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### ► **To cite this version:**

Michel Buffa, Marco Winckler, Quentin Escobar, Samuel Demont, Ayoub Hofr, et al.. WAM Jam Party: a collaborative real-time music creation experience in VR. WAC 2025 - Web Audio Conference, Nov 2025, Paris Auditorium du Petit Palais, France. Zenodo, 2025, <10.5281/zenodo.17761181>. <hal-05388770>

**HAL Id: hal-05388770**

**<https://inria.hal.science/hal-05388770v1>**

Submitted on 29 Nov 2025

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# WAM Jam Party: a collaborative real-time music creation experience in VR

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**Abstract**— WAM Jam Party is a real-time collaborative WebXR environment where users can build interactive 3D musical experiences powered by WAM plugins. This article shifts the focus from previously documented sync mechanisms to new features that enhance usability and creative expression. A major addition is a 3D interface editor that lets users wrap existing 2D plugins in custom 3D controls—like turning a synth into a playable 3D keyboard or shaping a guitar plugin into a realistic virtual instrument—without touching the original code. The platform also introduces a ‘3D Plugin Shop,’ replacing conventional menus with an immersive way to discover and assemble audio modules directly in the scene. Behind the scenes, the architecture now supports scripting and dynamic code injection, enabling advanced behaviors such as animated parameter modulation or interactive piano-roll sequencing. Feedback from structured tests with musicians, developers, sound designers, and XR creators shows higher engagement, smoother learning, and more exploratory building of audio graphs in VR. The article closes with observations and design guidance for creating collaborative spatial audio tools on the web.

**Keywords**— *Musical Metaverse, WebXR WebAudio, WebMidi, Web Audio Plugins, Web standards, Web Audio Modules, CRDT.*

## I. WAM JAM PARTY

Advances in Web Audio, WebXR, and standards like Web Audio Modules [5, 6, 7, 8] are reshaping how musical experiences can be created and shared online. These technologies are turning the idea of a ‘Musical Metaverse’ into a practical reality, one where music tools are spatial, embodied, and inherently collaborative [1].

WAM Jam Party sits within this emerging landscape. It is a WebXR-based environment where users build and interact with 3D musical setups made from WAM plugins—virtual instruments, MIDI generators, and audio effects linked together, ending in spatialized speakers that output sound inside the scene. The platform runs entirely in the browser of a VR headset, including full WebAssembly versions of classic synthesizers and sophisticated effects, all processed locally. Multi-user sessions require nothing more than opening a shared URL or scanning a QR code.

Earlier prototype stages proved that distributed audio graphs could be synchronized across users, but the interfaces were minimal and automatically generated from metadata, making plugins difficult to distinguish or use effectively [2]. This work builds on that foundation to create a richer, more usable immersive music environment.

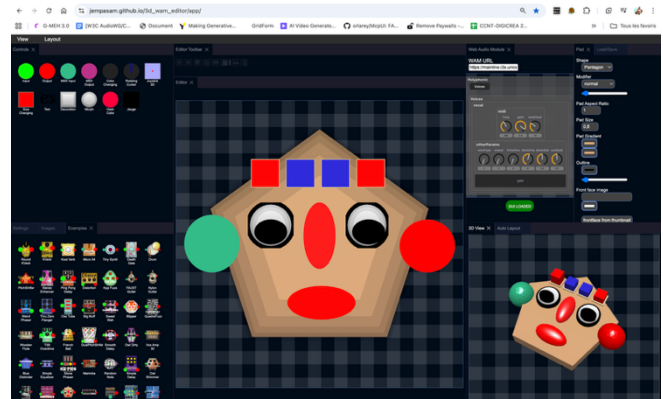


Figure 1 : WAM 3D editor. Enter the URI of an existing 2D WAM and make an additional 3D GUI.

The latest iteration of WAM Jam Party centers on expressive interaction through a new 3D interface editor. Users can now design distinctive plugin surfaces, complete with custom visuals, animations, and physics-driven behavior, making each module easier to recognize and more engaging to manipulate.

