4th INTERNATIONAL MOBILE MUSIC WORKSHOP

AMSTERDAM 6-8 MAY 2007

http://www.mobilemusicworkshop.org
Table of contents

Programme Day 1-3

Maps: How to get to STEIM and Waag

Mobile Music Workshop Introduction

Mobile Music Workshop Organisation

Previous Mobile Music Workshop Editions

About STEIM

About Waag Society

Keynotes

Hands-on Sessions

Performances

Papers

Posters

Demos
Programme Day 1: Sunday May 6

All day open to the public

Location morning: WAAG Nieuwmarkt and afternoon: STEIM

MORNING AT WAAG

9.30 - 13.00 Registration desk open at WAAG

10.30 – 13.00 Welcome and keynotes:

- 11.00 Welcome by steering committee
- 12.00 Keynote: Teri Rueb

13.00 Performance on the way from Waag to STEIM:
- Cathy van Eck – “Hearing Sirens: A project for mp3-players with portable horn-loudspeakers

The Workshop takes place at STEIM (bottom arrow on map) and Waag society (top arrow on map). Please find more information about both locations and how to get there on the next pages.
AFTERNOON AT STEIM

Entrance Utrechtsedwarsstraat 134

14.00 - 17.00 Registration desk open at STEIM

14.30 - 17.00 Demos and posters

Demos:

- Dan Wilcox / Robotcowboy. A Human-Computer Performance System
- Bernhard Garnicnig, Gottfried Haider / Craving, a Spatial Audio Narrative

Posters:

- Irad Lee / Egotone: Generative Ringtone Engine
- Mike Fleming, Kang Chang, Kyle Millns / Audio Bombing: Magnetic Cassette Tape Graffiti
- Chia-Ying Lee / Sonic Graffiti: Spraying and Remixing Music on the Street
- Ashley Elsdon / Platforms, Programs and Possibilities: The current state of mobile music creating technology
- Anna Dumitriu, Luciana Haill / Creative Uses of Virtual Sticky Notes in Art. A Critical Interrogation of The “Bio-tracking” Smart Phone Based Exhibition
- Takuya Yamauchi, Toru Iwatake / An Interactive Musical Installation through Spatial Sensing
- Colin Black / The Extended Enviro-Guitar (XEG): A Mobile Acoustic Profiling Resonating Filter
- Greg Schiemer, Mark Havryliv / Pocket Gamelan: swinging phones and ad hoc standards

17.00 PERFORMANCES

- The Handydandy (Bernhard Bauch, Florian Waldner, Gordan Savicic, Julia Staudach, Luc Gross, Nicolaj Kirisits) / Looking towards the Seas that are not sailed yet. The early Years of Bluetooth Rock
- TokTek (Tom Verbruggen)

Evening free
Programme Day 2: Monday May 7

Location all day: STEIM - Entrance Achtergracht 19

ALL DAY

(registered participants only)

9.30 –10.00 Morning coffee

10.00 Keynote:
  • Michel Waisvisz, introducing STEIM work + the hands + cracklebox

11.00 - 12.30 Papers:

11.00 Laura Beloff, Martin Pichlmair / TRATTI - A Noise Maker for Children
11.45 Atau Tanaka, Guillaume Valadon and Christophe Berger / Social Mobile Music Navigation Using The Compass

12.30 - 14.00 Lunch break

14.30 - 18.00

Python Programming for Symbian Series 60 (Jurgen Scheible)

18.00 Drinks at STEIM

Dinner at 19h at Bazar, Albert Cuypstraat

(dinner tickets sold during registration Sunday)
Programme Day 3: Tuesday May 8

Location all day: WAAG Nieuwmarkt

9.30 – 10.00 Morning coffee

10.00 - 11.30 Papers (registered participants only):
  - 10.00 Isabella van Elferen, Imar de Vries / Floating Fabulousness: Representation, Performativity and Identity in Musical Ringtones
  - 10.45 Yolande Harris / Taking Soundings - Investigating Coastal Navigations and Orientations in Sound

11.30 - 15.00 Hands-on [lunch break flexible] (registered participants only):
  - Geotracing (Just van den Broecke)
  - Arduino (Bas van Abel - Waag Society and Ubi de Feo - TwoDotOne)
  - KeyWorx Live (Lodewijk Loos - Waag Society)

15.00 - 16.00 Mobile music community town meeting (registered participants only)

16.00 - 18.00 Closing sessions (open to the public):
  - 16.00 Critiques and comments: Paul Keller
  - 17.00 Closing keynote address: Régine Debatty

20.30 PARTY (open to the public)
How to get to STEIM

Achtergracht 19, 1017 WL Amsterdam, tel. +31 (0)20 6228690

Sunday - performance entrance:
Utrechtsedwarsstraat 134

1. Walk from the Waag along with everyone else.

2. Take tram number 4 direction RAI and get off at Prinsengracht. Continue walking along Utrechtsestraat until you turn left down Utrechtsedwarsstraat.

3. Take the metro and get off at Weesperplein. Walk along Sarphatistraat towards the Amstel, cross the bridge and turn right along the river until you reach Utrechtsedwarsstraat on your left.

Monday - STEIM main entrance:
Achtergracht 19

1. Take tram number 4 direction RAI and get off at Frederiksplein. Walk back, turn right just before entering Utrechtsestraat (still called Frederiksplein - note: you will also pass Fredericksplein number 19 - this is NOT STEIM); after a while the name changes to Achtergracht.

