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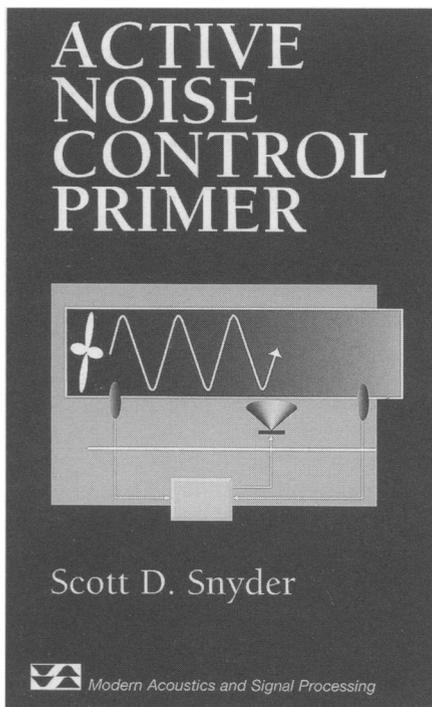


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noise control applications. *Active Noise Control Primer* is a brief introduction to active noise control applications and the challenges present in designing a strategy for active noise control. Such strategies consist of several components. A reference microphone brings the sound into a control system that then digitizes the signal and calculates a corresponding signal to cancel it out. A loudspeaker then produces this canceling signal. Finally, a second microphone brings sound into the control system to measure the amount of residual noise in the system.

The challenges lie in the fact that the sound will change as it propagates away from its source. For example, sound travelling down a ventilation duct will be modified by the acoustic properties of the duct space. If the offending noise changes between the point where it is picked up by the microphone and where the speaker should cancel it, the active noise control strategy will be ineffective because the sound being produced by the loudspeaker is no longer an exact phase-inversion of the noise. A control system can be fine-tuned to adjust for how a given sound will alter as it travels. However, the sound alteration will vary over time with temperature, humidity, and age of the components. Latency in the control system must also be finely tuned in order to distribute the canceling waveform with the correct phase, which forms the basis of the technique.

Scott Snyder states that he is directing this book toward an audience with a mathematics or physics framework, and no background in acoustics or sound. Chapter 1 explains what active noise control is, albeit rather verbosely. Because chapter 2 presents fundamentals of sound, which is much more comprehensively covered in the standard



texts of the field, it could be skipped by anyone who has a background in audio.

Chapter 3 begins the actual discussion about noise control. After brief explanations of power measurements, causes of noise and hearing loss, and a short description of passive noise control, the author engages in a lengthy description of active noise control. Chapters 4 and 5 discuss free space noise control and enclosed space noise control. Each employs a set of techniques having slightly different implementations. In some cases both free-space and enclosed-space techniques can be combined to provide an optimal noise control solution. Chapter 6 follows by dealing with the propagation of sound in ducts.

Chapters 7 and 8 discuss the heart of an active noise control system, the controller. This critical compo-

nent is responsible for taking the input from the reference and error microphones, and calculating the canceling waveform to be generated from the system. The book does not attempt to provide enough information to enable the design or construction of a controller. The reader does gain however, an understanding of the basic concepts of how it works.

To implement an active noise control system, one would need to purchase a more substantive book. Mr. Snyder's stated goal is to brief someone "contemplating active noise control for the first time or using a controller someone else has developed." The book does this satisfactorily, and avoids detailed mathematics, signal processing information, and programming. The content of the book may not apply directly to most computer music activities; however, it may be useful for finding solutions to eliminating noises such as those created by ventilation ducts.

Multimedia

DEGEM: Klangkunst in Deutschland (Sonic Arts in Germany)

CD-ROM, 2000, Wergo T 5150; available from Schott Music & Media, GmbH, Weihergarten 5, 55116 Mainz, Germany; telephone (+49) 6131-246-883/888; fax (+49) 6131-246-252; World Wide Web www.schott-music.com

*Reviewed by Oliver Schneller
Paris, France*

Klangkunst in Deutschland (Sonic Arts in Germany) is the title of the



first CD-ROM presented in both German and English by the German Society for Electroacoustic Music (DEGEM) in collaboration with the Aesthetic Strategies in Multimedia and Digital Networks project of the University of Lüneburg. The disc, issued on the Wergo label, contains portraits and work samples of seven "sound artists" currently living and working in Germany. As a special feature, DEGEM has included its International Documentation of Electroacoustic Music, a gigantic database (in FileMaker and Excel formats) containing a worldwide listing of studios for electronic music and a catalogue of 21,062(!) works written between 1901 and 1999 by over 4000 composers.

