

SONIC INTERACTION DESIGN

Exhibition Catalogue

Norwegian Museum of Science, Technology and Medicine, 2011

Natasha Barrett - Till Bovermann - Gerhard Eckel - Espen Sommer Eide - Christian Graupner
Thomas Hermann - Risto Kõiva - Karen Mair - Michael Markert - Satoshi Morita - Joshue Ott - Morgan Packard
Nils Peters - Scenocosme (Grégory Lasserre & Anaïs met den Ancxt) - Norbert Schnell
Steve Symons - Jessica Thompson - René Tünnermann - Roberto Zappalà

Copyright © 2011 BEK - Bergen Center For Electronic Arts

ISBN 978-82-998680-1-3

All Rights Reserved. No part of this document may be reproduced without written consent from the authors.

BEK: Bergen Center for Electronic Arts

C. Sundtsgt. 55

N-5004 Bergen

Norway

<http://www.bek.no>

bek@bek.no

SONIC INTERACTION DESIGN

Catalogue of an exhibition at Norwegian Museum of Science, Technology and Medicine, 2011

Curated by Trond Lossius and Frauke Behrendt

Edited by Frauke Behrendt and Trond Lossius

Produced by BEK: Bergen Center for Electronic Arts

in collaboration with:

Norwegian Museum of Science, Technology and Medicine

COST IC0601 Action on Sonic Interaction Design (SID)

NIME 2011: The International Conference on New Interfaces for Musical Expression

CoDE: The Cultures of the Digital Economy Research Institute

with generous support from:

Arts Council Norway

COST: European Cooperation in Science and Technology

Lydgalleriet

Table of contents

• Preface (Davide Rocchesso)	7
• Introduction (Frauke Behrendt and Trond Lossius)	8
• Exhibited works:	
• Akousmaflore (Scenocosme: Grégory Lasserre & Anaïs met den Ancxt)	10
• Auditory Augmentation at your Fingertips (René Tünnermann, Till Bovermann & Thomas Hermann)	14
• Aura : The stuff that forms around you (Steve Symons)	18
• Crush-2 (Natasha Barrett & Karen Mair)	20
• KII - Voicetopological Interface (Michael Markert)	24
• MindBox (Christian Graupner, Roberto Zappalà, Norbert Schnell & Nils Peters)	28
• Random Access Lattice (Gerhard Eckel)	32
• SonicChair (Thomas Hermann & Risto Kõiva)	36
• Sonic Helmet / Klanghelm (Satoshi Morita)	38
• Swinging Suitcase (Jessica Thompson)	42
• The Movement I-X (Espen Sommer Eide)	46
• Thicket (Joshue Ott & Morgan Packard)	50
• Curators	52
• Institutions	53
• Acknowledgements	54

Preface

by Professor Davide Rocchesso,
Chair of the EU COST IC0601 Action on Sonic Interaction Design (SID)

Sound is not Music. Hearing is not Listening. The sonic manifestations of objects affect our lives, even though they remain under the threshold of conscious attention most of the time.

The works exhibited in Oslo play with the threshold of attention, by bringing to the foreground the complexities of the sonic world. You do not need a special attitude to experience the exhibition. You do not go there for listening, as if you would if you were in a concert hall. Instead, you go there to touch, act, explore. Sound is functional to active explorations, it does not exist without gesture. Sound affords action, even virtuosic action in some cases.

The artists and scientists selected by Frauke Behrendt and Trond Lossius for this exhibition have been keen to develop the expressive possibilities of human-object interaction mediated by sound. When an object becomes a means for expressive interaction, this inevitably leads to playful use and creative exploration. Expressive interfaces unleash a performance potential for manipulative gestures. Therefore, I expect the visitors to be engaged in playful interactions and explorations. Ultimately, the success of the exhibition will be measured in terms of how the installations solicit new actions from the audience, actions that were not part of the original design stage of the designers, artists and scientists producing the works.

The sounds generated by the exhibited installations are there to be experienced through the body. Sometimes the whole body - via sitting, walking, or swinging - sometimes just the fingertips, via exploratory touch actions or articulatory gestures. Sound is not for the ears only. Sound affords bodily experiences.

Walking out of this exhibition, your perception of sound in the world is likely to have changed. Sound is not just a side effect of human actions, as it can actually drive human behaviors. Sounding objects give opportunities for composing informative and pleasant soundscapes, and the quality of our acoustic environments is much more than a measure of sound pressure expressed in decibel. There is a whole design space for sound in interaction, whose surface has been scratched by this exhibition, and that will be the playground for many artists, designers, and scientists in the years to come.

Introduction

by Frauke Behrendt and Trond Lossius

Boom...stroke...aaaaaeheh...swing...crash...push...beep! We struggle to put sonic interactions into words - and that is why an exhibition with real examples of sonic interaction design is the best way to experience this new field of research. It allows you to get your hands - and ears - on interactive works that showcase how sound can facilitate interaction in product design, mobile media, communicating scientific data, interactive art, and more.

"Sonic Interaction Design is the exploitation of sound as one of the principal channels conveying information, meaning, and aesthetic/emotional qualities in interactive contexts". That is the definition that has guided a four-year exploration of this innovative and interdisciplinary domain. The works in this exhibition aim to highlight that Sonic Interaction Design "has the potential of affecting everyday life through physical and virtual interactive objects, as today there is the possibility to design and actively control their acoustic response so that it conveys an intended aesthetic, informational, or emotional content" (<http://www.cost-sid.org>).

Sonic Interaction Design - or SID - is an especially pertinent example of how we are adjusting to the move from the screen-based era of desktop computing to the now ubiquitous world of mobile, networked media and the Internet of Things. While our eyes are busy in most everyday contexts where we use these devices (such as mobile phones, tablet computers or GPS navigation), the auditory channel is often under-utilised - and thus interaction with and via sound is highly relevant. But SID is a much wider field, and the focus on sound in interactions touches on all areas of our life and research, where a visual focus has been dominant for a long time.

This exhibition features works using sonic interaction within arts, music and design as well as examples of sonification for research and artistic purposes. The call for works was very successful with more than 100 submissions. Eleven works have been selected. In addition, a new work by the Norwegian musician and artist Espen Sommer Eide has been commissioned for the exhibition.

Some of the works illustrate the relevance of Sonic Interaction Design for our everyday environments, such as the office. In 'Auditory Augmentation at your Fingertips' (René Tünnermann, Till Bovermann & Thomas Hermann), the auditory characteristic of a computer keyboard is altered according to the weather situation outside, thus showing how a subtle soundscape can display relevant information, or serve as a discrete and ambient sonic embellishment of the environment. The 'SonicChair' (Thomas Hermann, Risto Kõiva) is an interactive office chair that gives auditory feedback that encourages users to be more dynamic on their chair to avoid back pain.

Sound can also be used to explore data in physical space in exciting ways. 'Crush-2' (Natasha Barrett & Karen Mair) is an interactive sound-art installation exploring the microscopic forces released during the process of crushing rock - the audience can move around the sample by using a sensor-enabled helmet (or alternatively a hand-held controller) and can then listen to the data, as interpreted by the artist. Using a hand-held device with speaker, the audience in 'Random Access Lattice' (Gerhard Eckel) interactively explores a virtual sonic sculpture constructed from speech recordings, arranged in a three-dimensional lattice structure.

The participants of 'Aura : The stuff that forms around you' (Steve Symons) are exploring physical space on a much larger scale: They walk around town with a GPS-enabled 'aura' backpack and headphones to experience a unique sound world - but they destroy the world as they listen to it, in fact they hear the degraded landscape created by other users' walks.

Playful interaction with and through sound is another aspect of Sonic Interaction design. The audience of 'MindBox' (Christian Graupner, Roberto Zappalà, Norbert Schnell & Nils Peters) operates the levers and buttons of a modified one-armed-bandit and thereby remixes the pre-recorded music-video of a beat-boxer that is displayed on large screens and by speakers above the machine. 'Swinging Suitcase' (Jessica Thompson) is a portable sound piece that generates and broadcasts the sound of a flock of house sparrows in response to the act of swinging.

The role of the voice in producing (largely non-speech) sound is also fascinating, for example, we can use our voice to sketch Sonic Interactions or to interact with and through sound. The close link between generating sounds and gestures is also a key aspect of SID. To interact with 'KII - Voicetopological Interface' (Michael Markert), the audiences' hands form specific gestures that imitate the opening of the mouth while speaking, and these are translated into a kind of voice. This is an example of gestural interaction without actually touching the object.

This is different in some other works in the exhibition where the audience is invited to touch or stroke objects, thus exploring the close link between sonic and haptic perception. The interactive installation 'Akousmaflöre' (Scenocosme: Grégory Lasserre & Anaïs met den Ancxt) is a small garden composed of living musical plants, which react individually to human gestures and to gentle contact by producing a specific sound. Other works get even closer than asking the audience to touch them - the audience actually need to wear them to experience them. Wearing the 'Sonic Helmet / Klanghelm' (Satoshi Morita) allows the audience to experience 3-D sound in two ways at once: by listening to the sounds with their ears, and by feeling vibrotactile stimulations that are mediated through their skull.

The role of Sonic Interaction design for mobile media such as tablet computers is also illustrated in the exhibition. The touch screens of these devices allow for new ways of sonic interaction in relation to gestural and haptic interfaces. The audio-visual iPad app 'The Movement I-X' (Espen Sommer Eide) is a commissioned work for this exhibition that focuses on gestural interaction. Thicket (Joshue Ott, Morgan Packard) runs on the iPad: by drawing on the touch screen with your fingers, you create dense sonic and visual patterns within a space of warm, bright, rhythmic sound design and constantly evolving, bending, elegant scrawls.

All these chosen works illustrate the emerging field of sonic interaction design, and especially how it can be made accessible to the wider public in an exhibition. In organising this exhibition we were faced with a multi-layered challenge: we wanted to show works that are interactive, focus on sound, and communicate science, art and design to the wider public. The public is invited to interact with all these works, to touch and wear them, to push, put on headphones, or even talk a loudspeaker for a walk. The works therefore need to be very robust - while at the same time illustrating cutting edge technologies. Sound is at the heart of all these works, challenging the traditional visual environment of the museum where all the different works have to co-exist while showcasing the role of sound without overwhelming the space. Sonic Interaction design is an interdisciplinary, cutting-edge field of science - yet the works on display need to communicate the field in an accessible way, engaging the public in art and research. This catalogue accompanies this exhibition, together with an online exhibition (<http://sid.bek.no/>) where an even wider public can experience and learn about Sonic Interaction Design by exploring interesting examples.

This exhibition on Sonic Interaction Design is curated in collaboration with the EU COST IC0601 Action on Sonic Interaction Design (SID) and in connection with NIME 2011 (New Interfaces for Musical Expression).

We would like to express our gratitude to the Norwegian Museum of Science, Technology and Medicine for generously hosting this exhibition, as well as the funding partners and everyone that has assisted towards the making of the exhibition (see Acknowledgements). The Sonic Interaction Design Exhibition will be open to the public from 29th May to 21st August 2011.



