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Augmenting MOCAP Animation with Sound and Live Coding

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We present a system for the real-time sonification of dancer motion data using live coding techniques. Our approach utilizes both the Rokoko motion capture (MOCAP) suit and an open-source, locally hosted AI-based pose estimation platform. The system enables performers and coders to collaborate closely, designing expressive sonic responses to live movement. Key features include: (a) real-time capture, transmission, and transformation of motion data; (b) live coding interfaces for modifying system behavior during performance; and (c) recording of both motion streams and evaluated code for iterative refinement in offline sessions. We describe algorithmic techniques for translating MOCAP data into sound, focusing on event triggering, rhythmic integration, and gesture curvature tracking to capture the idiosyncrasies of individual performers. These techniques not only support live sonification but also provide building blocks for animating virtual characters from recorded sessions, offering a path to imbue both human and non-human figures with distinctive personality traits. We present the software infrastructure developed to manage multiple streams of positional data and demonstrate its use in collaborative work sessions that alternate between live coding and offline exploration. Additionally, we show the application of the system in networked live coding performances and discuss its potential integration into virtual character animation pipelines. We conclude by situating our approach relative to existing gesture recognition frameworks, highlighting how our method—focused on expressive motion features rather than predefined gesture sets—affords greater flexibility and artistic agency while introducing new technical challenges. The present paper focuses on the interface between MOCAP movement, sound and graphics. We describe the interface written for the open source gaming engine GODOT. We use the open source sound and music programming environment SuperCollider as main tool for MOCAP data recording as well as for real-time analysis, sonification, and for generation of animation sources through sound and control signal synthesis algorithms. Our methodology distinguishes three ways to interact with the 3D Gaming engine in driving animation:

1. Use MOCAP data, either prerecorded or live, as source for the animation. In this mode, GODOT is a passive renderer, and SuperCollider acts as a puppeteer, playing back recorded or synthetic animations
2. Use a State Machine programmed in SuperCollider to select animation sequences in GODOT. This approach presents the advantage of allowing a tight integration of sound processing and synth-driven control signals, as well as of real time body motion analysis processes in the triggering of State Machine processes.
3. Use processes running in SuperCollider to modify animation data from GODOT in real time. In this mode, SuperCollider acts as a filter inserted in the chain of geometry modifying processes in the internal animation pipeline of GODOT.

To perform these tasks, we have created an interface that provides access to each of the joints in the animation of the figure, both individually and in combination with other joints, and furthermore permits access to each individual geometry variable (3 spatial coordinates and 4 quaternion variables for rotation). The core mechanism of our system directs data into control busses running in the SuperCollider synthesis engine, where any synthesis algorithm has access. We use two sets of busses: Input busses holding MOCAP data and output busses holding output from synthesis algorithms that can modify the MOCAP data. The input busses also permit the control of sound algorithms. This happens in several different ways, including use of motion data (a) as control sources for synthesis parameters and (b) as means for triggering. We give several examples of sound control from MOCAP data and of animation control from synth data., this approach opens new ways for tight cooperation between animators, sound designers and performers.