Sonifying Game-Space Choreographies with UDKOSC

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UDKOSC

Introduced in 2011, UDKOSC is an open-source game-type modification to the Unreal Development Kit (UDK) gaming engine featuring Open Sound Control (OSC) input and output streams for the control, tracking and sonification of in-game action and motion. Customized game functionalities built into UDKOSC are designed to aid real-time musical performance and composition, dynamic local and networked performance, procedural music/audio and rapid-prototyping of interactive game-sound design.

OSC input and output are handled through a Windows DLL bound to the UDK codebase. User-controlled avatars drive software-based sound servers in real-time with their motion through and interaction with rendered environments. Artifacts in each environment, including projectiles and the static-mesh building blocks of wall, floor and object components serve as control-data generating entities with which performers can interact. OSC input can control in-game units and the displayed camera view, allowing for external control with reactive algorithms or pre-defined scripts.

ABSTRACT

With a nod towards digital puppetry and game-based film genres such as machinima, UDKOSC now offers an Open Sound Control (OSC) input layer for external control over third-person “pawn” entities, first-person “player” actors and camera controllers. Using real-time OSC input, driven by algorithmic process or parsed from a human-readable timed scripting syntax, users can shape intricate choreographies of timed gesture. As UDKOSC outputs real-time coordinate and action data generated by UDK pawns and players with OSC, individual as well as aggregate virtual actor gestures and motion can be leveraged as drivers for both creative and procedural/adaptive gaming music and audio concerns.

VIRTUAL GESTURE

Within the scope of this project, virtual gesture can be defined as any series of actions or motions performed by one or more game-space actors. A dance-like series of motions (“actor spins up a ramp, jumps, twirls and lands”) or a direct mapping of human-physical gesture via a Kinect controller (“actor’s skeletal mesh mimicks user swinging an arm side-to-side”) are each considered a “gesture” in this context.

Actor motion can be tracked over OSC on a macro scale - 3D motion within the environment - as well as on a micro scale - the location and rotation of specific bones within the actor skeleton. Bone location can be driven through custom character animation routines or through direct control from scripting or a dynamic control stream such as a Kinect.

SONIFICATION OF FLIGHT

In the musical work ECHO: Canyon, the flight of a player-controlled bird through the environment is sonified in real-time using a Supercollider (SC) sound server. The bird’s speed, rotation, absolute X-location, height relative to the ground and distance to “crystal” objects in the environment (macro scale data) all serve as parameters driving real-time synthesis algorithms. Flocks of OSC-controlled birds, themselves driving separate synthesis processes in SC, are controlled over OSC with an OSC-emitting ChucK script. On a micro scale, motion of the bones in the bird skeleton’s wing (seen below as a white line) are tracked to capture the motion of the wings during flight.

FUTURE WORK

Current work is ongoing to create multiple in-game characters capable of evocative gesture. Creatures modelled after elephants and dinosaurs (see below) will make use of trunk and horn appendages to create musical gestures and interact with the environment in novel ways. OSC data from bones is being tracked to map motion to representative sound events.

ART DIRECTION

All art direction, modeling, rigging animation for UDKOSC character and environment examples shown in this project has been provided by visual artist Chris Platz.

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