The plants' sounds are played by speakers that are located above the hanging plants

Akousmaflöre (Scenocosme: Grégory Lasserre & Anaïs met den Ancxt), 2006

This interactive installation is a small garden composed of living musical plants, which react individually to human gestures and to gentle contact by producing a specific sound.

Each plant in this interactive installation reacts in a different way to human contact or warmth by producing a specific sound. The plant «language» or song occurs through touch and the close proximity of the spectator. The invisible electrical aura of humans acts on the plant branches and encourages them to react. The plants sing when the audience is touching or stroking them lightly. A plant concert is created.

In their artwork, the artists Scenocosme create hybrids between plants and digital technology. Plants are natural sensors and are sensitive to various energy flows. Digital technologies permit us to establish a relationship between plants and sound. This work displays the effects of random data flow and plant interaction. The data is modified as the spectator meanders around and touches the installation, resulting in a random musical universe. The audience's gestures and movements generate sound effects and change the texture of the sound.

The human body continually produces an electrical and heat aura in our immediate vicinity, which we cannot feel. In their research, the «design of the invisible», the artists' approach is to animate that which we cannot detect. Mixing reality

with imagination, they propose a sensory experience that encourage the audience to think about our relationship with other living things and with energy. Indoor plants can have an ambiguous existence, on the one hand as decorative object and on the other hand as living being. It is said that «inanimate objects» can react when they receive human attention. Through Akousmaflöre, plants let us know about their existence by a scream, a melody or an acoustical vibration.

The sounds created by the interaction between the ten plants in the installation and the audience are processed on a (hidden) computer and displayed by 5.1 surround sound speakers that are located above the plants.

Gregory Lasserre and Anaïs met den Ancxt are two artists who work together as a duo with the name Scenocosme. They use interactive art, music and architecture. With multiple forms of expression, they invite spectators to be in the centre of musical or choreographic collective performances. Gregory and Anaïs also explore invisible relationships with our environment: they can feel energetic variations of living beings, and they design interactive stagings where spectators share sensory and amazing experiences.

The artists have exhibited their interactive installation artworks at ZKM (Germany), Villa Romana of Firenze (Italy), Museum Art Gallery of Nova Scotia (Canada) and in many international biennals and festivals : BIACS3 - Biennale of contemporary art in Sevilla (Spain), INDAAF (Korea), Experimenta (Australia), C.O.D.E (Canada), ISEA (Belfast), Futuresonic (UK), WRO (Poland), FAD (Brasil), Citysonics (Belgium), Oso-sphere, EXIT, VIA, Scopitone, Seconde-nature (France), in various art centers : Kibla (Slovenia), Utsikten Kunstsenter (Norway), Centre des arts d'Enghien-les-Bains (France), and many more.

www.scenocosme.com



A visitor is interacting with the plants in the interactive installation



The audience's hands are touching the plant leaves and branches - the plants' reactions to this are translated into sound

Auditory Augmentation





Auditory Augmentation at your Fingertips (René Tünnermann, Till Bovermann & Thomas Hermann), 2010

The auditory characteristic of a computer keyboard is altered according to the weather situation outside.

Everybody is talking about augmented reality these days: the increasingly popular technology which presents additional information to you about your environment through the use of visual overlays on camera-equipped phones. But our realities are also full of sound, sound that can be digitally augmented to communicate information and create feelings. What kinds of information about our surroundings can be communicated to us by modifying the sounds made by common objects that we interact with? This is the question addressed in the practice of auditory augmentation.

In this exhibit, visitors are able to experience how the common soundscape of a workplace may be artificially augmented with streams of information that might be of interest to those working in the space. By carefully altering the structure-borne sound of a keyboard, which here stands for an everyday computer interface, information on the current weather situation is overlaid to the environment's existing soundscape. This auditory augmentation alters according to the readings of environmental sensors. The worker therefore gets a subliminally perceived hint about the current weather conditions outside his office.

Adding an auditory augmentation to structure-borne sounds means to insert a thin layer between people's action and an object's natural auditory re-action. This auditory augmentation is designed to be easily overlaid to existing sounds while it does not change prominent and, perception-wise, essential auditory features of the augmented objects. In a peripheral monitoring situation as it can be found at a workplace, the data representation therefore tends to be below the user's conscious perception. A characteristic change in the data stream, however, will likely claim the user's attention.

The exhibited setup shows the capabilities of auditory augmentation by using the example of several weather scenarios. Visitors can switch between these setups and experience how the keyboard's sonic characteristic changes when they type.

René Tünnermann is a research associate at the Ambient Intelligence Group at the Cognitive Interaction Technology Center of Excellence at Bielefeld University (CITEC). He studied science informatics at Bielefeld University. During his studies he worked as a student worker at the Neuroinformatics Group of Bielefeld University and the Alignment in AR-based cooperation project of the CRC673-Alignment in Communication. His research focus lies with tangible interfaces and interactive surfaces.

Till Bovermann is a researcher, artist, and engineer currently exploring tangible and auditory interfaces as a researcher at the Media Lab Helsinki, where he leads the TAI Studio. He has worked at various institutes within Bielefeld University, Germany, and most recently in the Ambient Intelligence Group of the CITEC Cognitive Interaction Technology Center of Excellence. He has also taught at the Institute for Music and Media of the University of Music Düsseldorf and the Generative Art class at UdK Berlin. His professional background is in Computer Science with a focus on Robotics. He received his PhD developing tangible auditory interfaces. Till Boverman's artistic works are mostly concerned with the relationship between digital and physical space. He is co-founder of TooManyGadgets, a media art group that tries to illuminate this relationship. Their most recent project "...between..." was exhibited at the Nacht der Klänge at Bielefeld University. In addition to his work with TooManyGadgets, Till has created installation pieces in conjunction with Animax, Bonn. Alongside his artistic and academic work, Till also develops software, mainly in SuperCollider.

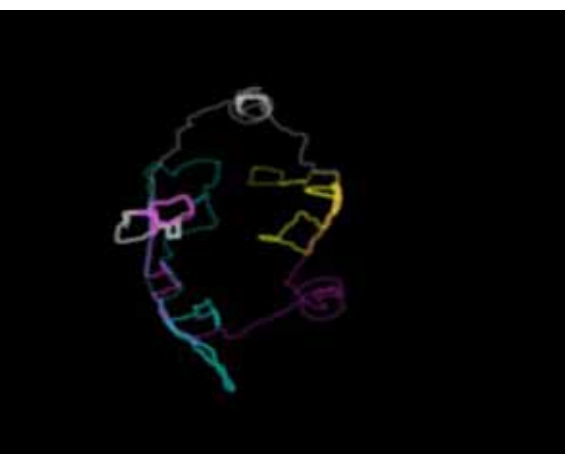
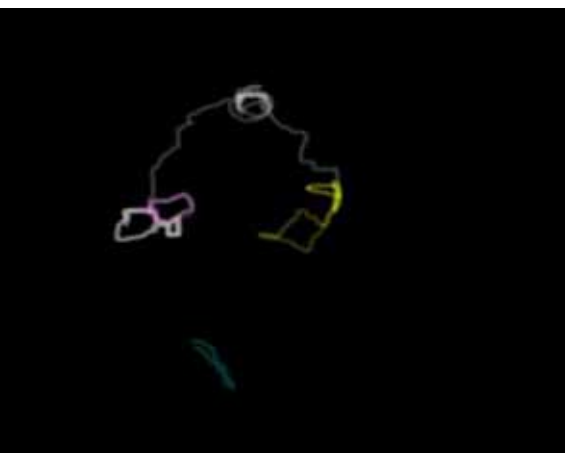
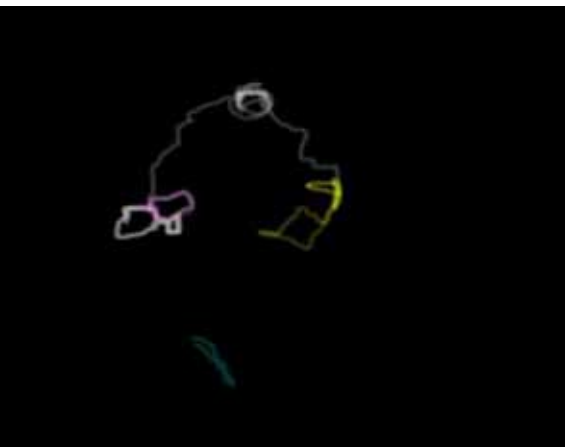
Dr. Thomas Hermann studied physics at Bielefeld University. From 1998 to 2001 he was a member of the interdisciplinary Graduate Program "Task-oriented Communication". He started the research on sonification and auditory display in the Neuroinformatics Group and received a Ph.D. in Computer Science in 2002 from Bielefeld University (thesis: Sonification for Exploratory Data Analysis). After research stays at the Bell Labs (NJ, USA, 2000) and GIST (Glasgow University, UK, 2004), he is currently assistant professor and head of the Ambient Intelligence Group within CITEC, the Center of Excellence in Cognitive Interaction Technology, Bielefeld University. His research focus is sonification, datamining, human-computer interaction and cognitive interaction technology.

<http://tangibleauditoryinterfaces.de/index.php/tai-applications/auditory-augmentation/>