2. Take the metro and get off at Weesperplein. Walk along Sarphatistraat towards the Amstel, cross the bridge and turn right along the river until you reach Achtergracht on your left.
The Waag building on the Nieuwmarkt in Amsterdam, the oldest secular building in the city, is very close to the Central Station. The easiest way to get there is by public transport, metro station Nieuwmarkt is very close, nearly under our feet.

* Central Station
  Tram lines 1, 2, 4, 5, 9, 13, 16, 17, 24 and 25

* Bus service 22, 32, 33, 34, 35 and 39

* Damrak
  Tram lines 4, 9, 16, 24 en 25

* Waterlooplein
  Tram lines 4, 9 en 14

* Metro
  Station/stop Nieuwmarkt, exit Nieuwmarkt
Combining music and mobile technology promises exciting future developments in a rapidly emerging field. Devices such as mobile phones, Walkmans and iPods have already brought music to the ever-changing social and geographic locations of their users and reshaped their experience of the urban landscape. With new properties such as ad hoc networking, Internet connection, and context-awareness, mobile music technology offers countless new artistic, commercial and socio-cultural opportunities for music creation, listening and sharing. How can we push forward the already successful combination of music and mobile technology? What new forms of interaction with music lie ahead, as locative media and music use merge into new forms of everyday experiences?

This year’s workshop is hosted by STEIM and Waag Society in Amsterdam, The Netherlands, and partners with the Futuresonic Festival in Manchester, England, taking place later the same week. The programme of the workshop will consist of keynote presentations from invited speakers, peer-reviewed paper presentations, poster sessions, in-depth discussions about the crucial issues of mobile music technology, demos of state-of-the-art projects, break-out sessions and live events. Registered participants will take part in hands-on sessions conducted by leaders in the field. In addition to traditional presentation sessions, the programme includes events open to a general audience, facilitating the presentation of artworks and technological breakthroughs to a wider public.

All submissions have been peer-reviewed by a committee of international specialists in the fields of mobile music, interactive music, and locative media.
Mobile Music Workshop Organisation

The Mobile Music Workshop sets the stage for a collaboration that brings together leading institutions in both experimental electronic music and mobile media. STEIM (the studio for electro-instrumental music) is a centre for electronic music production well known in the performing arts. STEIM promotes the idea that Touch is crucial in communicating with electronic and digital arts technologies, a vision that over the years has given birth to physical, sensor-based musical instruments. Waag Society is a research and development institute in the fields of networked art, education and creative industries. Waag Society develops platforms for artists to reach society through networked collaboration, media streaming, and locative media.

International Steering Committee
Frauke Behrendt (University of Sussex, UK)
Lalya Gaye (Viktoria Institute, Sweden)
Atau Tanaka (Sony CSL Paris, France)

Local Organising Committee
Kristina Andersen (STEIM, The Netherlands)
Robert van Heumen (STEIM, The Netherlands)
Ronald Lenz (Waag Society, The Netherlands)
**Previous Mobile Music Workshop Editions**

This series of annual workshops began to explore and establish the emerging field of mobile music technology in 2004.

The first International Workshop on Mobile Music Technology was organised at the Viktoria Institute in Göteborg, Sweden, in June 2004. The purpose was to gather a number of researchers with a shared interest in mobile music, and to attract additional people who might be interested in making the community grow. This workshop focused on presenting existing projects and defining the field. It had 15 external participants, plus organisers and student volunteers.

The second workshop was organised in May 2005 at NIME 2005 in Vancouver, Canada. This time, the community was better defined, and the workshop time was shared between presentations of new projects, in depth-discussions and hands-on brainstorming activities. It attracted 18 external participants plus the organisers.

The third edition of the workshop was a two-day event, taking place in March 2006 at the University of Sussex, Brighton, UK. It focused on the locative media aspect of mobile music, with presentations by invited speakers, feedback sessions about work-in-progress projects, and hands-on activities with the latest mobile music technology. Over 30 participants had registered. During this time, the mobile arena, both creatively and commercially has exploded. This sets the stage for a high level meeting like the Mobile Music Workshop to have increasing impact as a wider audience, both public and professional alike, start to become interested in the creative potential of mobile media.

For information about the previous workshops please refer to:
http://www.mobilemusicworkshop.org
About STEIM

STEIM (the Studio for Electro-Instrumental Music) is the only independent live electronic music centre in the world that is exclusively dedicated to the performing arts. The foundation’s artistic and technical department supports an international community of performers and musicians, and a growing group of visual artists, to develop unique instruments for their work. STEIM invites these people for residencies and provides them with an artistic and technical environment in which concepts can be given concrete form. It catalyzes their ideas by providing critical feedback grounded in professional experience. These new creations are then exposed to a receptive niche public at STEIM before being groomed for a larger audience.

Over the last thirty years STEIM’s unique position and open creative approach has encouraged artists and creators to rethink how we develop and play new technological instruments. As a centre it is internationally considered as a pioneering place for the new live electronic concepts.
About Waag Society

Waag Society is the name of what started in 1994 as 'Society for old en new Media', de Waag. Founders were Caroline Nevejan and Marleen Stikker, who is still Waag Society's director. Before, Stikker was the mayor of the Digital City, the first internet community in the Netherlands. The Society's -soon to be called 'Waag Society'-mission was to make new media available for groups of people that have little access to computers and internet, thus increasing their quality of living. After a complete restoration of the Waag building, a small group of enthusiastic idealists began their activities in 1996.

