**Annual Report: January – December 2021**

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**Looking Back: Major Activities and Accomplishments**

Activity/Accomplishment 1A: Re-building Music in a pandemic: **June – Sept 2021**

**Music@Olin website for prospective students, their families, and the Olin community**

Integrated Project Fund (IPF) support made this project a reality.

We set out to make a Music@Olin website, the first ever! Andrew Chang ’24 designed and built the site. I reviewed its development daily by providing content, feedback, testing, and design suggestions. Jim Paradis helped us with the back end; his expertise was critical. Our audience comprises prospective students and their families, as well as all Olin students, alumni, staff, and faculty—past, present, and future. We made the site available to Admissions (Susan Brisson and Emily Roper-Doten for their fall season. Our next step is to incorporate it into the Olin website—something I thought would be automatically done through IT in collaboration with OSCOM. But it’s nowhere to be found so it’s on my list for January 2022.

Pointer to evidence: the Music@Olin website can be found at <https://music.olin.edu>

Activity/Accomplishment 1B: Re-building Music in a pandemic: **July - December 2021**

**Resurrecting the Olin Conductorless Orchestra**

PPE, Air Exchanges, how to ensure safe auditions, rehearsals, and performances. Then establishing a new organizational structure to support more productive music-making. Covid wreaked havoc on music performance worldwide and as difficult as it was, some benefits happened. OCO was able to establish new models of operation and commitment.

Pointer to relevant evidence: OCO performed its first concert since March 6, 2020, on Oct 29, 2021 for Olin’s Family Day. Recordings in the pipeline.

Activity/Accomplishment 1C: Re-building Music in a pandemic: **July – December 2021**

**Resurrecting the Wired Ensemble**

In Wired Ensemble, we have wind, brass, and vocal ensembles rehearsing/performing throughout the semester in MAC 305 and MAC 304, in addition to string and percussion instruments. So considerations of PPE, Air Exchanges, and safe rehearsal/performance practices were omnipresent during Fall 21.

Pointer to relevant evidence: Original compositions by Wired Ensemble students were performed live at the Wired Ensemble Event in Milas Hall Mezzanine for Olin’s Fall Expo on Dec 17, 2021. Recordings in the pipeline.

Activity/Accomplishment 2A: **June 1, 2021**

**U.S. Patent awarded by the USPTO (United States Patent and Trademark Office)**

“Method of Creating Musical Compositions and other Symbolic Sequences by Artificial Intelligence”, continuation in part.

This patent outlines a method for creating AI-composed music having a style that reflects and/or augments the personal style of a composer.

Pointer to relevant evidence: <https://uspto.report/patent/grant/11,024,276#D00002>

Activity/Accomplishment 2B: **January – December 2021**

**The CantoVario Project – R&D**

CantoVario’s NSF grant (Partnerships for Innovation—Technology Transfer) has three prototype deliverables: a MIDI Variation Engine, an Audio Variation Engine, and a Science Museum Chaos+Music Exhibit. We built an initial prototype of the MIDI Variation Engine that incorporates user feedback on the interface, expanded the song base for the Audio Variation Engine, and finalized the design of the Chaos+Music Exhibit prototype which satisfies constraints identified through interviews with professionals who build science museum exhibits.

Pointer to relevant evidence: NSF PFI-TT Annual Report

Activity/Accomplishment 3A: **July 29, 2021**

**ASEE Distinguished Lecture Series, invited speaker**

“The Engineers’ Orchestra: a conductorless orchestra for developing 21st century professional skills”

The invitation stemmed from winning the Zone 1 “Best Paper of 2019” award.

 Pointer to relevant evidence: ASEE 2021 National Conference (virtual)

Activity/Accomplishment 3B: **July 24, 2021**

**ASEE 2021 Multidisciplinary Engineering Division Best Paper**

“It is my honor and pleasure to inform you that your paper, "A Multidisciplinary Mid-Level Electrical and Mechanical Engineering Course," has been selected to receive the 2021 best paper award for the Multidisciplinary Engineering (MULTI) Division of ASEE. Congratulations!”

The ASEE 2021 Multidisciplinary Engineering Division Best Paper was awarded to the Olin faculty who developed and documented the new Engineering Systems Analysis course (Christopher Lee, Siddhartan Govindasamy, Diana Dabby, and Paul Ruvolo).

