Haptic techniques for browsing sound maps organized by similarity

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This demo paper showcases haptic techniques for browsing sound maps organized by content-based similarity. Our system Freesound Tracker forks the Freesound Explorer application inside a web browser augmented with haptic capabilities using the Chai3d library that we modified to support Haply haptic devices, ours configured with a 2-DOF pantograph mechanism. A first technique enhances the exploratory navigation of sound maps by adding physical effects, such as: magnetizing the pointer to its closest sound item, rendering viscosity when hovering items. A second technique assists loop-based musical creation by having user-defined sound paths followed by the force-feedback pointing device.

Motivation

Context

Our research lies in a subset of the field of haptics for information visualization [4] focusing on multimedia data, in our case sound material. Sound designers either record foley sounds or rely on pre-recorded material to compose soundtracks. In both cases, they need to search and browse their collection of sounds during their composition. State-of-the-art solutions for sound collection browsing combine text-based search using queries on tags and metadata, with content-based exploration of sounds displayed in maps using audio features extracted from the sounds, so as for instance to display files that sound similar in the same visual neighborhoods. With this demo, we expore the design space on how haptic feedback can support sound collection browsing and sequencing.

Interaction Design

We propose two haptic techniques for browsing sound maps organized by similarity. 1) We enhance the exploratory navigation of sound maps by adding physical effects, such as: magnetizing the pointer to its closest sound item, rendering viscosity when hovering sounds. 2) We assist loop-based musical creation by having user-defined sound paths followed by the force-feedback pointing device.

Implementation

Components

Our system reuses off-the-shelf opensource and openhardware technologies. For organizing sound samples maps by content-based similarity, we forked the Freesound Explorer [3] that we can run off-the-grid with local servers. For providing force feedback interaction, we used the Haply development kit [2] set up with the 2-DOF Pantograph mechanism [5]. For rendering force feedback effects, we used the Chai3d library [1].

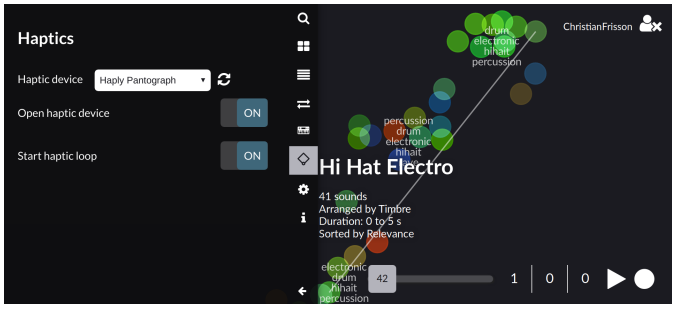

Figure 1: Freesound Tracker with haptic controls tab and sound path

Contributions

We developed a C++ API for communicating with Haply devices[1]. We added two contributions to the Chai3d library[2]: 1) we integrated the support of Haply devices and 2) we implemented the chai3djs bindings to mirror the haptic scenegraph (Chai3d SceneManager programmed in C++) in parallel with the visual scenegraph (Document Object Model programmed in JavaScript with React). We embedded Freesound Explorer and chai3djs inside a web application using Electron, to bypass security- and architecture-related limitations from web browsers when implementing device communication and web extensions [3].

References

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[2] https://github.com/HaplyHaptics/chai3d
[3] https://github.com/IDMIL/freesound-tracker