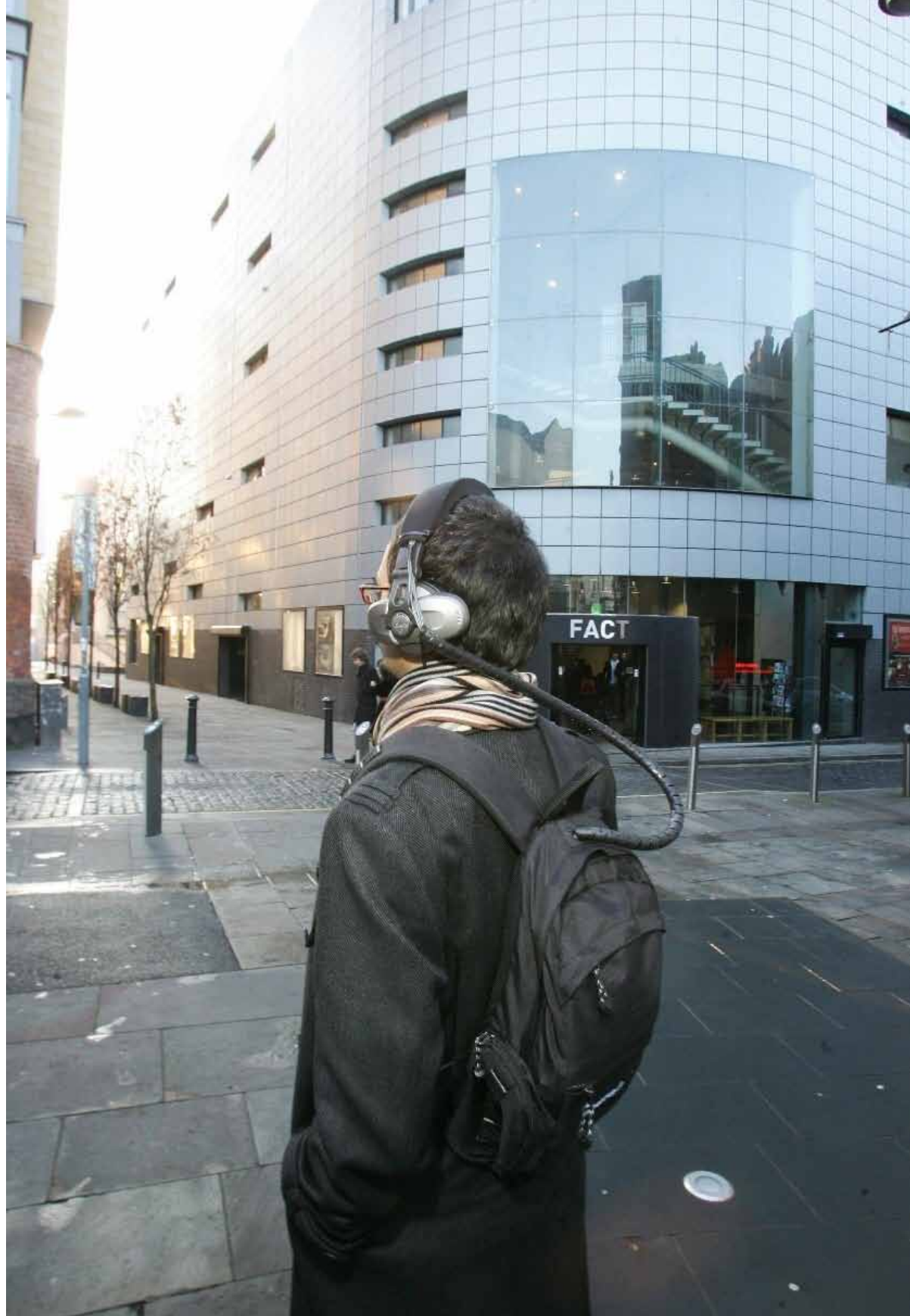


The sound of the user's typing changes depending on the real-time weather.



aura: the stuff that forms around you

aura: the stuff that forms around you outside FACT, Liverpool, UK, 2009



Aura : The stuff that forms around you (Steve Symons), 2007

Walk around town with this gps-enabled 'aura' backpack and headphones to experience a unique sound world - but be aware that you destroy the world as you listen to it, in fact you hear the degraded landscape created by other users' walks.

Aura is a located sound project that explores notions of consumption and ownership by allowing users to effect an audio landscape as they move within the Real World. Your movements are tracked by GPS as you explore the outdoor area near the gallery which is then layered onto a record of all the previous users', this map is used to generate surround sound. You can hear the resulting eroded landscape, left to right and front to back.

Imagine a playing field after a fresh falling of snow. The snow lies evenly and untrodden. This represents an empty aura sound world and, if you wore an aura backpack, would sound like soft pink noise balanced with a gently undulating hum. Someone walks across the field leaving footprints, the snow is sullied, eroded, the walker has left a patina in the world. In the aura world this patina is first represented by shifts in the intensity and changes in filtering; the audio moving as you cross the footprints. As more people walk in the world the sound becomes more and more fragmented and distorted, leaving smaller and smaller pockets of unconsumed beauty.

This artwork is positioned in the field of the emerging history of mobile audio projects and locative art forms; the work is also considered as systemic art practice.

"Aura - The stuff that forms around you" was premiered at the Enter Festival, Cambridge, UK in April 2007, and described in Creative Review as the best and most subtle work shown. Since then it has been exhibited at Ding Dong, FACT, Liverpool and ISEA09, Belfast.

Steve Symons is a sound artist known for an innovative series of sonic augmented reality projects titled 'aura' and as a member of the award winning Owl Project.

He creates digital systems for his own use, which are often released for artists and musicians as free and open-source tools, and is currently extending this process to include commissioning artists to make new content for the systems he has created, thus challenging traditional notions of artist, maker and producer. These activities operate under the guise of muio.org; an art and technology interface consultancy he set up to facilitate his artistic practice and exploit the technology created in its realisation.

Owl Project is a three person collaboration (Steve Symons, Simon Blackmore and Anthony Hall) who make and perform with sculptural sonic interfaces that critique human desire for technology. Nominated for the Northern Art Prize and awarded the Best of Manchester 2009, Owl Project (along with production manager Ed Carter) hold one of the Artists Taking the Lead commissions as part of the Cultural Olympiad.



An example of the visualisation of the scientific data in Crush-2.



Crush-2 (Natasha Barrett & Karen Mair), 2011

Crush is an interactive sound-art installation exploring the microscopic forces released during the process of crushing rock.

Crush involves 3D electroacoustic sound, a loudspeaker array, wireless headphones and a motion tracking system. In this installation, the audience can move through a virtual, immersive space, experiencing the dynamics of deformation from “inside” the rock.

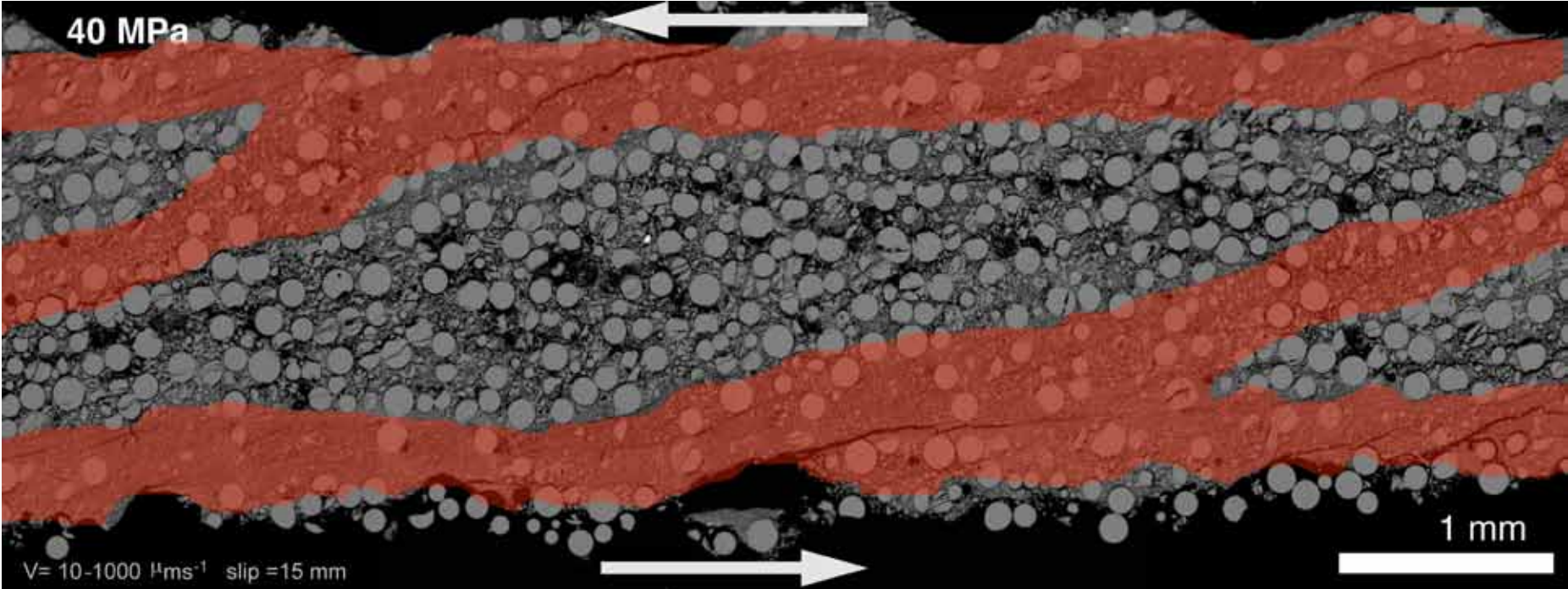
The installation draws from two research projects at PGP (Physics of Geological Processes in Oslo): 3D numerical simulations of grain fracture and fault gouge evolution during shear - the work of Steffen Abe (Aachen) and Karen Mair (Oslo), and the study of real acoustic emissions from granite, basalt and sandstone under compression - the work of Alexandre Schubnel (Paris).

The first test version of Crush was installed in the SAS Radisson hotel in Oslo as part of the Nordic Geological Winter meeting in January 2010. This first version used two attached spaces and involved an interactive video and still imagery. The version designed for SID is intended for one space and focuses on sound alone.

Science, sonification and artist process

Work on Crush began with the accurate sonification of data from simulations and real acoustic emissions. Subsequent stages involved degrees of abstraction through the choice of sound material, data mapping rules, interaction design and material montage. Maintaining a tight correlation between 3D sound and the patterns and processes found in the geological systems was an important consideration. In the final work, micro-scale processes are enlarged into a dynamic system audible through sound colour (timbre), texture, shape and spatial geometry.

A selection of ultrasonic recordings from different rock samples were transposed into the audible range and used as sound material in Crush. In addition, the artist made audible range recordings of rocks being crushed, scraped and generally destroyed. Parameters such as sound type, volume, transience, frequency, filter, pitch shift, grain, continuation, resonance and spatial location were mapped in various ways to the source data parameters such as fracture magnitude, fracture location and spatial displacement. Data reduction and elaborate mapping were also part of the process. The development of Crush was carried out during a work grant from the Norwegian Komponistenes Vederlagsfonds.



A visualisation of the scientific data that informs 'Crush-2': "Initially monodisperse granular layer under shear in the laboratory"

The interactive system and the installation space

The installation space comprises a loudspeaker array and seven targets of infrared light constellations. A custom-made motion tracking system allows each user to physically navigate through the 3D sound composition. The users wear head-mounted 3D accelerometers, gyroscopes and an infrared camera. The seven targets of infrared light constellations surround the interactive space and actively recalibrate drift from the accelerometers and gyroscopes. Motion data is sent to a computer over Bluetooth and processed to render the users' position and direction of view. This information is used to modify the spatial sound. For the person wearing the headset, the 3D sound is rendered using head-related transfer functions (HRTFs) over wireless headphones. For other visitors, sound is decoded over the loudspeaker array using ambisonics.

Dr. Natasha Barrett has performed and commissioned throughout the world. She has collaborated with well-known ensembles, scientists and designers, electronic performance groups and festivals. Her output spans concert composition through to sound-art, often incorporates latest technologies and includes a major work for the Norwegian state commission for art in public spaces. Barrett holds an MA and PhD from Birmingham and City University, London. Both degrees were funded by the humanities section of the British Academy. Since 1999 Norway has been her compositional and research base for an international platform. Her composition has received numerous recognitions, most notably the Nordic Council Music Prize (2006) For more information: <http://www.natashabarrett.org>

Dr. Karen Mair is a senior research scientist at the Center for Physics of Geological Processes at the University of Oslo (2005-present). She holds a BSc (Hons) in geophysics (93) and PhD in rock mechanics (97) from the University of Edinburgh. She carried out a postdoctoral fellowship in earthquake physics at MIT (97-00) and held a prestigious Royal Society Dorothy Hodgkin Fellowship (00-04) at the Universities of Liverpool, Toronto, Edinburgh and Queensland. Karen's research involves conducting novel experiments, geological fieldwork and computer simulations to investigate the mechanics of earthquakes and faulting: how things break in the earth. <http://folk.uio.no/karenmai/>



KII - Voicetopological Interface (Michael Markert), 2007

The audiences' hands form specific gestures that imitate the opening of the mouth while speaking, and these are translated into a kind of voice.

