July 2025

CURRICULUM VITAE

CONTACT

Champ Chadchavats Darabundit

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EDUCATION

McGill University
Montréal, Québec, Canada
2022 - Present
Ph.D. Music Technology

Stanford University
Stanford, California, USA
2020 - 2022
M.A. Music, Science, and Technology

University of Southern California
Los Angeles, California, USA
2015-2020
B.S. Electrical Engineering
B.A. Art and Design

RESEARCH INTEREST

Woodwind acoustics, physical modeling, machine learning, virtual analog, digital filter design

RESEARCH EXPERIENCE

PhD Student
Computational Acoustic Modeling Laboratory
McGill Univeristy
Sept. 2022 - Present
Pursuing doctoral research on musical acoustics and machine learning. Investigating methods to acoustically measure aspect of woodwind playability, improve computational models of woodwind instruments, and apply deep learning to the field of musical acoustics.

Master's Student
Center for Computer Research in Music and Acoustics
Stanford, CA
Sept. 2020 - May. 2022
Worked on filter design and acoustic physical modeling. Developed technique for accurate discretization of analog filters based on conformal mapping. Produced JUCE plugin with efficient acoustic model of a pipe organ using the Faust programming language.

DSP Engineering Consultant
Eventide Inc.
Little Ferry, NJ
Sept. 2019 - Oct. 2020
Digitized A/D and D/A filter chain in vintage digital rack unit. Designed recursive filters using least-squares optimization to fit measured transfer function of unknown ICs. Improved digital filter performance near Nyquist limit and published techniques in engineering brief.

Audio Engineering DSP Intern
Eventide Inc.
Little Ferry, NJ
Jun - Aug. 2018

Analyzed a rare vintage guitar pedal to create a complete virtual model of the effect. Completed model and software implementation within two-month period to produce beta of program. Research and analysis of vintage pedal culminated in an accepted peer-reviewed conference paper and oral presentation.

Undergraduate Lab Intern
Signal Analysis and Interpretations Laboratory
Los Angeles, CA
May – August 2017

Worked under a PhD candidate in the SAIL at USC doing preliminary digital signal processing for psychotherapy research. Solely responsible for assessing sound quality of recorded psychotherapy session using MatLab. Created test cases to test and fine tune existing neural networks.

AWARDS AND HONORS

Vanier Canada Graduate Scholarships (Vanier CGS)
$150,000 CAD, Government of Canada, 2024

Fonds de recherche du Québec - Nature et technologies (FRQNT)
$83,334 CAD, Gouvernement du Québec, 2024 (Declined)

CIRMMT Travel Award
$1,200 CAD (multiple), CIRMMT, May 2023, 2024, 2025

McGill Graduate Travel Award
$800 CAD (multiple), McGill University, May 2025 May 2024, Dec. 2023

Down Under Funder Travel Funding
$1000 USD, Acoustical Society of America, Dec. 1 - Dec. 14 2023

Graduate Excellence Award in Music
$10,000 CAD, McGill University, Sep. 2022 - Apr. 2023

Friends of Music Scholarship
$2,250 USD, Stanford University, Sep. 2021 - May 2022

Denning Family Fellowship for the Arts
$46,436 USD, Stanford University, May 2020

Renaissance Scholarship
University of Southern California, May 2020

Cum Laude
University of Southern California, May 2020

Viterbi School of Engineering Dean's List
University of Southern California, Jan. 2016 - May. 2020

PUBLICATIONS

Journal Articles

C. C. Darabundit and G. Scavone, "Discrete port-Hamiltonian system model of a single-reed woodwind instrument," *Frontiers in Signal Processing*, vol. 5, no. 1519450, 2025.

C. C. Darabundit, J. S. Abel, and D. Berners, "Nyquist band transform: An order preserving transform for bandlimited discretization," *Journal of the Audio Engineering Society*, vol. 70, no. 9, pp. 674–689, Sep. 2022.

Peer-Reviewed Conference Papers

C. C. Darabundit, V. Chatziioannou, and G. Scavone, "Distributed single-reed modeling based on energy quadratization and approximate modal expansion," in *Proceedings of the 28th International Conference on Digital Audio Effects (DAFx25)*, Ancona, Italy, 2025.

C. C. Darabundit, V. Chatziioannou, and G. Scavone, "Mapping woodwind playability using measurement based physical models," in *International Symposium on Musical and Room Acoustics*, New Orleans, U.S.A., 2025.

C. C. Darabundit, J. S. Abel, and W. Woszczyk, "Probabilistic reverberation based on echo density and kurtosis," in *26th International Conference on Digital Audio Effects (DAFx23)*, Copenhagen, Denmark, Sep. 2023.

C. C. Darabundit, D. Roosenburg, and J. O. Smith, "Neural nets tube models for wave digital filters," in *25th International Conference on Digital Audio Effects (DAFx20in22)*, Vienna, Austria, Sep. 2022.

C. C. Darabundit and J. S. Abel, "Conformal maps for the discretization of analog filters near the Nyquist limit," in *24th International Conference on Digital Audio Effects (DAFx20in21)*, Vienna, Austria, Sep. 2021.