Pointer to evidence: the paper can be found at

<https://peer.asee.org/a-multidisciplinary-mid-level-electrical-and-mechanical-engineering-course>

Activity/Accomplishment 4: **January - November 2021**

**Provided original music for a Chinese Engineering Education video produced by the Fulcrum Team, requested by Anne-Marie Dorning. The video would feature Olin’s strides in Engineering Education, based on an interview with President-emeritus Rick Miller**

Dedicated to education in pursuit of a more beautiful world, the Fulcrum Team comprises members from many countries, including China, the United States, Brazil, and Singapore. It is led by Helen Haste (Visiting Professor at Harvard), Yu Haiqin (Visiting Scholar at Harvard), and Justin Thomas (Harvard Masters graduate). Together they produced the video:

“The Olin Effect in School Management on Emerging Engineering Education: Small in Size but Large in Impact. The second interview with Olin College of Engineering President Richard K. Miller.”

Pointers to relevant evidence: The first and second video interviews were posted on the official WeChat account of the HEEC/Secretariat of China Engineering Education Accreditation Association (CEEAA) <https://mp.weixin.qq.com/s/3Ox-Ep6S8x6vwgxqXjU0ig>

Activity/Accomplishment 5: **March 2021**

**IEEE Spectrum Magazine print article about the Olin Conductorless Orchestra (OCO), originally appearing as an IEEE online article (Oct 26, 2020), is published again but this time in the March 2021 print edition of the IEEE Spectrum magazine**

“Conductorless Orchestra Helps EE Students Fine Tune their Professional Skills”

You can imagine my surprise when I saw a photo of OCO and me while reading the print edition of the March 2021 IEEE Spectrum, accompanied by a full article. The author (Joanna Goodrich, Asst. Editor at The Institute) describes how OCO develops leadership, teamwork, and effective communication in engineer-musicians.

Pointers to relevant evidence: Joanna Goodrich <https://spectrum.ieee.org/the-institute/ieee-member-news/conductorless-orchestra-helps-ee-students-fine-tune-their-professional-skills> (print article only available in monthly IEEE *Spectrum* magazine to IEEE members)

Activity/Accomplishment 6A **Fall 2021**

**Three arrangements of works for the Olin Conductorless Orchestra**

I created 3 original arrangements (aka re-orchestrations of symphonic works) for OCO’s eclectic instrumentation, i.e., its unbalanced wind, brass, and string sections. This is relevant because, as OCO students have noted in the past, “we wouldn’t have an orchestra without these.”

Fall 2021. Three original orchestral arrangements of works for 16 players (**flute, clarinet, 2 alto saxophones, tenor sax, trombone, bass trombone + tuba (one player on both), timpani, piano, 3 violins, viola, 2 cellos, and double bass**)

•Gustav Holst: *A Somerset Rhapsody.* Holstwrote the Rhapsody for 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, 4 horns, 2 trumpets, 3 trombones, tuba, strings (38 violins, 14 violas, 12 cellos, and 8 basses), timpani and percussion.

•Tchaikovsky: “*Élégie* from *Serenade for String Orchestra in C*, op. 48. Tchaikovskyscored his *“*Elégie” for full string orchestra (34 violins, 14 violas, 12 cellos, and 6 basses).

•Jo Hisaishi and P.H. Chen: “A Town with an Ocean View” from *Kiki’s Delivery Service*, scored for 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, horn, 2 trumpets, 2 trombones, tuba, strings, and percussion.

Pointers to evidence: arrangements will be posted to the Engineers’ Orchestra Hub website; recordings in the pipeline.

Activity/Accomplishment 6B: **Fall 2021**

**Five Music Program concerts/events showcasing our students for Olin and external communities**

These concerts are significant because they reach core Olin constituencies: families (Family Weekend), external professional visitors (e.g., at Expo), students + families attending Candidates Week.

Concert preparation (rehearsals and dress rehearsals) for Fall 2021:

•2 OCO concerts: Family Weekend (Oct. 29), Fall Expo (Dec. 17)

•The Wired Ensemble Event concert for Fall Expo (Dec. 17)

Preparation for Spring 2021:

•Wired Ensemble online event for Candidates Week (March 2, 2021)

•OCO online event for Candidates Week (March 4, 2021)

Pointers to relevant evidence: recordings, communications from Olin parents, students, professional musicians, and Candidates Week audiences

Activity/Accomplishment 7: **Spring 2021**

**Online delivery of Engineering Systems Analysis (ESA:Systems), co-taught with Chris Lee**

ESA:Systems involves building, developing, and practicing process-based quantitative analysis skills in the broad area comprising linear analysis of engineering systems. Concepts such as linearization, equilibrium, and stability will be applied to study the dynamic response of electrical and mechanical systems in both the time and frequency domains through time-integration, transfer functions, and state-space analysis. Ideas from feedback control are introduced. Coursework and projects will involve examples such as robots, communication systems, or aircraft/spacecraft.

