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DIMPLE links 3D interactive haptics with audiovisual design software

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DIMPLE is a software system providing a 3D "blank canvas" in which users can create 3D interactive scenes for haptic audio-visual interaction from any media creation system that supports Open Sound Control [5] messaging. This update modernizes DIMPLE for the current generation of haptic devices and operating systems.

INTRODUCTION

While designing 3D interactive systems for haptic audiovisual interaction, it is convenient to have a system that allows run-time construction of a scene containing geometric objects and their relations, such as kinematic relations and material properties. Moreover it is beneficial to have such a system integrate with tools already used in the design domain. Furthermore, providing some level of generalization and compatibility across many haptic devices is crucial for developing systems that can withstand the test of time in a changing technical environment, while shielding the user from complex implementation details of rendering algorithms and physics simulation.

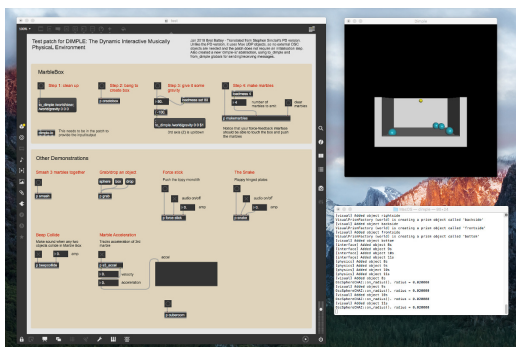


Figure 1: Test patches for DIMPLE running in Max/MSP.

These points of view were the inspiration for DIMPLE, the Dynamic Interactive Musically Physical Environment. It provides the *blank canvas* of an empty 3D environment to which a user can send messages instructing it to create geometric primitives, link them via joints, and provide them with material properties such as friction and colour. Upon creation, objects are rendered visually and can be interacted with using an input device or haptic force feedback device.

Of the goals mentioned above, one of the most difficult to achieve has certainly been that of protection against technical obsolescence. The initial 2007 publication addressed this by focusing on DIMPLE's *protocol* rather than the specific implementation [3], a set of semantic messages defined under the scope of Open Sound Control [5], a communications standard supported by a wide variety of digital creation environments.

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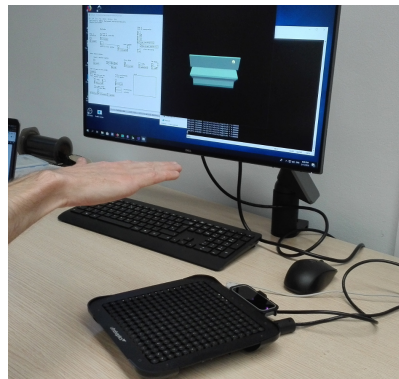


Figure 2: DIMPLE running with a Leap Motion input device and UltraHaptics ultrasound haptic display informing the user of contact events.

With no independent implementation forthcoming and the reality of an ever evolving software and hardware ecosystem, DIMPLE has struggled in past years to keep up with new versions of its software dependencies and multi-operating system and multi-device support. Recently, however, an effort has been undertaken to update DIMPLE to current environments, and with this demo we introduce a new release that leverages the latest versions of CHAI 3D [1], and the Open Dynamics Engine [4] to work with recent haptic devices and the latest operating systems. In addition to support for a large range of force feedback devices through CHAI 3D, this update also integrates preliminary support for ultrasound mid-air haptics via the UltraHaptics (UltraHaptics) and Leap Motion (Leap Motion, Inc) SDKs (Figure 2).

Finally, test patches and examples have been updated for the newer OSC objects integrated into vanilla Pure Data as of version 0.46 onwards [2], and have also been ported to Max/MSP (Cycling '74), see Figure 1.

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