Studio Report:
Yale Open Music Initiative

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Yale Open Music Initiative (OMI)

- Part of multifaceted system of Computer Music (CM) studies
- Supports and augments existing programs
- Bridges people to resources
- Offers workshops, reading groups, concerts
- Mode = Open
- Membership driven

Degree Programs Related to Computer Music

- Music
- Music/CS double-major
- Computing and the Arts (C2)
  - Undergraduate major with tracks for MS and PhD
  - Students take 6 core CS courses and 6 core courses in one of five tracks
    - music, art, art history, architecture and theater studies
  - The music track also requires two courses that specifically blend music and CS

Course Offerings

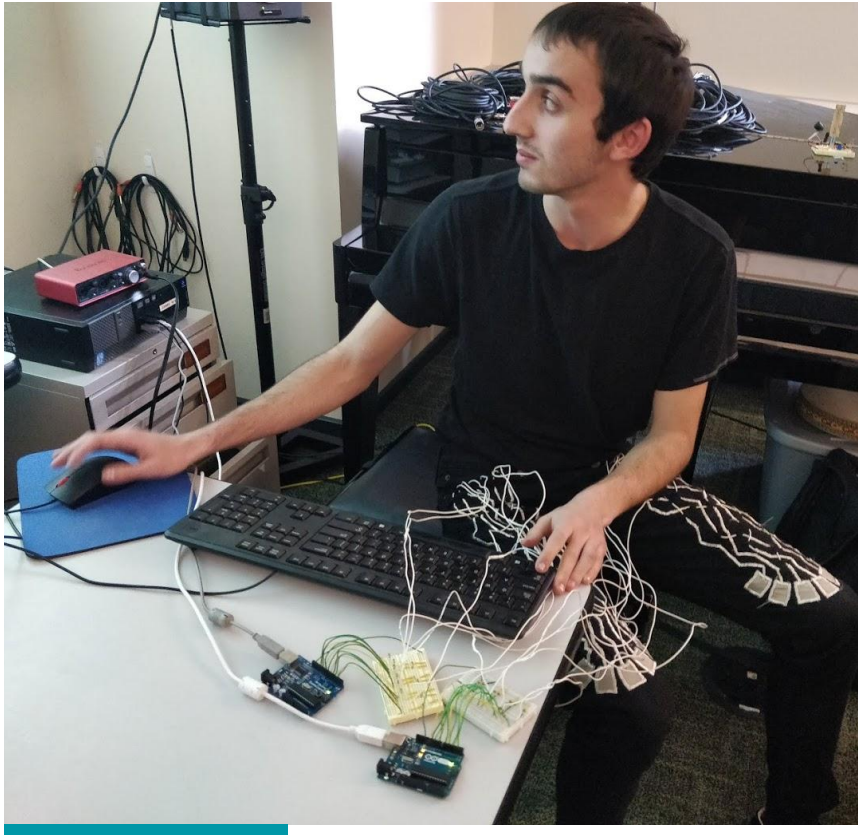
- **21st Century Electronic and Computer Music Techniques (CS)**
- **Computer Music: Algorithmic and Heuristic Composition (CS) ***
- **Computer Music: Sound Representation and Synthesis (CS) ***
- Programming Music Applications (CS)
- Fundamentals of Music Technology (Mus)
- Laptop Ensembles: Study and Performance (Mus)
- Musical Acoustics and Instrument Design (Mus/EE)
- **Creative Embedded Systems (CS) -- *new course, Fall 2019***

*Requirement of the C2 major

21st Century Electronic and Computer Music

Level: first-year students only
Technology: Ardour (DAW), SuperCollider, Arduino

- Introduction to digital music technologies
- Audio recording, editing, and production
- Audio programming in SuperCollider
- Physical computing: Arduino + sensors + SuperCollider

