

# Using drawings and a guitar pedal to create one-man-band music: the Illusio

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**Abstract.** *This paper presents a new digital musical instrument, the Illusio, based on an augmented multi-touch interface that combines a traditional multi-touch surface and a device similar to a guitar pedal. Illusio allows users to perform by drawing and by associating the sketches with live loops. These loops are manipulated based on a concept called hierarchical live looping, which extends traditional live looping through the use of a musical tree, in which any music operation applied to a node affects all its children nodes.*

## 1. Introduction

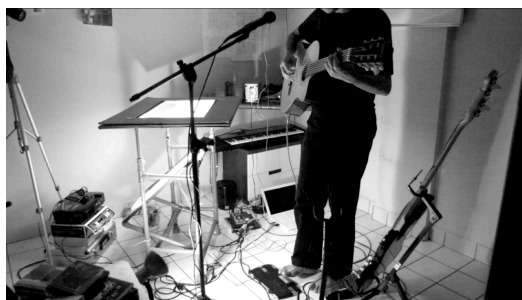
A digital musical instrument (DMI) “consists of a control surface or gestural controller, which drives the musical parameter of a sound synthesizer in real time” (Miranda & Wanderley 2006). They can be separated in three parts: (a) the input module - that transforms a value from nature into a computable number; (b) the output module – responsible for the sound synthesis; and (c) the mapping module – a set of strategies responsible for mapping the input into the output module.

Although the DMI may have a simple model, analyzing its user experience (UX) may be a complex task (O’Modhrain 2011). Attempting to refine this UX analysis, experiments by designing, evaluating and analyzing DMIs were performed based on potential user’s feedback (Barbosa et al. 2011; Barbosa et al. 2012). This led us to consider aspects beyond the traditional input, output and mapping ones, such as: (d) its body – e.g. ergonomics, appearance and portability of the device’s physical body; (e) adhesion – any reason that would lead someone to be interested in using this instrument, like price, references of virtuosi players; (f) and user profile – eg. how much suitable is the instrument to the musical style it plays.

Traditional aspects have been already explored: new interface technologies are opening a wide range of possibilities to new DMIs inputs (Miranda & Wanderley 2006), the great diversity of technologies related to sound synthesis (Roads 1996) brings valuable opportunities to be applied to DMIs outputs and tools are concerned with turning the mapping task more efficient. However, new DMIs that are focused on exploring aspects like body and adhesion are far insufficient and, if we want to build more engaging instruments, all these UX aspects should be considered in the design

process. Incorporating this idea to our design process and aiming to explore both body and adhesion aspects, we set the following guidelines to the creation of a new DMI:

- **Playfulness & Visual aesthetics** – related to the adhesion aspect, the DMI should resemble a playful environment where the user is encouraged to freely explore musical ideas. It should be visually expressive in a live performance, aiming to impact the audience;
- **Flexibility** – related to the body aspect, the DMI should be easily customizable by users concerning their context and intention.



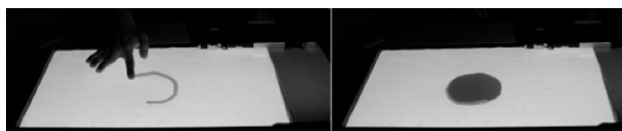
**Figure 1. User performing with the Illusio**

## **2. Description**

As a result, we propose the Illusio<sup>1</sup> (Figure 1), a DMI which is based on new interaction concepts – the sketch, the mockup and the navigation – that allow users to draw their own graphical interface (GUI) by sketching on an empty surface and by relating these sketches with real-time recorded loops during the performance (the mapping module). For that, it uses an augmented multi-touch interface as input module (that mixes a multi-touch surface with a guitar pedal), and the hierarchical live looping concept (Berthaut et al. 2010) as the output module. Each one of its interaction concepts is further described in the following subsections.

### **2.1. Sketches**

A sketch is a drawing made by the user and it is responsible for storing live loops. Users may create sketches by pressing and moving their fingers against the multi-touch surface as shown in Figure 2.