The medialab developed into an avant-gardistic thinktank with a lot of freedom. But with an eye for commercial possibilities: attempts were made to bring Waag prototypes to the market. Waag Society grew into an institution that was active in the fields of networked art, healthcare, education and internet related issues like bandwidth and copyright. The international network became increasingly important: Waag Society has a worldwide network with partners in countries like India, Canada and the UK.

Nowadays, Waag Society is an acknowledged institute where apart from R & D, there is room for experiment with new technologies, art and culture. Partners come from all parts of society: universities but also companies work together in our projects. Waag Products was founded, to market our products. Examples are the Storytable, Pilots (BoardMessenger in the USA and Monstermedia. A part of our activities has moved to the new cultural hotspot Pakhuis de Zwijger, a renovated warehouse in the Amsterdam Harbour that also houses the Media Guild.
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Keynotes
Teri Rueb

Rueb’s large-scale responsive spaces and location-aware installations explore issues of architecture and urbanism, landscape and the body, and sonic and acoustic space. In 1999 she launched "Trace", an interactive GPS-based sound installation set along a network of hiking trails in the Canadian Rockies (funded by the Banff Centre for the Arts). She recently launched "Drift" an interactive sound installation set along the tidal flats of the Wadden Sea in Cuxhaven, Germany (www.ohneschnur.de). She is currently working on an installation to be installed throughout Boston Common (commissioned by turbulence.org).

She lectures and exhibits world wide at venues including Transmediale (Berlin, 2004), SIGGRAPH (San Antonio, 2002), The International Symposium on Electronic Arts (Nagoya, 2002; Paris, 2000; Helsinki, 2004), Consciousness Reframed (Perth, 2002), The New Museum of Contemporary Art (New York), the Corcoran Gallery of Art (Washington D.C.), The Banff Centre for the Arts (Banff), Bell Laboratories (Holmdel), Interval Research Corporation (Palo Alto), and The Fraunhoefer Institute/GMD (IRCAM, Paris, 2002; Glasgow, 2001).

Rueb's work has been featured and reviewed in diverse publications including "Information Arts: Intersections of Art, Science and Technology", edited by Stephen Wilson, MIT Press, 2001. She holds a B.F.A. in Art and Literary and Cultural Studies from Carnegie Mellon University and a master's degree in Interactive Telecommunications from the Tisch School of the Arts, New York University. She is currently professor in the Graduate Department of Digital Media at the Rhode Island School of Design.
Michel Waisvisz

Michel Waisvisz is a pioneering composer, performer and instrument maker who for the last thirty years has been developing new ways to achieve physical touch with electronic music instruments.

Recognised as one of the first to develop and perform using gestural controllers and synthesizers on stage, over the years he has collaborated with amongst others: Laurie Anderson, DJ Spooky, Truus de Goort, Shelly Hirsch, Maarten Altena, Moniek Toebosch, Richard Teitelbaum, Steve Lacy, Frans Zwartjes, Misha Mengelberg, and many others.

An internationally renowned performer, Waisvisz has played in major international concert halls and arts spaces (e.g., Concertgebouw, Amsterdam; Louvre, Paris and The Kitchen, New York) at various festivals (Mutek, Montreal; Berlin Philharmonika, Exploratorium, San Francisco) and in clubs and smaller venues across Europe. Over the years he has received commissions for compositions by The San Francisco Symphony, IRCAM, Paris, and WDR studio for electronic music in Köln and so forth.

Besides his work as composer Waisvisz has created series of instrumental inventions, the most renowned being The Crackle Box, The Hands, and The Lick Machine, all which have explored the use of sensors and touch as a means for creating music and electronic sounds. Many of these instruments were considered breakthroughs at the time when electronic music was still considered merely a studio-art.
Régine Debatty (BE/DE) studied Classics in Belgium and England, worked as a teacher of Latin and ancient Greek, then moved to media, working as a documentary director for the Belgian national TV, as a reporter for the radio Onda Cero in Spain and as a consultant for the MEDIA programme of the European Commission in Italy.

She's now a full-time blogger, a new media art consultant for festivals and art commissions and writes about the intersection between art, design and technology on we-make-money-not-art.com and contributes to design and art magazines such as Art Review (UK) and Front (NL). She also speaks at conferences and festivals about artists, hackers and interaction designers (mis)use of technology.

Hands-on Sessions
Developing Python for S60 applications for Mobile Phones

This tutorial gives you an introduction to Python for S60 to catch in an easy and quick way the "low hanging fruits" it offers. No object oriented programming knowledge is needed here, even hardly any pre- knowledge of Python as a language. You will learn things as you go along here - by trying out working scripts on the phone to see what they do and then study them.

Development is simple and fast. In order to run a Python program of your Nokia S60 phone, all you have to do is to:

1. Install the Python interpreter application as a *.sis file called "Python for Series 60" which you can download for free (check here for details)
2. Write your python script with a simple editor on your Mac/PC, save it as a *.py file
3. Push via Bluetooth or move via USB cable your *.py file to your phone and simply run it. No compile, no build process needed.

"Python for S60" is an ideal choice for starting to create applications for devices based on Series 60 Platform because it is easy and quick. It is well suited for the development of prototypes or for building applications to make proof of concept with a simple and consistent language. Only some knowledge on any scripting language is enough to understand the programming of python scripts and to create working applications in a very short time.