Five individual artists, Werner Cee, Michael Harenberg, Robin Minard, Jutta Ravenna, and Johannes S. Siermanns, as well as the artist-tandem Sabine Schäfer/Joachim Krebs were invited to present themselves and their work with texts, pictures, audio samples, and spoken words. The CD-ROM seems a tremendous medium for the purpose of introducing artists who find themselves working in the zone between music and the visual arts with an emphasis on composed installations

and interactive environments. After reading through the informatory texts at their own pace, users have the possibility to get an impression of the spatial set-up of the often rather complex installations by viewing video-clips while listening to the actual acoustic responses. Pure audio files of a higher quality are provided for works where listening is the priority. Needless to say, both audio and video samples in their CD-ROM presentation convey merely an idea of the aura of the works presented. In reality, they may feature 32-channel spatialized sound or highly differentiated light choreography. One artist, Michael Harenberg, aware of this limitation, had the idea to create a new work especially for his contribution to the CD-ROM. His enjoyable "virtual interactive sound installation" *PERSIMFANS* transforms the graphic user interface into an interactive audiovisual experiential field which invites the user to freely browse through and interact with 15 virtual "rooms" appearing on the monitor. The sounds are also virtual in that they are based on physical modeling of flutes, percussion, and string instruments.

In spite of the fact that each of the contributors were given complete liberty to assemble their presentations according to their own wishes, the disc retains a graceful sense of unity with its engaging user surfaces. In addition, this release provides a vast source of information on the "state-of-Sonic-Arts," with links provided to individual Web sites as well as listings of publications and compact discs. (On a technical note: the various plug-ins that are needed to fully activate the HTML- and JavaScript-based applications have been conveniently included on the CD-ROM by DEGEM.)

The following provides a brief overview of the individual contribu-

tions. Werner Cee (b. 1953), a musical autodidact, fellow of the Akademie Schloß Solitude and Zentrum für Kunst und Medientechnologie (ZKM) in Karlsruhe, and Bourges prize winner in 1993, presents his work in six categories: 1) Sound and Light installations (multi-media); 2) Acoustic Art (composition); 3) Soundscapes (installations); 4) Theater (mostly music theater projects for children); 5) Live music (improvisations); and 6) Ethnomusicological projects, mostly in collaboration with the writer Bettina Obrecht (specializing in music from the Scottish Highlands and Istanbul). His works in these categories range from more or less "traditional" installation set-ups such as microphone/loudspeaker feedback-signals transformed to create a self-generating piece, to the light installations *lost* (1992), in which a stroboscope is suspended from an elastic cable, to *between the lines* (1992), coordinating the diffraction of colored light through a mass of glass-splinters with sonic responses, to *braindrops* (1993), in which the frequency and electronic transformation of the sound of water droplets is controlled by bio-feedback via EEG-processing.

A different aspect of Mr. Cee's work are his "acoustic films," mostly composed for radio production and filed under both of his categories, Acoustic Art (composition) and Soundscapes. While traveling the composer collected recordings of mostly urban environments and later mixed them to create an acoustic portrait. Such an "acoustic film" can then even be performed outdoors, as in the case of *Open Air Soundscape* (1998), a "piece for summer sunset" lasting over two hours to be performed in a familiar space that is then gradually (acoustically) contextualized and transformed into an Istanbul bazaar or a Cuban village via eight-channel sound diffusion.

