desired behavior alteration agents, a new and prominent player in the field is the serious game. Computerized serious games enjoy the motivation usually affiliated with games in general and computer games in particular. By harnessing the methods developed by the gaming industry, a game was designed to be an integral part of the home automation system of the house. The game is played in real life, converting the conventional appliances into game levers, manipulated to score high in the game.

To make the system more accepted and intuitive, a method for context aware remote controlling was developed. Using a smartphone, Kinect sensor and a wireless web server, a prototype for analyzing user intent was programmed and tested as a proof of concept. The relative personal thermostat – another method to reduce consumption by better understanding the user was prototyped as well. It was integrated with online resources harvested from an existing home automation system to establish the device’s plausibility and prove that the needed level of data collection, manipulation and interpretation had been reached.