We re-vamped our course for online delivery which necessitated changes, e.g., a hardware project for on-campus students and a software project for virtual students.

Pointers to relevant evidence: ESA:Systems Canvas site <https://canvas.olin.edu/courses/267>

**Continued online half-semester course—ESA:Signals**

Linear system theory offers a powerful set of mathematical tools used broadly across science and engineering. Signals represent the transfer of information or power, while systems represent operations on these signals. ESA:Signals extends material from the first half-semester to focus on fundamental concepts such as frequency response, convolution, impulse and step response, sampling and aliasing, transforms (CTFT, DTFT, z), and modulation. These concepts are presented within the framework of linear operators and transforms in discrete- and continuous-time. Applications include filters, system identification, and communications.

Parts I and II of ESA were, and continue to be, a love. Interacting with the students, co-developing with Chris, and learning much in the process, engaged me fully.

Pointers to relevant evidence: ESA: Signals Canvas site <https://canvas.olin.edu/courses/263>

**Looking Back: Other Activities and Accomplishments**

1. During Spring 21, my NSF Partnerships for Innovation—Technology Transfer Grant (250K) employed 5 Olin students for R&D projects combining musical variations, chaos science, acoustics, and signal processing (the CantoVario project).
2. During Jan – May 2021, I kept OCO going, despite being virtual due to covid. Four students recorded and videotaped duets (Beethoven’s “Eyeglasses” Duo for Viola and Cello, WoO 32 and “Fish and Chips” by Grace Kelly and Leo Pellegrino), as well as solos (Rachmaninov Prelude in g minor and Bach Prelude in d minor), that were presented at Olin’s May 13 Community Day Music Showcase. President Barabino attended the music showcase and afterwards asked that OCO perform at her inauguration in May 2022.
3. Both CantoVario® and EnginArt® are standard character trademarks that were registered with the USPTO in 2014 and 2015, respectively. The question of how our customers access products was researched as part of my NSF I-Corps customer discovery process. As a result, we realized our trademark classifications would have to change when they came up for renewal in December 2020 and February 2021, respectively. For both trademarks, we filed a section 7 amendment to revise goods (under class 9) to services based on the evolution of technology, specifically SAAS (software as a service). We then filed for renewal of sections 8 and 15 based on the section 7 amendment being accepted. These applications were successful, and both trademark registrations are now on the USPTO Principal Register.
4. Feb 26 – Mar 7, 2021 Olin Candidates Week participant, **Academic Chats** (March 1). **ESA class visit for candidates**, with Chris Lee (March 2). Presenter, **Wired Ensemble** (March 2). Presenter, **Olin Conductorless Orchestra**, with OCO Navigators Caitlin Coffey and Jack Mao (March 4).
5. April 20, 2021. Presentation on “Engineering Systems Analysis: A Multidisciplinary Approach to Mid-Level Engineering Courses”, with Prof. Christopher Lee, as part of “Inside Olin: Perspectives on Student-Centered Teaching and Learning”, the series of developmental online sessions offered to faculty at other institutions by the Olin College Collaboratory.

1. As part of the Spring 2021 AHS Capstone course, I provided weekly feedback to **Alex Bahner** as he created five songs for his hip hop album (*Lanes*).
2. June 1 – June 11: Virtual Summer Institute, Olin College. I served as a design coach with Prof. Lynn Andrea Stein to (1) assist the design of a new department within the Faculty of Engineering at the University of Ottawa that’ll bring together Engineering Design, Teaching, Innovation, and Entrepreneurship; and (2) assist with implementing a project-based teaching method for a University of Tsukuba branch campus in Malaysia.
3. August 31: participated in “Good Morning Olin”, an in-person orientation ‘talk show’ for incoming first years.
4. October 18: participated in Admissions “Mix and Mingle Fly-in Program” for prospective students.
5. October 27, 29: participated in Olin’s Faculty Search party for prospective faculty members on Gather.Town. Participated in the faculty video for prospective faculty.
6. During Fall 2021, I signed on for five passionate pursuits in music, of which 3 were completed. Provided feedback to students on two of them: Studying the Voice (Richard Gao) and Pennywhistle Design (Benji Pugh).
7. January – December 2021. Member, Reappointment and Promotion Committee.
8. **Music Program Director Activities/Responsibilities during covid**