KII (Kempelen 2.0) is a voice-topological interface for gestural navigation in linguistic space. The hands serve as speech organ during the articulation process. By using sensors, the device determines how opened both hands are, their position in space and their relative height. These and other parameters are then assigned to the jaw and tongue position in the mouth as well as to pitch and rhythm. A gesture imitating an open mouth would produce a sound reminiscent of a spoken 'aaaa', for example.

Phoneme production is based on phonetic laws. The implementation of musical scales and speech rhythms produces a spoken language. Their context of meaning is not characterized by the conveyance of information, but by the abstraction of the voice in the tonal linguistic space. Articulatory-topological phonetics deals with the speech process – parts of the body serve as speech organs during the articulation process. It is therefore historically linked to Kempelen's motif of speech generation for the voiceless: voice generation for the speechless.

When we speak or sing, we typically also produce other articulations of various body parts, such as gestures. The artist's research focuses on articulations of behaviour, posture and expression that are part of human speech. This work does not aim to reproduce meaning as source of communication, but to generate behaviour by interaction. The electronic voice is not intended to imitate, but to be an instrument. To distinguish this work from original speech, no original voices are used. Instead, high quality realtime speech synthesisers create the voices. The object is self-contained and also includes the speaker. In exhibitions it is typically placed on a plinth. The installation object is a cybernetic automat to generate system transcendent kinetic energy.

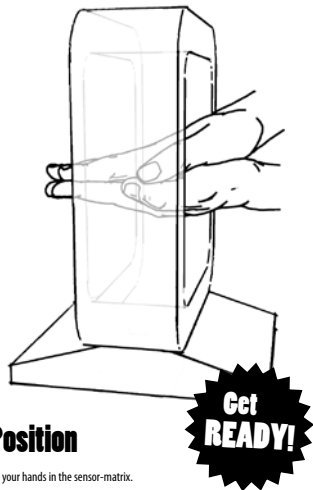
Michael Markert is a media-artist and musician specialising in programming and electronics. He lives in Nuremberg, Germany. His research in intuitive musical interfaces started with a diploma in Multimedia and Communications Design. Since then, he has developed various interactive sensory devices which he has used for installations and as musical instruments. His work focuses on exploring harmonic musical control through intuitive realtime sensory processing and cybernetic interaction systems, thereby overruling hierarchic mechanisms of reception in art.

Since 2005 he has been a member of the Urban Research Institute for Public Art and Urban Ethology (Intermedia), founded by Georg Winter. In 2008 he graduated with a second diploma at the College of Fine Arts Nuremberg and is currently teaching at the College of Fine Arts in Nuremberg and at the Bauhaus University Weimar, in the Faculty of Media

www.audiocommander.de

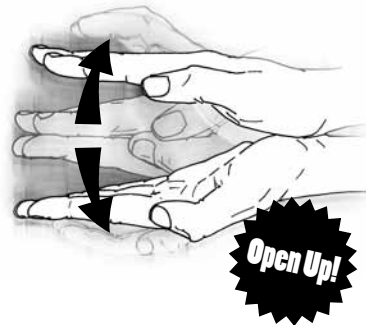


The audience interacting with the work while on display at the ZKM (Centre for Art and Media, Germany)



1. Position

Position your hands in the sensor-matrix.
Positionieren Sie Ihre Hände im Sensor-Rahmen.
Helyezze mindkét kezét a szenzor-keretbe.



2. Open & Close

Open and close your hands in order to open and close the jaw.
Öffnen und schließen Sie die Hände um die Kieferöffnung zu ändern.
Két kezének nyitásával és összehúzásával változtassa az állkapocs nyitottságát.



3. Speed & Height

Vary speed and position (e.g. height) while keeping your hands open.
Variieren Sie Geschwindigkeit und Position (z.B. Höhe). Halten Sie dabei Ihre Hände geöffnet.
Változtassa a sebességet és a helyzetet (pl. Magasság). Tartsa közben nyitva a kezeit.



4. Tilt & Roll

Tilt your hands to the left and to the right in order to change the position of the tongue.
Kippen Sie Ihre Hände nach links und rechts um die Position der Zunge im Mund zu ändern.
Döntse balra majd jobbra a kezeit, így változtatva a nyelv helyzetét a szájban.



VOICETOPOLOGICAL INTERFACE kII
STIMMTOPOLOGISCHES INTERFACE kII · HANGTOPOLOGIAI INTERFÉSZ kII

kII (Kempelen 2.0) is a voice-topological interface for gestural navigation in linguistic space. The hand serves as the speech organ during the articulation process. The device is operated by means of the sensory determination of the opened state of both hands, their position in space, their relative height, and other parameters which are assigned to the jaw and tongue position in the mouth as well as to pitch and rhythm. Phoneme production is based on phonetic laws. A spoken language is produced through the implementation of musical scales and speech rhythms whose context of meaning is not characterized by the conveyance of information but by the abstraction of the voice in tonal linguistic space.

Articulatory-topological phonetics deals with the speech process – parts of the body serve as speech organs during the articulation process. It is therefore historically linked to Kempelen's motif of speech generation for the voiceless: voice generation for the speechless.



Translations: Rebecca von Dyck, József Mihály. Speech-Technology by Magnification Speechkit. kII runs AMBP and MIDI, an open source hard- and software platform for microcontrollers (developed by T.Kösz, mlabbox.org). Additional schematics, circuits and the kII application software (IPC18 source-code) have been published under a GPL License by the Author Michael Markert on mlabbox.org and audiocommander.de.



kII (Kempelen 2.0) ist ein stimmtopologisches Interface zur gestischen Navigation im Sprachraum. Bei der Lautbildung des Sprechvorgangs fungiert die Hand als Sprechorgan. Die Bedienung erfolgt durch die sensorische Ermittlung des Öffnungszustandes beider Hände, der Position im Raum, der relativen Höhe und anderer Parameter, die der Kiefer- und Zungenposition im Mundraum sowie Tonhöhe und Rhythmus zugeordnet sind. Die Phonemerzeugung beruht auf phonetischen Gesetzen. Durch die Implementierung musikalischer Skalen und Sprech-Rhythmik entsteht eine Lautsprache, deren Sinnzusammenhang sich nicht durch den Informationstransport sondern die Abstraktion der Stimme im tonalen Sprachraum erschließt.

Die artikulatorisch-topologische Phonetik beschäftigt sich mit dem Sprechvorgang, bei dessen Lautbildung Körperteile als Sprechorgane fungieren – und knüpft somit historisch an Kempelens Motiv der Spracherzeugung für Stimmlose in abstrahierter Weise durch Stimmerzeugung für Sprachlose an.

A kII (Kempelen 2.0) hangtopológiai interfész a nyelvi térben végzett gesztusnavigáció céljait szolgálja. A nyelvi folyamatban a hangképzés során a kéz beszédszervé válik. A készülék a kezek nyitott állapotának, térbeli helyzetének, relatív magasságának és egyéb paramétereknek a szenzoros mérésén alapul, mely paraméterek az állkapocs és a nyelv helyzetének, illetve a hangmagasságának és a ritmusnak felelnek meg. A fonémaképzés fonetikai törvényszerűségeken alapul. A zenei skálák és a beszédritmus implementálása révén hangos beszéd jön létre, melynek összefüggérendszeré nem az információ továbbításából, hanem a hangnak a nyelvi térben lezajló absztrakciója nyomán alakul ki.

Az artikulált-topologikus fonetika egy olyan beszéd folyamat része, amelyben a testrészek egy idegen nyelv hangjait képzik, és ennek megfelelően történetileg kapcsolódik Kempelen azon szándékához, hogy reprodukálja a beszédet a beszédhanggal nem rendelkezők, a süketnémák számára.



5. Advanced Techniques

Try out advanced techniques. Listen to the language. Take your time.
Probieren Sie fortgeschrittene Techniken aus. Hören Sie auf die Sprache. Nehmen Sie sich Zeit.
Próbáljon ki összetettebb mozgásokat. Figyeljen a nyelvre. Ne sajnálja rá az időt.



VOICETOPOLOGICAL INTERFACE kII
STIMMTOPOLOGISCHES INTERFACE kII · HANGTOPOLOGIAI INTERFÉSZ kII
Michael Markert - www.audiocommander.de

This handout explains what kind of gestures produce what kinds of sounds and is distributed to the audience at exhibitions



MindBox (Christian Graupner, Roberto Zappalà, Norbert Schnell & Nils Peters), 2010

The audience operates the levers and buttons of a modified one-armed-bandit and thereby re-mixes the pre-recorded music-video of a beatboxer that is displayed on three large screens and by speakers above the machine.



MindBox is an intuitive audiovisual musical instrument, which aims to break barriers between players, performers and audience. The media slot machine allows for musical re-interpretation of sounds and images. It gives access to expressive parameters while at the same time preserving the character of the pre-recorded performance material.

There are two choices for the audience: They can either let the instrument autonomously generate variations, or they can interact with the installation and take over the audio-visual & musical control.

Players can stay in a consistent and continuous flow while switching between both modes. The installation is based on the artist's H.RP or 'Humatic Re-Performing' concept.

The intuitive interface of the vintage slot machine, the music-video style beatboxer, and the playful, tactile interaction engage the audience while playing or observing the installation.

Christian Graupner is a Berlin-based artist, film composer, and guest artist at ZKM Karlsruhe. His earlier works include drawings and experimental electronic music. In 2000 he and Nils Peters formed the independent artist group and production company Humatic. In his latest work, Christian explores the practices and myths around pop and contemporary music. He combines multiscreen videos and multichannel sound with mechanisms that are partly controlled by machines and partly user-controlled 'humatic' interfaces and mechanisms. His recent sculptural / media work includes gambling machines and asian mojo figures, feedback guitars and beatbox-like vocal and dance performances. In processing visual and audio material, he uses and adapts available computer programs, but also uses software coded by his project collaborators. His work has been shown and performed worldwide.
<http://www.humatic.de/cv/cg.html>



Roberto Zappalà founded the Compagnia Zappalà Danza in 1989 to widen and deepen his own research in choreography. Since then, he has created more than 25 pieces that have been presented throughout Europe, South America and the Middle East. He is the artistic director of the Scenario Pubblico performing arts center in Catania, Sicily.

Norbert Schnell studied telecommunications and music and worked at the Graz Institut für Elektronische Musik (IEM) as a developer and projects adviser. In 1995 he joined the Real-Time Systems team at IRCAM (Institut de Recherche et Coordination Acoustique/Musique) in Paris. He is involved in international scientific and artistic projects. In 2006 he chaired the NIME (new Interfaces for Musical Expression) conference.

Nils Peters is a software artist. Starting off with music, his work has taken him to fields such as installation, theater and performance. He joined machinery art ensembles such as Dead Chickens and BBM, where he combed music and robot sequencing. With Humatic he developed a patented realltimemultimedia sequencing environment. He received several grants for his projects. His musical work has been published by the Academy of Arts, Berlin.

