

WORCESTER POLYTECHNIC INSTITUTE
October 1, 2020

To: The WPI Faculty
From: Tanja Dominko
Secretary of the Faculty

The second Faculty meeting of the 2020-2021 academic year will be held on **Thursday, October 1st, 2020 at 3:15 pm via ZOOM.**

1. Call to Order
 - Approval of the Agenda
 - Approval of the Consent Agenda and the Minutes from 8-27-20
2. Secretary of the Faculty Welcome
3. President's Welcome
4. Provost's Welcome
5. Committee Business
 - Committee on Governance**
 - Motion that all remaining Faculty governance committee elections held over from the spring 2020 be conducted electronically.
6. **Committee Reports: COG**
7. **Other Reports: Upcoming NECHE accreditation**
8. New Business
9. Closing Announcements
10. Adjournment

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WORCESTER POLYTECHNIC INSTITUTE
Faculty Meeting Minutes
August 27, 2020

Summary:

1. Call to Order
 - Approval of Agenda
 - Approval of the Consent Agenda and Minutes from May 7, 2020
 - Approval of the Consent Agenda and Minutes from May 21, 2020
2. SoF Welcome
3. President's Welcome
4. Provost's Welcome
5. Committee Business: CAO, CGSR, COG, COG, CAP, COG/CAP/CGSR/CTAF
6. Committee Reports: COG, CAP, CGSR, CTAF
7. Faculty Introductions
8. Closing Announcements
9. Adjournment

Detail:

1. Call to Order

The first Faculty meeting of the 2020-2021 academic year was called to order at 3:15pm via ZOOM by **Prof. Dominko** (BBT).

Approval of the Agenda

Amended agenda was approved.

Approval of Consent Agenda and Minutes of May 7, 2020

The agenda and consent agenda (including the minutes from the May 7, 2020 Faculty meeting) were approved.

Approval of Consent Agenda and Minutes of May 21, 2020

The agenda and consent agenda (including the minutes from the May 21, 2020 Special Faculty meeting) were approved.

2. Secretary of the Faculty Welcome

Secretary of the Faculty Dominko started the meeting by reminding everyone that the meeting was being recorded for the purpose of these minutes. She mentioned that she had distributed an amended agenda that added a motion that CAP was working on before the academic year started. The first amendment is the motion by CAP to adopt an overloading policy and the second amendment on the agenda is reviewing the addition of committee reports on the status of COVID-related motions that were approved last year. These motions expire at beginning of A-term.

Prof. Dominko welcomed all the new faculty colleagues and invited everyone to do the same. She briefly reviewed the process of faculty governance and encouraged all to consult the Faculty Handbook for details. Prof. Dominko explained that meetings are guided by Robert's

Rules of Order and Prof. Hanlan serves as the Parliamentarian. When ZOOM is being used for the meetings, the yes and no features are used on every motion that is up for a vote. If in future meetings there is call for a secret ballot, a polling feature will be used. Prof. Dominko mentioned that every faculty member has the right to request a secret ballot for any motion and that request will be honored.

Prof. Dominko summarized faculty activities over the summer. Colleagues in the Civil and Environment Engineering, Mechanical Engineering, and Fire Protection departments all worked to evaluate our indoor space air quality and air movement. They worked with Facilities and VP Eric Beattie to develop recommendations on how to make sure that we can make our indoor spaces the least risky for virus transmission. Prof. Dominko thanked everyone who participated with their contributions to the final recommendations.

Next, she described a faculty effort to establish our own in-house capability for COVID testing. The effort is in planning stages.

Prof. Dominko also mentioned that the Foisie Innovation Studio has mobilized their 3D printing capabilities and printed face shields for all faculty and teaching staff that will be teaching on campus this fall.

