Music Performamatics: Interdisciplinary Interaction

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• connecting Computer Science to Art, Music, and Theatre through interdisciplinary courses that highlight computational thinking
• originally conceived to attract and retain CS majors by connecting theory to practice
• but also exposes non-CS majors to computing at a higher level than typically seen in General Education ("GenEd") computer literacy courses
Performamatics: Interdisciplinary Course Models

- **Synchronized**
  - pairings of upper-level courses for majors
  - joint project developed within the two courses
  - courses remain independent

- **Hybrid**
  - courses open to all students across the university
  - General Education (“GenEd”) credit
  - integrated, two instructors in the classroom

Performamatics: Synchronized Courses To Date

- **Graphical User Interface Programming** + **Web Art and Design**
  - artistic & human factors program enhancements

- **Graphical User Interface Programming** + **General Music Education Methods**
  - software for creative music notations

- **Software Engineering** + **Introduction to Theatrical Design**
  - software for theatrical lighting and scenic design
Performamatics:
Hybrid Courses To Date

- **Artbotics** (predecessor, model)
  - the use of robotics to create new media art
- **Tangible Interaction Design**
  - exploring how people interact with designed and computational objects in their daily lives
- **Sound Thinking**
  - the art and science of digital audio

Performamatics:
Focus for Today: CS + Music

- GUI Programming + Music Methods
- Sound Thinking
Interdisciplinary Courses Must Benefit Both Disciplines

• Benefits for Music Ed Students
  – Getting a feel for what’s involved in building technology applications for the classroom
  – Gaining insight into students growing up under the influence of media
  – Seeing the interdependence of sound, images, and technology

• Benefits for CS Students
  – Applying CS concepts
  – Working in an interesting application domain
  – Interacting with students who think differently
    • CS view: code-centric
    • Music view: usability
  – Gaining a strong exposure to human factors
**Interdisciplinary Courses**

**Must Benefit Both Disciplines**

- Benefits for both Music Ed and CS Students
  - Addressing creative challenges
  - Finding a common language
  - Getting out of their comfort zones

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**Found Instruments:**

**A Synchronized Project**

- Conceived by Prof. Gena Greher, Dept. of Music, & Coordinator, Music Ed
Found Instruments: Music Methods Assignment

- Using only household object(s), create a musical “instrument” that can produce several pitches or timbres.
- Create a composition for your instrument.
- Devise a system of creative notation that others will be able to understand well enough to perform your composition without specific instruction from you.
  - Your system must not resemble standard musical notation in any way, shape, or form.

Found Instruments: Create Instrument

1. Chris (CS), Joe (Music), and Sophanna (CS) playing their found instruments
- Maggie explaining her notation for playing a steam iron

**Found Instruments:**

- Create Notation
Found Instruments: Test Notation

- Maggie introducing Sophanna to her steam iron instrument and its notation

- Sophanna trying to play the steam iron using Maggie’s notation
Found Instruments: GUI Programming Assignment

- Create a computer program to implement one of the music students’ found instruments.
- Your program must be designed so that others can understand it well enough to create compositions *without specific instruction from you*.

1. Create Program

- Sophanna’s computer program for writing Maggie’s steam iron notation
### Found Instruments: 2 Test Program

- Maggie and Mike trying out Sophanna’s program and recommending revisions

### Mike’s Found Instrument

**Jacket Notation**

```
\begin{center}
\textbf{Eine Kleine Jacket Musik}
\end{center}
```

A diagram depicting the notation is shown beneath the title.
Mike’s Found Instrument
“Eine Kline Jacket Music”

Chris’s Composing Program
Initial Screen

Eine Kleine Jacket Musik

Click picture to play video
Chris’s Composing Program
Set Beat and Drag Icons

Chris’s Composing Program
Select Icon & Position Cursor
Chris’s Composing Program ④
Delete Icon, Where’s Cursor?

Chris’s Composing Program ⑤
Insert Icon Keyboard Shortcut
Performamatics: Music Student Observations

- “I thought that their systems depicted a much more technical view of things than what we had in mind.”

- “It’s very productive to have them come to class with us to share different ideas.”

- “They are in a creative process just as much as we are when we create music… I saw a lot of similarities between what they were doing and what we were doing.”
Performamatics: Music Student Observations

- “I love hearing different perspectives from people in totally different areas of study.”
- “It is always just interesting to see the differences – but similarities – between both of the majors.”
- “… somebody else on campus [who] has nothing to do with us [that is, a CS student] has everything to do with us.”

Sound Thinking: A Hybrid Course

- Dual-listed elective with “GenEd” credit
  - CS students get Arts & Humanities credit
  - Arts students get Technology credit
- Dual-taught: two professors in the classroom
  - Sustainability issues
    - FTE and, more importantly, P&T “credit”
  - Scheduling issues in tightly packed curricula
    - difficult for professors as well as students
  - Campus geography issues
Sound Thinking: Course Projects

- Found Instruments
  - Manipulating with Audacity

- SoundScapes
  - Audio Art: a soundtrack of an image
  - Audio Ethnography: a soundtrack of your life

- Computer Manipulation
  - Static webpages that incorporate sound
  - Dynamic webpages that can manipulate sounds

- Final Project
  - Integrating sound & video or complex webpages
Sound Thinking:
... and Expanded Thinking

- Bach to Lachenmann to Sciarrino
- Demonstration by violinist Ari Streisfeld

Click to play video
Performamatics: Benefits

• Grounding of theory in real applications
• Exposure to other ways of thinking
  – through interaction with other majors
• Attraction of majors with new interests
  – consideration of BA in CS to complement BS
• Revitalization of faculty as well as students
  – attraction of new faculty in related disciplines
• New interdisciplinary research opportunities
  – invitations to work with other faculty

Performamatics: Future

• Address issues at University level
  – our co-PIs are now on Univ.-level committees
• Expand successes into pipeline programs
  – develop closer ties with high and middle schools
  – coordinate with NSF-funded CAITE project
    (Commonwealth Alliance for Information Technology Education)
• Build on alliances with other institutions
  – refinement and replication of our efforts
    (Artbotics replication is already underway)
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http://www.performamatics.org

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