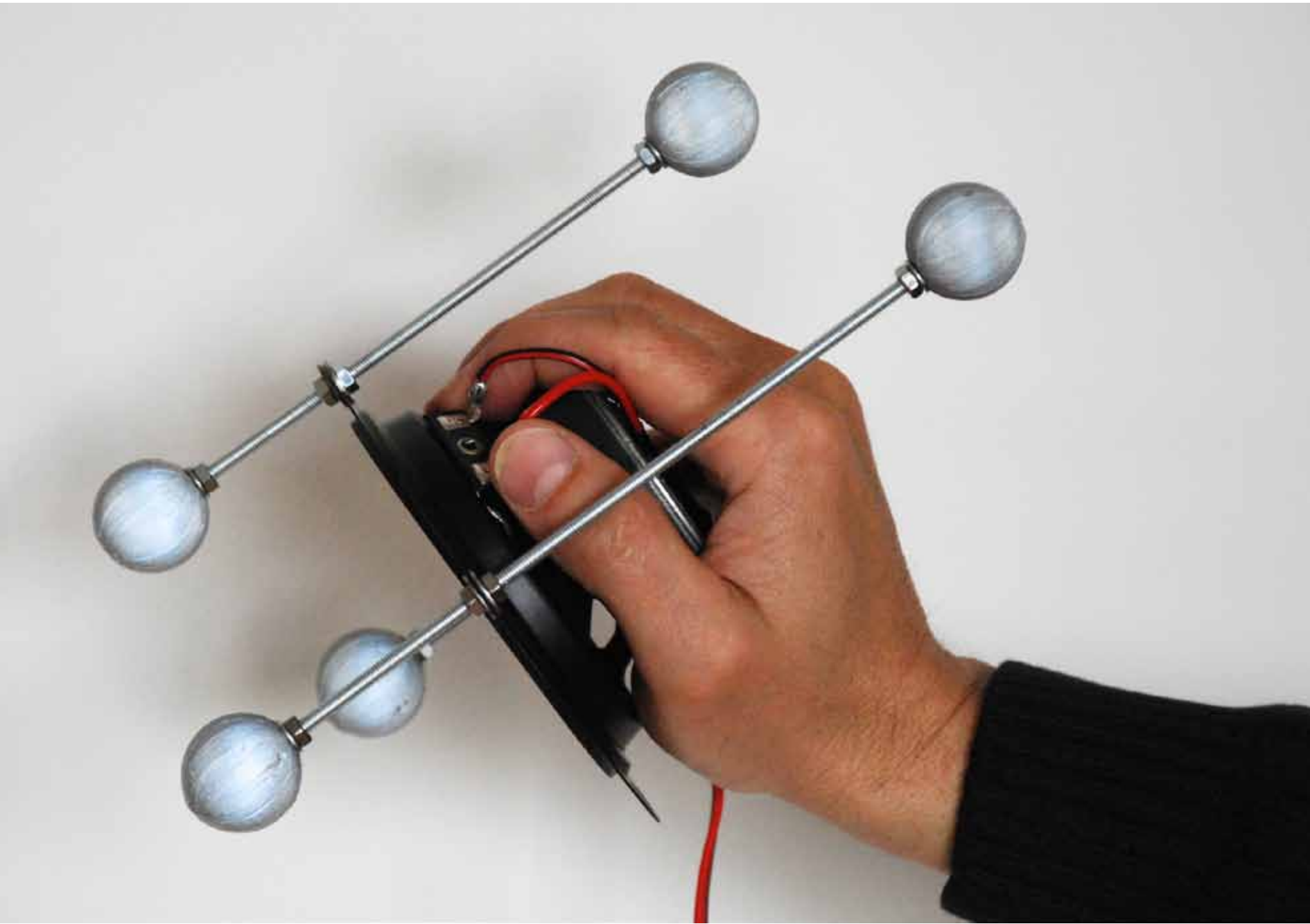


A group interacting with and observing the MindBox



1MindBox: Playing the mindbox: operating the levers and buttons of the vintage slot machine to remix the beatboxing music video. Copyright Loesel.





Random Access Lattice (Gerhard Eckel), 2011

Using a hand-held device with speaker, the audience in this installation interactively explores a virtual sonic sculpture constructed from speech recordings, arranged in a three-dimensional lattice structure.

Random Access Lattice is a sonic sculpture exploring the relationship between sound and motion, especially with respect to the idea of audio recording. Like any writing process, audio recording is dependent on the concept of motion, the principle linking time and space. In the recording process, the volatile temporal phenomenon of sound is transposed into a persistent spatial structure. Playback reverses this transposition by tracing the spatial structure, exerting a particular motion in order to recreate the temporal phenomenon of sound.

With his seminal 1967 work Random Access Music, Nam June Paik exposed the implications of the sound tracing motion in an installation to the gallery audience. He glued recorded magnetic tape on the gallery wall, creating an interactive visual and sonic artwork that the audience explored by means of a hand-held tape head. Moving the head over the tape (re)produced the (recorded) music. Speed and direction of the movement determined the kind and degree of transformation of the recorded material. The slower the lower and the faster the higher the material sounded. Through their bodily motion, Paik granted the audience random (as opposed to sequential) access to his music.

In Random Access Lattice the link between speed and pitch is suspended by using a sound granulation technique allowing the audience to play an audio recording at different speeds without changing its pitch. Apart from applying this technique, Random Access Lattice differs significantly from Paik's work in two other respects. Firstly, the sound is stored along each of the Cartesian axes of a three-dimensional lattice structure filling a cube (see image). Whereas Paik's work extends the one-dimensional structure of the tape recording to a two-dimensional assemblage – a field of sound allowing for random access, Random Access Lattice offers a densely packed crystalline structure that can be explored through unconstrained body motion in space. It does not restrict the movement to a surface. This is achieved by using an optical tracking system, which determines the position of a hand-held virtual sound head. Secondly, the sound head and the loudspeaker are made one and the same object. They form a hand-held tracked sensor/actuator which, when moved, reproduces the sound at the virtual location where it is stored in the lattice. Storage and reproduction location coincide, which underlines the spatial structure of the sound container realized with Random Access Lattice.

The space the audience explores is so densely packed with sound, that only the most controlled motion will allow for a meaningful navigation through the maze of multilingual voice recordings. By thus constraining the bodily movement, the focus is put on the relationship between motion and sound. The recordings used – human voices, also produced by bodily motion, but of a different kind and on another time scale – carry the potential of inducing an intense bodily resonance in the audience.

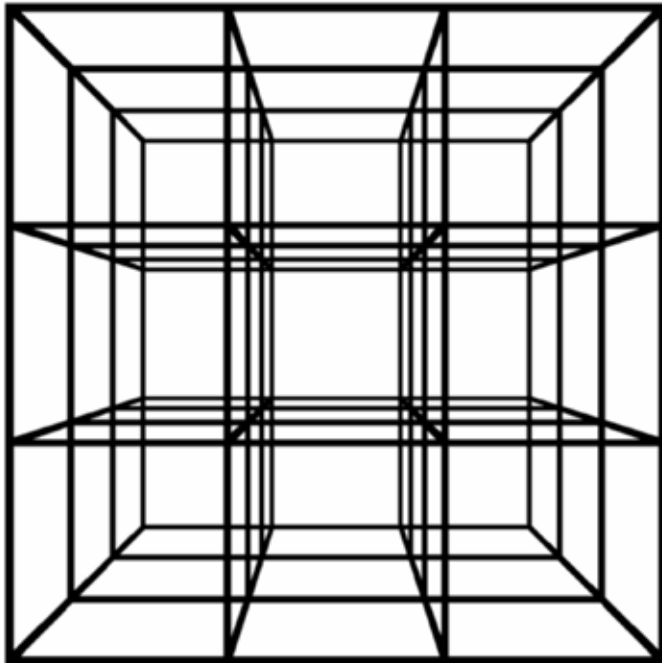


A sequence of stills from a video where the artist interacts with the prototype of the installation.



Gerhard Eckel (born 1962 in Vienna/Austria) is a full professor of Computer Music and Multimedia at the Institute of Electronic Music and Acoustics (IEM), University of Music and Performing Arts in Graz/Austria. Eckel holds a PhD in Musicology from the University of Vienna and studied Composition of Electroacoustic Music as well as Sound Engineering at the University of Music and Dramatic Arts Vienna. In the past Eckel worked at IRCAM, the computer music department of the Pompidou Centre in Paris and at the Fraunhofer Institute for Media Communication IMK in St. Augustin, Germany.

Eckel takes both an artistic and scientific interest in matters of sound. His research topics range from psychoacoustics, over sound analysis, visualization, processing, spatial rendering and synthesis to virtual and augmented reality systems. His artistic work focuses on the possibilities of installations to convey formal openness to the audience in a tangible way. He creates sound and music installations for real and virtual spaces, which are presented at international festivals, conferences and trade fairs. He initiated and coordinated the European project LISTEN, which defined and explored Immersive Audio-Augmented Environments from a scientific and artistic perspective. In a recent artistic research project he developed a new form of intermedial expression: Embodied Generative Music. His current artistic research project (The Choreography of Sound) funded by the Program for Arts-based Research of the Austrian Science Fund FWF explores the spatial in electroacoustic composition. Currently he works as a Guest Professor at the KTH Music Acoustics Group in Stockholm, where he investigates the possibilities of establishing a connection between the articulatory movements of the human vocal organs and body motion in dance.



An illustration of the lattice referenced by the artist



SonicChair Sensor lay-on attached to a standard office chair.



Controller-box - switches have meanwhile be replaced by less error prone hidden magnetic contacts.



SonicChair (Thomas Hermann & Risto Kõiva), 2008

This interactive office chair gives auditory feedback that encourages users to be more dynamic on their chair.

The interactive sonification of tacTiles used on an office chair can provide auditory feedback that triggers users to be more dynamic and flexible on the chair. This application of TacTiles is an interactive office chair that reacts to the movements of the office worker. The sonification of the chair user's movements could help reducing back problems in office work contexts.

TacTiles are a wireless modular tactile sensitive surface element that can be laid on the floor or furniture and can be used for a variety of applications. They can be used as interface for human-computer interaction or ambient information systems. The system can be used for real-time sonification for process monitoring and biofeedback. Future applications could include pairing tacTiles with sonification for games.

Thomas Hermann studied physics at Bielefeld University. From 1998 to 2001 he was a member of the interdisciplinary Graduate Program "Task-oriented Communication". He started the research on sonification and auditory display in the Neuroinformatics Group and received a Ph.D. in Computer Science in 2002 from Bielefeld University (thesis: Sonification for Exploratory Data Analysis). After research stays at the Bell Labs (NJ, USA, 2000) and GIST (Glasgow University, UK, 2004), he is currently assistant professor and head of the Ambient Intelligence Group within CITEC, the Center of Excellence in Cognitive Interaction Technology, Bielefeld University. His research focus is sonification, data mining, human-computer interaction and cognitive interaction technology.