3. President's Welcome

President Leshin welcomed everyone back to the most unusual year in the more than 150-year history of this great institution. She thanked everyone for preparing WPI for this school year. President Leshin was confident in our layered approach to health and safety because of the comprehensive testing program. Many other institutions are not doing what we are doing at WPI. She also talked about how fortunate we are to be in the Commonwealth where we have been able to make arrangements to do testing at the required scale. She highlighted other associated activities, namely contact tracing, isolation, quarantine, symptom monitoring, distancing, face coverings and cleaning/disinfecting. President Leshin asked that anyone returning to campus complete the training and paperwork that allows them to get tested. President Leshin reminded everyone to check in with their grad students to follow the testing program.

She then mentioned that every part of our physical infrastructure and the way we are conducting in-person activities has changed, so things will look very different. Facilities has worked hard getting everything ready and has made every change recommended by outside experts - from increasing air flows to upgrading filter systems. President Leshin is very impressed with the amount of work being done to get the campus ready for the students, who want to be here. They are thankful for the opportunity to come back and be able to show that they can get this done with us and do it well. They are holding each other more accountable than you would ever hope. She thanked the CERT team for making this happen and thanked the faculty for the preparations that they have done. President Leshin stated that they is very impressed with all of the hard work that has been conducted by faculty over the summer. She offered a special thanks to the Department Heads, as well as the Deans and the Provost.

She stated that Robert Goddard would be very proud. She wanted to take a moment for us to remember that we are doing this because we believe in our mission and we have spent generations building this place around the idea of hands on learning of theory and practice. We know that how we teach and train the next generation of STEM leaders matters, which is why we are not going to give up. We will continue to deliver a WPI education that is powerful and impactful for our students to be able to advance the research agenda of this institution, which is ever growing and ever diversifying. President Leshin stated that we will be watching COVID data very closely and we will be ready to pivot if necessary.

She welcomed everyone that is new to our community and congratulated them for joining this very special community. President Leshin believes that we care deeply about our students, about one another, and about faculty success at WPI. She expressed her appreciation for all the faculty for approaching the challenges ahead with a typical WPI curiosity and creativity. We will need this collaboration in all the work we have ahead of us this year.

We have work to do to increase equity and racial justice at WPI as well as work to do on our future strategic plan and financial plan for the future. We also need to ensure that our TRT colleagues, teaching and research track faculty, have better job security and can fully participate in our governance system. Along with this, our research program is growing and there are opportunities to advance our mission to increase our impact in the world. President Leshin stated that she has great confidence in our ability to do all these things together and requested positive and productive partnership from the faculty.

She thanked Faculty Governance, specifically the members of FAP, for meeting this summer as well as COG for the work they are doing with the Provost. President Leshin said that the next couple of weeks are going to be stressful, so she asked to approach this with empathy and kindness as well as respect for one another, staff, colleagues, and students. She concluded by wishing everyone a happy new school year.

4. Provost's Report

Provost Soboyejo extended his appreciation to the faculty for the tremendous effort that was made over the summer. He mentioned that as he walked through the campus yesterday, he appreciated seeing the students on campus, meeting a few colleagues, and just seeing the incredible effort that has prepared us for A-term. The committees remained active, and collaborations solved problems and eliminated all the obstacles. He is delighted to be a part of this community especially at this time. He stated that we are lucky to have all of the committed staff and faculty that make this place a truly special place. Provost Soboyejo also thanked President Leshin for her leadership. This moment has been taken as an opportunity rather than a challenge due to the innovative nature of WPI. He thanked all of the faculty for the different kinds of ways in which they are innovating to make education first class.

Provost Soboyejo also thanked them for their commitment to openness and making sure that he listens. He finds that when he listens and works in a team, things work out better. He hopes that we continue this culture of listening to each other with respect as well as having this attitude of flexibility and concern for each other's well-being.

As we look into the year ahead, we see this as a great opportunity to build on the strengths of WPI. As President Leshin stated, we are going to work with Prof. Richman, Prof. Dominko, Prof. Boudreau, COG, and all of Faculty Governance to really help establish better and more secure positions for our TRT faculty. We will work to ensure this effort has a full support of administration and the board.