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Jürgen Scheible is a researcher, engineer, programmer, project manager, music and video artist. He has extensive knowledge on mobile technology and learning. Currently he runs the "Mobile Hub" which is a prototype development unit at the Media Lab of the University of Art and Design, Helsinki, Finland. There he focuses on Mobile applications and Cross Media applications including Mobile Gaming, Mobile Media, Mobile Messaging, Bluetooth Hotspots, Ad-hoc Networks, Location Based
services, Mobile Learning and iTV. He also develops software tools and user interfaces for group audience participation to interact with rich media and games on large screens.

His vision is to do New Media projects based on artistic, social, cultural and pedagogical ideas/concepts and build the underlaying technology and software tools for them. By doing so he tries to be a "bridge builder" by bringing art, design and engineering together. These days, technology driven development is not sufficient enough anymore to develop products and services that are appealing to people. We need creative people, designers and engineers working together to transform the needs of today’s people into appealing, sellable products.

His Message to all the creative and innovative people out there: Use your skills, ideas and energy to inspire the world around you!
Arduino: physical computing workshop

The physical computing workshop focuses on the use of electronics in designing interactive objects and physical interfaces. Cheap, easy to use i/o boards make it easier for designers and artists to interface electronics with the computer. Waag Society often uses i/o boards in the design process of their projects. The workshop leaders will give the participants some idea of the possibilities of physical computing.

In the workshop the open source Arduino board will be used to experiment with a set of sensors and actuators. The participants will be introduced with some basic electronics and Arduino programming. Special attention will go to creating touch sensors with the qt113 chip, because it is easy to implement and offers great design possibilities. The workshop leaders will give a demonstration of a basic touch sensor application designed for the Mobile Music Workshop.

Finally everyone will work on their own micro-project in which they will interface a sensor and/or an actuator with the kwlive software developed by Waag Society by receiving/sending data through the serial port. The participants will create their own physical controller using the arduino board for manipulating video, image and audio streams.

Workshop leaders:
Ubi de Feo (Director, twodotone) and Bas van Abel (Head of Design, Waag Society)
**Geotracing**

Geotracing is an open source GPS-based locative media platform with which users can record their trace in realtime using a mobile phone onto a Google Map-based website and annotate this trace with media captured on the go.

In the workshop participants will learn about the technical ins and outs of the platform and experiment with creating mediated traces themselves. As Geotracing is open-source (java) software participants also have the opportunity to experiment with the codebase itself.

Workshop leader:
Just van den Broecke (http://www.geotracing.com)

**KeyWorx Live**

KWlive is a set of software tools which enables multiple networked users to create an audio/visual performance together possibly using live inputs such as joysticks. During the workshop we'll explore the possibilities of cross media synthesis, with live input of multiple-users within the scope of the KWlive tools.

Attenders will learn the principles behind the software in a hands-on session by patching various interfaces. Finally there will be some exchange with the parallel workshops on Arduino en GeoTracing.

Workshop leader:
Lodewijk Loos (software developer Waag Society)
Performances
Hearing Sirens

A project for mp3-players with portable horn-loudspeaker. By Cathy van Eck

Reversing the philosophy of headphones
A usual fashion to hear music nowadays is through headphones. The mp3-player made more music transportable than ever before and streets and public spaces are crowded nowadays with people, living in their own acoustic world. Cathy van Eck’s project is about reversing this situation. Using the same mp3-players, this time it is not for creating private music, but the music coming out of the mp3-players is sent to two big portable horn-loudspeakers, radiating the sound to the environment. The sound coming out of the horn-loudspeakers reveals by the reflections it causes the acoustical qualities of the environment. The horn-loudspeakers are worn by dancers, who are therefore not only dancing on the music but at the same time by their dance diffusing the music into the space.

The acoustic and visual design: Greek siren and emergency siren
The project Hearing Sirens is based on two of the applications of the word siren. The siren is both a mythological woman, having the body of a bird and the head of a woman as a noise maker, used to warn in emergency cases. The sirens as bird-women were known in Antiquity for their beautiful singing. It was unable to resist them and most of the men who heard them did not survive. The siren as a noisemaker is used to warn people for emergency cases and can therefore be seen as a survival tool. It uses a rotating disk with holes, to create its characteristic sound. I used both as an acoustic, visual and conceptual starting-point for the project Hearing Sirens.
The Handydandy * consists of five Media-artists from Austria (Bauch Bernhard, Gross Luc, Kirisits Nicolaj, Savicic Gordan, Waldner Florian) making music on their mobile telephones instead of using usual Music-instruments. The mobile Telephones are used only as interfaces and they are connected, via Bluetooth, to a computer network, a virtual opposite to the "human network" music-band.

The entire instrument served by the musicians, is thus divided into the mobile telephones, the Bluetooth connections and the laptops acting together over WLan. Thereby different Feedback systems on social and digital level, which are used for the compositions, develop. The selection of this configuration makes possible to use not only the movement in space as temporally akusmatic category but also to connect the powerful aesthetics of a Rock performance with the intellectual requirement of the electronic music. The Handydandy is at the same time a RocknRollband and a computer network – music group.

* The name of the Band consists of the words Handy; this is the German term for mobile telephone, and Dandy.

The poet Charles Baudelaire wrote that an aspiring dandy must have "no profession other than elegance. . . no other status but that of cultivating the idea of beauty in their own persons. . . he must live and sleep before a mirror."

Tom’s work is about the communication and non-communication between electronic devices and humans, focusing particularly on his relationship with such devices.

