Arcontinuo: the instrument of change

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ABSTRACT

The Arcontinuo is an electronic musical instrument designed from a perspective based in the study of their potential users and their interaction with existing musical interfaces. Arcontinuo aims to change the way electronic music is performed, as it is capable of incorporating natural and ergonomic human gestures, allowing the musician to engage with the instrument and as a result, enhance the connection with the audience. Arcontinuo challenges the notion of what a musical gesture is and goes against traditional ways of performing music, by proposing a concept that we call smart playing mapping, as a way of achieving a better and more meaningful performance.

Author Keywords

Arcontinuo, New interfaces for musical expression, haptic, sensors

ACM Classification

H.5.5 [Information Interfaces and Presentation] Sound and Music Computing, H.5.2 [Information Interfaces and Presentation] User Interfaces—Haptic I/O.

1. INTRODUCTION

The *Arcontinuo*[1] is an electronic musical instrument that was conceived with the intention of overcoming some of the difficulties of other instruments that have failed in getting a consistent place in the musical scene. Its creation was based on a model founded in concepts of interaction design research and narrative identity [1].

This need for a radical innovation in the way electronic musical instruments are designed and conceived has been the motivation to develop our research, consolidating a multidisciplinary team of designers, engineers and musicians who over the last seven years has been working on this new electronic musical controller/instrument. It is important to note that our research and development process has been guided by an epistemological disciplinary approach and methodology, focused in the subject-object interaction [2], in order to understand meanings as useful drivers to define both the shape and the technology of the product.

[1] `http://www.arcontinuo.com`

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2. FEATURES

We have developed an electronic musical instrument capable of incorporating natural human gestures, allowing the musician to engage with the instrument and as a result, enhance the connection with the audience. Electronic music today, is being played through interfaces made of a series of knobs, faders and other kinds of buttons that don't necessarily allow for the interpreter to create an expressive person-instrument interaction, nor use natural movements to create their musical inspiration in a continuous way. We believe that this interaction amplifies the engagement of the audience with the performance.

The Arcontinuo is an electronic musical instrument that belongs to the controller category. It contains a curved surface which is posed/strapped over the shoulders and allows for an ergonomic coupling with the user. The surface is 3D, resilient, elastic and continuous, allowing for fluid execution. Arcontinuo has 3 axes which are fully programmable (x,y,z), allowing the fingers to move along the surface to execute the music, where z is the pressure axis. This key factor enhances the dynamic range and gives versatility and musical expressiveness to the instrument. We are currently on our third prototype iteration, and we hope to reach a market-ready version of the instrument in the short time.

3. PROTOTYPES

We have conducted an iterative validation process, which begun with the first functional prototype (Arcontinuo 416). This instrument is described in some detail in [1]. As shown in figure 1, this first version was made of wood with a curved execution surface covered by polyester. This version communicated with a computer using a serial connector (RS-232) and all the data processing was done by an Arduino micro-processor.

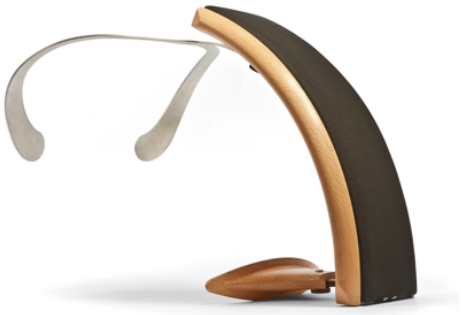

Figure 1: First prototype, Arcontinuo 416, made out of wood and polyester.

After a hardware and software redesign stage, we constructed a second functional prototype (Arcontinuo 520),

as seen in figure 2. This version is made of aluminum and covered with a sandwich of silicon and lycra. This version had two ways of connecting to a computer, by a standard USB connector, but also via a wireless ethernet connection. The software runs on a Raspberry Pi computer. In a similar fashion as with the first prototype, all the data processing was done by a PIC micro-processor.

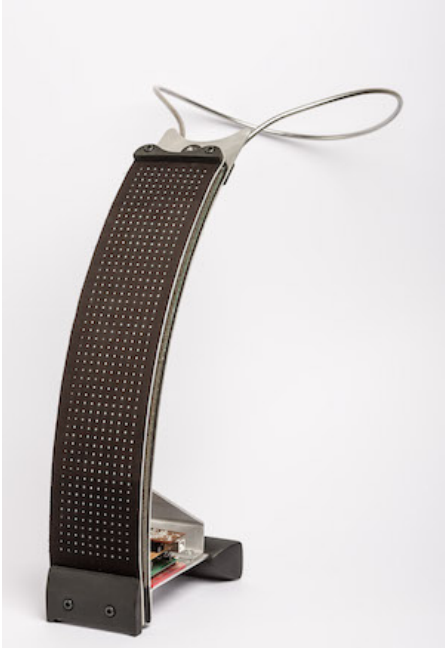

Figure 2: Second prototype, Arcontinuo 520, made of aluminum, silicone and lycra.

We are now in the final stages of producing the third prototype (Arcontinuo 1512), shown in figure 3. In this version, the complete instrument is covered by polyester and the skeleton is 3D printed. All the electronic processing in this version is considerably faster, as it is built using FPGAs instead of micro-processors. This version will allow for wireless, MIDI and standard USB connections. Also, the sensing technology has been improved, allowing for much accurate finger recognition algorithms.

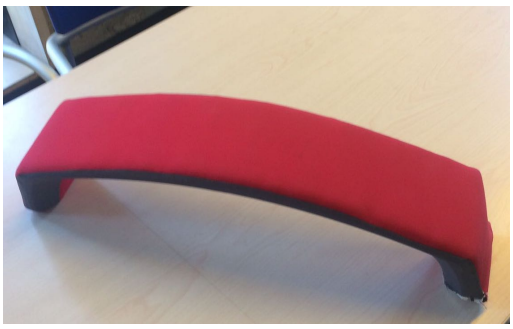

Figure 3: Third prototype, Arcontinuo 1512, 3D printed and covered by polyester.

One important aspect we have paid considerable attention since the second prototype, are the variety of performance options that this surface allows for. Figure 4 displays all five possible performance modes of the instrument.

For a full account of the design process, we refer the reader to [2].

Figure 4: Performance modes of the instrument.

4. MAPPING

It is not a trivial task to decide how to play a continuous 3D surface. Many questions arises when you are confronted with this situation, such as: Do we still need to consider the concept of key?, What is a musical event?, or What is the relationship between finger's gestures and musical events?

After several years of research, we have decided to let the user define how he interacts with the instrument. This means that the whole instrument surface is adjustable and customizable based on the user's needs. We called this approach *smart playing mapping*, which allows each user, using some of our software tools, to adapt and decide how the surface of the instrument is best performed [2].

For example, the Arcontinuo can be used as a gesture controller, where the musician triggers certain actions based on how he interacts with the 3D surface. But at the same time, it can also be performed in much more similar ways as traditional interfaces, such as the keyboard or a guitar, are played.

5. ACKNOWLEDGMENTS

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6. REFERENCES

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[2] A. Sylleros, P. de la Cuadra, and R. F. Cádiz. Designing a musical instrument: Enlivening theory through practice-based research. *Design Issues*, 30(2):83–96, 2014.

[2]For demos, please visit `http://www.arcontinuo.com`