

# CsoundEmscripten: An Audio Software API for the Web

*Edward Costello, Steven Yi, Victor Lazzarini and Joseph Timoney*

[edwardcostello@gmail.com](mailto:edwardcostello@gmail.com), [stevenyi@gmail.com](mailto:stevenyi@gmail.com), [victor.lazzarini@nuim.ie](mailto:victor.lazzarini@nuim.ie), [jtimoney@cs.nuim.ie](mailto:jtimoney@cs.nuim.ie)

This paper presents CsoundEmscripten, an audio software API for the Web. The Csound API has enabled the creation of complex audio software on the desktop and more recently on mobile devices with the Android and iOS software development kits. By porting the Csound API to Javascript using the cross compiler tool Emscripten, this has allowed the Csound API to be run in web browsers enabling the creation of web applications that utilise Csound's audio analysis and synthesis capabilities.

Web based multimedia applications are becoming as advanced as their desktop counterparts and there is a growing need for the necessary multimedia libraries and frameworks based on web technologies. Traditional browser plug-ins have allowed web applications to take advantage of existing software libraries by enabling the execution of native code within the web browser. Unfortunately the use of plugins also presents a number of disadvantages. Web plugin technologies such as Flash, ActiveX, and Java have been a chronic source of security vulnerabilities and, with the exception of Java, are based on closed-source proprietary technologies. A system that uses standardised web technologies has the advantage of being cross-platform as standards are adopted by browser vendors, and they can take advantage of existing security infrastructure.

In recent years the web standards consortium, W3C, have introduced standard Javascript media APIs such as the Web Audio API. This API addresses a number of use cases for web based audio applications, but due to its implementation it is of limited use for creating audio synthesis or analysis systems on the web that extensively utilise custom DSP algorithms.

In order to overcome the limitations of the Web Audio API while also avoiding the use of browser plugins, it is possible to cross-compile existing native audio APIs to Javascript using a tool called Emscripten. Emscripten can translate the source code of compiled native software libraries into Javascript. This allows web applications to take advantage of powerful and mature software libraries without using any plugins or proprietary technologies. CsoundEmscripten can be embedded in any webpage providing an extensive suite of audio processing tools for use within web applications.