

# About This Issue

This issue's front cover promises "Different Angles on Sound Synthesis," a theme pertaining to the first four articles. Each of these four does in fact present a different approach to digital sound synthesis, yet this statement should not be taken to mean that these approaches all represent fundamentally new synthesis techniques. On the contrary, three of them use a classic technique, additive synthesis, but in uncommon ways that harness psychoacoustic phenomena or unusual mappings from inputs to synthesis parameters.

The first article, by Gary Kendall and colleagues, offers a fresh perspective on combination tones. These are typically described as psychoacoustic products of nonlinear distortion in the ear resulting from the interaction between loud acoustical stimuli. A number of composers have explored the special perceptual effects of these distortion products, notably Maryanne Amacher (1938–2009). In contrast to the high volumes and limited timbral control that characterized Amacher's installations, the article shows how to use digitally induced combination tones to construct moderate-volume sounds that follow the pitch and amplitude of a recorded or real-time input signal, or that match up to four harmonics of a time-varying target spectrum, while engendering distinctive spatial imagery.

The second article, by Simon Conan et al., extends the work that the authors presented in their prizewinning paper at last year's Digital Audio Effects conference, DAFx 2013. Their Best Paper award entailed publication in *Computer Music Journal*. The authors' synthesis technique emulates the continuous interaction between

an object and a surface, specifically focusing on friction phenomena—rubbing and scratching—and on the rolling of an object across the surface. The synthesis is controlled by a strategy that lets the user morph between these different types of simulated physical interactions.

The next two articles examine mappings from algorithms or equations into control parameters for additive synthesis. In the article by Jaime Serquera and Eduardo Reck Miranda, the input is a cellular automaton. The authors' technique uses histograms that measure the occurrence frequencies of different "colors" (cell values) in the cellular automaton. The mapping takes advantage of these histograms' similarity to sound spectra, aurally representing the automaton's behavior in a way that avoids some of the unpredictability of other techniques for sonifying cellular automata. In the article by Rodrigo F. Cádiz and Javier Ramos, on the other hand, the input is a quantum physics equation. The equation in question describes a Gaussian-shaped bouncing wave packet, which the authors chose for its interesting dynamic behavior. Sound or video examples are provided for all four of these articles on sound synthesis.

The issue's fifth article, by Qi Yang and Georg Essl, lies more in the domain of controllers than of synthesis per se. Specifically, the authors are interested in using a performer's hand moving freely in the air as an alternative to the pitch and modulation wheels found on many keyboard-based synthesizers. Their user study evaluated camera-based tracking of hand gestures in comparison to the use of the traditional

wheels. The choice of mapping was important; for example, changing the hand's detected width (by opening or closing the hand or by turning the wrist) was found to offer good control of tremolo. In some cases, the gesture tracking outperformed the wheels when two synthesis parameters were being controlled simultaneously.

In the final article, Amy Hoover et al. discuss their work in computer-aided composition by amateur musicians. The idea is for a user to present the computer with a melody, or, more generally, any set of one or more simultaneous voices in a polyphonic texture, and have the computer generate a new voice to add to the texture, using the provided music as a model. The software incorporates the paradigm of interactive evolutionary computation, in which the user chooses one candidate from a set proposed by the computer, the computer "evolves" new candidates from the chosen one, and so on, until the user approves the result. The "mutation" process involves a network similar to a neural network, but in which each node can compute a different type of function: Gaussian, sigmoid, linear, sine, or multiplicative. The system has almost no knowledge of music theory, yet an experiment showed that in some cases it produced music that listeners had trouble distinguishing from a fully human-composed piece.

The Reviews section examines two books and an event. Andrey Smirnov's book describes the surprisingly advanced, but insufficiently well known, developments in experimental sound and electronic music in early 20th-century Russia,

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*Front cover.* A collection of figures from the issue's four articles on sound synthesis.

*Back cover.* A figure from the article by Conan et al., showing their synthesizer's graphical user interface and the use of a tablet for gestural control.

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mostly during the period between the Russian Revolution and the Stalin era. In the second book review, former *Computer Music Journal* editor Curtis Roads praises a recently issued book on vocal technique in contemporary music. A chapter titled "Electric Music" will be of particular interest to the *Journal's* readers, but the reviewer suggests that composers will find much else of value in the volume's pages, such as a long chapter on extended vocal techniques and an appendix listing some 400 pieces for solo voice composed since 1950. The third review in this issue reports on the 2014 Electroacoustic Music Studies (EMS)

Network Conference, held in Berlin in June.

The printed form of the Summer 2014 issue had a DVD attached to the back cover. That DVD was a replacement for the DVD that was delivered with the Winter 2013 issue, because the latter had two defective tracks as a result of mastering errors (the only time this has happened in the *Journal's* history, to our knowledge). As it turns out, the replacement DVD in the Summer issue was the final disc in the series of CDs and DVDs that *Computer Music Journal* has published annually since 1997. (Prior to that, the *Journal* published vinyl

soundsheets, whose contents were eventually reproduced on the 2006 DVD.) But the annual *Computer Music Journal Sound and Video Anthology* that used to be incarnated in plastic lives on. As of the present issue, the *Anthology* is available in an online presentation instead of as a physical disc. Please visit [http://www.mitpressjournals.org/doi/suppl/10.1162/COMJ\\_x.00276](http://www.mitpressjournals.org/doi/suppl/10.1162/COMJ_x.00276). The program notes for the *Anthology* are still included with the Winter issue; see the final section of this issue. Our curator this year is assistant editor Doug Van Nort, who is also producer and editor of the annual *Anthology*.