1. Introduction

The word "noise" comes from the Latin word nausea meaning "seasickness", or from a derivative (perhaps Latin noxia) of Latin nocēō = "I do harm", referring originally to nuisance noise. Generally all non-musical sounds are considered to be noise. Noise is a complex concept and source material to deal with; it is an invisible architectural element with an undefined aesthetics. It deeply affects people and yet people feel very powerless to interact with or control it. The fundamental idea is to turn noise into a reprocessed living, evolving and tangible experience, by interacting spatially and temporally with the environment and its observers. Our purpose is to raise people's awareness to sound, in all its forms: speech, non-speech sound (sound pollution sources) or natural sound, and treat it like data with a corporeal dimension. We aspire to convey an embodiment to an often neglected "hidden dimension", by adding it to a phenomenology and a poetics of visual space. Building up on our research in interactive membranes [1] [2], we introduce "Nausea Transformer": a sound reprocessed machine that unexpectedly can create pleasant behaviours by recycling noise into pleasant sound, therefore promoting new interactive experiences to a nearby audience.

2. Design Description

"Nausea Transformer": is a reconfigurable acoustic and visual system that records the environmental sound feeds in cycles of a certain time (i.e. 5 minutes), then filters that sound and delivers it to the audience with a physical response. The dynamics of the system, materialised as a responsive wall, is made of robotic levers, a latex membrane, sound sources and LED's which react in real time to change the behaviour of a membrane (Figure 1). The system, creates an evolutionary set of rules for what it considers a “perfect sound environment” and reacts accordingly with a sound source and a physically manifestation. If for example, the system receives “disturbing” levels of sound, it reacts in “resentment” with a louder cacophony feedback. Simultaneously, exhibits a physical relation creating “noisy” patterns on the surface through its actuators. If the input harmonizes with the set of rules of the moment, the output can be musical, pleasant and/or humorous. The users interact with the result by giving it a “empathy” or “repulsion” feedback and the system learns to adapt itself to the environment.

3. Real-Time Design Process

"Nausea Transformer", borrows its design logic from ubiquitous electronic technology, artificial life, robotics, and human computer interaction (HCI) models as integral components of the design system. The wall starts its learning process by responding to “empathy” or “repulsion” from the people around it. The "Nausea Transformer" behaviour is the result of a complex system composed by microphones, web cams, sensors (light, vibration and proximity sensors), SMA’s actuators and a Genetic Algorithm (GA) component. A GA involves a “genotype” which is a string of code specifying a “phenotype”. Here, our “phenotype” is the sound response, and the behaviour of the levers and LED’s. The environment feeds are inputs for the genetic variations. These inputs change the sound response behaviour of the membrane, change its shape, and trigger motion and light, making the wall a performance piece. A wide range of possible “phenotypes” can be generated, and are evaluated for their “fitness” based on some formally specified criteria. The wall begins its learning phase by running a random set of behaviours (raising and lowering levers to form patterns, and producing arbitrary sounds, taken from a reduced set of samples), and will try to adapt its effect sequences to get the maximum “empathy” responses. We will observe the “evolution” of this piece according to different stimuli and how it learns to adapt itself continually to the evolutionary properties of the environment echoes, thus becoming a “situated resonance living piece”.

References