Hubscape: Ambient Display as Physical Space

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Key Centre of Design Computing & Cognition, University of Sydney, NSW 2006

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ABSTRACT

Hubscape is a spatial ambient visualization installation developed by a group of undergraduate students in a studio-led course unit. It uses standard home automation hardware and multiple multimedia projections to display real-time, abstract datasets in physical space. The system extracts electronic and sensorial data in real time to generate data-driven atmospheres in space through electrically controlled devices and visual projections. Hubscape is aesthetically integrated into a computer lab hub room's architecture to unobtrusively reflect nearby electronic and human activities, such as network traffic, timetable information, and temperature, motion and sound measurements.

Keywords

ambient display, information visualization, interactive installation

1. INTRODUCTION

Ambient displays are abstract and aesthetic data representations portraying non-critical information in the periphery of a user's attention. Such displays present information spatially through subtle changes in light, sound and movement, which can be processed in the background of awareness [1]. Most current ambient display designs depict data on wall-mounted screens or through sculptural objects containing custom-made electronics.

2. SYSTEM DESCRIPTION

The Hubscape installation demonstrates how time-varying data values can determine the architectural experience within physical space. Its design concept was influenced by practice of Eastern Mysticism, allowing the instant absorption of knowledge through experiencing 'unity'. The installation contains two complementary parts: several wall-covering projections depicting network and sensorial data, and electrically controlled objects that dynamically highlight networked features present within the space itself.

2.1 Design Context

Hubscape was one of several group assignments from a studio-led course, titled 'infostudio', organized for 3rd year undergraduate Bachelor of Design Computing students. Hubscape was originally designed for representing the electronic activities in the computer labs of the Architecture building at the University of Sydney by dynamically enhancing a central printer hub space with data-driven architectural atmospheres. The most important used dataset included MRTG [2] log files, a common open-source UNIX network monitoring tool that is able to measure incoming and outgoing data packets on the switch or router level during regular intervals. In addition, several directly connected standard home automation sensors captured the environmental situation within the space, through sound, motion and temperature measurements.

Proceedings of the Second Australasian Conference on Interactive Entertainment, Sydney, Australia
ISBN 0-9751533-2-3/05/11

2.2 Data-Driven Electrical Artifacts

The electrical installation is based on slightly adapted standard home automation hardware that is normally used to control 'lighting scenes' in domestic housing. Hubscape exploits this home automation technology to dynamically steer constellations of household light globes and pedestal fans via a networked and continuously data-gathering computer. Light bulbs are arranged in circular clusters made up of three globes and one fan each, positioned around several networked devices (e.g. printers) for which they represent their real time usage data. The light clusters flash sequentially, with the animation speed based on the print queue size, and the brightness of the globes depicting the size of the print jobs. The fans further augment the data immersion experience, as users 'feel' data attributes as blows of wind.

2.3 Wallpaper Projection

The array of projections consists of a large artistic visualization inspired by Eastern Persian rug design. Abstract data from the surrounding environment is mapped to every aspect of the fractal-like graphic, creating a generative visualization which is projected as a repetitive pattern onto the walls, simulating an immersive 'data wallpaper'. The central pattern is made up of several sections that represent data attributes such as network traffic and external temperatures, while the surrounding four leaf clusters represent data relevant to surrounding spaces such as noise levels, internal versus external temperatures and timetable information. The concentrically layered approach depicts older data values on the outsides, so that the display allows for slow, non-obtrusive changes that visually retain a relevant data history.

Figure 1. Hubscape & adapted home automation hardware.

More information can be found at: http://www.arch.usyd.edu.au/~andrew/infostudio/presentation/xperception/

3. REFERENCES

[1] Ishii, H., Ullmer, B. (1997). Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms. *Proceedings of CHI '97*, ACM Press, 234-241.

[2] Oetiker, T., Rand, D. (2005). Multi Router Traffic Grapher. http://people.ee.ethz.ch/~oetiker/webtools/mrtg/