Abstract

Towards the development of elastic physical motor skills when using digital technology to mediate sonic interaction. Balance-Reach is an individual project within the context of a larger group musical ensemble project to create sound producing interactive robots, that considers the potential for human movement in interaction and incorporates reflection on ‘How We Hear in the World’ (Gaver, 1993).

Author Keywords

Human creativity; microprocessor; interactive sound sculptures; new interfaces for music production; human movement; balance and coordination; chromatic lament; embodiment; reach, stretch.

ACM Classification Keywords

Introduction

The brief was to create a sound producing interactive sculpture which will form one member of a 30-piece musical robot ensemble to be exhibited and performed in the atrium of the computer science building. The musical robot must sense or detect input from a human and respond by generating sound. The goal was to design actions which exploited human movement when the player interacted with it or vice versa.

How the interaction unfolds

The player and the audience/the passer by who becomes the player.
- Player balances rod on finger.
- Reaches up to pyramid.
- Aims to allow the rod to rest at one of the three levels.
- Connection in the circuit is made and the robot responds by playing melody assigned to that level
- There is a different melody for each of the three levels.
- If there is no interaction for two and a half minutes the robot plays a another different melody to attract passers by to interact and play with it

Embodiment

We evolved the human physical body in response to our environment. Fine motor skills evolved to get our bodies to be able to do things, e.g., sing high notes, play the flute or violin. Do we harness potential for developing physical motor skill when interacting with computer devices? For the most part interacting with digital devices involves, hand eye coordination, sitting, or holding an object in our dominant hand and moving the first digit of that hand. This project design harnesses the coordination of motor skills that we use when balancing an object (the conducting rod) on a finger. We bipedal human beings are masters of balancing upright. Aided by gravity we manage to negotiate life in a constant state of balancing. As Walter Carrington wrote to ‘Balance as a function of intelligence’ co-ordination and movement.

Design aesthetics

Production values are important in works of art. The components were designed so as they would fit together without using glue, in keeping with the overall aesthetic of the installation (however, glue was used discreetly to hold the Perspex letters in place in the box panels). The Tripods were of two heights and proportions. I chose the smaller, taller tripod. With the height I could incorporate the movement, reach, for the average sized adult into the design.

Coding

I programmed the Arduino using C code to drive a speaker directly using the Arduino Tone Library.
Brainstorming sketches of the initial concept for Balance – Reach, which involved the player balancing a rod vertically on her hand within the space of a wire hoop above the tripod. When achieved, I envisioned music emanating from the instrument. But when the rod unbalanced or went beyond the bounding frame, the music would change to ‘noise’ - a buzz. Followed by no more music until the player had achieved balancing the rod vertically again in the bounded by a wire ring.

Figure 3
Iterations and the final design.

Laser cutting of components.

Connection prototyped with switches on a bread board with Arduino.
Collaboration & Group Process

There was lots of creative collaboration throughout the design process with all other members of the ensemble. The workshops (coding labs, electronic labs, and at laser cutting IDC). Working separately but all together afforded the opportunity to cross pollinate ideas, share feedback and be inspired.

In the IDC Workshop.

The musical robots ensemble was performed live by its student designers, conducted by the two lecturers, to a live audience in the computer science building atrium. Afterwhich the robots remained in situ as an interactive sound sculpture for five weeks.

Video Link
https://youtu.be/KgYcAJQdq10

References