



**Interactive Music Science Collaborative Activities**  
 Team Teaching for STEAM Education

**Deliverable 5.1**

**Initial 3D musical instrument interactive design kit**

Date:	05/10/2017
Author(s):	Carlos Acosta (LEOPOLY)
Contributor(s):	Robert Piechaud (IRCAM)
Quality Assuror(s):	Petros Stergiopoulos (EA), Fotini Simistira (UNIFRI)
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# Executive Summary

This deliverable reports on the initial implementation of the 3D musical instrument interactive design kit.

The environment can be found at:

<http://devtest.leopoly.com/3d-interaction-repository-V1/leopolyDesign.html>

<b>Version Log</b>			
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26-09-2017	0.1	Carlos Acosta (LEOPOLY)	Initial content
29-09-2017	0.8	Carlos Acosta (LEOPOLY)	Finalized content and submit for review
04-10-2017	0.9	Carlos Acosta (LEOPOLY)	Reviewers comments incorporated
05-10-2017	1.0	Vassilis Katsouros (ATHENA)	Submitted to EU

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## LIST OF ABBREVIATIONS

Abbreviation	Description
3D	3 Dimension(al)
GUI	Graphical User Interface
ATHENA	ATHENA RESEARCH AND INNOVATION CENTER IN INFORMATION COMMUNICATION & KNOWLEDGE TECHNOLOGIES
UCLL	UC LIMBURG
EA	ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE
IRCAM	INSTITUT DE RECHERCHE ET DE COORDINATION ACOUSTIQUE MUSIQUE
LEOPOLY	3D FOR ALL SZAMITASTECHNIKAI FEJLESZTO KFT
CABRI	Cabrilog SAS
WIRIS	MATHS FOR MORE SL
UNIFRI	UNIVERSITE DE FRIBOURG

# 1. Introduction

Design Kit includes two modules in this version: Leopoly 3D modeling tool, described in document of [Deliverable 4.3-First Version of 3D design environment for musical instruments](#), and Modalys sound generator described in document of [Deliverable 4.4-First Version of Computational models for sound and music generation for virtual instruments](#). Full setup of musical instrument will be enabled including geometry modification and adjusting other - non-geometry parameters. User will be able to test the instrument's sounds right in the design kit by a click of the button.

## 2. Leopoly 3D modeling tool

### 2.1. Installation and technical requirements

The *Leopoly 3D modeling tool* is accessible through the following URL:  
<http://devtest.leopoly.com/3d-interaction-repository-V1/leopolyDesign.html>

For full functionality of the tool, Firefox Nightly or Edge Nightly versions are recommended. No additional applications or plugins are needed to run tool.

### 2.2. Description of demonstrator and user manual

The user can choose through the following virtual instruments (see Figure 2-1):

- Monochord,
- Circle Membrane,
- Square Membrane,
- Xylophone

This solution is only for demonstration purposes for now:

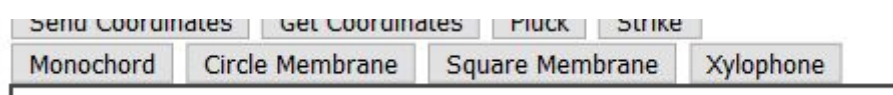


Figure 2-1: Available virtual instruments

After choosing the appropriate instrument, the corresponding instrument loads into the workbench with all design controllers. All models have the same 3D navigation options: it can be rotated intuitively by the primary button of the mouse, and it can be panned by the middle button of the mouse.

#### 2.2.1. Monochord

Figure 2-2 illustrates the overview of the monochord.