We are also going to take on the issues of racial justice as a community. In the era in which we find ourselves, there are ideas that are coming from the faculty on how we can own this as a community and make this another example for WPI.

Provost Soboyejo mentioned that he has lived on university campuses most of his life and the thing that he loves about it is the richness of dialogue of exchange. The young people that keep everyone young, the faculty colleagues who think outside of the box, and the fact that we are a caring community. Provost Soboyejo stated that it gives him great pride and privilege to be a part of a place that not only thinks about academics, but that thinks about the well-being of the community. He stated that he looks forward to working with everyone in the WPI community as we all come together to overcome the challenges that lie ahead and make this the very best university in the heart of New England.

5. Committee Business

CAO

Prof. Mathisen (CEE) presented the graduation list on behalf of the Committee on Academic Operations (CAO). He moved that pending the final verification by the Registrar that all those in this list have in fact completed their degree requirements, they be approved for the September 2020 graduation. **Registrar Miles** added Jessica Maria Marquez to the list in the Biochemistry section.

The motion passed.

CGSR

Prof. Walker (CEE) moved on behalf of the Committee on Graduate Studies and Research (CGSR). He moved that, pending final verification by the Registrar that all those on this list have in fact completed their degree requirements, they be approved for September 2020 graduation.

The motion passed.

COG

Prof. Boudreau (HUA) moved on behalf of the Committee on Governance (COG) to continue conducting faculty meetings remotely, including synchronous remote voting, through the first faculty meeting of C term 2021.

The motion passed.

COG

Prof. Boudreau moved on behalf of COG that if a faculty meeting cannot be convened in a timely manner, for any reason, all the elected members of faculty governance committees will have the power to vote on critical time sensitive issues with a quorum of at least 25%. These issues would be revisited by the faculty at the earliest possible convenience. This didn't get used previously, but it is an important mechanism so that faculty involvement in important academic issues can continue uninterrupted.

The motion passed.

Prof. Dominko motioned to suspend the rules in order to discuss the CAP motion that was made part of the amended agenda. This motion was seconded by Prof. Boudreau. Parliamentarian Prof. Hanlan confirmed that this is not a debatable motion.

The motion passed.

CAP

Prof. Heineman (CS), for the Committee on Academic Policy (CAP), moved that we change the overall policy that students be allowed to overload in A Term without prior advisor approval. The Registrar will email all faculty advisors a list of the students who have chosen to overload. The only students that would continue to require advisor approval would be first year students, students involved in a full-term IQP/MQP, and any student involved with ID 2050. This motion is due to the 800 overload requests that the Registrar had to handle in the first couple of days in D-term. Prof. Heineman stated that the point of this motion is to allow students to register for courses since this is the only way they can see the material. This technically places them in an overload situation. These students essentially look like they are taking four classes, then settle on the three they would like to take. We wanted to make sure that we didn't affect the students that would be in danger of overloading without advisor approval, which is why this motion is being brought on such short notice.

The motion passed.

Prof. Dominko thanked Prof. Heineman and CAP for developing the motion over the summer.

Committee Reports – review of the status of eleven COVID-related motions adopted in D-term 2020

COG

Prof. Boudreau first thanked the faculty for extending two COG motions adopted in D-term 2020. These were to allow remote voting at faculty meetings and allowing elected faculty members to vote on issues if a meeting of the entire faculty cannot be called. The third motion that she mentioned was extending the end of the academic year to save money on salaries. Provost Soboyejo rejected this idea. The fourth motion is on the suspension of faculty committee elections. Faculty members have been asked to stay on these committees for the time being. Prof. Boudreau added that next month there will be a motion on electronic

balloting. The intent is to run these faculty governance elections electronically. She urged faculty members to consider putting their names on the ballots for these committees.

