d.dialogue

A platform for human/digital communication

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Abstract

In this paper we describe an installation called *d.dialogue*. The proposed installation aims to establish an area of interaction between the dweller in an architectural space and the space itself. We will undertake to create a living space arising from the system's learning process brought about by an exchange of experiences with the human resident. The human dweller will be faced with a digital entity that will display curiosity towards human behavior and this confrontation will arouse a mutual need to learn the space. The project ensues from a reflection based on several dualities inherent to the relation between human natural language and digital processes: dichotomies such as technological / biological, digital / analogic, inner individual / outer collective body.

1. Backgound

The installation's development context is intimately linked to the relation between Art and Technology. Advances in each of these fields have always been reciprocally influenced. In spite of this, the current debate on the relations between Art and Technology seems to focus only on how the *new technologies*, and more specifically the digital technologies, affect the Arts.

The focus of the debate becomes still narrower if it is admitted as valid to view the relation of *the new technologies* to *a new art* as one of cause and effect.
Our role as artists is to bring the public to this debate. We chose to do this by creating an interactive and intuitive experience environment where visitors are able to contact an array of metaphorical *digital beings*. The purpose of this exercise is to make it possible for the human relation to that environment and to those *beings* to help a re-centering of the debate on the reciprocal and bi-directional influences between Art and Technology.
The proposed analogy, which reflects the relation of Art to Technology onto the relation of humans to an environment inhabited by *digital beings*, ensues from a reflection about some dualities present in the relation between human language and digital processes. We will briefly present the relevant dualities before we detail the installation itself.

1.1 The convergence of dualities

Technological / Biological

We are still hostage to a science-fictional legacy that

appears to condemn humankind to defend its existence against the supremacy of machines. The relation between man and machine is popularly described as conflituous in spite of the fact that we are nearing a man/machine status. Instances of this development can be found in the fields of Nanotechnology and Biobotics.
Nanotechnology operates at a molecular level to create atom by atom structures. Our mastering of the construction and control of such systems points, in the specific fields of Biology and Medicine, to an integration of these nano-machines in biological organisms.
Biobotics as an artistic practice is also an integration interface between technology and biology through which we are able to glimpse the future interdependence of these disciplines. The result of this integration is the inevitable re-definition of our view from one of conflict to one of symbiosis.
Nanotechnological developments and biobotics point towards such a convergence and are become increasingly a subject-matter for artistic production. [i,ii]

Digital / Analogic

Parallel to our continuous, analogic world runs a layer which constantly digitalizes, meta-organizes and reconfigures it. The point of convergence of these vectors materializes where the human ability to tell the discrete apart from the continuous ends.
This fusion of realities happens more and more often as the potentialities of digital technologies and human ingenuity become more powerful. Thus the process does not limit itself to the mere digitalization of the analogic, nor are the technical limits defined only by our ability to store such digitalizations. The active process of creating new intelligent beings (Artificial Intelligence) to inhabit that parallel digital universe ads power to that to that converging trend. The presence of transformation, processing and communication abilities by digital creatures catalizes the dialogue - the experience of the digital becomes natural. [iii,iv]

Inner individual / Outer collective

The digital sphere makes it increasingly difficult to identify the limits of our bodies. Where do our body extensions begin and where do they end? When the sum of our *avatars* becomes a part of that which characterizes us as individuals, where does individuality end and the collective begin?
As our bodies reach over the border of our physical presence, so does our thought flow outside. The dream of a shared consciousness, based on a collective or concerted intelligence, emerges whenever the appearance of a new technology points at a contraction of the distance in time or space separating our planet's inhabitants from one another. Instances of this dream range from H.G. Wells' World Brain, based on microfilm technology, to Pierre Leévy's certainty of a collective intelligence. [v,vi] As a matter of fact, the processes by which we think and create are increasingly associated to digital platforms of knowledge sharing and collaborative creation. A result of this is the increasing difficulty in determining the nucleus of human thought, which moves from the individual's inner space to an external shared space, so as to change permanently the relation of humans and their bodies to the physical or digital environment they inhabit.