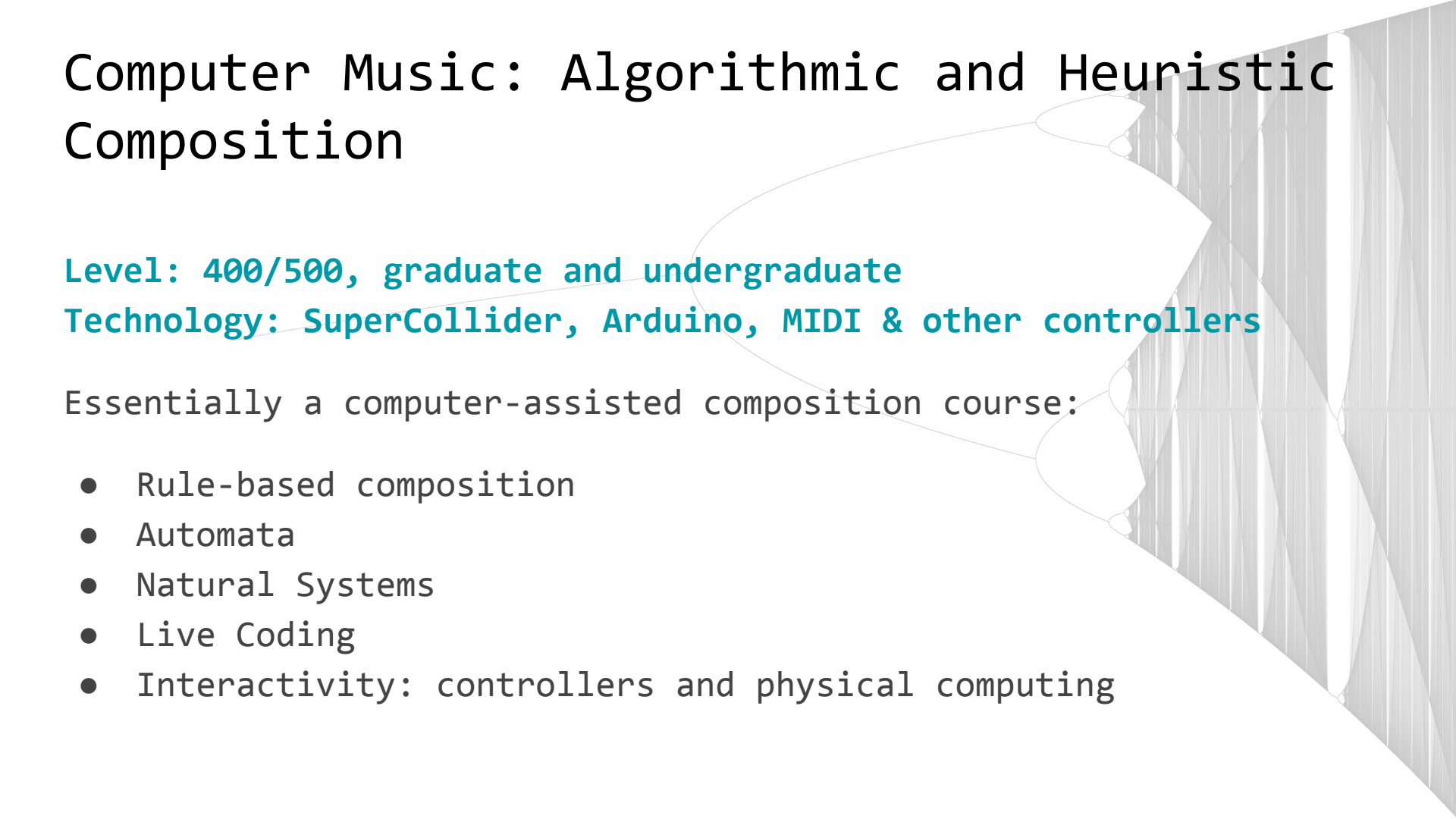


Computer Music: Algorithmic and Heuristic Composition

Level: 400/500, graduate and undergraduate
Technology: SuperCollider, Arduino, MIDI & other controllers

Essentially a computer-assisted composition course:

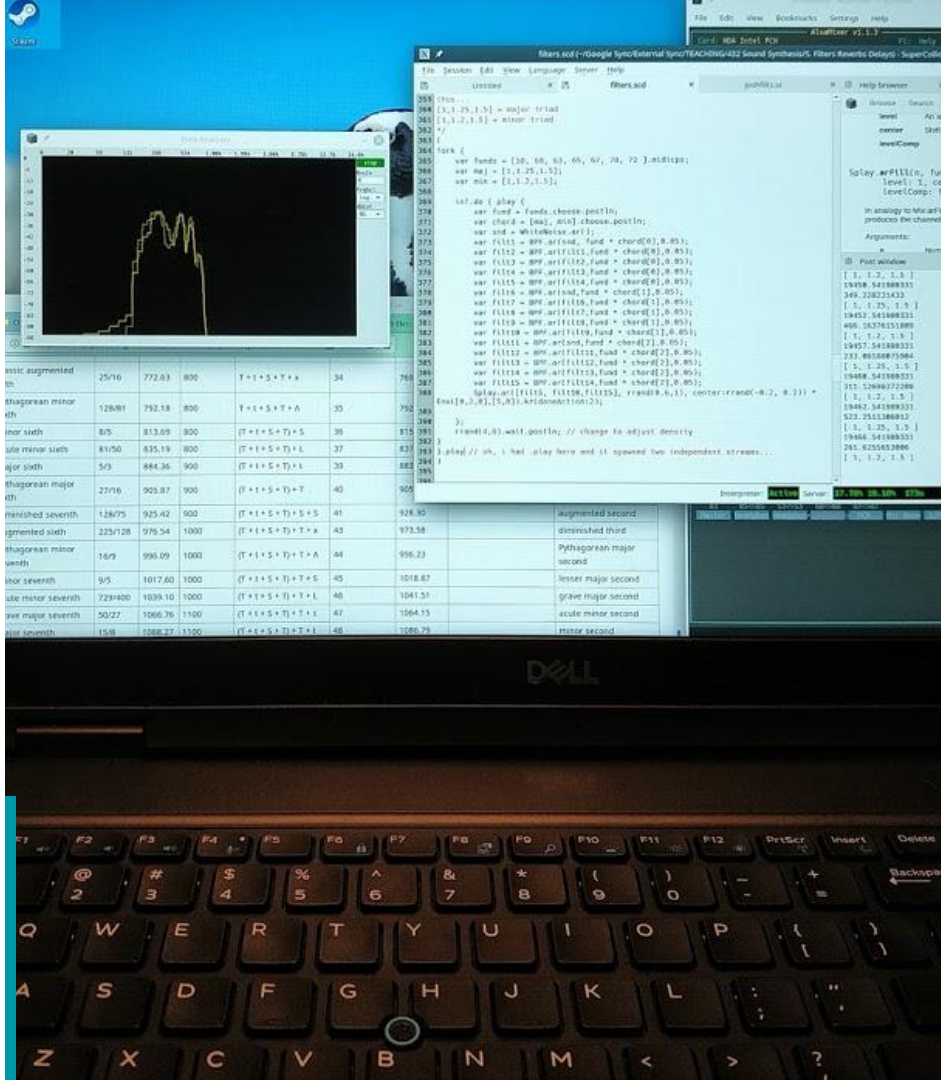
- Rule-based composition
- Automata
- Natural Systems
- Live Coding
- Interactivity: controllers and physical computing



Sound Synthesis

Level: 400/500, undergrad/grad
Technology: SuperCollider, Arduino, MIDI & other controllers

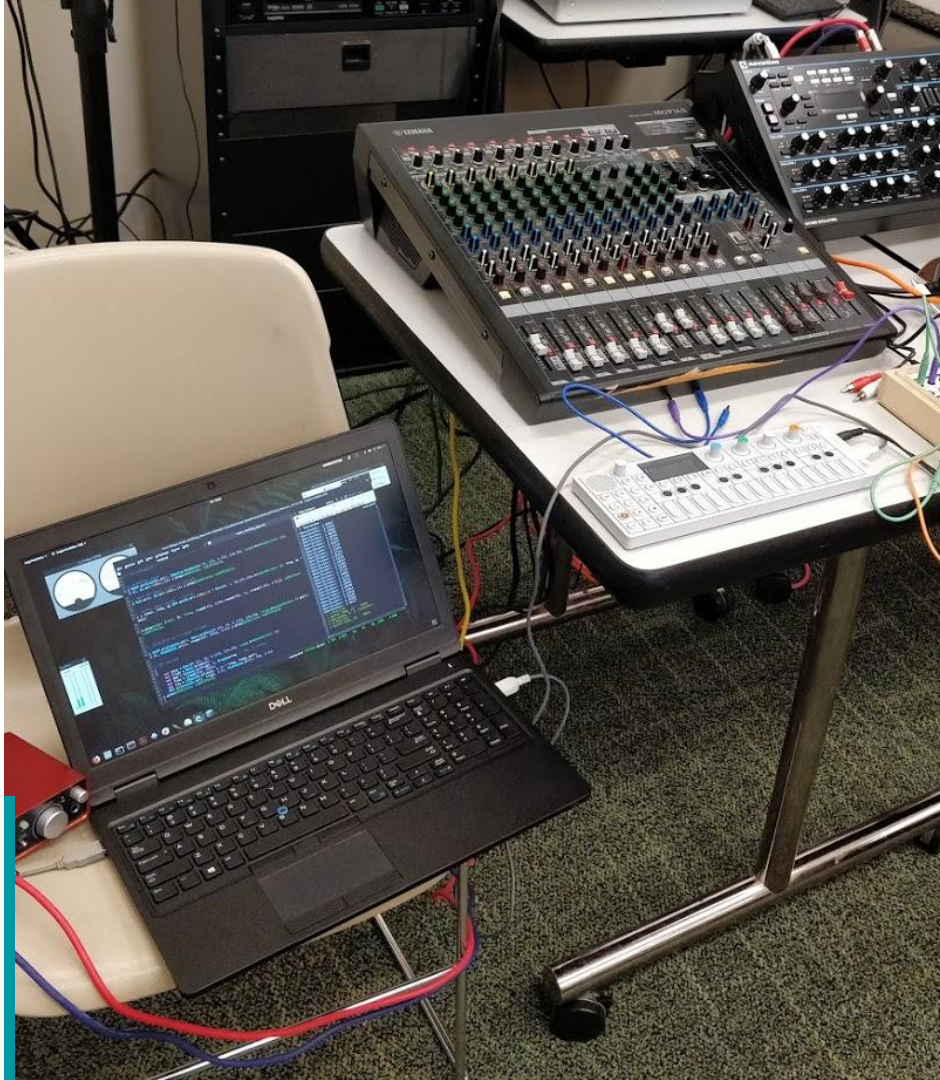
- Sound representation/Digital basics
- Synthesis techniques (Additive, Subtractive, Modulation, granular, stochastic)
- Live Coding
- Interactivity: controllers and physical computing



