A NATIONAL SCIENCE FOUNDATION
ENGINEERING RESEARCH CENTER

INTEGRATED MEDIA SYSTEMS CENTER
A National Science Foundation
Engineering Research Center at the
UNIVERSITY OF SOUTHERN CALIFORNIA

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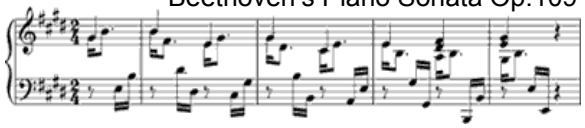
MUSIC PROCESSING: ESP – Expression Synthesis Project

Beethoven's Piano Sonata Op.109



BRIEF DESCRIPTION OF TECHNOLOGY DEMONSTRATION

The Expression Synthesis Project allows the users to visualize and manipulate expressive musical parameters in real time to render an expressive performance from an expressionless MIDI file. An intuitive driving interface is used to allow users to control the tempo (speed) and dynamics (loudness) throughout the piece. The user can use the visuals to make informed expressive decisions. The curvatures in the road correspond to pattern changes in the music. The steering wheel controls the camera view of the road.

UNIQUE OR DISTINGUISHING CHARACTERISTICS RELATIVE TO STATE-OF-THE-ART

- Use of a driving interface for music control.
- Mapping of music information to a road.
- Smooth and real-time control for expressive performance made possible by underlying framework.

APPLICATIONS

- Music performance rendering
- Music composition software
- Film & animation scoring
- Computer games

RECENT HIGHLIGHTS, LEVEL OF DEVELOPMENT, UPCOMING MILESTONES

- Highlights: Aaron Yang received the **Best Presentation Award** at the 2003 and 2004 IMSC Student Conferences. Demonstration at the 2004 USC Undergraduate Research Symposium.
- Milestones: Smooth control of dynamics and tempo (prototype I), real-time visualization of "path" of piece (prototype II). Next: Proof-of-concept tests and other terrain models.

UNDERLYING TECHNOLOGIES

- Implemented using MFSM (Modular Flow Scheduling Framework), an open source implementation of IMSC's SAI (Software Architecture for Immersipresence), in C++ and OpenGL. We used MIDI (Musical Instrument Digital Interface) and a MOMO driving wheel.

LIST OF PUBLICATIONS, REFERENCES, URLs

- ESP website: *http://cappriccio.usc.edu/ESP/esp.html*
- Max Matthews' Radio Baton: *http://www.csounds.com/mathews*
- Gil Weinberg's tactile instruments: *http://web.media.mit.edu/~gili/research/projects.html*
- Bresin R., Friberg A. *Director Musices*. *http://www.speech.kth.se/music/performance/download*
- Rubato http*://www.ifi.unizh.ch/groups/mml/musicmedia/rubato/rubato.html*
- POCO: *http://www.nici.kun.nl/mmm/projects/app3.html*
- Dixon S., Goebl W. and Widmer G., *The performance worm: Real time visualisation of expression based on langner's tempo-loudness animation*, Proc. of the Intl. Computer Music Conference, pages 361-364, Göteborg, Sweden, Sept. 2002.
- Modular Flow Scheduling Middleware: *http://mfsm.sourceforge.net/*

For additional information, please contact the Principal Investigator listed above via email, or contact

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