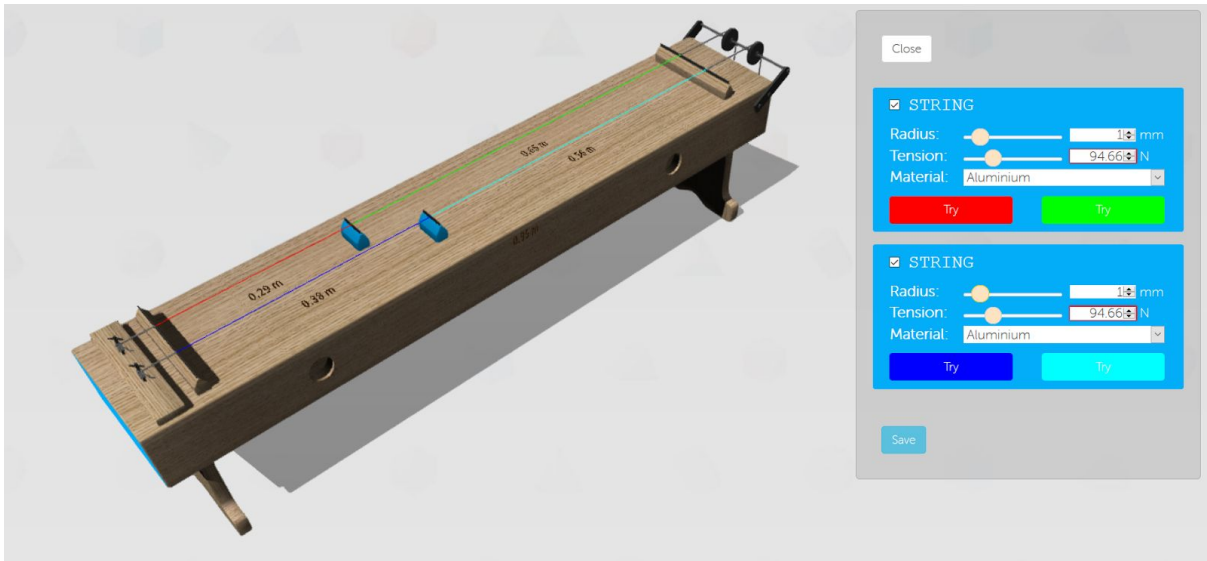


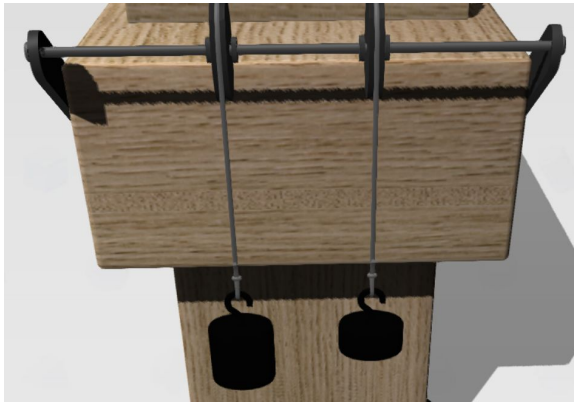
Figure 2-2: Overview of Monochord

When the user selects the monochord, the following options are available:

	<p><b>Moving bridges</b> can be done individually by dragging them. When dragging them until the limit, the bridge is disabled.</p>
	<p><b>Shrink or expand the length of the instrument</b> by dragging the side marked with blue.</p>

Figure 2-3: Bridge

Figure 2-4: Shrunk monochord



**Tension** can be adjusted by the corresponding slider or by entering the appropriate value to the textbox on the GUI. The weights, straining the relevant string, will grow or shrink accordingly.

Figure 2-5: Weights straining strings



Figure 2-6: Adjust tension



**Turn string on/off** by selecting the corresponding checkbox (see Figure 2-8). When a string is disabled, all corresponding elements, like bridge, weight, etc. are removed also (see Figure 2-7). When a string is disabled, the corresponding controls will be unavailable also.

**Radius** (see Figure 2-8) can be adjusted by the corresponding slider or by entering the desired value to the text box.

Figure 2-7: One string enabled.



Figure 2-8: Enable/disable string



Figure 2-9: Set material

**Material** (Aluminium, Bismuth, Brass, Bronze etc) can be chosen for each string individually from the dropdown list.

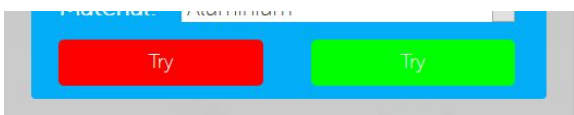


Figure 2-10: Test sound

**Test sound** by testing string sections individually. Each string can have up to 2 sections if the corresponding bridge is not slid to the limit. Otherwise it has a single section (the whole string).