Computer Music in CS

All courses:

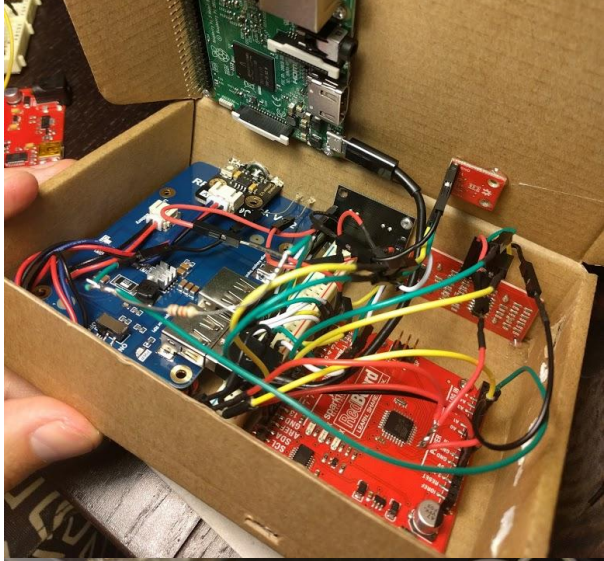
- Use SuperCollider
  - For continuity and overall feature-completeness
- Have hardware module:
  - Physical Computing: Arduino/Teensy plus sensors
  - MIDI controllers (Yaaay the 1980s!)
  - Kinekt, Leap Motion
- Have interactivity module:
  - Live coding
  - Machine listening



Creative Embedded Systems

Level: 300, upper-level undergrad
Technology: Arduino, ESP32, Raspberry Pi

- “... to conceive of and implement creative uses of computation.”
- Project based, portfolio building course
- Handle communications and constraints of complex embedded systems
- Co-taught through the Associates in Teaching program



