MAKE ELECTRONIC MUSICAL INSTRUMENTS WITH FAUST AND FASELUNARE'S MICROCOSMOS

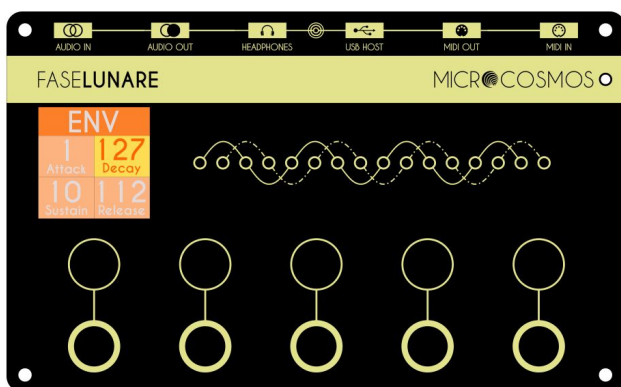| *Francesco Mulassano*	*Alessandro Comanzo*	*Daniele Pagliero*
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1. MICROCOSMOS

Figure 1: *Microcosmos panel concept.*

1.1. Hardware

Microcosmos is a small (130X80mm) open-source electronic board, developed by **Faselunare** (Italy), aimed at prototyping electronic musical instruments and learning electronics, microcontroller programming and audio DSP.

Microcosmos is made on top of a **Teensy 4.1** board and features several encoders, buttons, it has an OLED color display, SD Card, audio I/O, MIDI I/O on Mini Jack and MIDI over USBHost.

1.2. Software

Alongside the hardware, Faselunare is developing an **open-source Library** to program the board. The Language of the library is C++. The official repository of the Microcosmos Library and Firmware is on: https://gitlab.com/Faselunare/microcosmos
While **FAUST** is not (yet) directly integrated but must be exported for Teensy and then imported in the library, the developer team has adopted this language for the DSP part. The main reasons are:

1. compatibility with the Teensy board (with the exporter)
2. testing outside the board (with the online tools)
3. rapid prototyping

The integration of FAUST and the Microcosmos is made by mapping the parameters of the exported FAUST class (called MicrocosmosDSP) using a configuration file.
The mapping becomes a way to create a multi-page menu visualized on the OLED display, where every page has four parameters that are controlled by the onboard encoders.
In this way it is very easy playing, controlling and visualizing any kind of DSP produced by FAUST only by changing the imported class and the configuration file parameters.

2. THE SPEAKER

The Speaker of the presentation will be **Daniele Pagliero**, software developer and musician with more than 20 years of experience in multimedia and interaction design, involved in the development of the Faselunare products as software designer.

3. FASELUNARE

Faselunare is an Italian company, based in Torino, that deals with the design and construction of electronic musical instruments. In addition to Microcosmos, the first Eurorack module (Vega) is about to be released together with an open source drummachine (Shapeshifter) and other devices.
For more informations visit www.faselunare.com

Faselunare is also the organizer of **Soundmit**, the longest-running fair dedicated to synths and new music technologies.
For more informations visit www.soundmit.com

4. PRESENTATION

4.1. Focus

In this presentation, the developer of the Library will show to the audience the main features of the board and the design principles to develop an electronic musical instrument (a simulation of a very famous vintage synthesizer).

4.2 Arguments

The presentation will be split in several parts

- Overview of the board (schematics and capabilities and some working examples)
- Overview and design principles of the library
- Coding a synth voice with FAUST
- Export and use of the FAUST code on the Microcosmos
- Mapping FAUST parameters to the menu and explore how to control and display them
- (Optional) Using MIDI to control the board and play the synth
- Q/A with the Faselunare team to share knowledge and ideas with the audience

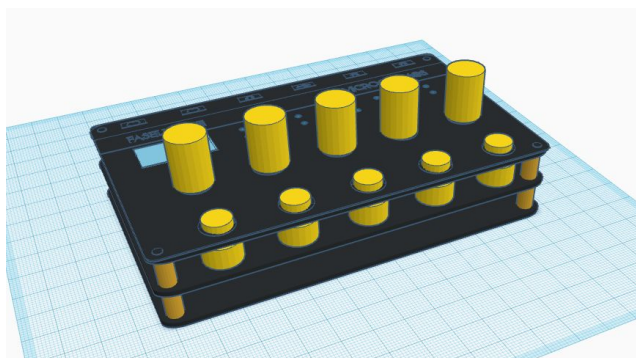Projected slides and screencasts will be used during the presentation.
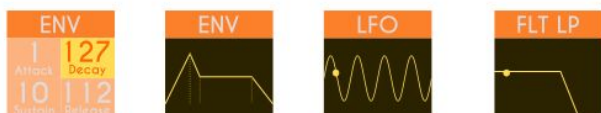

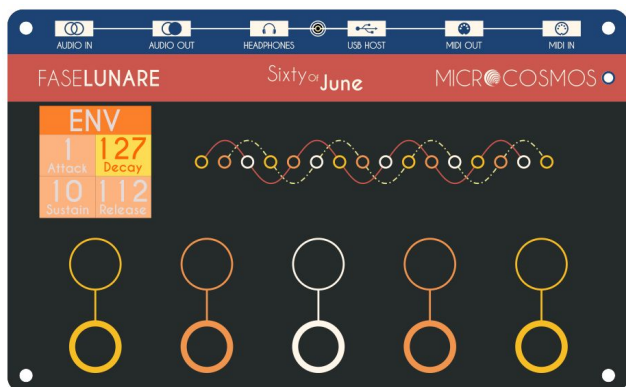Figure 2: *Preliminary rendering.*

Figure 3: *Display mockup.*

Figure 4: *Microcosmos can be customized with removable overlays.*