The Digital Orchestra Project: Digital Musical Instruments and Performance Practice

Erika Donald and Xenia Pestova
McGill University, Montreal, Canada
Overview

• CIRMMT/McGill Digital Orchestra Project
• Instruments
  – FM Gloves
  – Soprano T-Stick
  – Rulers
• Mapping
• Notation
• Performance Issues
• Conclusions
The Digital Orchestra Project

• Multidisciplinary project (2005 - 2008)
  – Music Technology, Composition, Performance

• Five types of new Digital Musical Instruments (DMIs)
  – Fortier-Marshall (FM) Gloves
  – Rulers
  – T-Box
  – Soprano and Tenor T-Sticks

• Two premieres
  – Heather Hindman: *The Long and the Short of It*
  – D. Andrew Stewart: *sounds between our minds*
The Long and the Short of It
by Heather Hindman
sounds between our minds
by D. Andrew Stewart
Fortier - Marshall (FM) Gloves

- Mark T. Marshall
- Pierre-Yves Fortier
- LH: 4 pressure sensors, two-axis accelerometer
- RH: 4 pressure sensors, bend sensor, infrared distance sensor
- Signals transmitted wirelessly to Kroonde
- Open Sound Control to Max/MSP
- Sound synthesis in Logic Pro
T-Sticks

- Family of instruments
  - 4 models built to date
- Joseph Malloch *et al.*
- Multi-touch capacitive sensing
- 2 accelerometers
- Pressure sensing
- Contact microphone
- Sampled by internal microcontroller
- USB or wireless
- Vocal microphone (Soprano)
- Foot pedals (Tenor)
The Rulers

- David Birnbaum
- 7 oscillating tines
- Infrared sensors measure tine position
- Sampled by microcontroller
- Transmitted via USB
- Converted to MIDI for use with Logic Pro
- Requires calibration (lighting conditions)
Mapping

• Gesture/sound relationship

  – How will we interact with the instrument?
  – What will it sound like?
  – Does the mapping “make sense”? 
Mapping

• Performer feedback
  – Aural, tactile, visual

• Performer control
  – Instrument responsiveness
  – Ergonomics and “tuning”

• Establishing playing techniques
  – Feedback loop
  – Collaborative process
Notation: FM Gloves
Notation: Soprano T-Stick
Notation: The Rulers
Performance Issues

• Ensemble rehearsal and performance
  – Latency
  – Instrument stability
  – Sound balance and diffusion
  – Lack of distinct sonic identities
Conclusions

• 3 Digital Musical Instruments (DMIs)
  – Instruments
  – Mapping
  – Notation
  – Performance Issues

• Evolution of instruments, mappings, notation, repertoire

• Establishment of performance practice
Acknowledgments

• Project Coordination
  • Sean Ferguson
  • Marcelo M. Wanderley

• Financial Support
  • Fonds québécois de la recherche sur la société et la culture
  • Centre for Interdisciplinary Research in Music Media and Technology

• Technical Support
  • Digital Composition Studios
  • Input Devices and Music Interaction Laboratory
  • Schulich School of Music
Acknowledgments

- Research assistants
  - David Birnbaum
  - Chloé Dominguez
  - Heather Hindman
  - Joseph Malloch
  - Mark T. Marshall
  - Fernando Rocha
  - Stephen Sinclair
  - D. Andrew Stewart
Further Reading

- *The Digital Orchestra Project*  
- Links to performance videos:  
- D. Birnbaum, *The Rulers*  
- J. Malloch, *The T-Stick*  
  [http://www.idmil.org/tstick](http://www.idmil.org/tstick)
- M. T. Marshall, *The FM Gloves and the T-Box*  