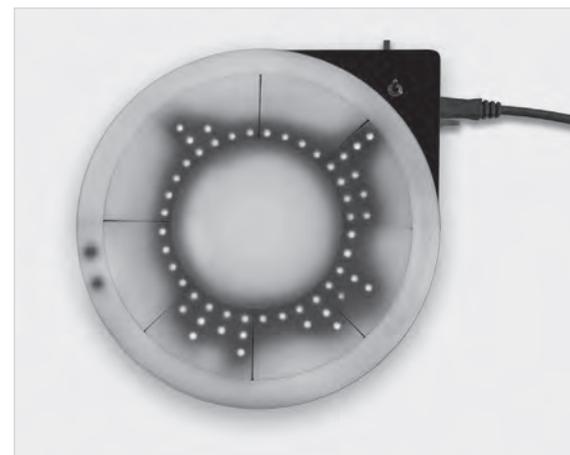
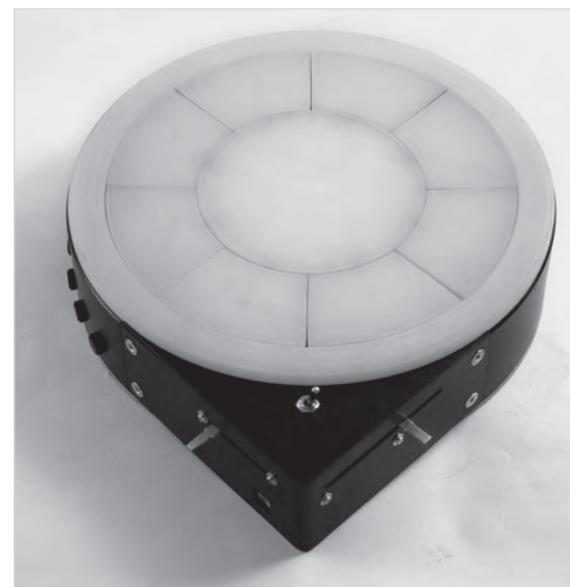


OTTOMusical Instrument for Realtime
Manual Beat Slicing**Luca De Rosso** (it)Freelance Interaction Designer
luderec@gmail.com**About the project**

OTTO is an electronic musical instrument for realtime manual beat slicing. The beat slicing is a well developed technique used mostly in electronic music, by means of what short rhythmical audio samples, of a few seconds in length, are cut into pieces to separate the main drum hits. These slices are then re-arranged in time, stretched, reversed, pitched up or down and so on, in order to create a completely new rhythmical section which could ideally last forever with continuous changes. The purpose of this project was to design specific controls for a technique that doesn't have a specific hardware yet. The device provides a tangible user interface designed with the aim of giving the user the feeling of having the sample in his hands. The performer can manipulate an audio sample in real time through the use of a restricted number of physical controls and clear visual feedbacks.

The philosophy

OTTO was designed after many comparisons between electronic musical instruments and conventional ones. Usually the second category is more engaging and requires an high and continuous control from the musician. This is due to the kind of interaction but also to the strong connection between sound, instrument and human being. Let's take a drum set for example: if you hit a snare you'll feel that the instrument is making the sound not just thanks to your ears but because you feel also the vibrations of it in your arm. This doesn't happen with a drum machine for instance, where the connection between sound and instrument is very weak. OTTO was designed thinking about other ways to improve this link between human action and sound, working on feedbacks and visual elements, but moreover designing specific interactions and their relative controls. The result is an instrument which

**Fig. 1: OTTO playing a sample** Photo: Luca De Rosso**Fig. 2: Front view** Photo: Luca De Rosso

doesn't necessarily make beat slicing easier – in fact there are computer softwares with algorithms which make very powerful effects just by moving few parameters with a mouse – but instead it gives to the performer more engagement and also more fun. This is also part of the reason why it's a musical instrument and not just a controller. As every musical instrument OTTO has its own learning curve, so to take the first steps with it is easy but if you want to push the instrument to the top of its possibilities you have to push yourself as well.

Feedbacks

The controls work definitely better if they give a feedback in return. The main goal of this project was to show to the performer what's happening to the audio sample while you are applying effects on it. In computer music, the audio samples are generally represented with a detailed view of the waveform itself or with little colored blocks and many other shapes. Since to slice the sample, the instrument needs to be controlled very fast, the performer needs to understand quickly where and how to play a specific part. The sample's visualization on top of OTTO has in fact been designed to provide just the information needed for that and nothing else. It's still the wave form, but represented in an extreme schematic way, so the performer can understand at first sight which parts are more full of sounds and which are not. However, this visualization does not have the purpose of making understandable how a slice will sound before playing it but after watching it playing once, you'll never miss a beat.

The prototype

Making a working prototype was fundamental to test if all the theories and the designed features of the instruments worked. Moreover, it was very helpful to understand where and how to fix bugs and usability issues. Anyhow, since it was impossible to me to prototype the whole instrument, the final prototype shows more or less half of OTTO's capabilities; but it was enough to test the design and achieved goals. Besides that, the instrument is capable of giving a lot of fun even if it is not in its final shape. The hardware is powered by an Arduino board, which controls all the input and the visual outputs. The board is then coded with a protocol to communicate with a Max/MSP patch which handles the audio effects and analyzes the waveform to visualize the sample. Concerning this point, a few words are due, to say thanks to the Max/MSP, and the Arduino communities; without their help I would have never had the chance to show a physical and working prototype of OTTO.

References

- De Rosso, Luca (2009): OTTO - Musical instrument for realtime manual beat slicing. Venice: IUAV University of Venice. Website: <http://www.lucaderosso.com>