emoTicSpace: when the Built Environments get Emotional…

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Abstract

What happens if the buildings and urban environments around us can respond to the dynamic changes of the environment and the occupancy patterns? How can a building express its excitement when it gets crowded with people? What happens if the built environment can express its "sick building syndrome", which is caused by poor air quality? If the urban space can feel the changes in the wind conditions, can the space respond and adapt to the passing occupants? How to design responsive and adaptive environments that are expressive, informative, and performative? This research aims to hypothetically visualize how buildings and urban environments can respond to crowd-sensed data, such as movement, air quality, temperature, light, and wind, through a kinetic organic interface embedded in the building or urban fabric.

Author Keywords

Responsive architecture; kinetic architecture; organic user interfaces; urban environment; ambient intelligence, interactive architecture.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

William J. Mitchell [1] argued for redefinitions of space in the world where cities are built from networked connections, shaped by connectivity and bandwidth constraints. In his technologically utopian vision of the "city of bits", he challenged architects and planners to rethink the design of digitally mediated environments for new types of communities and interactions that would occur. This was not new, considering that Cedric Price's design proposal of the Fun Palace in 1961-1972 had already involved reprogrammable spaces, integrating standard building components and communication technologies to generate a machine-like building "capable of adapting to users' needs and desires" [2]. The project also promotes the idea of virtual or computer-mediated social interactions in which "accidental communities" in public spaces may emerge from [2]. In the present day, the Fun Palace is no longer a sophisticated piece of whimsical architectural speculation, technologies are available now to make the Fun Palace real and fully deliverable. In this project, do-it-yourself microelectronics, sensors and actuators, such as the Arduino platform, will be used to crowd-sense the changes in the environment and occupancy.

Kinetic Organic Interfaces: Beyond a Display

Kinetic Organic Interfaces (KOIs), a term introduced by Parkes, Poupyrev, and Ishii [3], is a type of *Organic User Interfaces* or interfaces that can come in any shape or form, and capable of shape-changing through physical kinetic motions as embodiment and visualization of information. In our research, *Lumina*, a new soft kinetic form-changing material that has potential applications for morphing architectural building skins and organic user interfaces [4], has been

designed with the capacities to sense the ambient environment, morph and change forms, and emit light (see Figure 1). Lumina has been developed into a number of large scale prototypes, such as the *Cloud*, a kinetic canopy with the dimension of 7.8 meter x 2.5 meter and 5mm thickness, providing ambient lighting as well as active heating. This research aims to visualize crowd-sensed data beyond a screen-based visualization, but through the use of actuated forms and displays, which can be embedded in a wall, ceiling or a façade, as a way to engage users in a conversation with the built environments and with each other.

Figure 1. Lumina material. © Chin Koi Khoo

Figure 2. Cloud kinetic canopy © Chin Koi Khoo

References

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