Risto Kõiva studied at the Faculty of Information Technology of the Tallinn Technical University (Estonia), where he received in 2000 a diploma in Computer Control and Automation (with honors). After some years of experience in industry, he is currently pursuing a PhD program in Computer Science at the Neuroinformatics Group (AG Neuroinformatik) of the Bielefeld University. His fields of interest are sensors, robotics and computer control. Concurrently he is responsible for the Center of Excellence in Cognitive Interaction Technology, Bielefeld University (CITEC) workshop. In his spare time he is an excited R/C modeler, mostly interested in helicopters.

Presentation at Nodar Artist Residency, Portugal 2009. ©photo: Satoshi Morita





Sonic Helmet / Klanghelm (Satoshi Morita), 2008

Wearing this helmet allows you to experience 3-D sound in two ways at once: by listening to the sounds with your ears, and by feeling vibrotactile stimulations that are mediated through your skull.

Our experience of sound is not only about hearing and listening. “Klanghelm / Sonic Helmet” is a wearable sonic object, intended to be worn on the head. A three-channel sound system creates an intimate three-dimensional sound field and vibrotactile stimuli on your skull. Several sound artists and electroacoustic musicians have contributed their compositions for the Sonic Helmet.

This work deals with the issue of inter-sensory sonic perception. It is more an object than an installation, as the object itself creates the audio-tactile sonic experience without the sound being mediated into the surrounding space. The Sonic Helmet enables the audience to experience sound composition through the sense of hearing as well as through the sense of touch. The vibroacoustic stimulation of sound being played close to your ears is mediated directly to your skull. The SonicHelmet could be called a true ‘headphone’, as it involves the whole head. In addition to transmitting sound via the air, sound is mediated through the head (skull) physically, so that the multi-modal aspect of sound is perceived. The Sonic Helmet plays sound in a unique three-dimensional sonic field – not only in a horizontal way, but also vertically. Overall, the vibroacoustic stimulation supports another layer of sonic reality.

Satoshi invites electroacoustic musicians to create new pieces for this intimate audio-tactile sound experience of the SonicHelmet and some of these will be featured at the SID exhibition.

Satoshi Morita (1974, born in Tokyo) deals with the issue of “bodily listening” in his practice, and focusses on multimodal aspect of sound, which involves auditory and tactile perception. A series of sonic objects produced by him create a multi-modal sonic experience of the inner (kinaesthetic) and outer (auditory) spaces of the body.

Tactile information is sensed by mechanoreceptors on different parts of the body and transmitted to the brain via the spinal cord and neural network. Different to the other sensory modalities, tactile perception responds to receptor input from nearly the entire corpus. The multi-channel sound system used in Satoshi's work provides tactile stimuli by vibrotactile transducers on different locations of the body, as well as creating a three-dimensional sound field for the auditory channel. Sound material for the sonic objects are composed to gain corporeal sensitivity for audio-tactile perception regarding musical parameters such as frequency, intensity, rhythm, etc.

His experience at different artist-in-residence programs has given him opportunities to observe the diversity and uniqueness of sound in the environment, for instance as Nodar artist in residence in Portugal (2009).

Satoshi's works have won several prizes, such as a Honorary Mention from Prix Ars Electronica (2008). His works have been exhibited internationally including: BIORHYTHM – Music and the Body, Dublin, (2010), Sound Travels, NAISA, Toronto (2010), Device_art 3.010, Tokyo (2010), Kapelica Gallery, Ljubljana (2010), CyberArts 08- Ars Electronica, Linz (2008), paraflows 08, Vienna (2008), Touch Me Festival, Zagreb, (2008).



vibrotactile stimuli



auditory stimuli

The transmission of the auditory and tactile stimuli in the Sonic-Helmet. ©photo Satoshi Morita



The sonic field of the SonicHelmet. ©photo Satoshi Morita



Exhibition view at paraflows 2008, Vienna. ©photo Satoshi Morita





User swinging the Swinging Suitcase, Banff, Alberta, June 2010. Image courtesy of p|m Gallery, Toronto



*User with the Swinging Suitcase, Wildflour Café, Banff, Alberta, June 2010 (video still)
Image courtesy of p|m Gallery, Toronto*

*Suitcase, Arduino boards, waveshields, accelerometers, speakers. Produced in sets of two 54 x 38 x 15 cm.
Image courtesy of p|m Gallery, Toronto*



Swinging Suitcase (Jessica Thompson), 2010

Swinging suitcase is a portable sound piece that generates and broadcasts the sound of a flock of house sparrows in response to the act of swinging.

Each Swinging Suitcase consists of a vintage hard-shelled suitcase containing accelerometers, microprocessors and flash memory cards containing short sparrow vocalizations. When a suitcase is picked up, the birds begin to make noise, which calibrates to reflect movement – accelerating and multiplying in response to the gesture of the user.

The vocalizations in the Swinging Suitcase are constructed from sixty different source clips of house sparrows, which are arranged into responses that range from single chirps to social chatter to scolding. As the suitcase is swung, the tracks are played in relationship to how the suitcase is being moved and for how long.

While we understand that machines do not have feelings, if an event occurs that triggers a deeply ingrained social behavior, we will automatically respond according to the ingrained social conventions that we know. In the case of the Swinging Suitcase, reciprocal behavior is triggered through a user's initial encounter with the piece: grasping and lifting the suitcase is intuitive. However, when the user picks up the piece, the first bird chirrup. An everyday action triggers a sound that is instantly recognizable - and this triggers the suspension of disbelief and an almost universal sense of delight. Since we know that most birds are small, it is plausible that there is a bird inside the suitcase.

The piece is designed to be 'just intuitive enough' – while the 'birds' do 'respond' to motion and gesture, there is still a layer of unpredictability in the interaction model that helps to anthropomorphize the piece, and to create a reciprocal dialogue between body, artwork and site. Interaction becomes confounded when the gestures of the user become repetitive and the vocalizations become more complex – the 'birds' become restless, and as you 'play' the birds, the birds 'play' you.

By bringing birds through different places, especially those places where birds should not be, the Swinging Suitcase may initiate dialogues with passersby, shift the acoustic ecologies of shared public spaces, or be used for performative intervention, trickery, or play.

Jessica Thompson (b 1975, Toronto, Canada) is a new media artist whose projects facilitate social interaction within public space through sound, performance and mobile technologies. Her work has been shown in exhibitions and festivals such as Art Basel Miami Beach (USA), ISEA 2006 (San Jose, CA), FINE/LINE (Denmark), the Conflux Festival (New York), Thinking Metropolis (Copenhagen), (in)visible Cities (Winnipeg), Beyond/In Western New York (Buffalo) and the Deep Wireless Festival of Radio and Transmission Art (Toronto). Her projects have appeared in publications such as Canadian Art, c Magazine, Acoustic Territories, and numerous art and technology blogs. In 2011, Thompson will be a Senior Artist at Recycling Pervasive Media, Intervening in Planned Obsolescence and Practicing Technological Sustainability, a workshop hosted by the Banff Centre for the Arts.

<http://jessicathompson.ca/>



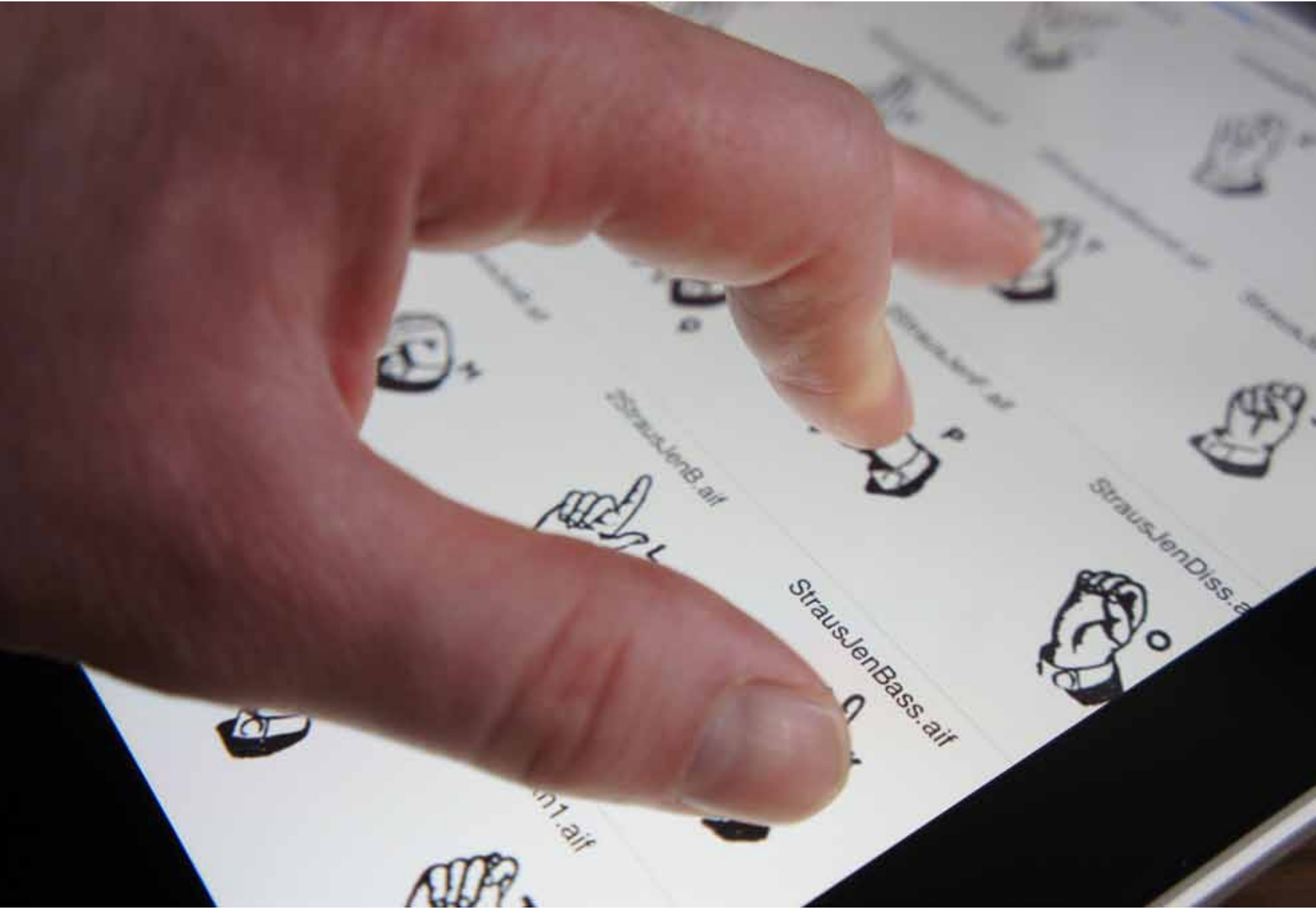
User playing with the Swinging Suitcase, Toronto, Canada (video stills). Images courtesy of p/m Gallery, Toronto





User playing with the Swinging Suitcase, Toronto, Canada (video stills). Images courtesy of p|m Gallery, Toronto





The development process of the work has been documented by the artist in this image of a prototype version of the piece.