* Preparing music program information sessions for first year students.
* Individual counseling for first year musicians, regarding auditions, music lessons, etc.
* Jam room coordination with students.
* Maintenance of East Hall Steinway A.
* Attendance at music events featuring students and alumni, as well as those featuring staff and faculty, including FWOP plays and musicals. (preCovid)
* Other responsibilities include:
  1. Providing orchestration, composition, theory, and performance skills to support all facets of the program
  2. Helping students find ‘good fit’ private teachers for their particular instruments
  3. Producing musical opportunities for students to create and perform
  4. Preparing / rehearsing concerts for Olin events (Family Weekend, Fall and Spring Olin Expositions, Candidates Week, etc.)
  5. Bringing in external coaches to provide additional feedback to students
  6. Maintaining all Olin-owned instruments, e.g., timpani and percussion
  7. Protecting Olin-owned instruments against theft. Sadly, triangles ($500), 4 tom-toms ($1000), 2 timbales ($500), and bongos ($150) disappeared during the 18 months we were virtual.
  8. Evaluating/coordinating all tunings and repairs of the AC 305 Steinway B, Yamaha AC 318 upright, MH Steinway B, and East Hall Steinway A
  9. Periodically checking Steinway A so it stays in good shape (requested by Olin’s piano tuner/technician)
  10. In tandem with marketing and student input, coordinating action photos of Olin musicians in performance and rehearsal
  11. Working to ensure the music program continues to grow, thrive, improve

1. **Explanatory notes for the OCO re-orchestrations (arrangements of symphonic works).** In creating these re-orchestrations, I strive to make OCO sound as full and varied as possible, with a wide dynamic range, different colorations, strategic doublings, and effective solos/duets. Yet constraints exist, e.g., the comfort ranges of the OCO musicians. Though one could be tempted to just substitute one instrument for another, this isn’t an option for many reasons, some of which conflict with others:

* Instrumental, sectional (strings, winds, brass, percussion), and orchestral voice leading.
* Contrapuntal and harmonic intent of the composer.
* Non-traditional instrumentation, i.e., instruments typically not found in an orchestra such as piano and saxophones.
* Non-standard ratios of strings to winds and brass.
* Reduction from 90+ player orchestrations to 12-22 player arrangements (e.g., the 22 wind/brass instruments required for the Berlioz “Marche Hongroise” vs. the 8 that were available in OCO), or an increase in forces, as from a wind ensemble to a mixed string/wind/brass/percussion group.
* Balance issues, e.g., non-standard numbers of wind, brass, and strings comprising their respective sections
* Creating the impression of large forces through dynamics, color contrasts, decreasing/increasing texture, among other strategies. OCO typically likes ‘big’ works.
* At the start of each semester, I ask students for their comfortable high and low *forte* notes and high/low *piano* notes. These often dictate what I can and cannot do, resulting in re-orchestrations particular to OCO.
* I try to give each student a good part that speaks to his/her/their strengths, while also challenging weaker aspects of an individual’s playing (provided the student shows a commitment to mastering an earlier part). I also try to give each at least one challenging part so they can ‘rise to the occasion’, hopefully paving the way for additional challenging parts. When material is repeated, I’ll often vary the orchestration with each repetition (e.g., Mozart’s “Wind Serenade in Bb major, K. 361”) or when duets/trios allow, I switch players in and out, thereby distributing parts (e.g., Mozart’s overture to *Così fan tutte*).
* And lastly, something I always try to do: everyone plays at the end of a piece—at least one note!

**Looking Back: Mapping Activities and Accomplishments**

Please see next page …

Diagram

Description automatically generated**Looking Back: Feedback Received**

**Feedback from Colleagues**

**Re-visiting a storytelling writing module for the resumption of Wired Ensemble**. Gillian Epstein continues to have progressive ideas for writing in the AHS Foundation courses. Working together, we changed a significant portion of the AHS Foundation Writing component for Wired Ensemble in 2017 and revived it again with the resumption of Wired in Fall 2021. Wired students appreciated her voice and feedback with respect to their narrative writing on the topic: how has music figured in my life. We included Close Reading and Evidence workshops, as well as a Storytelling Development and Feedback workshops on student draft narratives. I always learn something new during the writing component of Wired, whether it’s reinforcing an earlier concept or prompting a new connection, e.g., between writing compelling music and writing meaningful text.