CAP

Prof. Heineman mentioned that CAP is a wonderful committee to serve on and he appreciates everyone that takes a chance to put their names on the list. AT the beginning of D-term, we were faced with some incredible stress and we quickly moved to try to reduce this stress for the students. We passed a motion on grading (Pass or NR) to allow the students to work without worrying too much about the impact on their GPA for future job prospects. Three motions involved coursework and the projects, along with being extended into the summer. The last motion changed availability of course evaluations to administrators. As much as we thought it might be interesting to get feedback from the students on how well it went, we didn't want D-term evaluations to become part of a faculty record. This motion states that any online course reports will be sent only to the faculty member teaching that course. It is their choice if they would like to share it. At this point we are not forwarding any of these motions for extension to A term or fall term.

CGSR

Prof. Walker added that CGSR forwarded two motions related to COVID consistent with the CAP motions for undergraduates. Graduate students had the option to receive a pass or no credit grade for graduate courses for D term and also for the summer. We are undecided at this time if this is going to continue to the fall. We are keeping it on our radar as the situation changes. At this point we are not forwarding any of these motions for extension to A term or fall term.

CTAF

Prof. Doyle (SSPS) spoke for the Committee on Tenure and Academic Freedom (CTAF). He mentioned that in April we passed the motion to stop the tenure clock for tenure-track faculty for one year due to the pandemic. There is an option to opt-out if a faculty member so chooses. Faculty formerly scheduled to go for tenure review this year had to make their choice and there are cases that are proceeding. Faculty scheduled for tenure review next year have until May of next year to decide. Accepting a year extension is the default, and if a candidate decides to opt-out then he/she needs to notify the Provost and his/her Department Head by May of next year. If anyone has questions, Prof. Doyle urged them to contact their departmental tenure committee or reach out to himself and other members of CTAF.

6. Faculty Introductions

Dean McNeill (School of Engineering) introduced Department heads in turn:

Department Head Gatsonis (AE) introduced Prof. Yuan.

Associate Department Head Ludwig (ECE) introduced Prof. Ganji, Prof. Shaheen and Prof. Uzunovic.

Department Head Yagoobi (ME) introduced Prof. Gnanaskandan.

Department Head Xiao (RBE) introduced Prof. Nemitz.

Dean Taylor (Business School) then introduced Department Head Strong, who is the new department head of the Management Department.

Department Head Strong (FBS) introduced Prof. Rashidi.

Dean King (School of Arts and Sciences) introduced Department Heads in turn:

Department Head Moncrief (HUA) introduced Prof. Riddick, Prof. Colvin, and Prof. Lutch.

Department Head Capogna (MA) introduced three new assistant professors in the department: Prof. Bonardi, Prof. Peng and Prof. Sales.

Department Head Krueger (SSPS) stated that he is happy about the opportunity to be department head of SSPS. He appreciates the confidence everyone has in him and he is working to cultivate the department as well. He started by mentioning that Prof. Skorinko was just named the inaugural director of the newly expanded psychological and cognitive sciences program. This newest major program in arts and sciences reflects Prof. Skorinko's outstanding efforts as the director of the psychology program, which has over 75 majors and minors.

Then Prof. Krueger introduced Prof. Brown and Prof. Shaw.

Department Head Petkie (PH) welcomed all of the new faculty. He then introduced Prof. Trubko.

7. Closing Announcements

There were no closing announcements.

8. Adjournment

Meeting was adjourned at 4:50pm by **Prof. Dominko**.

Respectfully submitted,
Tanja Dominko
Secretary of the Faculty

CONSENT AGENDA

CGSR Interdisciplinary Master's in Music Technology

Date: October 1, 2020
To: WPI Faculty
From: The Committee on Graduate Studies and Research (Prof. Walker, Chair)
Re: Motion to approve Interdisciplinary Master's Degree in Music Technology

Proposal for an Interdisciplinary Master's Degree in Music Technology

Prospective Student: Rebecca Callaway

TITLE OF PROPOSAL:

Creating Technology for Music Performance and Education

SPONSORING DEPARTMENTS:

Music (Humanities and Arts), Robotics Engineering, Electrical & Computer Engineering