Drawing on his fine art background, his work explores the relationships between, human touch, memory and everyday electronic objects. For example his work “Moederkoek”, which literally translated is mother-cake but refers in English to the placebo, Tom performs with his mother and she bakes a cake, like she used to when he was a young boy. In the contemporary version, in a self-assembled kitchen, Tom performers with his mother, sampling her baking and the sounds its produces in real-time. These sounds are arranged and manipulated on the fly and form an ongoing, improvised composition. The performance ends, with the cake going into the oven and the smell of baking filling the room. Once it is baked, the cake is served to the audience.

Tom’s latest invention is the Crackle-Canvas. Using STEIM crackle box hardware, Tom has created paintings that produce sound. Each painting can produce sound by itself but when connected with other paintings forms a ‘painting orchestra’. By connecting cables between the paintings, the sound changes, while the cables length, colour and form, form a drawing on the wall or in the space the paintings are hanging.
Papers
TRATTI - A Noise Maker for Children

Laura Beloff
Independent artist / Planetary Collegium - The Centre for Advanced Inquiry in the Interactive Arts, University of Plymouth, Faculty of Technology, UK / Finland
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Martin Pichlmair
Independent artist / Institute of Design and Assessment of Technology, Vienna University of Technology, Favoritenstrasse 9-11/187
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ABSTRACT

In this paper, we describe TRATTI, an art piece that can clearly be characterized as Device Art. It is a funnel shaped bullhorn to be worn in front of the belly. Children can walk around with the TRATTI. First, they record their voice into the device. Then, they can point the TRATTI anywhere they want. The TRATTI constantly snaps images from its surroundings and plays back the recorded voice samples manipulated through the image, through the environment. TRATTI is technologically based on mobile phone technology and it reflects a number of key features of mobile phone technology. TRATTI is a loud and disturbing piece of real-time art, a very personal musical instrument playing the voice of the musician, according to her standpoint in the world.

Keywords
Device Art, Retrolutionary, Playing the world, Mobile Instruments, Music, Wearables, Systems Aesthetics.

1. INTRODUCTION

Device is defined as a machine or an invention, which is used to perform relatively simple tasks. Recently Machiko Kusahara, a Japanese media art historian and a curator, has defined a new form of media art as ‘Device Art’ [8]. Device Art integrates art and technology, design, entertainment, and popular culture into the creative process. Kusahara is investigating Device Art specifically from a Japanese perspective and cultural history, but her thoughts clearly resonate also with some of the works coming from a western media-art scene. She defines typical characteristics of Device Art to be a combination of interaction, application of physical material, custom-made devices and playfulness. Also an affirmative attitude towards technology is another typical feature of the works. “As a concept, Device Art is rooted in the analysis of the key role that devices play in certain types of art, that is, artworks involving hardware (a device) specifically designed to realize the artistic concept. The device itself can become the content. Technology is not hidden, its function is visible and easy to understand, while it still brings about a sense of wonder.” [8] She continues arguing that the actual art in the works is the experience that the device offers for its users and the device itself functions only as the ‘body’ of the artwork. The achieved experience obviously cannot be separated from the device, when the device is the means to achieve the experience. Her examples include artist like Toshio Iwai and Maywa Denki [8]. The art piece presented in this paper - TRATTI - also fits into the category of device art exactly because of the role the device plays in the artwork. TRATTI looks like an enhanced bullhorn, and it works like an extended megaphone. It features a giant funnel shaped speaker and a microphone, and it amplifies the sound it records.

2. NOISE INTONERS

There is a rich tradition of musical instruments in art. Some of them could be regarded as ancestors of the TRATTI. A good example of artist-created experimental sound device from western art history is for example Luigi Russolo’s (1885-1947) “Noise Intoners”. In 1913 Luigi Russolo wrote "The Art of Noises, Futurist Manifesto" [9]. In it he writes: “Ancient life was all silence. In the 19th Century, with the invention of machines, Noise was born.” [9]. In Russolo’s view the evolution of music was comparable to the multiplication of machines, which had became part of the everyday life during industrial revolution. In the following year 1914 Russolo introduced his experimental sound-making machines or ‘noise-intoners’, which he had built with his assistant Piatti. These noise machines can be seen as

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Figure 1. TRATTI visually resembles a bull horn worn around the belly.
concrete instantiations of ideas he had put forward in his manifesto. In the manifesto - The Art of Noises, a Futurist Manifesto - he had claimed that his intention was to research and renew the discipline of acoustics and harmony by introducing a neglected area; the study of noises.

Russolo’s noise machines were fairly comical looking sound generators. They were constructed as boxes of different sizes, where each box had a large metal speaker-horn attached to it. The system inside the box was simple; according to Russolo it contained a single stretched diaphragm in the right position, which could create a scale of more than ten notes when tension was varied. Russolo and Piatti were performing several successful concerts with the instruments during 1914. In some of the concerts the noise making instruments were accompanying a classical orchestra.

These new and unique noise instruments were built to enable new kind of sounds and characteristics of sounds to emerge. New kinds of sounds, which were thought to reflect the changing society better than the sounds from the classical instruments. Also the visual appearance of these instruments clearly refers to the age of heavy machinery and industrial production.

A contemporary example of a sound-based device created by an artist is for example Mark Bain’s Acoustic Space Gun (2004). This mobile device is a linear sound shifter, which contains a meter long directional microphone and a megaphone shaped sound projector pointed in opposite direction. The device functions as a real time acoustic space shifter meant for use in public spaces. It collects sounds and conversations from far away with the help of the directional microphone and presents them in the other direction via the sound projector. It is an absurd spatial system inside the box was simple; according to Russolo it contained a single stretched diaphragm in the right position, which could create a scale of more than ten notes when tension was varied. Russolo and Piatti were performing several successful concerts with the instruments during 1914. In some of the concerts the noise making instruments were accompanying a classical orchestra.

