



Interactive Music Science Collaborative Activities
 Team Teaching for STEAM Education

Deliverable 5.10
Intermediate Gesture and VR tools for music interaction
and co-creation

Date:	23/04/2018
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Dissemination level:	PU
Work package	WP5 – Workbench of iMuSciCA prototypes
Version:	1.0
Keywords:	gesture interaction, performance with virtual musical instruments
Description:	This deliverable reports on the initial implementation of the gesture and VR tools for music interaction and co-creation.



H2020-ICT-22-2016 Technologies for Learning and Skills
iMuSciCA (Interactive Music Science Collaborative Activities)
 Project No. 731861
 Project Runtime: January 2017 – June 2019
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Executive Summary

This deliverable reports on the intermediate version of the Gesture and Virtual Reality (G-VR) tools for music interaction and co-creation. The demonstrated G-VR tools allow students to load a previously designed virtual instrument and perform it in the interaction 3D world. After recording the audio of performances, students can open these recordings in the Performance Sound Sampler (PSS) music co-creation tool, cut sample slices on the waveform of the performance, change the pitch of the selected samples, their activation times and collaborate with other students for making new music. The intermediate versions of these AE include the following changes:

- Both AE now work over HTTPS, a secure protocol which uses certificates to validate server identity to avoid impersonation.
- There are several simplifications of the Gesture and Virtual Reality AE; the visualizations, the tools, and the selection of instrument/sensor/interaction menu have been removed.
- Both AE are implemented to work integrated to the workbench.

Links to demonstrators:

Gesture Interactions:

<https://athena.imuscica.eu/performance/v2/>

Performance Sound Sampler:

<https://athena.imuscica.eu/sampler/v2/>



The above links should be loaded from iMuscica workbench in order to be fully functional. Gesture Interactions AE won't produce any sound as standalone.

Note that the development of the activity environments continues, and the updated stable version of the environments can be accessed at <http://platform.imuscica.eu/workbench.html> under the Music section (the three icons on the right).

Version Log			
Date	Version No.	Author	Change
02-04-2018	0.1	Aggelos Gkiokas (ATHENA)	Initial content
04-04-2018	0.2	Aggelos Gkiokas (ATHENA)	Content update based on reviews
23-04-2018	1.0	Vassilis Katsouros (ATHENA)	Finalized and submit to EU

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iMuSciCA is an H2020 project funded by the European Union.

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LIST OF ABBREVIATIONS

Abbreviation	Description
G-VR	Gesture and Virtual Reality
MVC	Model-View-Controller
PSS	Performance Sample Sequencer
SPA	Single-Page Application
UI	User Interface
UX	User Experience
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
AE	Activity Environment

1. Introduction

This deliverable describes the intermediate version of the Gesture and Virtual Reality (G-VR) Tools for Music Interaction and Co-creation that constitute of two Activity Environments: a) the Gesture and VR tools for music interaction and b) the Performance Sample Sequencer. We will describe the updates performed in these tools since [D5.4-Initial Gesture and VR tools for music interaction and co-creation](#).

2. Installation and technical requirements

The Gesture and Virtual Reality environment and the Performance Sample Sequencer are running on the Firefox Nightly web browser. Both environments should be used in a computer with speakers for listening the generated audio.