Events

Synth Jams

Workshops

Concerts

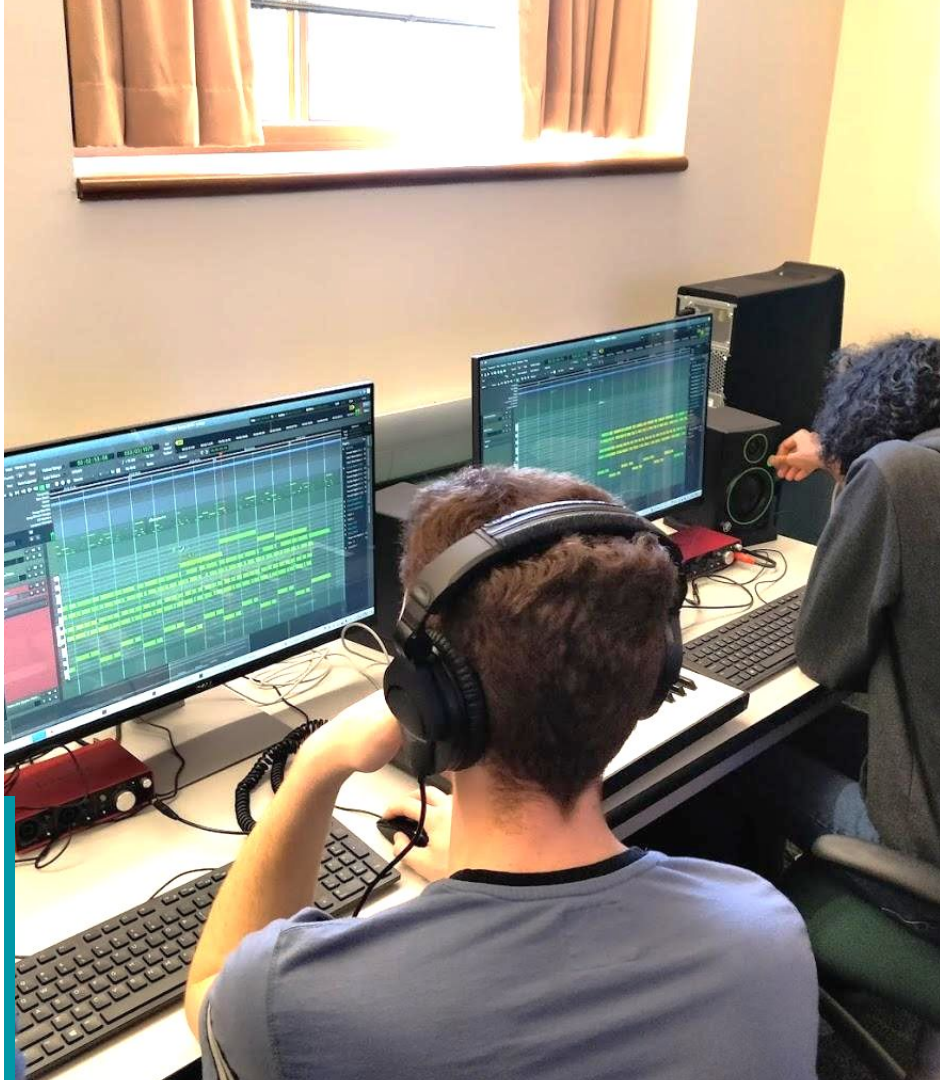
Reading Groups

Synth Jams

- Student-led
- Open to all levels
- Provides practical experience with studio hardware
- Recordings are made available on omi.yale.edu

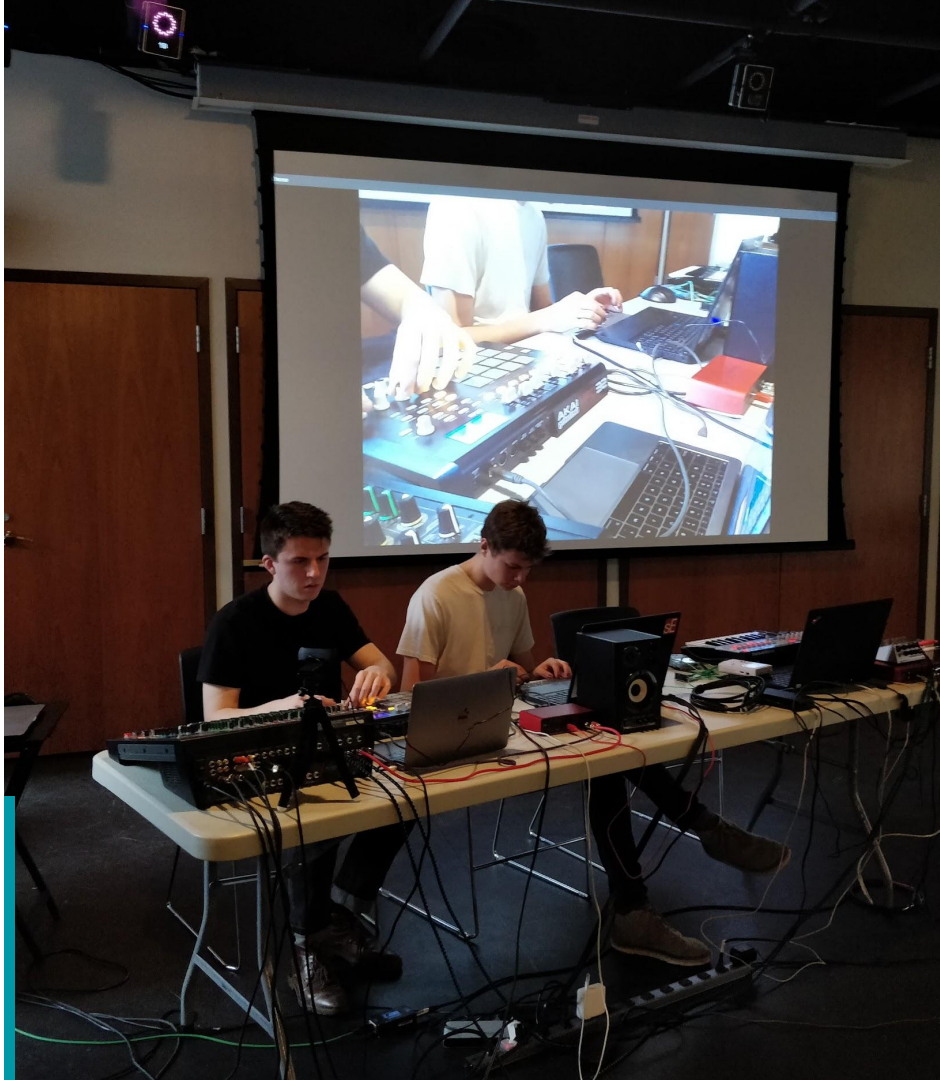
Workshops

- 5-8 per semester
- Largely Student-led
- Hands-on
- Open-source
- Often, attendees take project home



Concerts

- Held at CCAM at end-of-semester
- Both student and faculty work
- Live coding, chip tunes, hardware synths, multi-channel fixed media, and more

