The Vibrobyte: A Haptic Interface for Co-Located Performance  
Kyle McDonald*, Dane Kouttron, Curtis Bahn, Jonas Braasch, and Pauline Oliveros at Rensselaer Polytechnic Institute

Introduction

The Vibrobyte is a wireless haptic interface specialized for co-located musical performance. The hardware is designed around the open source Arduino platform, with haptic control data encapsulated in OSC messages, and OSC/hardware communications handled by Processing. The Vibrobyte was featured at the International Computer Music Conference 2008 (ICMC) in a telematic performance between ensembles in Belfast, Palo Alto (California, USA), and Troy (New York, USA).

Hardware

The Vibrobyte includes four LEDs for non-haptic output and tracking. Coupled with a camera, the infrared LED may be used to determine the position of a Vibrobyte in space. The other LEDs have been used to mirror the haptic outputs as a cue for the audience.

Software

Vibrobytes are addressed via OSC messages that are translated to Serial by a Processing application and load balanced, with repetition, before being sent to a wireless transmitter. The OSC protocol is shaped by the Vibrobyte's functionality.

Vibrobytes each have a unique ID, and may be addressed individually or in groups. If a group is addressed, the characteristics of its members are overridden. If an individual in a group is addressed, its unique characteristics take precedence. Different locations are not distinguished by the protocol, but the wireless transmission may optionally be optimized on location by selecting the subset of Vibrobytes currently present.

Performance

During ICMC 2008 we coordinated a co-located performance between the Roots Ensemble in Belfast, SoundWire in Palo Alto, California and Tintinnabulate in Troy, New York. Vibrobytes were employed for the first time in this performance to help coordinate the ensembles despite limited practice time. Each performer in the three groups was provided with a Vibrobyte, for approximately 15 performers total. A Max/MSP composition written by Curtis Bahn sent messages to each Vibrobyte, cueing the performers with dynamically varying intensity, rhythm and instrumentation combinations. The performers (with the exception of Pauline Oliveros who was wearing a prototype of a vibrating haptic device) could observe the bright multicolored LEDs bringing them in and out of the improvisation. Players entered when their LEDs were on and exited when off accordingly. Furthermore, players could interpret the rhythms and intensities of their LEDs freely when on. This first test of the Vibrobyte helped to shape the music in a new way that had not been possible before.

*Corresponding author: mcdonk@rpi.edu