Returning to Michael Harenberg (b. 1961), one discovers already in his early works an emphasis on the use of computers. His activities have included collaborations with multimedia artists Clarence Barlow and Barbara Heller, shows at the Documenta in Kassel (1992) and participation in the aforementioned Aesthetic Strategies project at Lüneburg University. Following his early compositions for instrumental ensembles are works in which the sounds of real instruments have been replaced by an array of virtual instruments created by complex physical modeling algorithms. His works *Stundenlang Nr.5* for a dancer, four instruments, and virtual flute, *E-/L-/M-Medusa* for virtual bass flute and computer (1999), and *Doublebind* (1998), an interactive sound installation for “low-tech” analog equipment and complex computer-controlled physical modeling, make extensive use of this synthesis technique. *Inter-music* (1996), for Speech Synthesizer, connects to the virtual space of the Internet by reciting all the URLs that were to be found in Mr. Harenberg’s browser at the time.

If the accent of Mr. Harenberg’s work lies in the creation of the artificial and virtual, the installations of Robin Minard (b.1953, Montreal) seem often to be based on finding links to the organic world through the use of technology. Works such as *Silent Music* (1995) or *Landscape I* (1997) consist of hundreds of mushroom-like little piezo loudspeakers that cover the floor or are mounted on walls. The organic analogy of these plant-like configurations that emit soft sounds of computer-controlled MIDI instruments is enhanced by their responsiveness to natural phenomena. In *Weather Station* (1995), light and climate sensors turn detected weather changes into MIDI control data, while *Intermezzo*

(1999) is a fixture of hundreds of loudspeakers partially hidden among bushes, adding to the acoustic environment of the Federal Garden Show 1999 in Magdeburg, Germany.

The transformation of a given environment through sound is also the theme of Mr. Minard’s *Neptun* (1996) commissioned by the Institute of Electronic Music (IEM) in Graz. Here, two small rooms of a castle in Graz are fortified with a layer of artificial walls behind which lies—invisibly—an 8 cm-thick “loudspeaker ribbon” that circumscribes the two rooms. Water-like, streaming sounds evenly pass through this diffusion field. The composer describes the “loudspeaker ribbon” as:

A variation of the electrostatic principle sometimes found in high-fidelity loudspeaker systems. The ribbon diffuses sound uniformly across its entire surface. For the installation *Neptun* a special loudspeaker ribbon, made from a paper-thin amalgam of aluminum and Mylar plastic, was developed and produced together with Christoph Moldrzyk (Berlin).

Interaction with environments, in particular with hidden or even inaccessible ones, is also one important aspect of the work of Jutta Ravenna (b. 1960). Besides installations using floating sound-buoys to amplify the barely audible sounds of water-insects [*LeiseLaute(Feld1)*, 1994], or the mixing of digital and real cricket-chirping in an abandoned factory hall [*LeiseLaute(Feld2)*, 1994], she has found ways to make the inner world of computer circuit boards acoustically tangible. Through the use of impulse amplification and transposition these sounds become audible to the human ear. By creating sculptures of mounted racks with circuit-boards, often equipped with light- and pressure-sensors, Ms. Ravenna’s

aim is to “re-materialize and integrate this phenomenon [the circuit board] into the real world in which it is presented.”

A particularly original manifestation of this idea is the series of *Data-Sound-Windows (Fields 1 to 4)* created in 1995. In *Field 1*, green windows of semi-transparent circuit boards contextualize the sacred space of a church. By placing the construction in front of the church windows the intricate patterns of the circuitry shine through in counterpoint to the usual paintings found on the windows. *Field 1* is equipped with light sensors that trace light changes that are transformed into timbral changes in the accompanying soundscape of amplified printer, mouse-click, and ventilator sounds.

By comparison, Cologne artist Johannes S. Siermanns (b. 1955) stresses the “performance” aspect more than any of the other composers presented on the DEGEM CD-ROM. His work revolves around the idea of resonance in the widest possible sense: “The room becomes a resonance of what is out, the outside is the resonance of what is in.”

In Mr. Siermanns’s works, “resonance” encompasses the acoustic response of a room or body as well as the resonance of a mind: “I just want to open up a field of infinite possibilities. I make an invitation.” Resonance happens in the response of the listener: “Experience yourself as an observer whose body is being played.”

To begin with, a practical example of this composer’s idea of resonance can be found in his frequent use of his multi-monochord, which is based on Pythagoras’s instrument but which has 39 strings tuned to the same pitch. His *Lichtung* (1997) suspends three such instruments in the atrium of the SFB-Soundgalerie in Berlin. Their excitation occurs via

membrane contact by transferring radio and television sounds onto the bodies of the monochords.