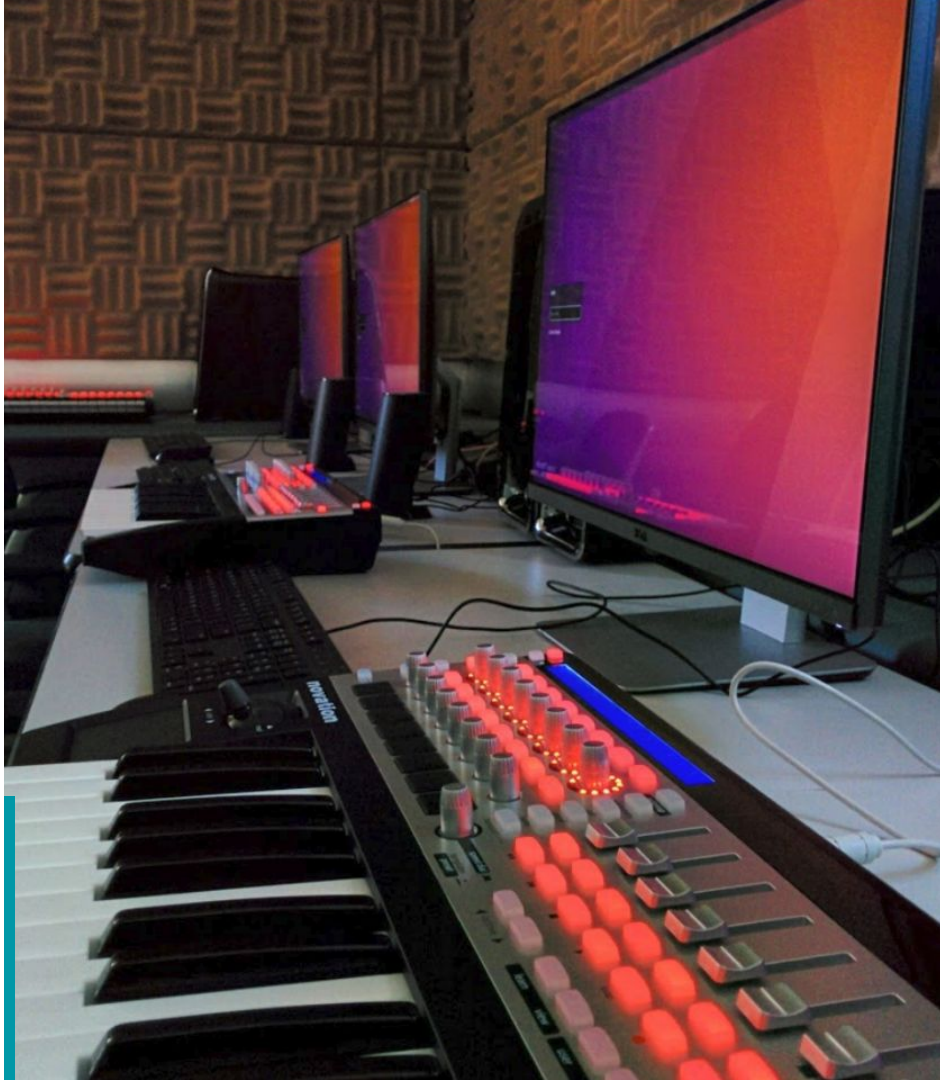


Video

https://www.youtube.com/watch?v=ac0GrSG5IKU&t=1181s

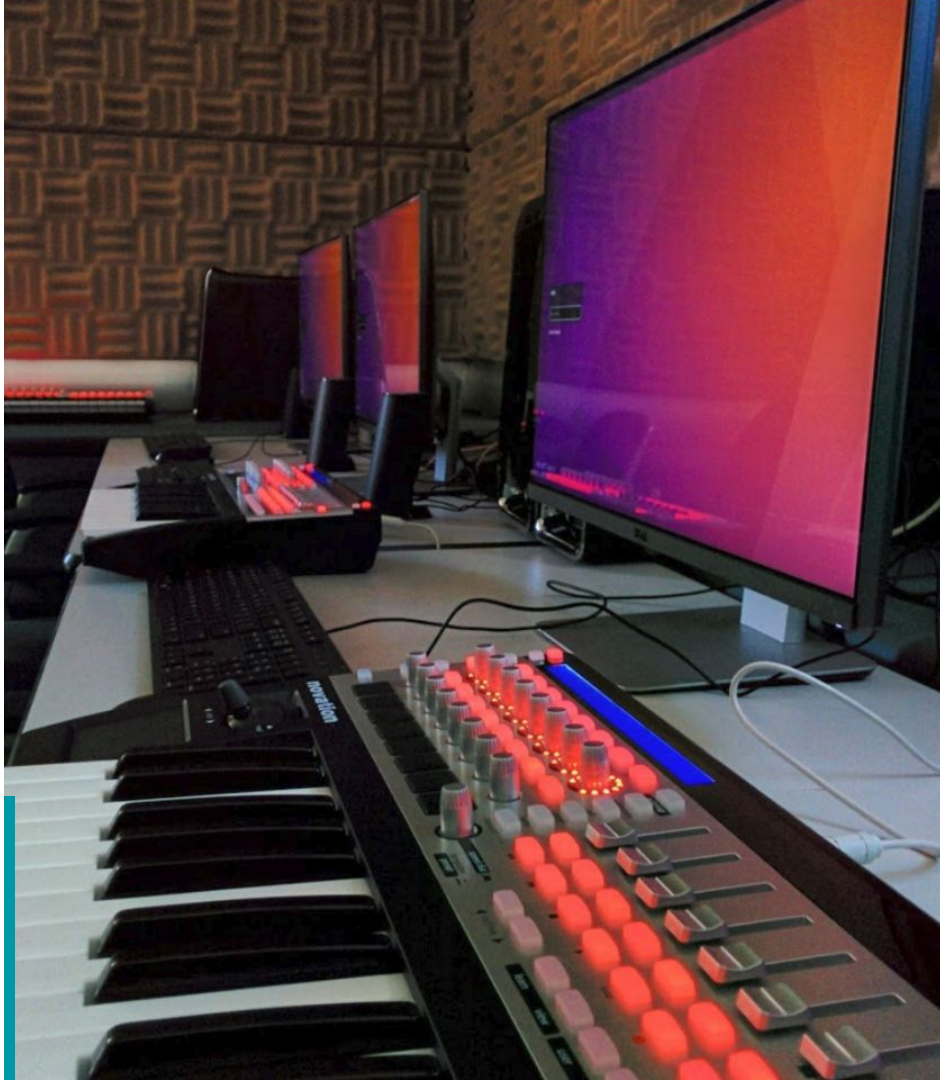
Work and Performance Spaces

1. **AKW 123**
2. **Center for Collaborative Arts and Media (CCAM)**
3. Yale Music Technology Labs (YalMusT)
4. Residential College Studios



Computer Science Music Studio: AKW 123

- DAWs
  - Custom Linux OS with audio IO and MIDI controllers at every station
- Instruments and Controllers
  - 3 Digital/Analog hybrid synthesizers
- Prototyping Station
  - everything needed to design and build custom hardware
- VR Systems
  - HTC Vive, Oculus Rift
- Audio mixing/mastering desk