2. d.dialogue

Our proposal consists in creating a metaphor for the movements of convergence we have identified. The installation's architectural space is characterized by a visual and auditive environment which prompts the convergence of human and digital realities. Through a mimetic course, typical of human learning processes, the digital residents of this space strive to learn the language and behavior of those who share it with them.
These *beings* are simultaneously cautious and curious in their relation to humans and demand that they in their turn learn a behavior in the shared space. From this interplay of interactive advances and retreats results a conflict, of which the expected resolution consists in a new perception of the way humans relate to a space which is alive. Thus, the ever present dualities in the project have led us to attempt the creation of a living system, a digital one but one that is fed by that which is the most human in us (word and motion).

Fig. 1 d.dialogue beta at Mapa, oct'07

The installation reacts in the same way as a series of living organisms which communicate among themselves and with us. Their immediate response to a human presence is flight: They show themselves later on if human activity turns out to be not too threatening; but they use the time of their flight to observe us and to learn our words. When they return the words of humans are already part of their memory and are changed in their attempt to provide us with an answer based on a shared communication platform. Motion in space is no longer intrinsic to us and becomes external; in the same way do our words become a part of the environment.

2.1 Implementation:

The installation operates in three vectors:

Motion

Motion is parametrized through a camera that records the actions of those who are present, linked to an application which determines the quantity of motion in the space and the co-ordinates of that motion

Fig. 2 d.dialogue user interaction beta at Mapa, oct'07

Sight

The visual symbols in the installation are points of light that represent digital beings that react to human presence. The chart for their intensity and for the rhythm of their reaction is generated in real time by the location and quantity of localized motion.

Sound

The installation's sound environment is shaped by sound samples collected in real time in the installation space itself. These samples are sequenced and manipulated so as to allow episodes of symbolic communication.

Architecture

The basic conceptual challenge for the project consists in driving communication and starting a dialogue involving the visitor, the environment and the *digital beings.*
For such a dialogue to happen we must establish a modular synthesis computer system and relate it with an electronic control system using led lights.
The computer operates though three information processing units: an input unit which allows the system to detect and interpret a visitor's presence, a synthesis unit where analysis is performed and relation commands are attributed to information, and an output unit which leads the sound synthesis and the relevant commands to the electronic interface.
The electronic system gathers the data from the output module and assumes command of the led lights' intensity and pulse.

Computer synthesis:

For the environment analysis in the input unit we chose to use a vídeo camera's image processing ability and sound capture by microphone. The installed camera conveys information in real time to the computer, which interprets and parametrizes, through the eyesweb[vii] graphic programming software, two data flows:

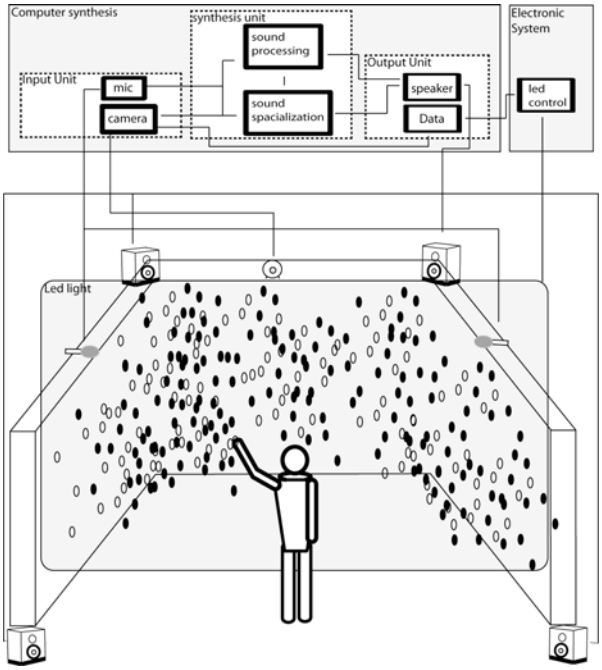

Fig. 3 d.dialogue scheme

the quantity of movement in the installation perimeter and the visitor's position in the space. These two values are directly related to the artistic object in the synthesis unit and each of them brings about both sound and visual relations. Sound capture by microphone answers two needs: sound amplitude analysis and the recording of sound samples.
In the synthesis unit the relations are created in a modular processing system, whereby two modules are in operation: one for the synthesis and processing of the sound signal and another for the spacialization of sound.
In the synthesis unit the relations are created in a modular processing system, whereby two modules are in operation: one for the synthesis and processing of the sound signal and another for the spacialization of the