The Movement I-X (Espen Sommer Eide), 2011

This audio-visual iPad app is a commissioned work for this exhibition that focusses on gestural interaction.

In addition to works selected on the basis of the open call, a new work by the Norwegian musician and artist Espen Sommer Eide has been commissioned for the exhibition. Entitled "The Movement I-X", the work will be in the form of a iPad multi-touch instrument, to be played by one or more users simultaneously. In the exhibition, two iPads allow for collaborative music creation. The app is still a work in progress as of this writing, but the following artists statement details the ideas and inspiration that is driving the development:

The hands and the fingers are the central manipulative organ of playing most musical instruments. A number of gestural and manipulating movements of the hand are used in playing: picking, fingering, grasping, touching, sliding and tapping are examples. On a hot summer's day in Tana, leaning over the side of the riverboat, I let my hand move through the water.

Each of the digits has its own name and movement range. The thumb, the index finger, the middle finger, the ring finger and the little finger, also called pinkie. Each finger may flex and extend, abduct and adduct, and so also circumduct. The hand consist of 27 bones.

The hand has always held a special position in evolutionary biology. The anatomist-neurologist-philosopher Sir Charles Bell, a contemporary of Darwin, was considered one of the greatest authorities on the nerve connection between the brain and the hand in his time. He began his famous Bridgewater treatise on the hand in 1833 by writing: "We ought to define the hand as belonging exclusively to man, corresponding in its sensibility and motion to the endowment of his mind".

Fingers and hands have been the focal point of all kinds of symbolism and allegories in the realms of culture and religion. The central idea in the ancient tradition of palm reading – palmistry – is that the connection between life and hand is so tightly interwoven that any events in someone's life simultaneously effects the person's hands. It forms lines that can be read as a language. But in d'Arpentignys 1839 version of palmistry, even the shape of the hand and fingers themselves are legible. The first finger is considered as the Dictator, the Lawgiver, the finger of Ambition. The shape of the second finger is an indicator of Melancholy. The length of the third finger indicates an extraordinary desire for Glory, Celebrity, Publicity and the like. The fourth, or little finger, if long is indicative of power of Speech and subtlety in choice of language. The thumb is in itself more expressive of character than any other member of the hand. D'Arpentigny wrote: "the thumb individualises the man".

"If my hand traces a complicated path through the air, I do not need, in order to know its final position, to add together all movements made in the same direction and subtract those made in the opposite direction. [...] It is, as it were, dove-tailed into the present, and present perception generally speaking consists in drawing together, on the basis of one's present position, the succession of previous positions, which envelop each other. "

– M. Merleau-Ponty, *Phenomenology of Perception*.

It is not consciousness which touches or feels, but the hand, and the hand is, as Kant says, "an outer brain of man".

In Hinduism, the gods reside in the fingertips. The tip of the thumb is occupied by Govinda, the forefinger by Mahldhara, the middle finger by Hrishikesa, the next finger (called the nameless finger) by Tri-vikrama, the little finger by Vishnu. In Roman mythology, the fingers themselves are corresponding to the gods, counting from the index finger: Jupiter, Saturn, Apollo and Mercury. In Buddhist iconography, every buddha is depicted with a characteristic gesture of the hands, the so-called "Mudras". These are a kind of religious-pedagogic language, that help reach various goals in meditation.

Sliders, buttons and knobs are the physical interaction interfaces of most electronic instruments. I want to rethink this paradigm in relation to touch screens, and give the various unique aspects of the hand the possibility to express themselves. The pinkie illustrates this point. It has the biggest range of sideways movement of the four fingers. This is reflected in the playing of classical instruments, for instance various flutes and the recorder, where this finger is used to reach two or more adjacent holes. On the trumpet, the tuning slider for those hard to reach notes is also operated by the pinkie. However, for some reason, the pinkie has never been given any special role in mainstream electronic interfaces. If we rethink this role for touchscreen interfaces, the smallest finger should become the most important one for sliding things around, maybe only rivalled by the thumb.

In magic, the gestures of the hands serve a dual purpose. They seek to confuse and distract the audience – to control their attention, but at the same time hide the rapid hand movement needed to do the trick itself.

Sometimes, the interaction between player and instrument is imagined as the instrument becoming part of his or her body. For example, a trumpet extending the mouth, or the accordion becoming something like a second stomach or lung. This is taken to its demonic extreme in the paintings of Hieronymus Bosch. In several of the famous scenes from Hell, instruments and humans grow together: a human being crucified on a harp or locked in a drum, the hurdy-gurdy (or wheel fiddle) - allegorically the instrument of the physical body - is being played automatically by an acrobat who lies on it, a woman who is trapped in the body of the hurdy-gurdy, is playing the triangle. Why make a musical instrument for the soul-less, cold, non-tactile, non-haptic touch-screen? Compared to other physical interfaces, it is lacking and limited in every respect. The touchscreen's one advantage is its connection to visual experience.

"In visual experience, which pushes objectification further than does tactile experience, we can, at least at first sight, flatter ourselves that we constitute the world, because it presents us with a spectacle spread out before us at a distance, and gives us the illusion of being immediately present everywhere and being situated nowhere. Tactile experience, on the other hand, adheres to the surface of our body; we cannot unfold it before us, and it never quite becomes an object. Correspondingly, as the subject of touch, I cannot flatter myself that I am everywhere and nowhere; I cannot forget in this case that it is through my body that I go to the world, and tactile experience occurs 'ahead' of me, and is not centred in me."

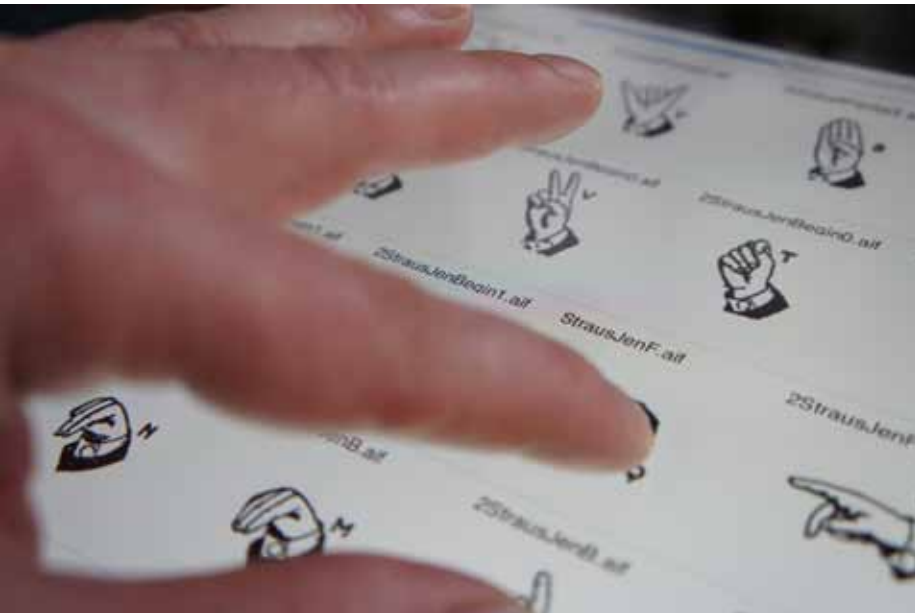
— M. Merleau-Ponty, *Phenomenology of Perception*.

The touch screen attempts to bridge this gap between the "here and now" of tactile experience's and the "everywhere and nowhere" of visual experience.

Ornaments in music require rapid finger movement. The paragon of speed. The thrills of the flute or the fiddle. Where does the main line end and the ornaments begin? Is the quality of the sound itself also ornamental? I want to make an instrument for the ornamental alone.

Espen Sommer Eide (Tromsø, 1972) is a musician and artist currently living in Bergen. He composes under the alias Phonophani, and as a member of the band Alog. Live he uses elaborate setups of custom made instruments, hybrids combining electronic and acoustic elements. He has several releases on the record label Rune Grammofon. Alogs album "Miniatures" was awarded the Norwegian Grammy-award (Spellemannprisen) in 2006. In addition to touring extensively with his musical projects, Eide also has produced a series of site-specific pieces and artworks, and is currently a member of the theatre-collective Verdensteatret, involved especially with building instruments and sounddesign.

Other works include composing and performing music for the 50-year anniversary of Le Corbusiers chapel in Ronchamp, France, building the sound art installation Sonus Barenticus for the Northern Lights Festival in Tromsø, Norway, and a special performance at the Manifesta7 biennale in Italy, where local vinyl records were reconstructed into new musical instruments. Recently he presented the work "Kreken", made for a custom built instrument, the "concertinome", at the GRM festival Présences Electronique in Paris. Eide has also been involved in a series of net-art projects with various topics connected to the Barents and arctic regions of Northern Norway, under the heading of "rural readers", including a permanent installation for the Eastern Sami Museum in Neiden, Norway. In addition to making music and art, Eide has also been directing the Trollofon electronic music festival in Bergen (2001-2006), and works as artistic developer at BEK (Bergen Center for Electronic Arts).





Thicket (Joshue Ott & Morgan Packard), 2010

By drawing on the iPad screen with your fingers, you create dense sonic and visual patterns within a space of warm, bright, rhythmic sound design and constantly evolving, bending, elegant scrawls.

The iPad application Thicket is an audiovisual world of texture, movement, line and tone. Thicket has a single, unified gestural interface for controlling both sound and picture. There are no knobs, sliders, or buttons. Thicket aims to be expressive and intuitive, working with the grain of the touch screen interface, and moving away from the point and click paradigm of traditional software interfaces.

Thicket is not a tool, it is a piece of art. Therefore, Thicket is not open-ended, and guides the user strongly toward a particular audio and visual aesthetic. Thicket's basic sound and visual palette is fixed, but the user has a freedom to explore within these fixed palettes.

The audience can download this software to their iPads and have to pay a small fee for this. At the Sonic Interaction design Exhibition, Thicket is installed on an iPad with attached loudspeakers for the audience to experience the piece.

Audio-Visual duo **Joshue Ott** and **Morgan Packard's** work, while often quite abstract, daring and experimental, is informed by the discipline, structure, and craft of their former study in more traditional art forms — figurative drawing, classical harmony and counterpoint, theater, jazz improvisation. The result is an immersive, engrossing multi-sensory experience with fascinating strength and agility.

Over the past several years, both Ott and Packard have emerged as exciting new voices in the experimental electronica and live cinema scenes, both as individual artists and as a collaborative duo. Recent highlights include performances at prestigious festivals: Mutek (Montreal, Canada), Plateaux (Torun, Poland), Communikey (Boulder, Colorado), a collaborative DVD release: "Unsimulatable", and an iPhone/iPad app: "Thicket".
<http://apps.intervalstudios.com/thicket/>

Curators

Trond Lossius

Trond Lossius is a sound and installation artist living in Bergen, Norway. He has collaborated on a large number of cross-disciplinary artistic projects, in particular sound installations and works for stage. His projects has been presented at major venues in Norway and abroad, including Dutch Electronic Arts Festival, World Wide Video Festival and Electrohype. He has contributed to several productions with the contemporary performance group Verdensteatret, winner of New York Dance and Performance Awards a.k.a. The Bessies 2005-2006 in the Installation & New Media category.

