EmbodiNet: Enriching Distributed Musical Collaboration through Embodied Interactions

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Aims to understand and support collaborations

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COLOCATED

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COLOCATED

REMOTE

### **Motivation**

# How can we better support the **creative, playful and spontaneous** aspects of distributed collaborative activities?





Public Sound Objects (Barbosa and Kaltenbrunner, 2002)





#### **Existing systems**

#### "Apart" Project



(Schroeder, Renaud, Rebelo and Gualda, 2007)

#### SoundWIRE



(Chafe, Leistikow, Chisolm and Scavone, 2000)

#### Ultra-videoconferencing



(Cooperstock and Spackman, 2001)

## Increase the level of interaction among participants

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## Without detracting from the higher-level task of performance

- Key principles of usability design (Gould and Lewis, 1985)
  - Early focus on users and tasks
  - 2 Empirical Measurement
  - Iterative Design



#### http://www.lukew.com/

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## **New Directions in HCI**

- "Usability" alone is not enough
- New directions in HCl necessitate alternatives to "usability" (Kaye et al., 2007; MacDonald et al., 2013)
- Musical performance provided an excellent testbed for exploring such alternatives

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- Observed 15 musicians
- Focused on interpersonal interactions

- Evaluation Criteria
  - Enjoyment
  - Creativity
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#### **First Feature**

#### Rationale

- Capitalizes on a simple and common behaviour
- Emulates a natural property of sound
- Volume control is cumbersome mid-performance
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# Dynamic Volume

D. El-Shimy, T. Hermann, J. R. Cooperstock. A Reactive Environment for Dynamic Volume Control. NIME '12.

# **Graphical User Interface**



D. El-Shimy, J.R. Cooperstock (SRL)

# **Graphical User Interface**



# **Dynamic Volume**

- Capitalizes on another simple and common behaviour
- Provides functionality that is familiar to musicians
- Expands the system while keeping it simple and easy to use

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# **Track Panning**

D. El-Shimy, J. R. Cooperstock. Reactive Environment for Network Music Performance. NIME '13.

# **Track Panning**

# **Third Feature**

- Arose through user testing
- Restores spatial properties of sound that are absent in the distributed context

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## **Musician Spatialization**

D. El-Shimy, F. Grond, A. Olmos and J. R. Cooperstock. Eyes-Free Environment Awareness. Springer JMUI 2011.



## **Musician Spatialization**

- System evaluated according to standard user tests, but...
- Narrow feedback
- Unsuitable for testing small, iterative changes
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- Questionnaires
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### **Mix Control**

D. El-Shimy, S. Cowan, J.R. Cooperstock. EmbodiComp: Embodied Controls for Mixing and Composition. ICMC 2014

### **Mix Control**

### **Results of Long-Term Deployment**

#### Analysis of position data:







Analysis of post-test discussions:



#### **Occurrences of Positive and Negative Comments**

## **Results of Long-Term Deployment**

Analysis of post-condition questionnaires:



- Focus on interaction is key to successful collaboration
- Designed, developed and tested a novel system that:
  - Encompasses five features and accompanying GUI
  - Capitalizes on embodied interactions as a means of control
  - Offers performers the ability to affect one anothers sound parameters
  - Helps increase interpersonal interactions
  - Was crafted entirely through a user-centric approach
- Musicians found system practical and would use it again in the future
- http://www.github.com/delshimy

### **Summary**

#### • Focus on interaction is key to successful collaboration

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# **Questions?**

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Thesis Oral Defence

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