**External Guests provide feedback to OCO**. Since 2006, I’ve invited 3-4 orchestral musicians in the Boston area to provide external feedback to OCO students each semester. Music benefits from different voices, interpretations, and viewpoints. Students highly value these visits from our external guests. Though I reached out to 6 excellent musicians, only one was able to make an OCO rehearsal in Fall 21. But I anticipate more visits in 2022.

**Piano maintenance feedback**. Whenever Olin’s pianos are tuned by Mark Whitlock, I ask for his assessment on the state of the instruments. He tuned the East Hall Steinway on November 16 and told me that “the room is over-heated and bone dry.”  I wrote to Claire Rodgers about the problem, but she had data showing the temperature was between 71 and 74.5 degrees. In deference to our tuner, I asked one of our Music Program Assistants to put a sign in the room asking that students keep the door open when the room wasn’t in use so the heat he noticed could dissipate. These over-heated conditions damage pianos, wreaking havoc with the wooden mechanical parts; it also causes cracks in the sound board and pin block.

Anticipating the holiday break, I had to return to the over-heating problem in December because a student would no longer be available to check in on the East Hall Steinway. Furthermore, students would be storing instruments in both East Hall practice rooms over the break, so I wrote Claire requesting a decrease in heat in both rooms and a working humidifier in the Steinway room. Claire reported that Olin’s HVAC and controls vendor found a mechanical issue with how the heating valve is opened and closed in the music room, so they fixed that. Facilities also put maintenance of the humidifier on their docket.

We had an over-heating issue in December 2020, and Claire found there was a mechanical failure in temperature regulation for the room. It was fixed and Facilities put a humidifier in the room. That was a great call, especially since no students were allowed in the practice rooms for AY 20-21. But during AY 21-22, the rooms are open for student use. A well-known concern about humidifiers is mold and mildew growth. I asked Claire whether the humidifier in the Steinway room is self-cleaning. It’s not. But as long as it’s cleaned regularly, it should be safe. Facilities has the cleaning instructions.

**CantoVario (a project combining musical variations, chaos science, acoustics, and signal processing)**. Feedback provided by the MIT Venture Mentoring Service (VMS) Advisory team to CantoVario has benefited this project from the start and continues to do so. Additional feedback was provided by student and professional musicians, as well as potential users in the music production space at the Bridge, a Knight-funded incubator for musician-producers in Miami, FL. Regarding a second application of CantoVario’s technology, i.e., a chaos+music exhibit prototype for science museums, we conducted virtual interviews on what does and doesn’t work with professionals who have built these exhibits. These interviews laid the groundwork for CantoVario’s NSF Partnerships for Innovation—Technology Transfer (PFI-TT) product development. Similarly, interviews with student and professional music producers guided PFI-TT product development for the MIDI Variation Engine prototype, including an effective user interface.

**Virtual Team-teaching Engineering Systems Analysis with Chris Lee.** Just as students express how much they learn from their peers, Chris and I brought different perspectives to the table, and those perspectives informed not only us but our students. I continue to enjoy the learning exchange with Chris!

**Feedback from Students**

**The Olin Conductorless Orchestra**. During Spring 21, we carried OCO forward, despite a pandemic and having only 6 instrumentalists (viola, cello, alto sax, trombone, and 2 pianists). I wrestled with how to do this effectively. Finally, I realized that while OCO had always recorded itself as an orchestra, students would benefit from recording themselves in smaller groups, especially duets. Students liked this idea; in fact, feedback on course evals suggested that playing and recording duets should definitely continue in OCO.

During Fall 21, OCO came back! It once again functioned as an in-person, project-based learning course (PBL) where students experientially practice leadership, teamwork, and communication skills week-in and week-out. Students greatly appreciated being able to play together again. They spent anywhere from 3 – 8 hours outside of class practicing their parts, and anywhere from 2 – 20 hours outside of class when OCO’s workload was heaviest. These numbers reveal much about the dedication of the players, yet they also suggest we may have to revisit the 1 AHSE credit given per semester. On the other hand, if a part was too difficult, students let me know, and I’d re-write the part so they could play it confidently. On the CourseEval Faculty Questions, students gave ratings ranging from 4.3 – 4.8/5, excepting Q13 (Connected the course content to other subjects or disciplines, mean = 3.8), which isn’t addressed in the course, unless serendipitously.

