LABSCAPE

Luis Bustamante, l.bustamante@isnm.de ,
Tadele Feyissa, t.feyissa@isnm.de ,
Rangga Winantyo, r.winantyo@isnm.de ,
Mantas Talmantas , m.talmantas@isnm.de,
Albert Quansah a.quansah@isnm.de

International School of New Media at the University of Lübeck

Willy-Brandt-Allee 31C

23554 Luebeck

Germany

Telephone: 49 (0)4 51 / 29 67 0

Fax: 49 (0)4 51 / 29 67 40

E-Mail info@isnm.de

Abstract

Labscape is a multimedia system that uses cameras, microphones and sensors for mapping human activity in architectural spaces, and use the data retrieved to affect the course of action of different graphical compositions based on biological entities. The dimensions and movement of these data-nourished plants, is a function of the measure of sound, movement and light present in the different spaces under “passive surveillance” within the building.

The project is currently developed at ISNM (International School of New Media), with collaboration of other members of the school. The idea is to explore dimensions of organic interaction between humans and computer systems, using control and surveillance technologies. What if the eye-machine, or the almighty sensor network that seems to be growing in these days, could be a receptacle or a platform for a new kind of context-aware ecosystem?

1.0 Introduction

Labscape is just a tentative name for a system that could be also thought of as a smartscape, intelligent picture or something alike. This word aims to describe a symbiosis between the term scape as it works in *landscape*, and the word lab (could be room, hall, square), as the definition of a space, and more specifically an architectural space conceived and controlled by human action.

In the frame of the technological age of ubiquitous computing or “everyware” , as it has been recently called, contemporary structures of surveillance are complex, and oscillate between common tv based structures for public security, the protruding methods of information capture and tracking, and experiments in pattern, gesture and feature recognition, among others. Our social mainframe is defined by the intersection of these technologies with human communities and their practices, and this is often forgotten in the middle of our daily routines.

We are in the conjuncture between the previous human state of the Bigeye, where subjects watched other subjects through video devices and the new state of the Eye-machine, where computers are the subjects that perform the observation, and perceive, measure, classify and react to the activity detected. This transition is a proper context for setting a display of interesting discussions and issues confronting the implications of such a shift, and also, for suggesting ways of generating a soft, familiar and socially encouraging adaptation to the new landscape.

In that context, Labscape is a project developed in the ubiquitous computing research lab of ISNM, with the aim of exploring organic methods of interaction between humans and computer systems through surveillance and tracking mechanisms -sensors, microphones, cameras, photocells- that are employed in architectural spaces where human groups perform routinary actions. The result of the data gathered by the tracking sensors is the generation of a graphical ecosystem which movement, siye and orientation corresponds to the dimension of human movements and interactions in a given space. Labscape's scope is to be a 'mise en escene' of what the big eye-machine could be capable of, a plan of an alternate reality that strongly intersects ours and adapts its behavior to reveal how we interact with others, inhabit spaces and create living ecosystems within our artificially crafted environment.

2. 0 Related Work

Like most projects, Labscape is similar in concept to other existing projects, but with a slightly different flavour. Two other similar projects are :

1. Timescape
2. Sonic City

2.1 Timescape

This installation deals with architectural and city planning concepts. The goal of this project is to depict human activity in architectural spaces, as a dynamic organism – to insinuate that the human environment is a collective entity which is in constant transformation. On its surveillance front, this project is not about recognizing what makes up each person per surveillance system, but about perceiving the quality specific to the site and to test it on humans and human behaviour. It's about the cognition of behavioural patterns, but not about a description of the individual. Moreover the site should be individualized to ascertain its character. Details on this project can be located online at http://www.inoutsite.de/zeitraum_e_n.html#concept . [1]

2.2 Sonic City

This project explores mobile interactions and wearable technology for everyday music creation. This system has been designed, implemented and evaluated to create electronic music based on sensing bodily and environmental factors. Mapping these to the real-time processing of concrete sounds, Sonic City generates a personal soundscape co-produced by physical movement, local activity, and urban ambiance. Encounters, events, architecture, (mis)behaviours – all become means of interacting with or 'playing the city'.

The goal of this project is to break out of traditional contexts for music creation and to explore creative possibilities within local surroundings and mundane activities. Wearing Sonic City, anyone can experience a simple walk down the street as an expressive act, a path through the city as a personal composition. As a complement to lived urban experience, it is an intimate soundscape intended to enhance perception and encourage new uses of the urban landscape. Details of this project can be found at its online source : http://www.tii.se/reform/projects/pps/soniccity/index.html [2]

3.0 Labscape – System Architecture

The system conforms to a simple networked Processing [3] application, specially designed to write and receive data values to and from remote locations, where different sensors are 'perceiving' and tracking the intensity of human activity in the space in different layers. The data retrieved to the application should be conformed by video signals, sound waves, and possibly, values generated by other sensors used, such as photocells. These values are

analyzed locally and 'injected' into the graphic algorithms that creates the overall composition of the plants.