sound. The synthesis is brought about by the transformation of sound samples taken from the installation environment. The entry unit measures the sound amplitude and whenever this goes over 50db it sends a command for the synthesis unit to buffer the sound. These sound samples are sequenced and processed in real time, so that the variation in the quantity of processing suffered by the sound is directly related to the quantity of movement recorded by the input unit. By this sound we represent the *beings'* will to communicate and to learn human speech.
The spacialization module collects the visitor's position values in the installation space and re-directs the sound to four separate outlets, establishing a relation between the visitor's listening point to the *beings'* position in space.
In the output unit the sound process is finalized and the sound is sent to the four loudspeakers set in the space in a quadrangular disposition. In this unit the information parametrized in the *eyesweb* is simultaneously sent to the electronic system to the application that comes with the visual processing hardware Arduino[viii].

Electronic System:

The electronic system is that which commands the *beings'* visual representation. This system, consisting in 500 leds, a micro-controller called *Arduino* and a set of printed circuits fitted with electric intensity distribution chips, is in charge of managing and coordinating each individual led's light pulse and intensity.
The *Arduino* controller collects the visitor's position and movement quantity from the computer's Arduino unit. In the installation space it distributes the light points so as to relate the quantity of movement to the number and distribution of the light points. These relations are used in their turn to create the sensation that the *beings* shy away from the observer when a sudden first contact is attempted. Notwithstanding, givem a modicum of subtlety which visitors must learn to impart to their movements, the *beings* come nearer and interact with visitors. As for the visitor's position, it reflects on the installation through its effect on the distribution of the light points.

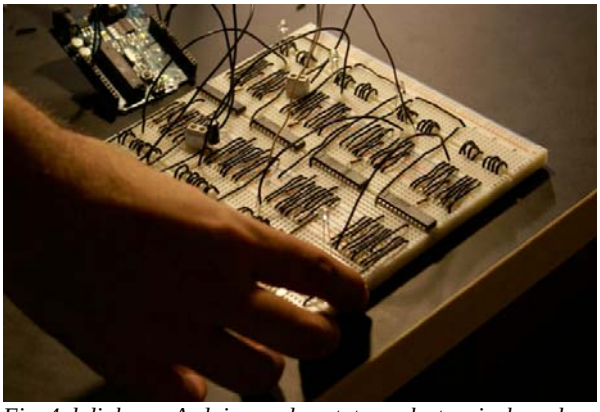

Fig. 4 d.dialogue Arduino and prototype electronic board

3. Conclusion

The installation described in this paper was developed to raise public awareness of the relation of Art and Technology. Using an analogy which reflects that relation onto the relation of humans to an environment inhabited by *digital beings* we were able to make a space in which human words and motion are the means to a metaphorical dialogue with a digital world that comes in the form of light and sound. The reflexion on some dualities, including Technological / Biological, Digital / Analogic, Inner individual / Outer collective, and our view on their convergence was the conceptual starting point for the installation. In the future we aim to further explore the human/digital dialogue theme hopefully helping to bring the public to the debate on the reciprocal and bi-directional influences between Art and Technology. [ix]

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References

i Kac, Eduardo. "A-positive". In : ISEA '97 - The Eighth International Symposium on Electronic Art, September 22 -27, 1997 (Chicago: The School of the Art Institute of Chicago, 1997), p. 62
ii NanoArts: http://nano.arts.ucla.edu/
iii Renan, Sheldon. "The Net and the future of Being Fictive" Clicking In, Hot Links to a Digital Culture, pp. 61-69, Seatle, Bay Press, 1996
iv de Kerckhove, Derrick (2001) The architecture of intelligence, Zurich, Birkhauser.
v Wells, H.G. (1938). World Brain. Meuthuen & Co. Limited.
vi Leévy, Pierre., Toward Superlanguage, http://www.humanities.uci.edu/mposter/syllabi/readings/levy.html
vii EyesWeb Software http://www.infomus.dist.unige.it/eywindex.html
viii Arduino hardware:http:// www.arduino.cc
ix d.dialogue: http://www.biobit.org/ddialogue