**The Wired Ensemble**. Wired Ensemble was last given in Fall 19. Due to covid, it could not run during Fall 2020. It came back in Fall 21! Some students would have liked more theory, and others wanted more time to revise their compositions, including more time to rehearse with their performers. This is the first time the request for more revision time has appeared on a Wired CourseEval. I have an idea how this can be implemented for those who want it in future iterations of the course.

Regarding theory, I can always give more theory and do so in individual sessions, according to a student’s desire for it. In general, there’s always a wide disparity in musical knowledge among Wired students. Still, the theory I do give suits most of them. Interestingly, when the faculty relaxed our syllabi campus-wide in November due to student burnout, I offered the Wired class the option for more theory, or less. They voted for less by a wide margin. But for those who wanted more, I continued with them privately. In short, I’m able to gear the course to the learning goals of most students, while offering those who desire additional knowledge the opportunity to probe further during our individual sessions.

**Engineering Systems Analysis (ESA:Systems) with Chris Lee**

ESA:Systems ran for the first time during Spring 20 as the half-course prelude to either ESA:Signals or ESA:Dynamics. It concluded on March 13, 2020 after which Olin closed its campus due to covid. During Spring 21, Chris Lee and I taught the course for the first time over zoom. I really enjoy teaching ESA and co-teaching with Chris is such a pleasure. On our CourseEvals students made helpful comments that we’re incorporating into our Spring 22 course, e.g., timely grading of homework by the course assistants, as well as grading consistency across problems by the CAs, not to mention timely grading of material by the professors!

Student CourseEvals rated the course quite well: Made connections with other subjects, courses, and disciplines (Mean = 4.2), Helped me think creatively about the subject (Mean = 4.2), Included assignments that contributed effectively to my learning (Mean = 4.4); and Distributed the workload appropriately throughout the semester (Mean = 4.0). The latter metric was a significant improvement over our first iteration when the workload was distributed less evenly.

Moreover, our students rated themselves as Proficient (5.0/7.0) in the Course-specific Questions targeted for Spring 21: Improve quantitative analysis skills (Mean = 5.1), Learn and apply useful analysis tools (Mean = 5.0), and Practice self-directed learning skills (Mean = 5.3).

With respect to my part in the course, standard deviations were highest with Used class time effectively (.82) and Explained material clearly (.80). These averaged out to 3.9 and 3.8, respectively. In any case, I plan to continue working on these two areas, as well as helping students to think creatively about the subject (3.9), something I usually do well on. My other metrics ran from means of 4.0 to 4.5, with a 4.3 mean for “Overall, was an effective teacher” (21 Agree and 7 Strongly Agree with a standard deviation of .43).

**ESA: Signals.** I always love teaching Signals, and Spring 21 followed suit! On CourseEvals, the course did well with making connections with other subjects/courses/disciplines (4.5 mean), helping students to think creatively about the subject (4.0 mean), providing assignments that contributed effectively to their learning (4.2 mean), and distributing the workload appropriately throughout the semester (4.4 mean).

Outside of class, students spent 3 – 9 hours on Signals during a typical week, and 4 – 12 hours during the week when its workload was heaviest.

Because Signals ran via Zoom, I was able to record each class so students could go back into a presentation to review any concepts. I also posted my slides ahead of time on Canvas to help students follow along with their own copies.

Students rated themselves as Proficient on the Course-specific Questions: mean = 5.0/7.0 on Represent physical systems mathematically in both time and frequency domains, as well as Apply fundamental signals/systems techniques to inform final project; mean = 5.2/7.0 on Practice using quantitative analysis to support the engineering design process.

I based the Spring 21 Signals on what I presented virtually during Spring 2020. But the students wanted less lecture and more time in breakout rooms, contrary to the 2020 version of the course. They let me know midway through and I adjusted the delivery. With respect to my faculty metrics, the standard deviations were highest with Used class time effectively (.89) and Explained material clearly (.79). These produced means of 3.5 and 3.9, respectively. I’ll continue working on these areas for the Spring 22 iteration of the course. But I was surprised when “Gave useful feedback on my work” had a mean of 3.9 (with a standard deviation of .70). It was a surprise since I knew the material well and gave significant help in office hours and in breakout rooms.

