Recycled Wind: A Sound Installation

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ABSTRACT

Recycled Wind is a sound installation in which a visitor's breath is emulated mechanically. Sensors detect the breath and trigger small fans, which blow sound-making objects such as wind chimes and leaves. Like the wind itself, the chimes and leaves are emulated, constructed of recycled materials such as jar lids and grocery bags.

KEYWORDS

Breath, wind, wind chimes, motors, Arduino, piezoelectric, recycle, kinetic art, sound sculpture, bricolage

INTRODUCTION

Recycled Wind is a sound installation, but could also be described as a sound sculpture or a work of kinetic art. Visitors blow on artificial flowers, which sense the intensity of their breath and trigger small fans mounted on a wall. The fans blow artificial leaves and wind chimes to create soft aleatoric music.

This work was one of a group of eleven installations presented at Queen's University Belfast in May 2008. I knew that most of the other installations would rely on loudspeakers as the sound source, so I decided to create an installation using only physical sound. This would require the use of motors and sound making objects instead of loudspeakers. Since the sound-making objects would be visible to the visitors, they would require a certain level of visual interest. Thus, *Recycled Wind* is perhaps more closely related to sound sculpture and kinetic art than it is to many other sound installations.

Kinetic art is a type of art based on motion. First coined in the *Realist Manifesto* by Soviet artists Naum Gabo and Antoine Pevsner in 1920, notable works in this genre include Marcel Duchamp's "Bicycle Wheel" and Alexander Calder's mobiles [5]. In these works, sound is not necessarily a critical component, if it is present at all. However, these works remain important precedents to *Recycled Wind.*

In much kinetic art, there is an element of chance (exceptions being those works which move in a predefined sequence). George Rickey writes in 1963 that, in kinetic art, "chance may be introduced either by the movement of the observer, which the artist prepares for but does not predetermine, or by incorporating, in the object itself, some factor of fortuitousness" [5]. In works like Calder's mobiles, the wind is the factor of fortuitousness, but in interactive installations, the factor, by definition, is the audience's intervention. The intention is for the audience to participate with the work instead of simply observing it.

For this *Recycled Wind*, visitors could readily see how the sound was made, so the sound-producing objects needed to look interesting in some way. In Emery and Morriss's paper on their sound sculpture *Kinesone I,* they note that visual artists and musicians often lack the respective training in acoustics and visual aesthetics. "As it happens, both sound-sculptor and musician have turned in large part to electronics for a solution" [3]. I am a musician by training, but I wanted to break from this popular path. Considering that physical objects would be creating the sounds, I knew that the visual element of the installation would also be important.

Since I have no training as a visual artist, I needed to consider how I could make this project effective visually as well as sonically. The

sounds produced by the installation would resemble something in nature (leaves) but would probably need to be artificial. I realized that it would be interesting to emphasize the artificiality of the installation, which led me to the idea of recycling readily-available materials, a technique known as *bricolage*. I must also admit that I hoped that the use of bricolage would somehow disguise my lack of visual art experience.

Art works involving bricolage, as in those created and described by R. Murray Schafer in 1980, are "expressions of energy conservation and recycling. They breathe new life into old objects. They prove that nothing in this life is dead or past usefulness if the imagination can put it to work again" [6]. His *Sound Sculptures Nos. 1 and 2* use recycled farm tools, suspended to clang and scrape against each other. Similarly, in this project I suspended recycled materials to create artificial leaves and wind chimes.

Unlike the works mentioned previously, which are powered by humans or by natural forces, this installation is controlled by a computer. What were simply objects one would hang outside to be "performed" by the wind become something that a visitor can perform. A visitor may simply play the chimes by hand, as is done in concert situations, or they can control the wind and therefore indirectly play the chimes. In this respect, the installation is similar (but far simpler) to such projects as *Sustainable* by Birchfield, et al, which creates sounds with water gongs [2] and the "artificial life" works of Ken Rinaldo, Sam Woolf, and many others, which use robotics to emulate natural phenomena [7].

Figure 1: Vines and Chimes

DESIGN AND IMPLEMENTATION

Three piezo sensors are fed into the analog inputs of an Arduino microcontroller board. The piezos have been decorated with plastic "petals" and straws for "stems," and placed in a flower pot filled with chunks of packing foam. The Arduino controls a circuit that will start and stop several motors in succession. Each piezo triggers two possible sequences, and the duration of the sequence is determined by the intensity detected by the sensor.

Figure 2: Blowing on the piezo flowers

Each sensor has two thresholds, and the Arduino has been programmed to detect the breaking of one of the six thresholds and to start a unique sequence. The sequences of the motors were created to emulate the motion of wind from one side of the wall to another. For example, blowing on the left-facing flower will begin a sequence that starts with the left-most motor, followed by the center motor, and ending with the right-most motor. If the higher threshold is hit, the Arduino will cycle through the motors twice; the second time through the cycle, each motor will run for a longer amount of time. This was intended to depict a "strong" wind.

The wires powering each motor extend from the motors, which are mounted on a wall, to the Arduino and circuit board. The wires are decorated with artificial leaves cut from used grocery bags. This disguises the wires somewhat, turning them into vines, obviously artificial though they may be. An extra "vine" is hung across the installation to obscure the motors and to provide soft rustling noises when moved by the motors.

Figure 3: (partially) hidden motor

Each motor has a styrene fan blade attached, which creates sufficient force to move some of the leaves and the wind chimes. Several different wind chimes were made, using string, cardboard tubes, coins, pens, jar lids, and the packaging from the motors. The items were chosen for their sound characteristics, but in the end the coins and pens were moved away from the motors in favor of the jar lids and motor packaging. Although the pens and coins created interesting timbres, the fans could not move them sufficiently. The lids and motor packaging could catch the wind better and created more sound. The pen and coin chimes were left hanging in case visitors wanted to play them manually.

The Arduino circuit board was powered by a laptop USB power supply and the motors were powered by an external (3V-12V) power supply. The power was set to 6V, which created the best balance between wind force and quiet running. Due to the soft sounds created by the chimes, there was some concern that the noise of the motors would overpower the other sounds. The test version, which I created at home, was particularly problematic, since the motors resonated the walls considerably. Thankfully, the display board in the exhibition location m did not resonate as much and the motors ran relatively quietly.

CONCLUSION AND FURTHER WORK

Recycled Wind was first shown on May 21, 2008 in the Students Union Enterprise Room at Queen's University Belfast. The reaction was generally positive; it was viewed as a light-hearted piece and several visitors stated that it was relaxing and something that they would love to have in their home.

A major problem I noticed with the installation (besides that it was far too soft for its given environment) was that guests expected a correspondence between the sensors and the motors. Since there were three sensors and three motors, some guests naturally assumed that there was an intended correspondence. By expanding the installation, with three flowers and ten motors, for instance, this may cease to be assumed. The program for the motors could be revised as well, so that more motors could run at once and so that the succession could move faster. This also could help disrupt the unintended correlation between the sensors and specific motors.

Figure 4: Guests interact with *Recycled Wind*

ACKNOWLEDGEMENTS

The circuit to connect the motors to the Arduino was adapted from the ITP Physical Computing lab at New York University [4]. The circuit itself was controlled by an Arduino program derived from several of the tutorials found on the Arduino website [1]. Both of these sites were invaluable tools in the creation of this project.

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