The underlying system has also been extended to allow custom code to be injected into plugin interfaces. This opens the door to advanced 3D controls such as animated modulators, sequencer panels, or other interactive elements that enhance feedback around existing WAM plugins. These custom behaviors can tap into a physics engine like Havok; for instance, we built a virtual drum kit that generates MIDI notes when players strike physically responsive drum components with virtual sticks. This prototype signals a move toward more embodied instruments and richer spatial interaction [3].

To support these additions, a new 3D Plugin Shop replaces earlier text-based menus. Plugins appear as objects arranged on virtual shelves, offering a clearer, more immersive way to browse and assemble a setup.

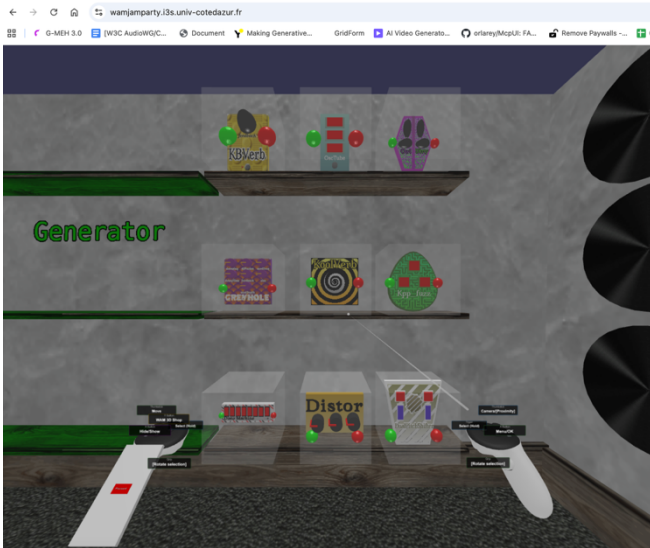


Figure 2: Choose any music note generator, virtual instrument or audio effect from the WAM Shop.

These features can be seen in action in the accompanying videos<sup>1</sup>.

## II. DEMO PROPOSAL

The application is open source<sup>2</sup> and available online<sup>3</sup>. In the demo, several users wearing Meta Quest 3 headsets will join the same session through their browsers, alongside remote collaborators connecting from our lab. Together they will assemble shared 3D musical setups, combining note generators, instruments, and effects into spatialized audio chains rendered binaurally in real time. Everyone can adjust each other's modules, highlighting the system's collaborative and interactive nature. The demonstration shows that even complex distributed audio workflows—including detailed synth emulations like the Prophet V or OB-Xd, high-quality effects, and modular routing, can run smoothly on typical Wi-Fi or 5G connections, entirely inside a browser.

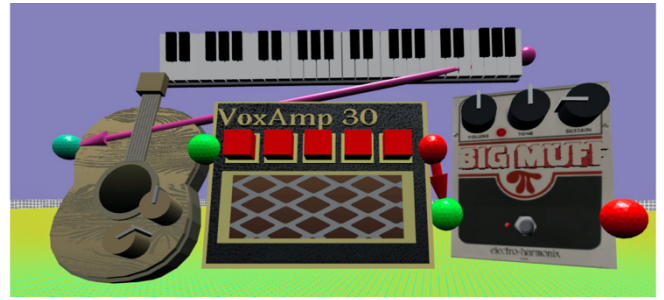


Figure 3: A typical music installation.

## ACKNOWLEDGMENTS

This work has been supported by the French government, through the France 2030 investment plan managed by the *Agence Nationale de la Recherche*, as part of the "UCA DS4H" project, reference ANR-17-EURE-0004

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<sup>1</sup> 3D editor : <https://www.youtube.com/watch?v=4JOE3F579kI>,  
VR session with multiple participants :  
[https://www.youtube.com/watch?v=zZdZef6XB\\_I](https://www.youtube.com/watch?v=zZdZef6XB_I)  
<sup>2</sup> <https://github.com/doriangirard9/musical-multiverse-vr>

<sup>3</sup> To test this application, you need to access it with the browser of a VR headset or using a browser extension for debugging WebXR applications. URL : <https://wamjamparty.i3s.univ-cotedazur.fr/>