My other Faculty metrics were higher: 4.4 on Helped me think creatively about the subject, 4.5 for Connected the course content to other subjects or disciplines, 4.3 (Was available for help outside of class), 4.3 (Treated students fairly), 4.4 (Responded effectively to feedback from the class), 4.3 (Responded effectively to feedback from individual students, and 4.2 (Overall, was an effective teacher).

**Reflection**

Preparing for live music again at Olin turned out to be an odyssey. I met with Claire Rodgers on July 1; we walked the music rooms and discussed ventilation.  She later sent me air flow information.  Then I met with Seth Hodge on July 20 to discuss best practices/protocol for music practice, rehearsals, and performances.  He wrote to Beth Grampetro that afternoon inquiring about best practices for moving forward with orchestra, including ppe for musicians and instruments, but didn’t hear back.

So I thought we’d definitely hear something at the August 4 community meeting on covid preparations.  When that didn’t happen, I wrote Jeremy directly the same day, explaining what would occur in Wired Ensemble and OCO during fall semester, as well as asking for guidance on rules and expectations for live music-making.  He was about to go on vacation but referred my email to OlinAhead, scheduled to meet August 10.

In the meantime, I met with a wonderful colleague in the Tufts Music Dept on Aug 8.  He told me that the Tufts Music Dept worked closely with Tufts Medical School to acquire effective ppe for musicians.  Tufts had already ordered and secured vocal masks, wind/brass instrument bags, wind/brass bell covers, and wind/brass face masks for players.

He referred me to the Tufts administrator who gave us the complete list of manufacturers and vendors so we could order these items as well.  But she warned me that time was critical because of the sheer number of K5-12 and college/university music programs all ramping up for in-person teaching and playing. Thankfully, Barb Luciano took charge, placed all the orders, and we received the special musicians ppe two days before OCO auditions. In fact, Barb personally delivered a missing ppe package to me in MAC 305, not only surprising me but eliminating any need to track it down. She has been wonderful to work with!

For the first time in five years, OCO had a number of students auditioning: 16, nine of whom ultimately passed. But all 16 needed places to practice for their auditions—places that were covid safe, especially since ppe hadn’t arrived yet. So Alisha Sieminski and I worked out a solution to enable safe practicing over the long Labor Day weekend.

Scheduling the auditions turned out to be more involved, i.e., reserving 5 rooms, then timing warmup and audition slots in coordination with Olin’s air exchanges in the MAC so that enough time elapsed between wind/brass players and other players. It was like solving a giant puzzle! All told, the first 10 days of September were consumed with covid-related preparations for both OCO and Wired to the tune of 60+ hours, and the following week involved another 50. So many details to attend to. It felt like building a music program from scratch again. A ton of work, but ultimately worth it!

Wired was great this year. Many stories linger about this fall semester but one in particular presented me with a time-sensitive challenge. Two days before the Wired Ensemble Event performance at Expo, a student asked for additional help on their composition. Sadly, they didn’t like their piece and didn’t know what to do about it. Furthermore, it was clear the student was tired and exhausted. There was no energy left. So starting fresh again with a new piece was out of the question. Somehow we had to take advantage of the current piece, despite great dissatisfaction with it. I kept asking myself inside: How to take a dense, thickly-written piece and make it sound good? Perhaps more importantly, how to re-engage the student with this piece that was no longer liked? I felt a lot of pressure, not having an immediate solution that would breathe life again into the process. Then suddenly the solution hit me: we could completely alter the texture, first starting with the prime melody, then gradually bringing in the other instruments one-by-one till the climax, after which the instruments could be decreased one-by-one to the end. I went through the piece, showing how it could be done. The student perked up, even got a little excited. Yes, that would work, and it did!

OCO also presented me with an unexpected challenge, due to a player’s assurances over many weeks that their part was making progress. I’ll let the student tell the story, as recounted in CourseEval comments:

Two weeks before our first performance, I emailed her explaining that I had learned only 10% of the piece we were supposed to perform and that there was no way I would be able to complete it on time. She asked me to meet with her, and in the meeting, while she was understandably disappointed that I hadn’t let her know about this earlier, she did not berate me. Instead, she spent two hours rewriting my entire part and re-printing the score, so that it was easier for me and manageable to learn. I was able to learn my part well and perform it, and the experience made me feel very fulfilled and valued. In rehearsals, I feel that Diana plays a good balance between letting us lead the orchestra and providing feedback, and she is very patient with us. I appreciate the focus on constructive growth that Diana has shown towards me.