## 2.2.2. Membranes

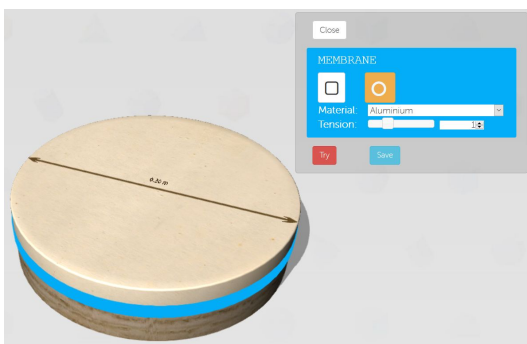


Figure 2.11: Circle membrane overview

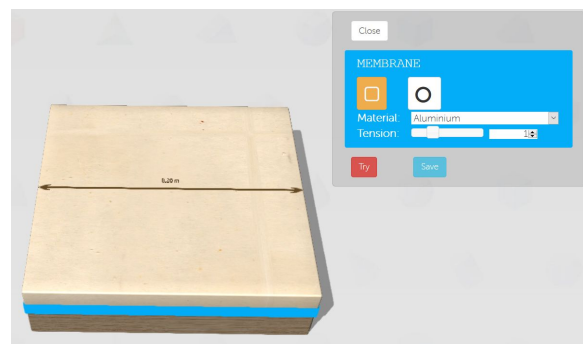


Figure 2.12: Square membrane overview

### Options:

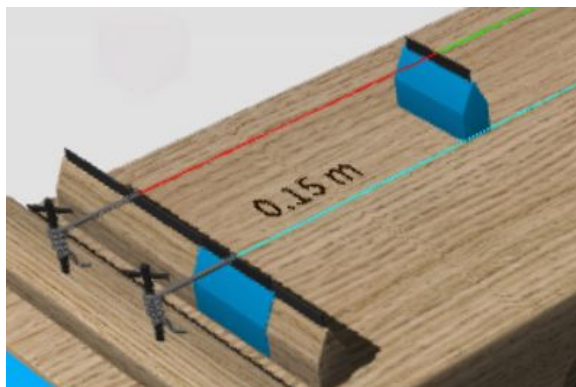

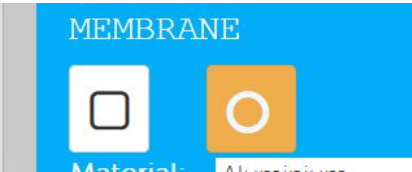




Figure 2-13: Bridge

**Moving bridges** can be done individually by dragging them. When dragging them until the limit, the bridge is disabled.

 <p data-bbox="347 584 639 613">Figure 2-14: Change size</p>	<p data-bbox="810 212 1310 320"><b>Change the size</b> keeping circle and square shapes by dragging the blue part of the instrument</p>
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 <p data-bbox="272 1003 715 1032">Figure 2-15: Change membrane type</p>	<p data-bbox="810 817 1374 846"><b>Change</b> between square and circle membranes</p>
 <p data-bbox="347 1173 639 1202">Figure 2-16: Set material</p>	<p data-bbox="810 1066 1326 1137"><b>Material can be chosen</b> for the membrane. Choose material from the dropdown list.</p>
 <p data-bbox="352 1375 635 1404">Figure 2-17: Test sound</p>	<p data-bbox="810 1240 1326 1312"><b>Test Membrane</b> sound by clicking the “Try” button.</p>

### 2.2.3. Xylophone

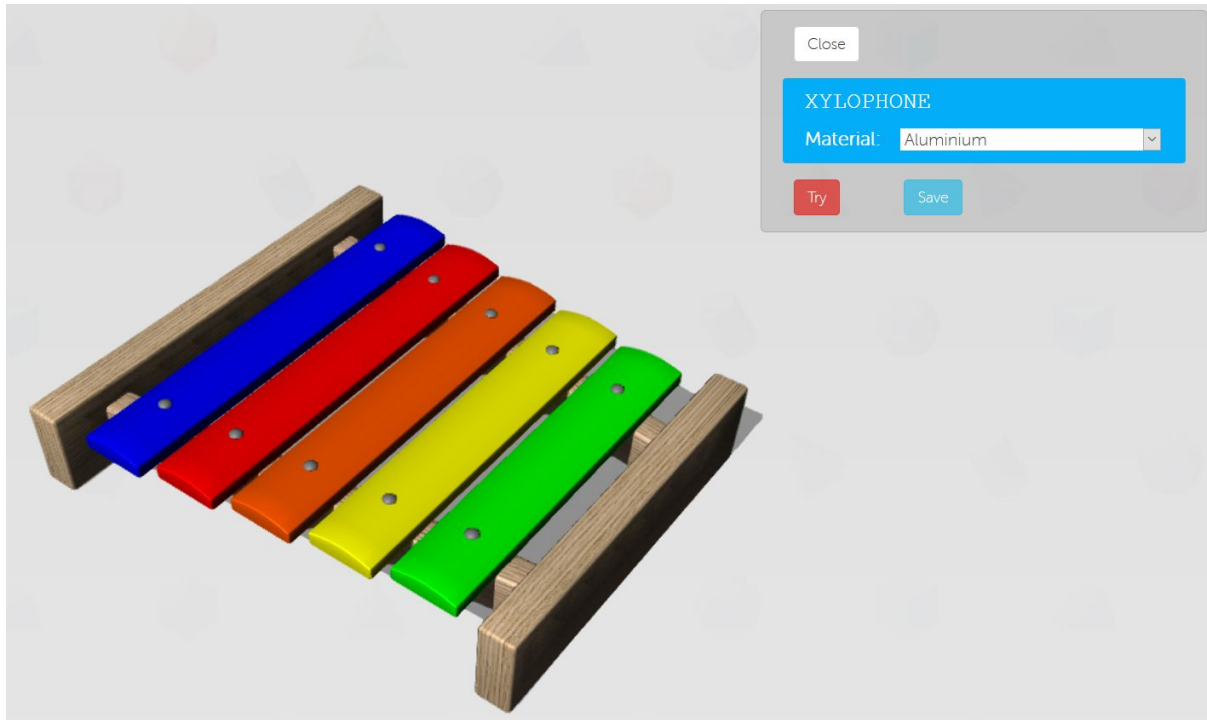
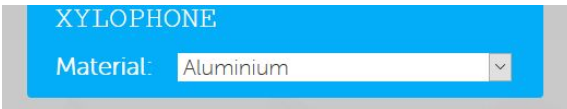



Figure 2-18: Xylophone

#### Options:

 <p>Figure 2-19: Set material</p>	<p><b>Material can be chosen</b> for the membrane. Choose material from the dropdown list.</p>
 <p>Figure 2-20: Test sound</p>	<p><b>Test Membrane</b> sound by clicking the “Try” button.</p>