

Elegy (Ready, Set, Rapture)

for virtual reality double bass

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Fig. 1. Dual display performance of *Elegy (Ready, Set, Rapture)*

1. PROGRAM NOTES

Elegy (Ready, Set, Rapture) is the second work composed for Coretet [1], a virtual reality musical instrument modeled after traditional bowed stringed instruments including the violin, viola, cello and double bass. *Elegy (Ready, Set, Rapture)* is a solo multi-channel performance for the Coretet double bass that combines a pre-composed musical chord structure displayed on the neck of the instrument in real-time with improvisation. Coretet is built using the Unreal Engine and is performed using the Oculus Rift or Quest 2 head-mounted displays and Oculus Touch controllers. All audio in Coretet is procedurally generated, using physical models of a bowed string from the Synthesis Toolkit (STK) and a waveguide plucked string, all running within Pure Data.

2. PROJECT DESCRIPTION

Coretet is a virtual reality instrument and networked performance environment that explores the translation of gesture and mechanic from traditional bowed and plucked string performance practices into an inherently non-physical implementation. Built using the Unreal Engine and Pure Data, Coretet offers musicians a flexible and articulate musical instrument to play as well as a

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networked performance environment capable of supporting and presenting a four-member string quartet.

With deliberate reference to traditional stringed instrument performance practices, Coretet was designed as a futuristic 21st Century implementation of the core gestural and interaction modalities that generate musical sound in the violin, viola and cello. By coupling the real-time fluid interactivity offered by the Unreal Engine game engine with procedurally driven string models within Pure Data, Coretet is capable of supporting improvisation as well as notated solo or ensemble performance.

Coretet leverages the Unreal Engine's native network layer to create a multi-user virtual performance environment capable of supporting and presenting a traditional four-member string quartet to performers using stereoscopic head-mounted displays and to audiences viewing an auxiliary screen or projector. In an ensemble concert performance such as is utilized for the VR string quartet *Trois Machins de la Grâce Aimante* [2] the Coretet game server hosts each Coretet client instance (representing each performer) connected across a local ethernet or wifi network. Performers in Coretet see one another within a virtual concert space in real-time with imperceptible latency, allowing for the use of communicative visual gesture both of the body and of the instrument and bow.

Fundamentally Coretet is a single instrument which can be shaped and scaled by performers into different configurations. Parameters such as neck length, body size, and number of strings can be manipulated in real-time to either recreate traditional stringed instruments or to create new and physically impossible instruments. For ease of use during performance, parameter presets for violin, viola and cello can be chosen and recalled instantly as can an experimental spherical instrument configuration known as the orb. Parameter values representing string length and body scale are also used to procedurally drive each instrument's sound affecting the frequency range and timbral identity of the current Coretet instrument.

3. PERFORMANCE NOTES

Elegy (Ready, Set, Rapture) is a 9 minute long live performance featuring a solo performer playing Coretet while wearing an Oculus virtual reality stereoscopic display and while holding Oculus controllers. The piece can output between 1 and 32 channels of audio with individual channel separation possible on a string-by-string basis. A video projector is required to display the visual output of a series of cinematic virtual camera views on the game server to the audience. A second optional display can also be used to project the performer's view from within the HMD to the audience (see Figure 1).

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When staged using a wired Oculus Rift display, *Elegy (Ready, Set, Rapture)* requires a 10x10 ft space on stage for the performer and Oculus tracking towers, a table to hold 3 laptops, a multi-channel audio interface and a local ethernet switch. When a wireless Oculus Quest 2 headset is used, an accessible wifi network and a Google Chromecast are used to cast the performer's view of the performance to a projector for audience display.

4. MEDIA LINK(S)

- *Elegy (Ready, Set, Rapture)* performance from the 2022 Sound and Music Computing (SMC) conference in Saint-Étienne, France on June 7, 2022 at La Comète: <https://youtu.be/igDivwXD2Ik> (video)
- Coretet project overview: <https://youtu.be/cgODPY90pAU> (video)

REFERENCES

- [1] R. Hamilton, "Coretet: a 21st Century Virtual Interface for Musical Expression", In Proceedings of the 14th International Symposium on Computer Music Multidisciplinary Research (CMMR), Marseille, France, 2019.
- [2] R. Hamilton, Composing (and Designing) *Trois Machins de la Grâce Aimante*: a Virtual Reality String Quartet. In: Ciciliani, M., Lüneburg, B., Pirchner, A. (Eds.) *Ludified: Artistic Research in Audiovisual Composition, Performance & Perception*. The Green Box. Berlin, Germany, pp. 77-96, 2021.