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3. A DEVICE WITH RELATION TO ITS ENVIRONMENT

The camera built into TRATTI records the environment and shapes the noises of TRATTI accordingly. The world gets a score and the basis of improvisation.

“The soundscape of the world is changing. Modern man is beginning to inhabit a world with an acoustical environment radically different from any he has hitherto known”, wrote Canadian composer R. Murray Schafer (1933-) in 1973 in a text “The Music of the Environment” [11]. In this text he introduced the term ‘acoustic ecology’, which considers the entire world itself as a musical composition. According to him the blurring of edges between the music and environmental sounds is the most striking feature of twentieth-century music. It became possible to insert any sound from the environment into a composition via electronic recording techniques. The original sound from a source and its electro acoustic transmission or reproduction was separated. In earlier times sounds were always tied to the mechanisms, which produced them. Now any sound could be blown up and stored for the future generations. The sound was split or separated from the maker of the sound and given an amplified and independent existence.

The French composer Pierre Schaeffer (1910-1995), the father of ‘musique concrète’ was following a similar line of interests in the concrete sounds from the environment and in the existence of sounds distinct from their sources. His ideas followed the principles of Edmund Husserl and phenomenology, where sound was inherently considered as separate from its source - a sound as such-and the differences among the sounds themselves were described without considering the modes of its production and transmission. (Schaeffer)

In 1959 Umberto Eco published his text on music “The Poetics of the Open Work” [6]. He writes: “A number of recent pieces of instrumental music are linked by a common feature the considerable autonomy left to the individual performer in the way he chooses to play the work.”[6] His examples from the time include for example, Klavierstuck XI by Stockhausen and Scambi by Henri Pousseur. Henri Pousseur has himself said that “Scambi is not so much a musical composition as a field of possibilities, an explicit invitation to exercise choice.”[6] According to Eco ‘open’ works are characterized by invitation to make the work together with the author, works are ‘open’ to a continuous generation of internal relations which the addressee must uncover and select in his act of perceiving the totality in incoming stimuli and every work is effectively open to a virtually unlimited range of possible readings, which cause the work to acquire new vitality in terms of one particular taste, or perspective, or personal performance.

These few selected examples from the history of audio culture share some similarities; they are concerned with structures and methods that create the work, and make it interesting and ‘new’. And they emphasize the active role of the audience.

During the late 1960’s and early 1970’s there were similar interests in structures and systems within the visual arts. An American art critic Jack Burnham published two essays on the state of the art: In 1968 “Systems Esthetics” [4] and 1969 “Real Time Systems” [3]. His interest was in art, which could be been operating as a system. He wrote: “Where the object almost always has a fixed shape and boundaries, the consistency of a system may be altered in time and space, its behavior determined both by external conditions and its mechanisms of control.”[4] He argued that conceptual focus rather than material limits define the system. His examples for art, which could be considered a system, were for example Hans Haacke’s art projects which were linked to the environment and used materials like air, water, steam, temperature, etc. Artist Les Levine was also creating art, which was dealing with systems. He stated the following in the late 1960’s: “Many serious artists at this time, are for the most part involved in making art producing systems. The works themselves are not to be considered as art, rather systems for production of art.” This is very close to what Kusahara is arguing about Device Art, that the actual art is the experience, which is produced and enabled by the device and its recipient, its user.

Artist Krystof Wodiczko created Personal Instrument in 1969 for street performances. It was a wearable device, which transformed the surrounding soundscape by manipulating two light sensors in the hands, which were connected to electro acoustic filters located in the soundproof earphones.

One of the new art forms developed during the 1960s was the ‘happening’. In her book “Getting Under the Skin” [13] Bernadette Wegenstein writes about 1960s happenings that the concept of simultaneity makes it clear that performance is no longer based on unity, as in traditional theater, but on fragmentation, separation and difference. ‘What is crucial in this style is the fusion of the product with its creation process and –
most important—with its environment.” [13] According to her a performance as a final product is produced simultaneously with its creation process and its environment. In a happening the body became a part of a real-time and real-life process, which functioned as the final artwork. In the 1960s and 1970s performances the body was often used as a political tool and treated as ‘raw’ material, while in the recent performance works—also in many media art works—the body has become a medium itself. This is visible for example in Benoit Maubrey’s experiments with performance and electro-acoustic clothes. In his works the diverse looking clothes or costumes make sounds by interacting with their environment and the user’s body becomes a moving speaker. The wearer of the TRATTI similarly gets a speaker wearing a device that is partially a megaphone.

4. TRATTI, AN INSTRUMENT
A traditional megaphone can be thought of as an instrument of amplification or reproduction, while the mouth functions as the place of production. TRATTI is an instrument of both: reproduction and production. It carries the original acoustic message and reproduces it, while it simultaneously separates the sound from the original source and produces a new sound based on the original source, manipulated by the environment.

TRATTI records a sound and plays it back manipulated. Whatever kind of an image the TRATTI-camera receives, it determines how the recorded sound is played. Thus, TRATTI is far more than a megaphone, it plays with their aesthetics, functionality, and social implications.

