MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2024

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

RESEARCH GROUP AND URL

Instituto de Etnomusicologia, Centro de Estudos em Música e Dança

Music acoustics and Sound Studies

http://www.inetmd.pt/index.php/en/investigacao/grupos/musical-acoustics-and-sound-studies

SUPERVISOR (NAME AND E-MAIL)

Vincent Debut | vincentdebut@fcsh.unl.pt

SHORT CV OF THE SUPERVISOR

Vincent Debut is a French researcher working in Portugal for 18 years, addressing acoustic and vibration issues concerned with musical instruments. He is currently adjunct professor at the Instituto Politécnico de Castelo Branco/Escola Superior de Artes Aplicadas, teaching courses on Acoustics and Music Production, and an integrated researcher at the Instituto de Etnomusicologia, Centro de Estudo em Música e Dança, where he coordinates the Acoustics and Sound Studies research group and is head of its associated laboratory, the Music Acoustics Lab, and is a member of the Directive Board. From 2008-2023, he was an invited professor at the New University of Lisbon (UNL, Portugal), lecturing a series of courses on Acoustics, and was in charge of the Acoustics and Sound Studies postgraduate program. Recently, in collaboration with public partners, he has produced works of international interest in the area of Cultural Heritage, for preserving rare musical instruments. His scientific recognition is evidenced by invitations for lecturing at conferences, symposia and advanced schools, by his peer reviewing activity for journals, conferences and funding bodies, the external examination of thesis, as well as his track record of research supervision for both Portuguese and foreign students. In 2020, he was invited by the Portuguese government for an expert assignment in the action plan to restore the historical carillons of the Mafra National Palace, and currently, is a member of the scientific committees of the National Music Museum. Since 2019, he is the chair of the Technical Committee on Music Acoustics of the Portuguese Acoustical Society. He has co-authored over 80 papers international peer-reviewed journals and conference papers and 5 technical reports. His work has been awarded five prizes (Entrepreneurship award Santander-Totta, 2017; Collaborative Research Project Prize, Santander-Totta, 2016; Best Paper Award, XXI Congreso Nacional de Ingeniera Mecanica, 2016; Associação Portuguesa de Museologia, 2015; International Symposium on Musical Acoustics, 2014).

5 SELECTED PUBLICATIONS

- M. Carvalho, V. Debut & J. Antunes (2021), A Physical modelling techniques for the dynamical characterization and sound synthesis of historical bells. Heritage Sciences, 9, 157. https://doi.org/10.1186/s40494-021-00620-2
- V. Debut & J. Antunes (2020), Physical synthesis of six-string guitar plucks using the Udwadia-Kalaba modal formulation. Journal of the Acoustical Society of America, 148:2, pp. 575-587. https://doi.org/10.1121/10.0001635
- F. Soares, V. Debut & J. Antunes (2023), The bar-resonator interaction in mallet percussion instruments: A multi-modal model and experimental validation. Journal of Sound and Vibration, vol. 548(6) :117528. https://doi.org/10.1016/j.jsv.2022.117528
- J. Antunes & V. Debut (2017), Dynamical computation of constrained flexible systems using a modal Udwadia-Kalaba formulation: application to guitar modelling. Journal of the Acoustical Society of America, 141(2), pp. 764-778. https://doi.org/10.1121/1.4973534

- A. Baklouti, J. Antunes, V. Debut, T. Fakhfakh & M. Haddar (2017), A method for the identification of dynamic constraint parameters in multi-supported flexible structures. Comptes Rendus Mécanique, 345 (4), pp. 239-247. https://doi.org/10.1016/j.crme.2017.02.002

PROJECT TITLE AND SHORT DESCRIPTION

Title: Sound Retrieval Of Acoustic Gramophones By Physical Modelling

Abstract: A great deal of current knowledge in disciplines such as linguistics, ethnography, anthropology and musicology relies on a wealth of recordings stored in many archives, libraries and academic institutions worldwide. Supported by UNESCO, national and international organizations have agreed to establish guidelines for the preservation of historical sound material. However, to make the most efficient use of this recording heritage, ethnomusicologists face one remaining issue: the absence of accepted standards for playing back audio archives, nowadays predominantly in digital format, in order to reproduce recorded performance faithfully in terms of acoustic qualities. The replay conditions systematically influence how we perceive a recording, and listening to early recordings using modern technology must call for specific care. This proposal aims to establish new objective standards for sound reproduction of early disc gramophones, based on a scientific physical basis, and create innovative sound synthesis tools that provide faithful sound rendering.

To mimic the sound of gramophones, the current, but questionable, practice, relies on using mainstream signal processing tools, applied to playback copy files. These are essentially routines of frequency equalization, ruled empirically, which completely bypass some inherent acoustical phenomena of early reproducers. As an alternative to this basic approach, the key point of the project is to provide a complete and objective characterization of gramophones reproducers in vibro-acoustical terms. Guided by the physical principles underlying the sound production in musical instruments, we explore the full sound transfer path, using a combination of experimental work and physical modelling techniques. We will take advantage of several avenues and complementary of methods from numerical acoustics, applied mathematics and vibration analysis, to reproduce both the spectral and spatial characteristics of the sound radiated by gramophones.

Application of the methodology to a collection of surviving models will bring to the fore the varieties in sonority of early reproducers, and will point toward how recorded music sounded in the past. A bundle of plug-ins dedicated to emulation of gramophones will be developed for music production applications. Outcomes of the project include the design of a compact multi-loudspeaker sound diffusion system prototype for realistic spatial simulation, which will open the promise for high fidelity reproduction of the sound directivity of any musical instrument by electroacoustic devices, for music research and performative arts.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Information Science and Engineering (ENG)

***Scientific Area where the project fits best** – Please select/indicate the scientific area according to the panel evaluation areas: Chemistry (CHE) • Social Sciences and Humanities (SOC) • Economic Sciences (ECO) • Information Science and Engineering (ENG) • Environment and Geosciences (ENV) • Life Sciences (LIF) • Mathematics (MAT) • Physics (PHY)