**Figure 2. User drawing a sketch**

A sketch is considered finished when the shape is closed. Thereafter, it can be selected by touching the surface. In this case, they can also be freely moved by dragging the finger. After created, the sketch is ready to be associated with any loop. This can be achieved through its selection and by recording a new loop using the pedal. Sketches that are associated with loops have a timer inside them, so the user can distinguish from sketches not yet associated with loops.

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<sup>1</sup> Video demo available in: <http://vimeo.com/25641586>

When this association is completed, it is possible to play or stop loops by using the pedal – that also allows users to delete any sketch at any time. While a spinning line in the center of the sketch is used to represent playing loops, a point is used to represent stopped loops, as shown in Figure 4.

## 2.2. Mockups

Mockups are a subtype of sketch that, instead of live loops, stores other sketches (including other mockups as well). Thus, any music operation applied to a given mockup will affect all sketches stored inside it.



**Figure 3. Grouping two sketches into a mockup**

Mockups aim at gathering different loops into a single structure, triggering them together – by playing or stopping. Besides, it allows reducing the visual complexity of sketches. There are two ways for creating them:

- By selecting sketches already created and then by using the pedal, like shown in Figure 3;
- By opening an empty sketch – thereby, not associated with any loop – and then creating a new sketch inside of it (concept to be explained in the next section).

## 2.3. Navigation

Sketches and mockups are organized in a tree structure. Thus, navigation is the concept that allows users to navigate through this structure and to edit sketches in real-time.

For navigation, users should open or close objects. Both can be achieved by applying pinch gestures on the surface. To open a sketch, users should pinch inside the sketch area. To close a sketch, the gesture should be made where there are no sketches. When a sketch associated with a loop is open, it is possible to visualize the loop's waveform and then change it by drawing a new waveform. Besides, it is also possible to apply sound effects. When an empty sketch is open (with no loop associated) a new stage is shown. There, it is possible to create new sketches, which will automatically become children of the former sketch – that, in turn, will be transformed into a mockup.

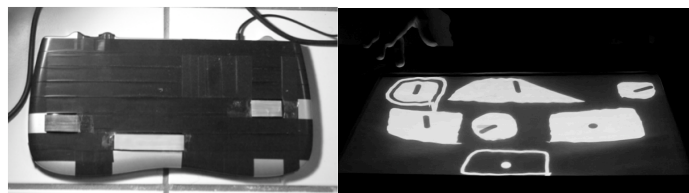
Finally, when a mockup is open, its content (sketches and mockups inside the mockup) is displayed on the screen. These objects can once again be navigated as described above, until reaching the leaves.

## 2.4. Technical Description

Technically, Illusio comprises three components: the pedal, the interactive surface and the software.

The pedal component is responsible for triggering which functionality should be activated. It was built using a QWERTY USB keyboard, from which all but three keys were removed. The interactive surface component is responsible for allowing multi-touch interaction. For this, we used a Samsung Galaxy Tab 7 Plus. Both are shown in

Figure 4. The software component is the core of the instrument and can be separated in two different modules: (a) the black & white visual interface (illustrated in Figure 4), developed using Processing<sup>2</sup>, responsible for handling user input gestures and represented by an empty screen containing rough sketches; and (b) the sound looper, developed using Openframeworks<sup>3</sup>/C++, responsible for dealing with the audio output. Both modules communicate via Open Sound Control (OSC) messages.



**Figure 4. The pedal and the user interface**

### **3. Conclusion**

We presented here the Illusio – a new digital musical instrument that allows users to perform by drawing sketches and by associating them with live loops. As future work, we hope to improve the system by using the results achieved in a previous user test. We believe that this approach – a cycle of evaluation processes in which user feedback is constantly used to improve the system, always concerning all DMI's UX aspects – could be a promising way to build more effective and contextualized DMIs.

### **4. Acknowledgments**

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<sup>2</sup> <http://processing.org>

<sup>3</sup> <http://openframeworks.cc>