Both tools are intended to be included in the iMuSciCA workbench as an iframe using the following code:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html>
  <head>...</head>
  <body>
    <iframe src="https://athena.imuscica.eu/performance/v2/" frameborder="0"></iframe>
    <iframe src="https://athena.imuscica.eu/sampler/v2/" frameborder="0"></iframe>
  </body>
</html>
```

Specifically for the G-VR interaction, the Kinect and/or Leap Motion sensors are also necessary for tracking the movement of the user in order to allow free and gesture-based interaction with the virtual instrument. Regarding the Leap Motion Sensor software requirements and installation instructions can be found in the Sections 2 of [Deliverable D4.1-First version of gesture and VR multimodal interaction interface](#). Regarding the Kinect, the executable found at ¹. Unrar the corresponding file and run the *kinectImusica.exe*.

3. Description of new features demonstrator and user manual

In the following subsections the changes of the intermediate versions of Gesture and Virtual Reality interaction environment and the Performance Sample Sequencer are described.

¹ <https://athena.imuscica.eu/software/kinect/v2/kinectImusica.rar>

3.1. Gesture and VR tools for music interaction

There are several changes that made in the intermediate version of the Gesture and VR tools for music interaction Activity Environment (AE). The whole interface was greatly simplified and many of the operations (such as instrument selection and visualizations) can now be made externally from the workbench. Figure 1 shows a screenshot of the intermediate version of the AE.

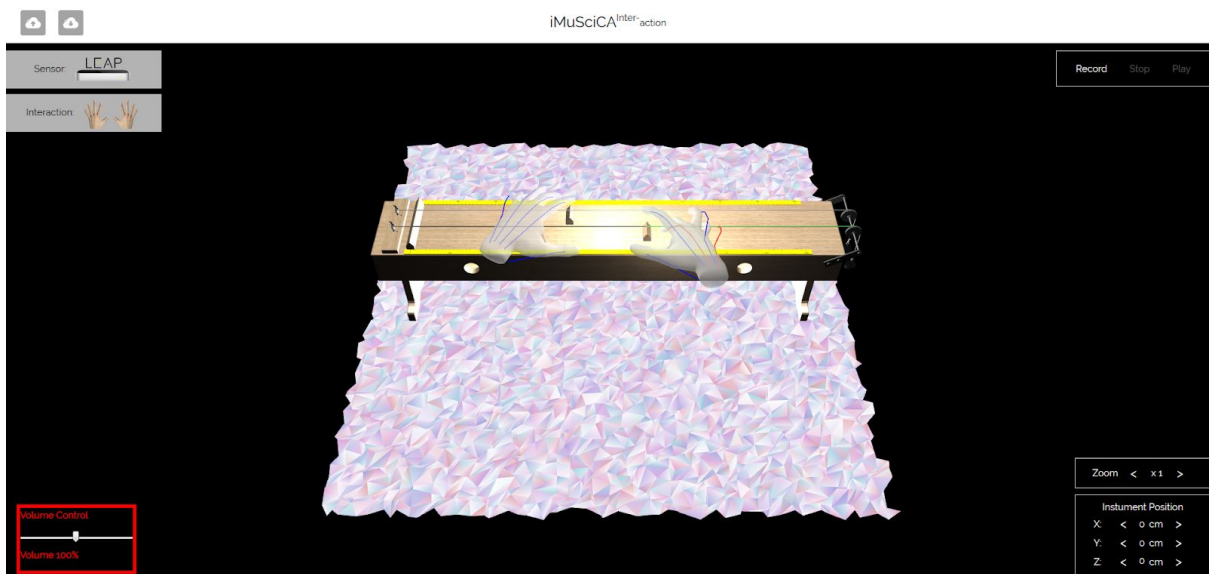


Figure 1. The intermediate version of the Gesture and VR tools for music interaction Activity Environment.

The changes of the intermediate version with respect to the first version described in [Deliverable D5.4](#) can be summarized as:

- All parameters to the AE passed as URL parameters. The usage of the AE is <https://athena.imuscica.eu/performance/v2/?lang=el&sens=SENS&int=INT&inst=INST&uid=UID>

where:

- ❖ SENS in the sensor: leap, kinect. default = leap
 - ❖ INT is the interaction type: free, gestures, mixed. default = free
 - ❖ INST is the instrument: monochord, circle, square. default = monochord
 - ❖ UID is the username: default a random string.
- **Intro menu removed:** The options menu on the right part of the screen where the user selects instrument, sensor and interaction type is removed. Since the the sensor, instrument and interaction type will be selected from the workbench, the menu has been removed (see Figure 3.1.2 of [Deliverable 5.4](#)). The option can now be set directly as URL parameters as previously defined.
 - **Additional instruments added:** In the intermediate version two instruments are supported: the circle membrane and the square membrane. For both instrument the free interaction mode is supported for both the Kinect and Leap Motion sensors.

- **Visualization and Music Tools are removed:** Since there is a separate area in the iMuscica Workbench (see [deliverable D5.11](#)) for loading and displaying the music tools and the visualizations, this area of the AE has been removed (see Figures 3.1.6, 3.1.7 of [Deliverable D5.4](#)).
- **Kinect avatar included:** Instead of visualizing only the hands of the kinect skeleton as lines in the 3D world, a simple kinect avatar has been deployed.
- **Language bar removed:** Since the language is set by the workbench, the language bar has been removed. The AE still has the functionality of switching language on the fly without the need of reloading the page.
- **Full Screen mode:** The user can switch the 3D world in full screen mode during the performance.
- **Air guitar interaction:** The air guitar interaction has been incorporated in the web based Activity Environment (in the first version it was a standalone application, see Deliverable 5.4, Section 3.1.7.2)
- **Modalys:** the Activity environment works with the Modalys v2 which is loaded from the workbench. The Modalys v2 is much more computational efficient, and this the whole AE is less computational consuming.
- **User id:** The user ID is passed to the AE as a URL argument. This will be user for tracking user activities (future version)
- **Hands in 3D:** User hands tracked by the Leap Motion sensor are shown during gesture playback (bug fix from previous version).
- **HTTPS:** The AE now works over HTTPS, a secure protocol which uses certificates to validate server identity to avoid impersonation.
- **Copy/Paste:** The Copy/paste back end has been implemented for importing virtual instruments designed in the 3D instrument design AE.
- **Volume Control:** A volume control has been added. This will be removed from future versions

3.2. Description of the changes on the intermediate version of the Performance Sample Sequencer

The intermediate version of the Performance Sample Sequencer has some back-end adjustments in comparison with the first version. Therefore, the appearance of this tool has not changed from its previous version; the modifications are the following:

- 1) Integration of the tool with the iMuSciCA workbench with implementation of audio communication (sending/receiving audio directly to the workbench).
- 2) Programming adjustments to the audio framework for better compatibility with the new versions of Firefox.
- 3) Improvements in the way samples were created, by adding a Hann amplitude envelope to each sample selected by the user.
- 4) The AE now works over HTTPS, a secure protocol which uses certificates to validate server identity to avoid impersonation.