

# Non\_sensor

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## ABSTRACT

The paper presents Non\_sensor, a digital art project that makes use of a Polhemus motion tracking system to create an electromagnetic field which is disturbed by metallic objects that are manipulated by the visitors in the installation. This disturbance is interpreted by the system as movement, and presented in the interface as lines that create trajectories according to the distortions. Visitors can therefore design different graphic patterns in the interface by playing with objects.

## Categories and Subject Descriptors

B. Hardware. B.4 [INPUT/OUTPUT AND DATA COMMUNICATIONS]: *General*. J.5 [Computer Applications]: Arts and Humanities: Fine arts.

## General Terms

Measurement, Performance, Design, Experimentation, Human Factors.

## Keywords

Digital art, interactivity, distortion, motion capturing system.

## 1. PROJECT DESCRIPTION

### 1.1 Introduction

The piece aims to show the interface as a connecting channel between hardware, user and environment, a connection which in reality, also takes place outside of the machine system. It uses the Polhemus motion capturing system (<http://www.polhemus.com>) that is a commercial equipment, frequently used for character animation and feature films in advertising and entertaining industry. It's constituted of a transmitter, a receiver and the System Electronic Unit. The transmitter contains electromagnetic coils that emit the magnetic fields (at a maximum range of 10 feet). The receiver detect these magnetic fields and it's position and orientation is precisely measured when attached to a performer's body. The System Electronic Unit contains the hardware and software necessary to generate and sense the magnetic fields, compute position and orientation, and interface with the host computer via an RS-232 and USB. This system is disturbed by the proximity of metallic objects. This disturbance generates changing in data that is exactly what happens when there's physical displacement or movement, so the system reads

“movement” even if receivers are still. Polhemus' motion tracker has a system that minimizes the external interferences, so normally the designer sets out to control or eliminate these interferences so as to create his works. In Non\_sensor the physical environment is regarded as a connective factor, thus disturbance is not eliminated but constitutes part of the work instead. The receivers are fixed in a box and all movement is created by distortion caused by the manipulation of metallic objects in the electromagnetic field.

### 1.2 Interface design

Developing an interface always implies the choice of some elements for demonstration purposes and consequently, the exclusion of others. The idea here is to choose a path of deconstruction more than the creation of an illusory magnetic effect. Therefore the graphic interface created for the piece is simple and clean, showing eight points that represent the position of each receiver inside the box. Whenever someone approaches a metallic object to the electromagnetic field the distortion is interpreted as 'receiver's' movement by the system. The interface shows a line tracking the trajectory of each “moving” receiver. The eight lines and points together in the screen create patterns, aesthetic results that can be constantly changed by the action of the visitors.

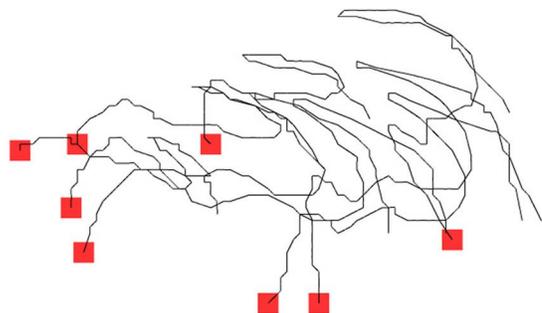


Figure 1. Graphic patters designed in the interface

### 1.3 Interaction

The graphic results vary depending on: the shape of the object, type of metal, kind of movement made by the user and the distance between objects, the receivers and transmitter. Each visitor can create their own results depending on their choice of an object and how they manipulate it. Mobile phones and radios for example don't even need to be moved to create distortion. Since they also transmit electromagnetic waves, people can play (or *design*) in different ways by simply using mobile phones in different status (standby, calling from one phone to another), or for example by changing radio stations or moving radio antennas.

## 1.4 Deconstruction of conditioned action

Visitors interacting with the piece gave meaning to the forms they developed through distortion. Some saw them as digital prints, viruses or a 2D sculpture. As no previous control or meaning was specified, people could interact with the piece using the box with receivers as a blank canvas to be painted on.

During the interaction it was noticed that even objects like pans and metal boxes were eventually manipulated as a mouse and the box with the sensors used as a big mouse-pad. This kind of conditioned action was changed when people noticed that the graphic results were not obeying the object's command and the table itself was not the only base to orient the distortion.



Figure 2. Objects being manipulated over the box with sensors

## 1.5 Conclusion

If the substance of the electronic art is information, the study of the interface is the study of the forms that are given to the this incorporeal flow. Information is not only about meaning of codes or words, but are also impulses, abstract paths of energy in motion. In the case of the artificial language, it can be changed generating aesthetic results even from a deeper and more basic level of the machine.

## 2. RELATED WORKS

Étienne-Jules Marey in the 19<sup>th</sup> Century, with his *Machines à fumées*, pays attention to the process of constitution of the moving image in nature, where the movement is a way to perceive the changing world, rather than just a succession of fixed images.

Maurice Benayoun's *Le diable est-il courbe?*, is an organism which change in accordance to *stimuli* created by the user, and which at a given moment, charged by a *super-stimulus*, become insipid and formless. It is related to Non\_sensor in a way that also explores simple images so as to make people think about the way they interact with technological objects.

Louis-Philippe Demers' *Le procès*, a piece that mix robotics and theatrical stage design, where the viewer creates most of the "simulation effects" based on their imagination. Like Non\_sensor it asks people to interact not (only) physically, but also by giving meanings to abstract forms based on their own individual experience.

## 3. TECHNICAL DETAILS

The project is constituted of a Polhemus motion tracking system with no more than 8 receivers (to assure realtime performance) fixed inside a five sided box made of plexiglas, which are connected to a network with two PCs.

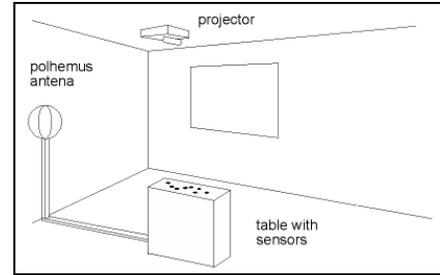


Figure 3. Illustration of space

One PC reads the data from Polhemus and sends it to the Flash Player (performed by the other PC). A projector hung from the ceiling displays the graphic results created through Flash. The transmitter is displayed in a distance of about 5 feet from the box, in order to create a magnetic field sensible to user interaction.

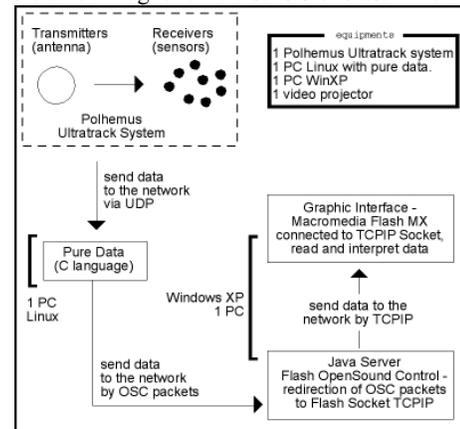


Figure 4. Non\_sensor - technical information

## 4. ACKNOWLEDGMENTS

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