

SARC Research Wins Best Paper Award at DAFx 2018 Conference!



The 21st edition of the [International Conference on Digital Audio Effects \(DAFx\)](#) took place at the Universidade de Aveiro (Aveiro, Portugal) from 4 - 8 September 2018. It was hosted by Profs Guilherme Campos and Nuno Fonseca through the University of Aveiro Institute of Electronics and Informatics Engineering and in collaboration with the Portuguese Audio Engineering Association (APEA). At DAFx, academic and industry presenters from around the world gave papers, posters, tutorials and keynote talks on a range of subjects related to audio signal processing, including virtual analog modeling, music information retrieval, machine learning and audio effect design.

Best Paper Award

At this year's DAFx, the **Best Paper Award** was given to a team of two authors - [Ólafur Bogason](#) and [Dr Kurt James Werner](#) - for their paper entitled '**Modeling time-varying reactances using wave digital filters**' [1]. Following a preliminary round of ranking by the local organising committee, an international panel of three judges decided the best paper awards. This award was presented to Mr Bogason and Dr Werner by distinguished Portuguese producer and recording engineer José Fortes. The award-winning paper improves the modeling of time-varying electronic components in audio circuits (such as wah-wah pedals), allowing the design of more accurate and flexible virtual analog models. The paper also contributes new theoretical insight on the choice of wave variable types in Wave Digital Filter formalism.

The authors have been working together for several years to develop aspects of wave digital filter modeling, building on Dr Werner's PhD thesis 'Virtual Analog Modeling using Wave Digital Filters' (Stanford University, 2016) [2] and Mr Bogason's master's thesis 'Modeling Audio Circuitry Containing Typical Nonlinear Components with Wave Digital Filters' (McGill University, 2018) [3]. This collaboration also led to a 2017 DAFx paper entitled 'Modeling Circuits with Operational Transconductance Amplifiers Using Wave Digital Filters' [4]. Ólafur Bogason (MA, McGill University) is the CEO of an Icelandic music technology company [Genki Instruments](#), who specialise in creating unique music-related consumer products. Their first product Wave is wearable MIDI controller that lets you control sound, shape effects and send commands with the motion of your hand. Wave and its Eurorack extension Wavefront will be available in late 2018. Dr Kurt James Werner (PhD, Stanford University) is a Lecturer in Audio at SARC, where he conducts research on digital signal processing, virtual analog modeling and the history of audio electronics. Dr Werner also teaches modules on the Music and Audio Engineering pathways.

SARC History at DAFx

DAFx has been around for 21 years, with the first edition taking place in Barcelona in 1998. SARC researchers have contributed to DAFx for most of its history. The first SARC paper at DAFx was the paper by Stefan Bilbao *et al.* in 2003: 'The Wave Digital Reed: A Passive Formulation' [5]. Since then many faculty and students from SARC have contributed to DAFx, including Stéphanie Bertet, Stefan Bilbao, Jamie Bridges, Vasileios Chatziioannou, Ben Holmes, Konrad Kowalczyk, Sandor Mehes, Sarah Orr, Giovanni De Sanctis and Peter Stitt. Current SARC lecturers [Dr Maarten van Walstijn](#) and [Dr Kurt James Werner](#) are long-time contributors to DAFx.

This year's award builds on a tradition of SARC excellence at DAFx. In 2016, Maarten van Walstijn, Jamie Bridges and Sandor Mehes won 4th Prize in the best paper awards for their paper entitled 'A real-time synthesis oriented tanpura model' [6]. Dr Werner has previously been awarded Best Paper No. 3 for his work with Ross Dunkel (Universal Audio, MA Stanford), Max Rest (E-RM Erfindungsbüro, MSc TU Berlin), Michael Olsen (MA Stanford) and Prof Julius O. Smith (Stanford), entitled 'The Fender Bassman 5F6-A family of preamplifier circuits—a wave digital filter case study' [7] and Best Student Paper for his paper with Chet Cnegy (Google, MA Stanford) entitled 'Modeling the Ibanez Weeping Demon wah pedal' [8].

Upcoming Related Events

If you are interested in the work being done by Dr Werner and Mr Bogason, you can hear public lectures on their recent work on wearable audio electronics and the history of drum machine circuitry at two upcoming SARC/Music Seminars at Queen's University Belfast. Both seminars are free and open to the public:

- Dr Kurt James Werner: '[“Nothing Sounds Quite Like an 808”: Pop Music's Most Celebrated Kick Drum Circuit and its Ancestors](#)'. 1:00–2:00pm on 7 November 2018 at SARC's Sonic Lab (4 Cloreen Park, Belfast BT9 5HN)
- Ólafur Bogason: 'Title TBA'. (time TBA) on 6 February 2019 at (location TBA)

References

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- [2] Kurt James Werner, 'Virtual analog modeling of audio circuitry using wave digital filters', Ph.D. dissertation, Stanford University, Stanford, California, December, 2016.
- [3] Ólafur Bogason, 'Modeling audio circuitry containing typical nonlinear components with wave digital filters', master's thesis, McGill University, Montreal, Canada, April, 2018.
- [4] Ólafur Bogason and Kurt James Werner, '[Modeling circuits with operational transconductance amplifiers using wave digital filters](#)', *Proceedings of the 20th International Conference on Digital Audio Effects (DAFx-17)*, Edinburgh, UK, September 5–9, 2017, pp. 130–137.
- [5] Stefan Bilbao, Julien Bensa and Richard Kronland-Martinet, '[The wave digital reed: A passive formulation](#)', *Proceedings of the International Conference on Digital Audio Effects (DAFx-03)*, London, UK, September 8–11, 2003, pp. 225–230.
- [6] Maarten van Walstijn, Jamie Bridges and Sandor Mehes, '[A real-time synthesis oriented tanpura model](#)', *Proceedings of the 19th International Conference on Digital Audio Effects (DAFx-16)*, Brno, Czech Republic, September 5–9, 2016, pp. 175–182.

- [7] W. Ross Dunkel, Maximilian Rest, Kurt James Werner, Michael Jørgen Olsen and Julius O. Smith III, '[The Fender Bassman 5F6-A family of preamplifier circuits—a wave digital filter case study](#)', *Proceedings of the 19th International Conference on Digital Audio Effects (DAFx-16)*, Brno, Czech Republic, September 5–9, 2016, pp. 263–270.
- [8] Chet Gnegy and Kurt James Werner, '[Modeling the Ibanez Weeping Demon wah pedal](#)', *Proceedings of the 18th International Conference on Digital Audio Effects (DAFx-16)*, Trondheim, Norway, November 30 – December 3, 2015, pp. 257–264.