

Dr Craig J. Webb

15 Heath Park Road
Romford
London
RM2 5UB

Email: craigjonathan.webb@unibo.it
Phone: +44 (0)7525 924 880
Nationality: British

Academic History

NEMUS project, University of Bologna, 2023-present
Postdoctoral researcher.

Acoustics and Audio Group, University of Edinburgh, 2015-2016
Postdoctoral researcher and teaching assistant.

Working as part of the ERC-funded NESS project (Next Generation Sound Synthesis) I explored the real-time applications of the systems and models developed during the project. Specifically 1D and 2D finite difference schemes, and the use of low-level intrinsics and multi-threading to acceleration their computation. I also supervised a number of MSc students for their summer projects and taught at lab sessions and lectures.

PhD in Computational Physics, University of Edinburgh, 2014
"Parallel computation techniques for virtual acoustics and physical modelling synthesis"

As a PhD candidate I was the first student to be part of the NESS project at the University of Edinburgh. My research focused on 3D simulations of wave propagation in acoustics systems using Finite Difference schemes, and also embedded models of musical instruments in these spaces. I also received grants from College of Humanities and Social Science, Edinburgh College of Art and Edinburgh Innovation.

MSc Acoustics and Music Technology (with Distinction), University of Edinburgh, 2010.

BSc Computer Science, University of Bath, 2007.

Employment

Physical Audio Ltd, London, 2016-2023
Software developer.

Since 2016 I have been developing real-time audio software based on physical modelling systems. I have over 5-years experience of creating plug-ins using the industry-standard JUCE framework, including UI and UX design, and low level optimisation using vector intrinsics and multi-threading. I have over 10 years experience of porting Matlab systems for physical modelling into highly optimised C++, both for modal and FDTD schemes. In 2019 I was awarded a Creative Informatics grant as part of the Resident Entrepreneur scheme.

Selected Publications

Journal articles

- S. Bilbao, C. Desvages, M. Ducceschi, B. Hamilton, R. Harrison, A. Torin and C. Webb, "Physical modeling, algorithms, and sound synthesis: The NESS project", *Computer Music Journal*, vol. 43 (2-3), pp. 15-30, 2019.
- M. Ducceschi, C. Touze, S. Bilbao and C. Webb, "Nonlinear dynamics of rectangular plates: Investigation of modal interaction in free and forced vibrations", *Acta Mechanica*, vol. 225, no. 1, pp. 213-232, 2014.
- S. Bilbao and C. Webb, "Physical modeling of timpani drums in 3D on GPGPUs", *Journal of the Audio Engineering Society*, vol. 61, no. 10, pp. 737-748, 2013.

Proceedings

- M. Ducceschi, S. Bilbao, and C. Webb, "Real-time simulation of the struck piano string with geometrically exact nonlinearity via a scalar quadratic energy method", In *Proceedings of the European Nonlinear Dynamics Conference*, Lyon, France, 2022.
- M. Ducceschi, S. Bilbao, C. Webb, "Non-iterative schemes for the simulation of nonlinear audio circuits", In *Proceedings of the 24th International Conference on Digital Audio Effects*, Vienna, Austria, 2021.
- S. Bilbao, M. Ducceschi, C. Webb, "Large-scale real-time modular physical modeling sound synthesis", In *Proceedings of the 22nd International Conference on Digital Audio Effects*, Birmingham, UK, 2019.
- B. Hamilton, S. Bilbao and C. Webb, "Improved Finite Difference Schemes for a 3-D Viscothermal Wave Equation on a GPU", In *Proceedings of Forum Acusticum*, Krakow, Poland, 2014.
- C. Webb, "Computing virtual acoustics using the 3D finite difference time domain method and Kepler architecture GPUs", In *Proceedings of the Stockholm Music Acoustics Conference*, Stockholm, Sweden, 2013, pp. 648-653.
- S. Bilbao, B. Hamilton, A. Torin, C. Webb, P. Graham, A. Gray, K. Kavoussanakis and J. Perry, "Large scale physical modeling sound synthesis", In *Proceedings of the Stockholm Music Acoustics Conference*, Stockholm, Sweden, 2013, pp. 593-600.
- C. Webb and A. Gray, "Large-scale virtual acoustics simulation at audio rates using three dimensional finite difference time domain and multiple GPUs", In *Proceedings of Meetings on Acoustics: International Congress on Acoustics*, vol. 19, Montreal, Canada, 2013, p. 70092.
- C. Webb and S. Bilbao, "Computing Room Acoustics with CUDA - 3D FDTD schemes with boundary losses and viscosity", In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing*, Prague, Czech, 2011, pp. 317-320.
- C. Webb and S. Bilbao, "Virtual Room Acoustics: A Comparison of techniques for computing 3D-FDTD schemes using CUDA", In *Proceedings of the 130th Convention of the Audio Engineering Society*, vol. 2, London, UK, 2011, pp. 1163-1169.