

Interdisciplinary Team Teaching

Collaboration and Creativity
through Orchestra-Conducting Robots

The College of New Jersey

- ⊗ Andrea Salgian, Computer Science
- ⊗ Teresa Marrin Nakra, Music
- ⊗ Yunfeng Wang, Mechanical Engineering
- ⊗ Chris Ault, Interactive Multimedia
- ⊗ With Support from Meredith Stone



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(Interdisciplinary *Special Topics Course*)

- ⊗ Faculty from Computer Science, Music, Mechanical Engineering and Interactive Multimedia
- ⊗ Sparked by NSF Creative IT program
- ⊗ Built on previous collaborations

Course Inspiration

- ⊗ NSF Creative IT program supports “projects that explore synergistic cross-disciplinary research in creativity and computer science and information technology.”
- ⊗ Sought to design a course that
 - ⊗ encouraged cross-disciplinary collaboration and learning, and
 - ⊗ encouraged students to approach problems from a new angle
- ⊗ Searched for a project that would combine our disciplines

(Course Structure)

- ⊗ Two-semester sequence gave way to one-semester course
- ⊗ Initial questionnaire to gauge prior knowledge
- ⊗ Groups with students from each discipline
- ⊗ Initial “pie in the sky” design

(Course Structure)

Domain-specific lectures:

- ⊗ Conducting theory and technique
- ⊗ Visual music and interface design
- ⊗ Procedural animation and microcontrollers
- ⊗ Spatial representation and forward kinematics of robotic manipulators
- ⊗ Project management and collaboration

Course Structure

- ⊗ Revised proposal to reflect baseline lectures
- ⊗ Iterative cycle of development and testing sessions
- ⊗ Students keep reflective journals
- ⊗ Groups manage projects using online tool
- ⊗ Peer assessment
- ⊗ End-of-semester performance and musician feedback

Rewards

- ⊗ Teachers drew inspiration from each other
- ⊗ Established a track record with the NSF
- ⊗ Music, Mind and Invention workshop
- ⊗ Student outcomes:
 - ⊗ Graduate schools including NYU, Texas A&M, University of Michigan, Virginia Tech and Carnegie Mellon
 - ⊗ Communication between disciplines
 - ⊗ Increased collaboration and creativity

(Collaboration)

“It was shocking to hear that all the other students from the ‘smart’ majors (ME and CS) were as confused about conducting and music as I had been about their subject areas.”

(Collaboration)

“I have decided that I want to go to grad school for music technology. A major impact on this decision has been my experience in this course for the past two semesters. It has exposed me to the limitless possibilities of combining music and computers.”

(Collaboration)

“Trying to wrap my mind around having my right hand do something and my left hand do something entirely different was surprisingly difficult. It was really trying it [conducting] out for myself that made me realize how much cognitive multitasking this feat required.”

(Collaboration)

“I feel it is good to try to understand a new subject which I previously did not even think about, because it has forced me to learn what feels like a new language... really made me see how different it must be for the mechanical engineers in the class to study the musical aspect, because compared to mechanical engineering theory, music theory has an almost mystic quality.”

(Collaboration)

“It makes you take a step back and forces you to explain things in a way that you’re not used to with your fellow engineers. That is one of the major things I enjoy about this class, everyone trying to convey their knowledge to people who might not have any idea about what they’re talking about. I think it’s a great challenge for all the majors”

(Challenges)

- ⊗ Faculty teaching load
- ⊗ Teaching evaluation forms
- ⊗ Requires extensive support from colleagues
 - IT, chairs, deans, advisory board
- ⊗ Integration of different teaching styles
- ⊗ Addressing different levels of student expertise
- ⊗ Logistics of meetings, course administration



Thank you.



salgian@tcnj.edu

nakra@tcnj.edu

jwang@tcnjj.edu

aalt@tcnj.edu