The virtual orchestra: a systematic method of realising music composition through sample-based orchestral simulation

Leif Sundstrup
University of Wollongong

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The Virtual Orchestra: A Systematic Method of Realising Music Composition through Sample-Based Orchestral Simulation

Presented in partial fulfilment of the requirements for the award of the degree

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I dedicate this thesis to my parents Mary and Erik, who I am sure will be delighted that I have finally submitted my doctoral project.
Abstract

This thesis investigates a method of orchestral simulation using sample-based synthesis, instrument modelling, and music performance rules. Music scores are produced using Sibelius notation software and performed by FATSO (Film and Television Studio Orchestra). FATSO is a virtual orchestra developed by the author using a combination of computer-music software applications and expressive instrument modelling techniques capable of producing convincing simulated orchestral performances of music scores.

Music performance rules are modelled on live human performance practice using both Analysis-by-Synthesis and Analysis-by-Measurement techniques. The collected data is analysed, and then implemented into a music score using the Sibelius live playback transformation feature. After a music score is processed with human performance data, the instrument sounds and playing techniques are realised by the Vienna Instruments sample playback engine and GigaPulse convolution reverberation plug-in. The processed performance data of the score is transmitted to Vienna Instruments via MIDI using sound-sets created with the Sibelius sound-set editor. Consequently, a music score created using Sibelius can be performed by FATSO with a high level of realism through detailed instrument modelling and expressive music performance rules.

This thesis contains two parts. Part 1 discusses the background to sample-based orchestral simulation and the main components of realistic and expressive orchestral modelling. Part 2 discusses methods used by the author for performance data acquisition, and the resulting performance data implementation into the FATSO environment.
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