BRIEF DESCRIPTION:

My studies will focus on the development and implementation of new technologies that facilitate musicianship and music learning, as well as examining the role of technologies that allow non-musicians to acquire basic musicianship skills. The field of music technology has a longstanding tradition of being interdisciplinary and I intend to draw from a few disciplines at WPI: Music/Music Technology (Humanities and Arts), Robotics Engineering, Electrical & Computer Engineering, and Mechanical Engineering. I am interested in the intersection of these various fields toward developing novel and open-source projects that facilitate music composition, performance, and education in populations that are known to be underserved (special needs, adult, low-income learners, etc.) by traditionally music education efforts. Specifically, I am focused on the development of low-cost instruments, audio effects processes (embedded systems), and multimedia and immersive technology that could help reach these populations in field-transformative ways. My prior experiences as an undergraduate studying music, engineering, and physics have provided me with the skills to pursue these goals in some capacity and, I feel, the unique interdisciplinary aspects of WPI, this degree track I've proposed, and the faculty members I've identified as advisors will help me reach the research goals I've described as well as uncover new areas of exploration for the future.

JUSTIFICATION:

I first came to learn about WPI through my research in music technology. I've found myself referencing several books authored by professors of the school and have since come to learn about the university's value and embrace of interdisciplinary research; an interdisciplinary master's degree like this was what I was looking for in a graduate program. With the opportunity to pursue advanced studies at this institution, I believe I will be able to

hone my abilities as a music technology engineer.

For almost two decades I have been pursuing my passion for music. Beginning with percussion, I have acquired proficiency with a variety of musical instruments including alto saxophone, viola, piano, and harp. In addition to actively performing with various established artists, I have also conducted research in the convergence of music and technology and, specifically, in novel technology-based musical instruments.

While attending University of Mary Washington, a liberal arts university, I explored my interdisciplinary interests in music, electronics, and physics. Recently, through the support of a research grant, I acquired an old, damaged concert grand harp, which outfitted with 650 nm laser diodes, light-dependent-resistors, and a multi-input microcontroller to create a unique laser harp. Through the development process, I identified approaches of adapting other instruments with similar components; in this regard, a substantial number of damaged stringed instruments could be salvaged, repurposed, and given to populations that don't have access to musical instruments.

A related research interest involves the role of electronics in shaping the sound of this and other technology-based instruments. The microcontroller in my laser harp converts performance data into a stream of numbers (MIDI) that leverages software-based synthesizer technology to shape the sound of the instrument, and allows the data to be recorded and notated. Currently, I am exploring the implementation of electromagnets in an effort to produce a more string-like timbre similar to the remains. This will give the performer greater control and flexibility over the dynamics of the performance as well as the instrument's timbre.

Expanding on my Laser Harp research, I am interested in the various roles of electronics and other technologies in creating adapted musical instruments using low-cost and sustainable materials; such instruments, and the system used in the harp could be attributed into any stringed instrument. This process could save school districts thousands of dollars and could help expand music programs across the country especially in lower income areas where musical education opportunities are scarce.

The proposed courses of study that I've developed with my potential advisors involves an overarching exploration of the specific needs of performers and music educators and the ways that new or adapted musical instruments can be used to facilitate musicianship in novel ways. This focus includes the design of microcontrollers, signal processors, transducers, and an array of other electronic components that could be used to adapt musical instruments. I also propose to explore the role of sustainable materials in the instrument-making process, and, the ways that non-biodegradable materials could be minimized in landfills and used to make low-cost musical instruments.

I believe at WPI I could contribute to the development of new instruments and user interfaces that innovates music technology around the globe. My research goals and interests seem to be a good fit for the faculty advisors I've identified and general essence of WPI as I've come to understand it. With this support, I will be able to focus my goals and interests toward new paths in music technology.

CLEARANCES:



Professor V.J.