CantoVario made a lot of strides during 2021. We generated design ideas for our science museum Chaos+Music Exhibit prototype, e.g., a reactive sculpture where motion tracking allows people walking through a museum to alter a famous piece, a magnetic pole with people moving the system, physical positioning to get initial conditions, continuous variations, and motion capture. We also identified constraints: size of exhibit footprint, sound isolation, cost, covid cleaning protocols, and motion capture expense. But by March 4, we still hadn’t nailed down a design. So I said to the student on the project: for our March 11 meeting, you come up with a final design, and I’ll come up with a final design. Then we’ll decide. March 11 arrived and I’d had no time that week to come up with a design, but knew I couldn’t show up empty-handed. What I did have, though, was an hour. During that time I closed my eyes, sat quietly with pencil and paper, and something started to happen. I sketched it all out, brought it to our meeting. Turns out he had had a hectic week too and apologized for not having anything. Not to worry, I said. We discussed the design, he suggested infrared trip wires instead of motion capture to register user gestures, and we were all set! We built a demo video showing how the exhibit prototype would work. When I presented it to my mentors at MIT, they latched onto it, even suggesting I show the video whenever trying to explain what CantoVario does.

Two other students prepared a Framer prototype of the CantoVario MIDI Variation Engine. We devised UX questions for musician-producers, added a MIDI preview and variation selector, implemented live audio previewing, and decided on a minimal feature set as an initial hypothesis. Then I interviewed/observed producers working with successive Framer prototypes (weekly), incorporating their feedback into the next iteration of the prototype, e.g., implement A/B comparison options, “favoriting” of variations, toggling between “all variations” and only “favorites”.

However, Framer turned out to be a bear of an app to work with. So I took what we had learned and hired a student over the summer to implement a working prototype. When Olin’s summer research period ended, we had just barely finished the working prototype, but there was no time to rigorously test it. Due to the aforementioned time constraints that consumed September, I wasn’t able to run validation experiments till October. Then I discovered that the algorithms weren’t being implemented correctly so I’m now in the process of fixing that.

Finally, I thought I’d go to NYC to meet a pianist friend and catch-up on December 11-13—something we had both been eagerly anticipating—but the more I thought about what would occur December 14 – 17, i.e., preparing and conducting three 3-hour rehearsals, two dress rehearsals, and 2 concerts, the more I questioned whether this was a good idea. We ended up postponing the trip and I’m glad we did! Everything went longer than expected, with unexpected details surfacing each day, e.g., Wired Ensemble students wanting to rehearse in MH Mezz from 8 – 11pm the night before Expo. That showed great initiative on their part. And Jeremy Goodman said yes!

**Looking Ahead: Goals and possible activities for the coming year**

**What are your personal goals for the coming year, and longer term?**

1. Work with Chris Lee to make ESA:Systems an effective in-person experience
2. Produce an ESA:Signals course that’ll now run in-person
3. Find funding for more performing opportunities for OCO outside of Olin so we can announce these to prospective students
4. Move forward with CantoVario’s R&D plan
5. Compose another concert of “Variations and Shadows”, i.e., a “variation concert” piece
6. Implement the expanded song base for CantoVario Mashup

**What do you see as important Olin goals that you can contribute to over the next year, and beyond?**

Contributions to Olin’s leadership in the educational space:

1. ESA workshops in conjunction with the Collaboratory and Summer Institute
2. Participate as a Design Coach during the Summer Institute
3. Export the conductorless orchestra model to other engineering schools
4. Support Olin’s transformational mission

**Given these goals, identify activities that you *might* pursue in the coming year.**

* Cultivate ongoing appreciation for, and admittance of, good musicians
* Continued work in the pedagogical ESA and Signals & Systems space
* Work with students talented in music and engineering to help them realize their goals
* Contribute to a vibrant Olin community culture that fosters growth, openness, creativity, and ‘doing good’

**What does Olin need from you?**

1. Creativity and resourcefulness for internal and external projects that help develop students, build the college, and achieve impact
2. Continued work and involvement with electrical engineering courses
3. Continued work and involvement with music composition and performance courses, as well as AHS Capstones and Independent Studies in Music
4. Continued work and involvement with AHS Foundation courses
5. Continued work and involvement with developing the Music Program at Olin

**What do you need from Olin?**

* Ongoing help with attracting and admitting musicians to build up OCO and other music performing groups on campus, e.g., the Olin Jazz Orchestra, the Olin Rock Orchestra, PowerChords
* Summer support for an Olin student would be helpful.

Thank you!