He graduated with a master degree in geophysics from the University of Bergen, and went on to study composition at The Grieg Academy. From 2003-2007 he was a research fellow in the arts at Bergen National Academy of the Arts. He is currently engaged in research and development at BEK, contributing to development of Jamoma, and is on the Local Committee of NIME 2011 and the Steering Committee of the European COST Action on 'Sonic Interaction Design'. He has formerly held a temporary position as Associate Professor at Bergen National Academy of the Arts.

<http://www.trondlossius.no>

Frauke Behrendt

Frauke Behrendt's research interests include the areas of digital cultures, sound studies, mobility and media theory. Her research combines empirical and theoretical investigations of the link between mobility, sound and media and how this is articulated both in contemporary art and in everyday live. Frauke is on the Steering Committee of the European COST Action on 'Sonic Interaction Design' and of the International Workshop of Mobile Music Technology. In addition, she is a member of NYLON (international research network in sociology, history and cultural studies), and the 'Centre for Material Digital Culture' (Sussex University).

She is a Research Fellow at the Cultures of the Digital Economy Institute (CoDE), Anglia Ruskin University, Cambridge. Previously, Frauke has held positions at the University of Sussex and as Visiting Assistant Professor at the Rhode Island School of Design (US). She completed her PhD on 'Mobile Sound: Media Art in Hybrid Spaces' at the University of Sussex and holds an MA in Cultural Studies from Leuphana University in Germany.

<http://www.fraukebehrendt.com/>

Institutions

BEK: Bergen Center for Electronic Arts

BEK, Bergen Center for Electronic Arts, is a non-profit organization situated in Bergen, Norway, which main aim is to be a national resource centre for work within the field of arts and new technology. BEK works with both artistic and scientific research and development and puts into practice an amount of mixed artistic projects. It also practices an educational program that includes courses, workshops, talks and presentations. BEK runs its own server and hosts several mailing lists and web pages for cultural organizations, artists and artistic projects. <http://www.bek.no>

CoDE: The Cultures of the Digital Economy Research Institute

CoDE is based at Anglia Ruskin University in Cambridge (UK). It is a network of academics working in media theory and network culture, media archaeology, digital music and video, fine arts, video games, production and performance, serious gaming and digital text, combined with scientific contributions from colleagues involved with design and technology, audio engineering and computer design and animation. Its key emerging research areas include social media and network politics, digital performance and production, digital humanities and play and serious gaming. The Institute fosters a critical and experimental interdisciplinary research environment and through projects, seminars and published research aims to explore the role of current and emerging technologies in a creative context. <http://www.anglia.ac.uk/ruskin/en/home/microsites/code.html>

COST - European Cooperation in Science and Technology - is an intergovernmental framework that allows the coordination of nationally-funded research on a European level. COST contributes to reducing the fragmentation in European research investments and opening the European Research Area to cooperation worldwide. The goal of COST is to ensure that Europe holds a strong position in the field of scientific and technical research for peaceful purposes, by increasing European cooperation and interaction. This initiative makes it possible for national facilities, universities and private industry to work jointly on innovative Research and Development (R&D) activities. www.cost.eu

COST IC0601 Action on Sonic Interaction Design (SID)

The exhibition is curated in collaboration with the EU COST IC0601 Action on Sonic Interaction Design (SID). This EU-funded Action ran from 2007-2011. Sonic Interaction Design is the exploitation of sound as one of the principal channels conveying information, meaning, and aesthetic/emotional qualities in interactive contexts. The Action pro— actively contributes to the creation and consolidation of new design theories, tools, and practices in this innovative and interdisciplinary domain.

Norwegian Museum of Science, Technology and Medicine

The Norwegian Museum of Science, Technology, Industry and Medicine, founded in 1914, is located at Kjelsås in Oslo, covering an area of around 20,000 square meters, used for exhibitions, a library, historical archives, a café and a museum shop. The museum's objective is to demonstrate the implications of progress in Science, Technology, Industry and Medicine, socially and culturally, through the ages. The museum is an educational institution with collections, exhibitions, publications and other activities, making it a place of learning for visitors of all ages.

The museum chronicles the development of Norway from an agrarian society to a complex industrial society. The museum contains permanent exhibitions on transport and aviation, Norwegian industrial history, energy and electricity, the wood and metal industries, oil, gas and plastics, music, clocks and watches, calculating machines and computers, as well as a science centre. The most recent addition is the National Museum of Medicine, opened to the public in 2003.

<http://www.tekniskmuseum.no/>



Acknowledgements

SONIC INTERACTION DESIGN

<http://sid.bek.no>

Norwegian Museum of Science, Technology and Medicine, 2011

Part of the program for NIME 2011: The International Conference on New Interfaces for Musical Expression

Curators: Trond Lossius & Frauke Behrendt

Produced by BEK - Bergen Center for Electronic Arts

Producer: Elisabeth Gmeiner

Catalogue editors: Frauke Behrendt & Trond Lossius

Catalogue design & Layout: Monique Mossefinn

Cover design: Marieke Verbiesen

Printed by: Bodoni AS

Web site content editor: Frauke Behrendt

Web site design: Marieke Verbiesen

Web site programming: Trond Lossius

The curators would also like to express their gratitude towards everyone else who has contributed to the realization of the exhibition:

The artist, designers and researchers participating in the exhibition

The staff at Norwegian Museum of Science, Technology and Medicine, in particular Frode Weium, Henning Sandsdalen & Dag Andreassen

Members of the management Committee and Working Groups of COST IC0601 Action on Sonic Interaction Design (SID), in particular Davide Rocchesso (Chair), Thomas Hermann (Vice Chair), Maria Grazia Ballerano (secretary), Daniel Arfib and the members of Working Group 3

Staff at the COST office: Alessandra Paccamiccio, Aranzazu Sanchez, Inge de Prins & Matteo Razzanelli

The chairs of NIME 2011: Alexander Refsum Jensenius & Kjell Tore Innervik

BEK staff: Lars Ove Toft, Espen Egeland & Anne Marthe Dyvi

Staff and students at fourMs Lab, University of Oslo: Rolf Inge Godøy, Arve Voldsund, Arjun Chandra, Kristian Nymoen & Anders Tveit

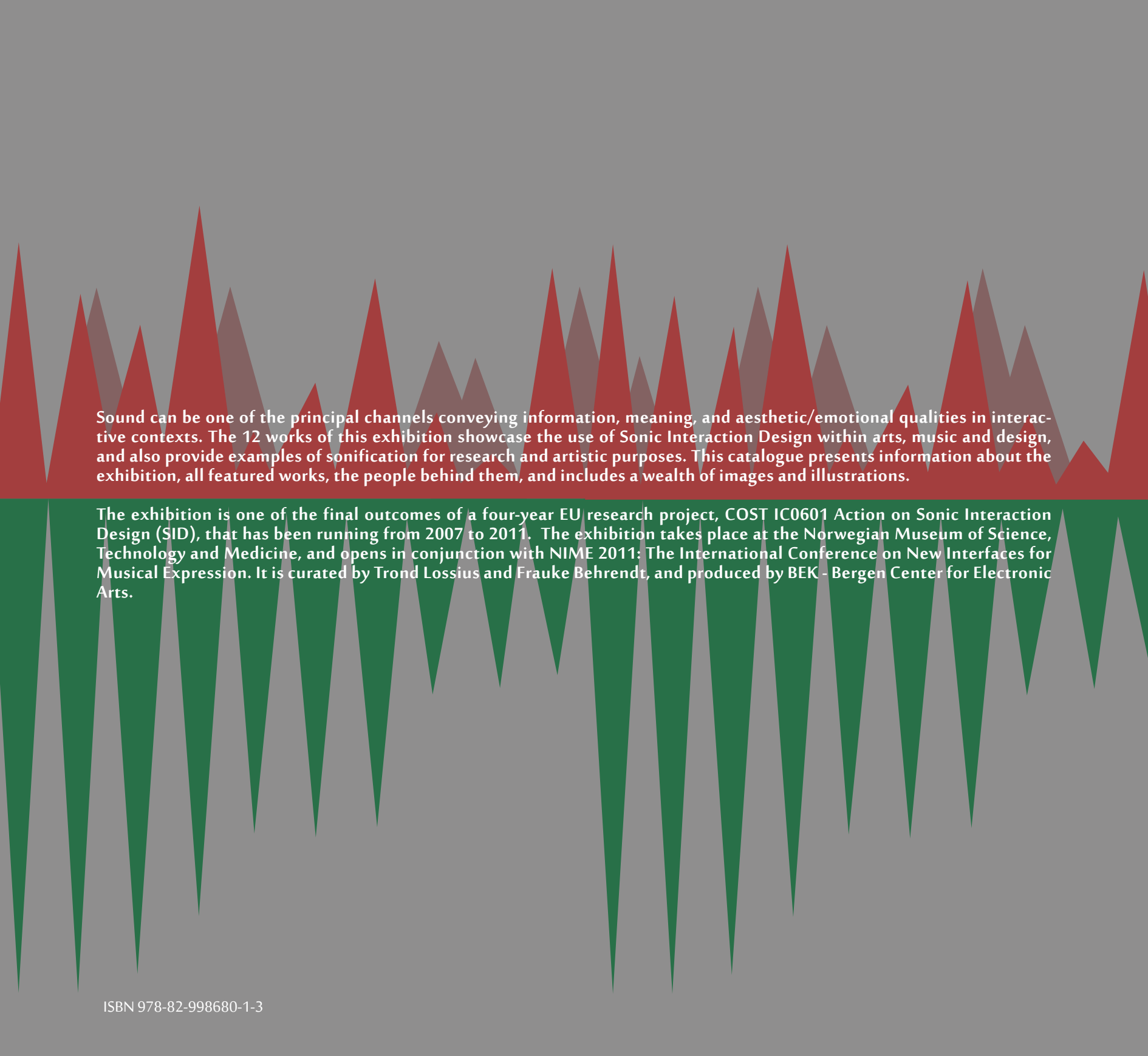
Funding partners:

Arts Council Norway
COST IC0601 Action on Sonic Interaction Design (SID)
COST: European Cooperation in Science and Technology, Year of Visibility
Lydgalleriet

BEK is supported by:

Norwegian Arts Council
Municipality of Bergen
Hordaland County Council

Support:



Sound can be one of the principal channels conveying information, meaning, and aesthetic/emotional qualities in interactive contexts. The 12 works of this exhibition showcase the use of Sonic Interaction Design within arts, music and design, and also provide examples of sonification for research and artistic purposes. This catalogue presents information about the exhibition, all featured works, the people behind them, and includes a wealth of images and illustrations.

The exhibition is one of the final outcomes of a four-year EU research project, COST IC0601 Action on Sonic Interaction Design (SID), that has been running from 2007 to 2011. The exhibition takes place at the Norwegian Museum of Science, Technology and Medicine, and opens in conjunction with NIME 2011: The International Conference on New Interfaces for Musical Expression. It is curated by Trond Lossius and Frauke Behrendt, and produced by BEK - Bergen Center for Electronic Arts.