Manzo
Department of Humanities &
Arts Associate Professor of
Music
Affiliated Interactive Media and Game Design
Principal Academic Advisor



Professor Scott

D. Barton
Department of Humanities & Arts
Associate Professor of Music and Robotics
Engineering Co-Academic Advisor



Professor

Frederick Bianchi
Department of Humanities &
Arts Professor of Music

Of special note: Rick Brown, Department Head of Engineering, though not an advisor, has expressed his general support of this proposal on behalf of the ECE department. Kathryn Moncrief, Department Head of Humanities and Arts, has also expressed her general support of this proposal.

STATEMENT FOR THE PROGRAMS OF STUDY:

For completion of this graduate degree in Musical Technology Engineering, a minimum of 30 credits of graduate level coursework, distributed between Humanities and Arts with a music focus, Robotics Engineering, Electrical & Computer Engineering, Mechanical Engineering with a year-long graduate capstone project, are required. The capstone project counts for six credits overall.

PROPOSED COURSES OF STUDY:

See Revised Addenda (July 27th, 2020)

Semester 1 - Fall 2020

ECE 4703 (2 Credits)

MU 3616. Topics in Interactive Programming (2 Credits)

ISP 5xx with Professor Barton on Musical Robotics (3 Credits)

Semester 2 - Spring 2021

ECE 503 (3 Credits)

ISP 5xx with Professor Manzo on Interactive Music Systems (3 Credits)

Mechanical Engineering Graduate Elective (2 - 3 Credits)

Semester 3 - Fall 2021

ISP5xx with Professor Bianchi on Electronics in Music Composition (3 Credits)

M.S. Thesis Proposal Preparation (3 Credits)

Semester 4 - Spring 2022

M.S. Thesis Research (9 Credits)

Total Credits = 30 - 31

ANALOGOUS PROGRAM:

Music Engineering at Tufts University

This interdisciplinary program follows the path of sound from creation, through propagation, to reception. Through demonstrations, discussion, and interactive projects, students survey the science, engineering, and technology involved in musical instruments and music production. How do acoustic and electronic musical instruments function? How does sound behave in enclosed spaces and why? How does one capture, manipulate and reproduce sound? And how do our ears and brains intervene on the receiving end? Review of the underlying engineering and the basic fabrication of musical instruments, including an introduction to musical acoustics, computer-based simulation tools, laboratory measurement, and manufacturing. The

bulk of the program is dedicated to designing, simulating, building, and testing of an instrument.

Georgia Tech's Masters of Science in Music Technology

The science or engineering aspect of Georgia Tech's Master of Science in Music Technology is fully embedded in the Music curriculum. The objective of this program is to teach students to revolutionize music making, performance, analysis, education, and consumption by being the creators of next-generation music software and hardware.

Acoustics and Technology of Musical Instrument Making at West Saxon University of Applied Sciences, Zwickau (Germany)

The master's degree is aimed at musical instrument makers of all types of instruments, but also at graduates from various technical fields such as media technology, electrical engineering, acoustics, sound engineering or mechanical engineering. It is regarded as a postgraduate course for graduates of the bachelor's degree in musical instrument making as well as for bachelor's graduates of related courses. The course combines training in musical acoustics with modern technologies such as lightweight construction, the use of alternative materials, reverse engineering and the study of the methodology of scientific work. Dealing with business models for small and medium-sized companies complements the offer. In addition to the compulsory modules, the following optional specializations are possible: Public address technology; Special restoration techniques; Historic instrument making and technologies used.