C. C. Darabundit, R. Wedelich, and P. Bischoff, "Digital grey box model of the Uni-Vibe effects pedal," in *22nd International Conference on Digital Audio Effects (DAFx-19)*, Birmingham, UK, Sep. 2019.

Peer-Reviewed Abstracts

C. C. Darabundit and G. Scavone, "Acoustic impedance measurement head design and evaluation," in *Joint Meeting 186th Meeting of the Acoustical Society of America/Acoustics Week in Canada*, Ottawa, Canada, May 2024.

C. C. Darabundit and G. Scavone, "Torwards data-driven physical modeling synthesis," in *Acoustics 2023 Sydney*, Sydney, Australia, Dec. 2023.

C. C. Darabundit and M. Rau, "Modeling and correction of piezoelectric string instrument pickups," in *183rd Meeting of the Acoustical Society of America*, Nashville, Tennessee, USA, Dec. 2022.

C. C. Darabundit and J. O. Smith, "Efficient digital waveguide synthesis of a pipe organ," in *181st Meeting of the Acoustical Society of America*, Seattle, Washington, USA, Dec. 2021.

Engineering Briefs

C. C. Darabundit and R. Wedelich, "Generalized digital second order systems beyond Nyquist frequency," Audio Engineering Society, Tech. Rep., 2020.

TEACHING EXPERIENCE

Co-Instructor
MUMT 302
McGill University
Winter 2023, 2024, 2025

MUMT302 New Media Production, is an undergraduate course focused on the technology behind music production tools. Developed new curriculum in iterative process with co-instruments and students. Instructed students on concepts behind production tools using PureData.

Teaching Assistant
MUSIC 320C
Stanford University
Spring 2022

Audio DSP Projects in Faust and C++ is a graduate course focused on developing software projects in C++ and the JUCE plugin framework. Led lab sessions and course lectures. Unblocked students on project and programming assignments.

Teaching Assistant
MUSIC 424
Stanford University
Spring 2022

Signal Processing Techniques for Digital Audio Effects is a graduate course on the DSP theory behind audio effects. Held office hours and helped prepare audio demonstrations in course.

Research Assistant
MUSIC 320C
Stanford University
Winter 2022

Helped to redesign course material, design assignments, and redesign course website.

Teaching Assistant
MUSIC 422
Stanford University
Winter 2022

Perceptual Audio Coding is a graduate course focused on the theory behind perceptual audio coding method such as in MPEG. Led lab course each week and helped students prepare for assignments in Python.

WORK EXPERIENCE

SPG Acoustics Intern
Apple Inc.
Cupertino, CA
Jun. - Sept. 2019

Remote position. Worked in Special Projects Group (SPG) developing new technology using acoustic measurement and machine learning.

DSP Engineering Consultant
Eventide Inc.
Little Ferry, NJ
Sept. 2019 - Oct. 2020

Remote position. Created library code for calculating gain of equalizer filters using C++ templates. Designed API to streamline digital filter implementation. Developed virtual analog model of A/D and D/A of vintage digital rack unit and integrated model into existing products.

Luxury Audio Engineering Intern
Harman International
Northridge, CA
May - Aug. 2019

Responsible for calibration of three anechoic chambers on site. Updated turntables in chambers and designed interface in Altium to communicate with legacy systems over ethernet. Used Klippel software to measure loudspeaker units from oversea manufactures and modified crossovers to match system engineer specifications.

Audio Engineering DSP Intern
Eventide Inc.
Little Ferry, NJ
May 2018 - May 2019

Architected model of a vintage effect pedal. Optimized model to run on Linux ARM Cortex-A9. Designed variable triangle wave generator module to aid model and support other R&D projects. Improved existing spring reverberation algorithm through filter parallelization, resulting in 11-16% increase in efficiency. Ported legacy Motorola 56K Assembly tone deaf decoder software to C++ for use in updated emergency response systems.

PRESENTATIONS

(2024) "Acoustic impedance measurement head design and evaluation," Joint Meeting 186$^{\text{th}}$ Meeting of the Acoustical Society of America/Acoustics Week in Canada, Ottawa, Canada.

(2023) "Torwards data-driven physical modeling synthesis," Acoustics 2023 Syndey, Sydney, Australia.

(2023) "Probabilistic reverberation based on echo density and kurtosis," 26$^{\text{th}}$ International Conference on Digital Audio Effects (DAFx23), Copenhagen, Denmark.

(2021) "Efficient digital waveguide synthesis of a pipe organ," 181$^{\text{st}}$ Meeting of the Acoustical Society of America, Seattle, USA.

(2021) "Conformal maps for the discretization of analog filters near the Nyquist limit," 24$^{\text{th}}$ International Conference on Digital Audio Effects (DAFx20in21), Vienna, Austria.

(2020) "Generalized second order systems beyond Nyquist frequency," 149$^{\text{th}}$ Audio Engineering Society Convention, New York City, USA.

(2019) "Digital grey box model of the uni-vibe effects pedal," 19$^{\text{th}}$ International Conference on Digital Audio Effects (DAFx19), Birmingham, UK.