The analysis of the data is logically adapted from reality, with the exception of the video signals. This means, that data values like volume, frequency, temperature or brightness are unidimensional and would be simply scaled to affect different values of the generated graphics, but the camera signals, used to track people movements, contains bi dimensional data that needs to be interpreted.
The cameras are set in high locations above the space and are calibrated so the captured images offer a high contrasted signal.

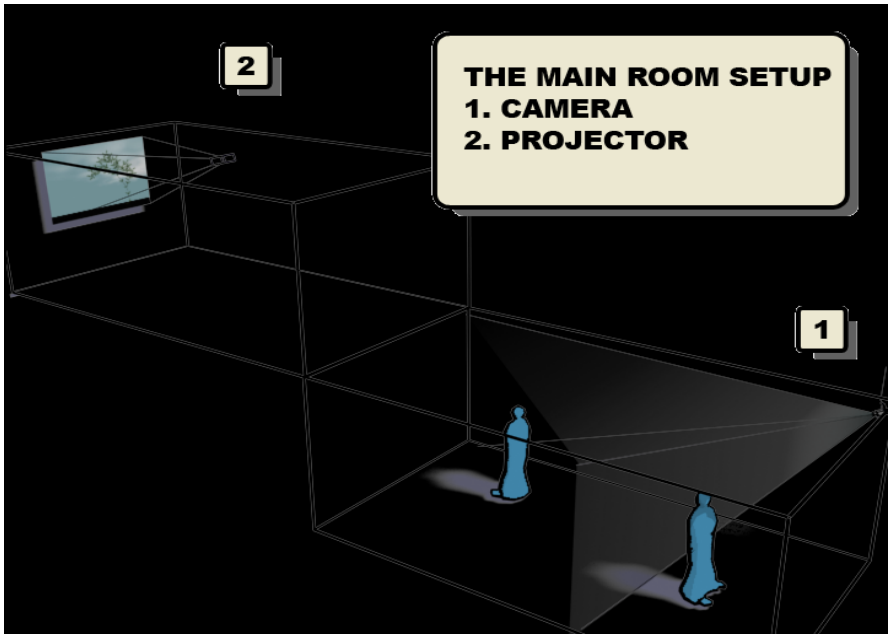

Figure 1 The Labscape setup

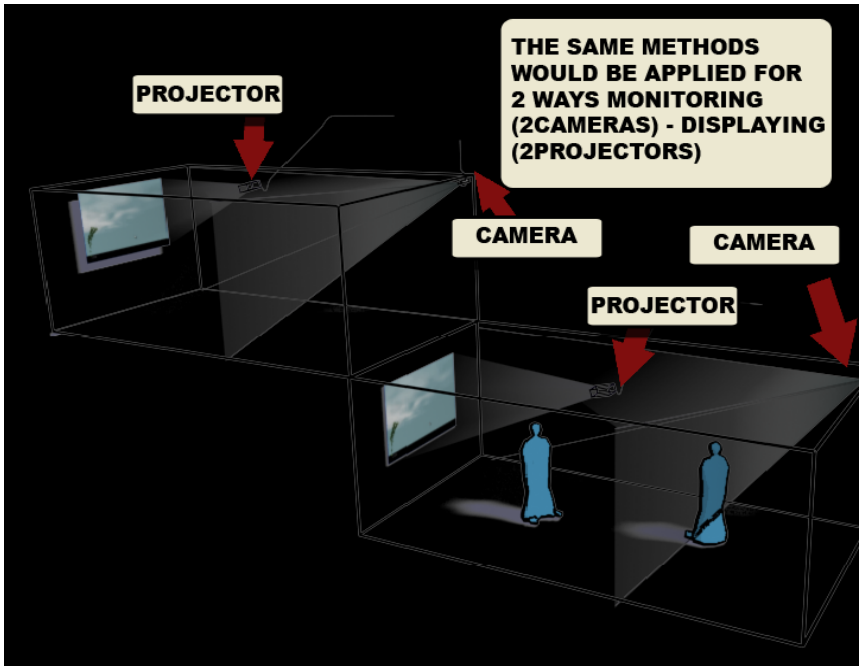

Figure 2 Positioned camera in one space tracks movements and sends data which is processed as simulated trees and projected by beamers on walls (screen) in different spaces.

Using Jmyron [4], a free-source, easy-to-use computer vision library, the program detects the changing pixels of the video signal, in reference with a previously captured frame, and return these groups of pixels, or globs, as a method for quantifying movement. The amount of this blobs is averaged and their location is used to affect directly the size and ratio of development of the generated plant. The Plant is generated from scratch code, using a recursive method known as Lindenmeyer systems [5], which generates directed geometries based on specific grammars that determine the shape and orientation of the graphic. (Figures 3 - 5)