TRATTI is aimed for children, so it is a fairly small device. It is a wearable device, worn tightly around the belly. Children are free to roam with the TRATTI; it becomes part of their physical body and features. They can record sounds and point the TRATTI somewhere to play them back loud.

4.1 Aesthetics
Traditionally art has been—at least in some parts—dealing with appearance and visuality. Like the examples in the beginning of the text show, an interest in appearances is still visible in the works, but it is no longer fore-grounded in them. Especially in the media-/digital-arts one could argue, that the focus of the most of the works is instead in the diverse processes what the work is treating as ‘raw’ material, while in the recent performance works—the body has become a medium itself. This is visible for example in Benoit Maubrey’s experiments with performance and electro-acoustic clothes. In his works the diverse looking clothes or costumes make sounds by interacting with their environment and the user’s body becomes a moving speaker. The wearer of the TRATTI similarly gets a speaker wearing a device that is partially a megaphone.

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4.2 Structure
Though in the end invariable, the design of TRATTI is woven around the mobile phone that builds its centre. The TRATTI exposes its function rather than its workings. These functions reference mobile phone technology; it focuses on vocal sounds, it is planned to get networked, and it is portable. TRATTI is clearly a communication device, an iconic one. In this regard, TRATTI once more emphasizes its status as device art: “Technology is not hidden, its function is visible and easy to understand, while it still brings about a sense of wonder. Well-designed interfaces made of the right materials facilitate interaction for users, often in a playful manner.” [8]

The interface of TRATTI manifests itself in manifold ways. The piece is worn and thus tightly attached to the body. The direction of the sound is determined by the orientation of the body. The body in the space thus presents the first layer of interactivity. The visual image the TRATTI sees is the second layer of interactivity; by pointing the TRATTI to a specific image, the wearer exercises its influence on the device. All traditional interface elements are left out, leaving no way of directly controlling the device. The vocal input to the device builds the third layer of interactivity; the audio pattern then is manipulated through pointing the device at a specific image and transmitted in a direction and space determined according to body position and orientation. TRATTI is a device close to your body, close to you.

Just like the mobile phone informed the functionality of the piece, the bullhorn determined its iconic shape. These were also our first design decisions: We chose mobile phones as the technological and social platform, and the bullhorn as the aesthetic principle. From there, designing the piece was constrained by technical requirements and aesthetic choices. The piece had to be large enough to hold all the technology plus their power sources. At the same time it had to be kept light in order to be suitable for children. Since the weight is felt less when it is placed close to the body, all the heavy parts are in the half sphere right in front of the belly. Of course, the camera image needs to be relayed to the phone. Since the phone cannot be placed at the tip of the bullhorn, we had to take the camera out of the phone shell. The same was done with the microphone. The phone speaker was disconnected.
and the bullhorn attached instead. Overall, the whole device could be technically regarded as an enhanced mobile phone.

4.3 TRATTI as an Enhanced Mobile Phone
TRATTI renders some key aspects of mobile phones visible. The speakers and the camera are enlarged. While visually tiny on a normal phone these functions are noticeably negatively reflected in public: “Once more, one's right to a certain amount of privacy, even within the public sphere, is being called for, and its transgressions protested at. Do I have to listen to ring-tones and other people's private discussions, although I don't wish to?” [7]. TRATTI consciously emphasizes the base functions of contemporary cell phones.

At the same time, the piece turns these features into interfaces. The microphone is no longer an invisible means of communication. It is instrumental for operating the TRATTI. When the user records her own voice, she communicates with herself as much as with her surroundings. Also, the camera no longer takes images - it is used for modulating the spoken sample. The manipulated sound is amplified and played out loud. This way, TRATTI stresses all socially critical aspects of mobile phones.

5. THE MAKING OF TRATTI
While taking inspiration from megaphones and bullhorns, the TRATTIs themselves are not built out of pre-manufactured items. Instead, the funnels were custom cast from plastic for the piece. The whole setup consists of several parts: The horn, the half-ball shaped belly, holding straps, the mobile phone, an audio amplifier and speakers, cables, and glue. A diagram explaining how these building blocks play together can be found in Figure 2. The whole system is driven by the mobile phone, running custom software. The belly is screwed to the horn. Also, the speaker - appropriated from a bullhorn - is fixedly screwed into the device. The speaker is receiving its signal from an audio amplifier that amplifies the sound from the phone. The phone’s camera constantly records video and outputs sound. The camera, the microphone, and the mobile phone speaker were removed from the phone and replaced by cables sticking out of the phone’s cover. Thus, the audio amplifier takes the role of the phone’s speakers, the microphone was reconnected at the outside of the TRATTI’s cover, and so is the camera.

The software was custom programmed for the piece. It is based on Java and developed in the Mobile Processing environment. It interconnects the different hardware parts of the TRATTI in a very tight way. The whole system runs in a constant cycle (see Figure 3 for schematics). At first, the camera takes an image. The image centre is analyzed for its color. The color determines if the TRATTI records, plays back, manipulates the audio, or silences. There is a clearly defined mapping between colors and action:

- red > record
- black > silence
- yellow > faster
- green > reverse
- blue > slower

If the color is red, a new audio file of two seconds is recorded and immediately played. In case of darkness (black), the TRATTI goes silent. The other colors affect the speed, play direction and pitch of the sound. Of course, the color detection is not 100 percent perfect. Due to that, the piece gains ambiguity and personality.