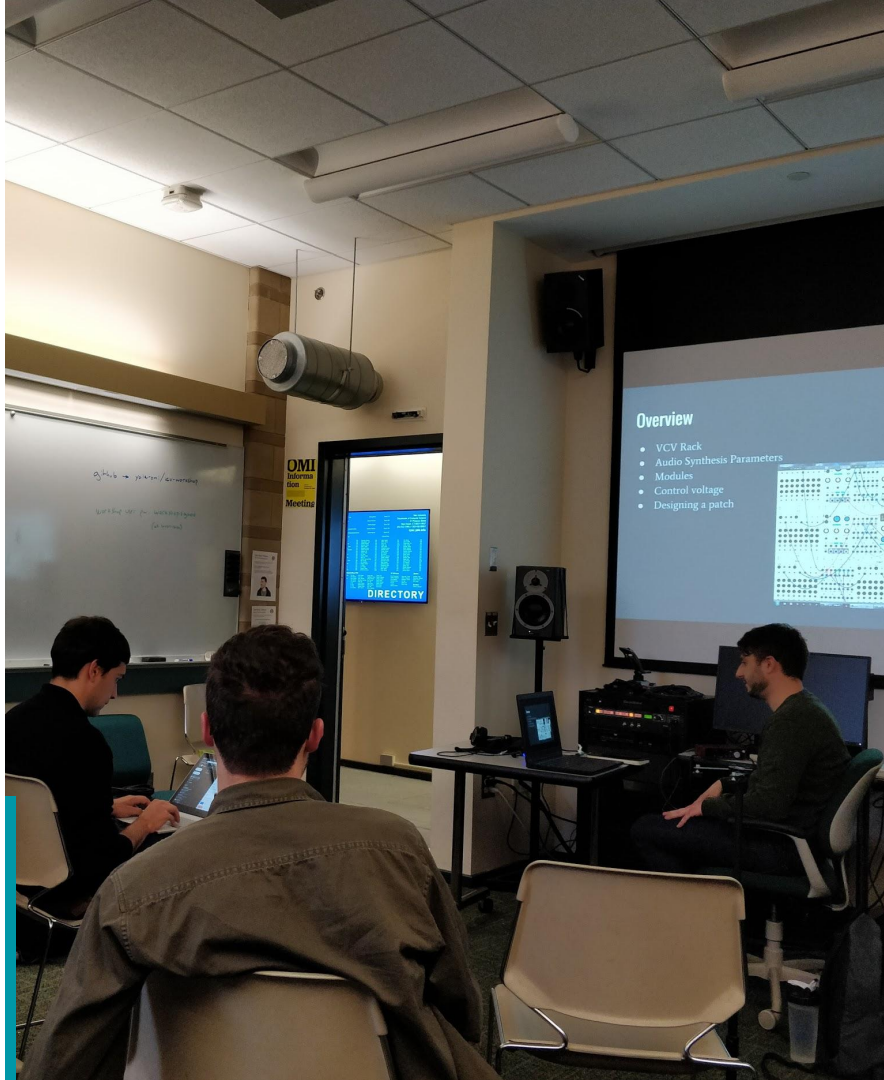


CCAM

- Leeds Studio
  - 8 channel surround sound
    - matrixing
  - 32 camera motion capture system
  - 6 projectors
- Video Production Studio
- Post-production A/V Studio
- Multiple Installation Spaces

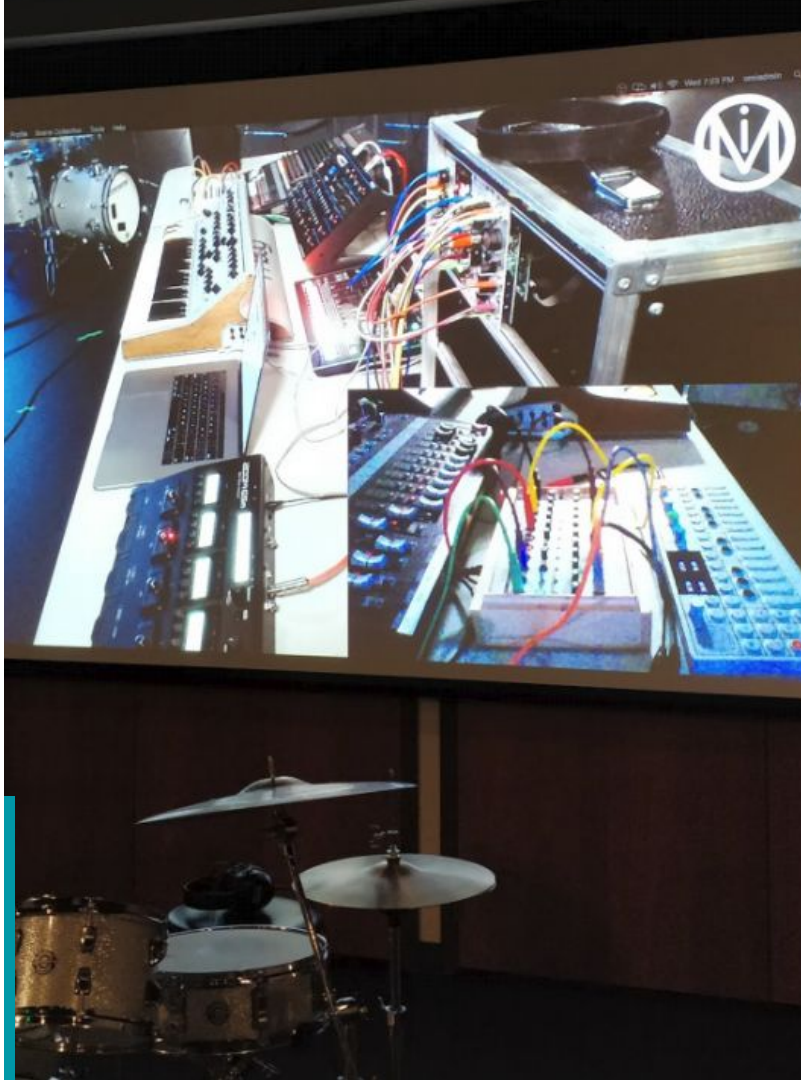
Research

- Collaborating with other labs in CS department
- Undergraduate involvement
- Programming languages + Computer Music
  - Programming-by-example for audio: synthesizing digital signal processing programs. Functional Art and Music workshop at ICFP (2018)
- Education + Computer Music
  - How can computing and the arts help build a more diverse student body
- Weekly reading group seminars



OMI Going Forward

- Continue to respond to feedback
  - Redesign Studio 123: accessible, interconnected
- Focus on cost and accessibility
  - Remove barriers to entry by diversifying programs and activities for broader appeal
  - easy access to expertise and shared resources.
- Continued emphasis on inter-program collaboration: Blended Reality Group, CCAM, and other institutions



Yale Open Music Initiative (OMI): Q & A

“a community of practice around the development and use of open source audio tools in the context of artistic expression”

- https://omi.yale.edu

- Degree programs and CS+Music course offerings
- Spaces available (AKW123, CCAM, ...) for student use
- Regular events: synth jams, concerts, workshops

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