REFERENCES:

Music Engineering at Tufts University

<http://www.tuftl.tufts.edu/musicengineering/>

Georgia Tech's Masters of Science in Music Technology

<https://music.gatech.edu/master-science-music-technology>

Acoustics and Technology of Musical Instrument Making at West Saxon University of Applied Sciences, Zwickau (Germany)

<https://www.fh-zwickau.de/studieninteressenten/studienangebot/akustik-und-technologie-des-musikinstrumentenbaus-master/>

Audio Processing for New Instrument Design Graduate Independent Study Project

Faculty Advisor:

V.J. Manzo Associate Prof. of Music Technology, WPI
Spring 2021

Overview

This independent study project will explore the potential for the design and development of new instruments that consider, as *primary* factors, ergonomics, (size, weight, feel, ease of use, etc.), stability during environmental changes (humidity, temperature, etc.), use of sustainable materials, affordability by the target demographic, manufacturability, learnability, teachability, and more. The *secondary* factors that, by and large, dictate the design and development of musical instruments relate to instrument timbre; instruments made of inorganic materials that prioritize these *primary* factors generally lack resonance of harmonic content, sustain, and other valued timbral aspects.

Research Questions

The guiding questions and hypotheses of this project can be summarized through a series of if/then statements:

- If we understand how to embed audio processing software on specific hardware (the *embedded system*), then we can
 - Integrate controls for that hardware to manipulate the software in known ways
 - Write audio processing software capable of significantly manipulating timbre
- If we are capable of significantly manipulating the timbre of any instrument hosting the *embedded system*, then we can consider the development of new instrument designs based on factors **other than** factors that impact timbre such as ergonomics (size, weight, feel, ease of use), tuning stability, sustainability, affordability, manufacturability, learnability, teachability, and more.

Project Goals

Compare the Owl, Bela, and Daisy Platforms

The goal of this project is to 1) compare the [Rebel Technology Owl Pedal](#), the [Bela Chip](#), and the [Daisy](#) in order to 2) make a recommendation toward which technologies will be suit *our* purposes with regard to a) developing code in Gen through Max, b) embedding the system inside instruments, controllers, and small enclosures, and c) affixing potentiometers, switches, buttons, sensors, and other elements to these circuitboards in order to manipulate parameters in the code. In essence: we're looking to devise a streamlined workflow that others can follow to get embedded systems up and running on hardware with controls in a way that is **easily repeatable**.

Deliverable: The deliverable for this project is 1) a summarizing document comparing all technologies and 2) a recommendation for a particular technology to implement.

Stretch goal: Create a "how-to-build" document guide that explains how to go from unboxing a particular chip to 1) wiring in controls 2) loading software on the chip, 3) accessing hardware controls via software, and 4) other particulars about the process

More information can be obtained here:

[h](#)

https://vjmedia.wpi.edu/Private:Guitar_FX_Pedals#Future_Work:_Compare_the_Owl.2C_Bela.2C_and_Daisy_Platforms

Processing Instrument Timbre to Run on Embedded Systems

The [Fishman Aura](#), the [D-Tar Mama Bear](#), and other commercial audio processors use impulse responses of existing instruments in a process by which an incoming signal is filtered into sounding like the instrument from which the impulse response was obtained.

Goal: The goal of this project is to develop a workflow by which 1) impulse responses are obtained from existing audio sources and 2) those impulse responses are implemented into Gen for use with our [Testing Rig](#).

Stretch goal: Capture an impulse response from an acoustic instrument and manipulate the signal from a piezoelectric source.

More information can be obtained here:

[h](#)

https://vjmedia.wpi.edu/Private:Guitar_FX_Pedals#Future_Work:_Audio_Filtering_Based_on_Impulse_Responses

Broader Educational Aspects and Implementations of this Work

In a One-day Undergraduate Workshop in 2021 or 2022

Create an instructional hands-on activity suitable for undergraduate music technology students that culminates with them building an audio processing pedal using 1) a board (Bela, Daisy, etc.), 2) our Gen/Max Testing Rig, 3) hardware controls, and 4) an enclosure of some sort. The processing could be anything: a delay effect, a chorus process, pitch-to-MIDI filtering, or sensor-mapping to pitch. The activity should include a list of materials needed and an accompanying lesson plan that can be implemented by a music educator.

In a Middleschool Summer Camp in 2021 & 2022

Create an instructional hands-on activity suitable for middleschool kids that culminates with them doing something creative with music to be offered in summer 2021: July 19-23; July 26-30 Activity should include a list of materials needed and an accompanying lesson plan that can be implemented by a music educator.