Figure 3 Detection of movement by camera

Figure 4

Initial state of the projection – A small still image

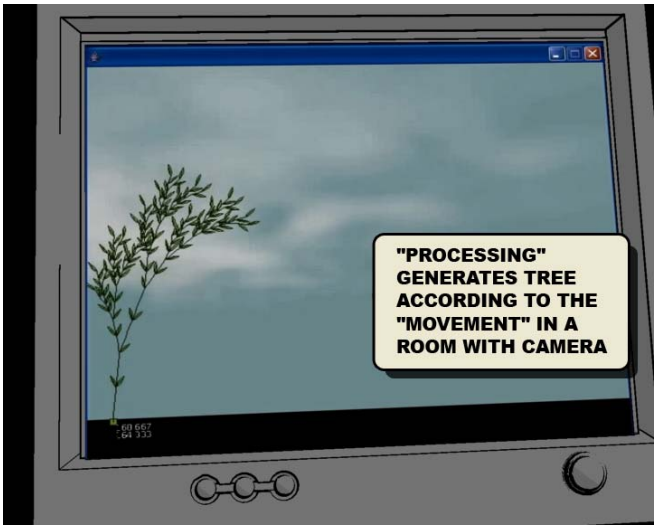

Figure 5

Processing generates tree according to the level of movements in the space where camera is mounted

4.0 Add Ons

The Labscape project comes with other media extensions to make it complete. Beside the installation, there are a website, a project poster and documentation.

4.1 Website

The online presence for this project can be located at http://isnm.de/~tgemechu/, the site deploying state-of-the-art technology .

4.2 Project Poster

The Labscape project poster captures the concept in text and two dimensional graphical image, with the full display of the Labscape colour scheme. The poster, displaying the logo of the project among others, has been displayed in a landscape layout on an A1 size of paper. Figure 6 is a screen shot of the poster.

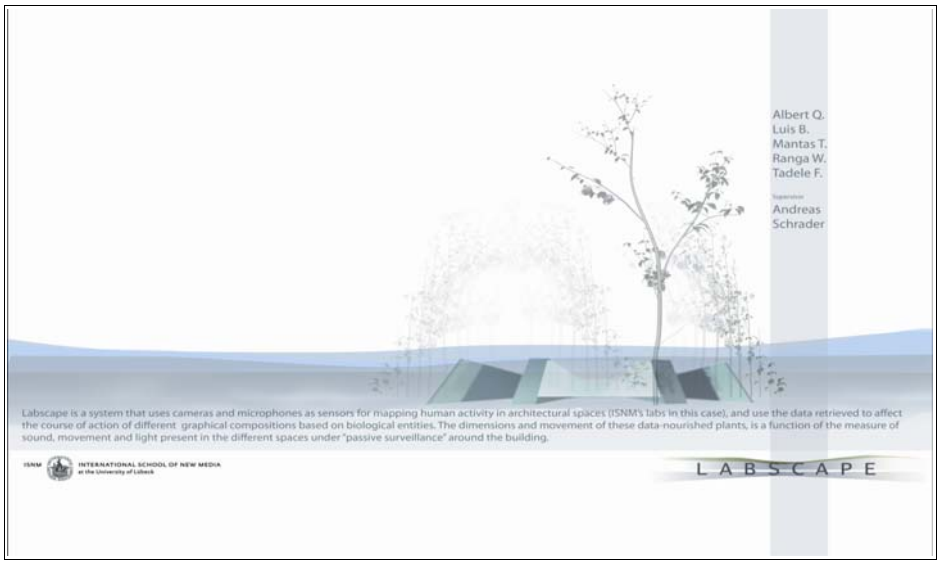

Figure 6 Labscape Poster

5.0 Prototype

For the prototype, as explained earlier in this paper, a webcam would be tracking the average movement within the given space by means of a basic glob tracking algorithm provided by the library Jmyron - http://webcamxtra.sourceforge.net , and imported to the processing environment. The globs are afterwards counted, an average position of all the persons in the room is extracted and the animation of the plant is consequently affected by the data stream.

In a remote room, a second application is receiving the analyzed data simultaneously and generates the plant that reflects the remote activity in the targeted location.

6.0 Conclusions

This project, although being realised as a result of inspirations from previous efforts in the the same vein, it is also a contribution to knowledge and Ubiquitous computing efforts, which is obviously the next level of computing. It seeks to integrate computer systems into our personal spaces in a more social and interactive context, even though surveillance and tracking systems are being employed. For this reason, this project can be described as a passive surveillance.

It is being realised through a combined use of both hardware and software (processing), in a subtle way such that the computer gets out of the way as much as possible, as outlined by Marc Weiser in his vision statement to realising Ubiquitous Computing :

“The most profound technologies are those that disappear.They weave themselves into the fabric of everyday life until they are indistinguishable from it " Marc Weiser in 1988.[6]
Although this project is not in its refined state, it promises to take on a perfect shape in the near future.

Reference

1. http://www.inoutsite.de/zeitraum_e_n.html#concept
2. http://www.tii.se/reform/projects/pps/soniccity/index.html
3. http://processing.org/
4. http://webcamxtra.sourceforge.net/
5. http://www.calresco.org/lucas/classify.htm
6. http://delivery.acm.org/10.1145/330000/329126/p3-weiser.pdf?key1=329126&key2=5775222511&coll=GUIDE&dl=GUIDE&CFID=992500&CFTOKEN=32082736