In his "TV-under-water-performance," *Water under Water* (1997), the monochord at first resonates to the sounds of Mr. Sistermann's voice and is then struck by pebbles collected in his mouth during a dive in the Rhine river.

A broader idea of resonance comes to carry the pieces *Paris, drinnen* (1992), and *Klangort* (1992). The former is a radiophonic sound project for interior spaces (passages, metro stations, malls, and private apartments) found in Paris. These spaces maintain contact with the outside world through various openings, windows, and doors. Mr. Sistermann found the particular resonance tone of each room and recorded himself humming it. The results of this process including additional noises recorded in and around these spaces were then played into a piano with the sustain pedal down and re-recorded with the added level of resonance. *Klangort* for 24 a cappella singers in 24 private apartment spaces with open windows presents a live application of a similar idea. All 24 singers chant the resonance tones of their rooms at the same time out of their open windows, thus giving a city block a magical acoustic ambience.

The most elaborate presentation of a single work on this CD-ROM is the project *sonic lines n'rooms* by Joachim Krebs and Sabine Schäfer, who have worked together as a team since 1995. A commission by the SüdWestRundfunk (SWR), the piece was presented at the Donaueschinger Musiktage in October 1999 in the basement of the old library building, the Hofbibliothek. The 32-channel spatial sound composition spreads out through four connected rooms, which together become a "travers-

able four-limbed spatial sound body." Each of the four rooms contain eight loudspeakers set up in different configurations—diagonal, elliptical, and trapezoidal—each with their own diffusion patterns of varying sound sources. The CD-ROM features detailed plans of the set-up (so-called "consistency-maps") as well as the spatial trajectories of the source sounds and their transformations, along with photos, video clips, and audio samples.

The objective of the installation was to intensify the experience of acoustic conditions through the artistic-poetic manipulation of architectural space. The sounds themselves fluctuate between low continuous drones and rhythmic and discrete artificial or processed animal utterances. Controlling this elaborate sound-space composition is the Topoph40D, a spatialization system developed for Sabine Schäfer by Sukandar Kartadinata during the early 1990s. Three computers share the control of this system together with a special mixing board built to fit this configuration. Computer A receives the itineraries of the desired spatial motions as MIDI data from a sequencer, transforms them into system-exclusive control data that is relayed to computers B and C, which then translate the data into the format used by the mixer, which in turn passes out the discrete signals to the speakers by means of voltage controlled amplification (VCA).

Other projects involving elaborate spatialization are Sabine Schäfer's *TopophonicPlateaus* (1995), for 27-channel sound, electroacoustic sounds, human voices, and computer-controlled piano; *Sonic-Rooms* (from 1997), a group of sound-tents with individual multi-channel spatialization; and Joachim Krebs's *AquaAngelusVox* (1998), a 16-channel sound installation with

visual projections premiered in the Zeiss-planetarium in Berlin.

Whether through the statements of the artists, the audio or video samples of their works, or score excerpts and diagrams, this CD-ROM presents a wealth of stimulation and ideas around the context of "Sonic Art," "Audio/Visual Art," "Sound ART," and "SOUND Art," or whatever definition one chooses to settle on. In spite of the practical necessity to be selective, the expectation raised by the title to present an overview of "Sonic Arts in Germany" is not disappointed, and one leaves one's screen with an inspired air and the hope that listening/seeing/perceiving will continue to be challenged through the creation of art.

Recordings

Heidi Grundmann, Editor: *Sound Drifting. I Silenzi Parlando Tra Loro*

Compact discs (2) with booklet (49 pages), 2000, Triton Verlag/ORF Kunstradio; available from ORF Kunstradio, Argentinierstrasse 30 A, A-1040 Vienna, Austria; telephone (+43) 1-501-18277; electronic mail kunstradio@thing.at; World Wide Web kunstradio.at/SD

*Reviewed by Ian Whalley
Hamilton, New Zealand*

The Ars Electronica symposium and exhibition, now in its 20th year, aims to present artworks that traverse boundaries through digital technologies used as an implement, a medium, and as subject matter. The theme for the 1999 event held in Linz, Austria, was "Life Science." It