Considerations for Future Research for the Student

Based on these explorations, a variety of perspective shifts may occur. For future research, we will consider beginning new projects related to (but not limited to) these areas, which could potentially inform your graduate thesis:

- New Instrument or Controller Design
- Instrument Re-Design

- Controls for Timbre
- Transducers
- Sensors
- Materials

Stress-Responsive Polymers in Musical Robotics Graduate Independent Study Project

Faculty Advisor: Scott Barton
Associate Prof. of Music Technology, WPI
Fall 2020

Overview

This independent study will investigate the use of novel stress-responsive polymers in the design and construction of a robotic musical instrument. Advances in polymer chemistry have produced materials that can visually indicate physical stress and structural integrity. Integrating these materials into musical machines can shape the design process to make systems more robust, less wasteful, and more visually engaging. This independent study will experiment with these materials in the design and fabrication of a novel musical robot that dynamically varies the tension of its strings.

Research Questions

The independent study is motivated by the following research questions:

- In what locations and to what extent does physical stress manifest in an instrument as it dynamically varies the tension in its strings to produce different pitches?
- How can these strings be configured on the instrument to distribute this stress both to avoid structural failure and to create visual interest?
- What are the characteristics of the instrument body, polymers, strings and tensioning system that are best suited for this purpose?

Project Goals

- Experiment with and identify the appropriate polymers to use in the tension robot.
- Revise the design of the instrument (e.g. string characteristics, physical form) according to the polymer characteristics.
- Design and implement an autonomous string tuning system.
- A written report that details the experimental methodologies and results of this research.

Multichannel and Immersive Sound Design Graduate Independent Study Project

Faculty Advisor: Frederick Bianchi
Prof. of Music Technology, WPI
Spring 2021

Overview

This independent study project will investigate various processes, methods, and strategies used for creating, capturing, and listening to music through multichannel playback.

Because the topic is broad, the research will include aspects of the following: understanding the spatial characteristics of traditional acoustic music, film scoring for surround sound, mixing and interacting with sound in real time, and composing for multichannel playback.

Research Questions

In our culture, cinema has been the new frontier for the next generation of multichannel sound systems. The new audio formats — among them, Dolby's Atmos, Barco's Auro and DTS' DTS:X

— are the vanguard of the 3D immersive-sound universe. The ISP will address the evolving relationship between 4K and 8K video and the degree to which immersive sound and highly directional audio integrates as the sonic complement to Ultra HD video.

Project Goals

1. To help shape, define, and develop the student's sensibilities for a particularly complex artistic issue of relevance to the fine arts.
2. To produce an enriched environment for learning and discovery through the combination of scholarly study and creative activity.

Deliverables

In addition to any creative work, programming, design documents, etc., the student will produce a final *ISP Research Paper*. This paper is due on the last day of the Term and will be structured in the following manner:

1. Cover/Title Page
2. Abstract
3. Table of Contents
4. Table of Figures
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COMMITTEE BUSINESS

Date: October 1, 2020
To: The WPI Faculty
From: Committee on Governance (Prof. Boudreau, Chair)
Re: Electronic Faculty governance committee elections

Motion: The Committee on Governance recommends, and I move, that all remaining Faculty governance committee elections held over from the spring 2020 be conducted electronically.

Rationale:

When the WPI campus closed down in March 2020 in response to the global coronavirus pandemic, the faculty voted to postpone all remaining elections for faculty governance committees and to extend elected governance committee membership through the end of A term 2020. At the time, the faculty had no reliable way to conduct elections electronically while ensuring both accuracy and confidentiality. As of A term 2020, a reliable Qualtrics-based method developed by WPI faculty now allows for confidential and accurate voting. Electronic voting will allow faculty whose terms should have expired to be replaced with newly-elected members. Upon successful completion of electronic voting in the fall, faculty can consider a motion for permanent electronic voting for faculty government positions.