Additionally to detecting the central color, the image is analyzed for visual patterns. The whole image is first turned black and white. The lighter 50% of the picture’s pixels are set white and the darker half is set to black. This yields a black and white image. Any pattern on the image stands out clear after this process. The audio data is manipulated according to the black and white image. For example, horizontal stripes with uniform distances and widths would trigger a “ripple” sound. The exact effect of the pattern on the sound is slightly different for every TRATTI. At the end of each cycle of the software, the processed or freshly recorded audio data is played back.

6. SUMMARY
TRATTI is a ‘retrolutionary’ [2] art piece for children. It visually and functionally resembles a bullhorn worn around the belly. It is mobile and technologically based on mobile phones. TRATTI is an open artwork, making children composers, instrumentalists, and performers. Children can record their voice and carry it around, having it played back in a myriad of different ways according to the environment they scan with the TRATTI. TRATTI is Device Art and it manifests itself as a personal experience. It operates in real-time and real-space. The piece emphasizes the local node of a communication network, the communication device as it appears here and now, loud and disturbing.

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Social Mobile Music Navigation Using The Compass

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ABSTRACT
During a regular day while on the move, most people interact with multiple portable devices: a personal music player, mobile phone, and digital camera. People driving cars in addition may also use navigation systems. Whereas each of these devices are getting more and more sophisticated, and packed with numerous functionalities, they are each optimized for specific usages. Modern mobile phones for example, claim to function as digital cameras and music players, but these are features that are more often than not added on almost as an afterthought, and are not integrated with the connectivity that the mobile phone represents.

From an engineering point of view, the goal of this project is to push mass-market mobile phones to their limits in networked musical exchange by implementing The Compass. Specifically, we are targeting phones embedded with WiFi, music player and location capabilities. The idea was to build a true convergence application that integrated localization, mobile networking, and music listening.

1. INTRODUCTION
Various network-based services available in mobile environments have enhanced the realm of possible spontaneous human interactions. The mobile phone is used not just for voice communications, but text messaging, taking pictures, and listening to music. The Global Positioning System (GPS) allows geographic localization not just of the user, but geo-tagging of content that may be generated while on the move. While music can be considered one of the first mobile media, with the arrival of portable devices and wireless networks for music exchange, including TunA [1], and Push!Music [2]. Since these research projects, some commercial devices, notably the Microsoft Zune [3] have been introduced on the market allowing basic forms of wireless music sharing. All these systems assume that the users entering into interaction are in proximity to be in WiFi or Bluetooth signal range.

Network based services are beginning to be launched, for example SonyNetServices’ StreamMan [4] allowing over-the-air downloading of music content. These systems tend to be single user, and any notion of music discovery is based on matching of personal profiles against meta-data tags of the server-side content database. Moreover these systems rely solely on GSM, GPRS, and 3G networks, which for the user are billed by the data volume downloaded. This plus the cost of subscription or cost of content creates a financial barrier which is one reason such systems have not attained commercial success.

Geographic localization services have found use in artists’ projects in the field of locative media. They have been used in Human Computer Interaction (HCI) research to explore human interaction. The Familiar Stranger project [5] has resulted in the Jabberwocky [6] software that is downloadable to mobile phones. GPS connected to server-side audio content generation and streaming have been explored in Net_Dérive [7].

Social networks have been at once a field of research and with social software, an area of commercial applications. In the mobile sphere, platforms such as Dodgeball [8] and Socialight [9] have allowed spontaneous social congregation and shared tagging of physical space. Little has been done to extend these possibilities to embrace music.

The present project seeks to fuse these disparate elements of proximal interaction, geographic localization, and social navigation to allow groups of users to intuitively find friends, network connectivity, or new music. The notion of the compass is introduced as a metaphor for navigation across these three domains of community, infrastructure, and content.
3. SCENARIOS

3.1 Current Usage Patterns
Despite the lack of clear present day solutions to facilitate gathering and subsequent music exchange, normal users have found ways to share their musical experiences with friends while on the move.

The classic case is that of “earbud sharing” where the main listener removes one side of their personal music player headphones to have a friend listen along. Ironically, early Walkman models featured two headphone jacks with a volume-ducking feature to allow listeners to attenuate the music and talk to each other. In any case, any actual sharing of music is postponed to a non-mobile moment when the users are back in front of their landline based computers.”

New music sharing tendencies have emerged recently with the arrival of mobile phones with high storage capacities. Today, these MP3 enabled devices are quite cheap and are well distributed on the mass market. For example, it is quite common to see high schools students exchanging music using small range technologies such as Bluetooth, or Infrared. While somehow marginal, this usage is really interesting to analyze as users are pushing devices’ limitations to fit their needs. Moreover, with the high uptake of peer-to-peer systems, such as edonkey or bittorent, it is quite important to distinguish how people are exchanging music through spheres of friends and acquaintances or through anonymous end-to-end systems.

Most scenarios of socialization through mobile technologies are multi-step processes. Mobile phones have changed social patterns for making fixed appointments. These have entered a taxonomy of techno-social interactions that include terms such as “mobile text meet” and “augmented flesh meet” [10]. While these scenarios represent new forms of social interaction, they are far from seamless. They typically are mediated by Short Message Service (SMS) text messages, often in multiple iterations. Finding out where a friend is, what music they are listening to, and to meet them, or find where they got their music, would be a task that would take more time typing text messages than actually traveling or listening.

3.2 New Scenario
The project described here begins with navigation as an integral first step in its scenario. The different steps in the scenario include:

1. Navigation using initial infrastructure
2. Rapprochement to desired resource
3. Bootstrapping proximal infrastructure
4. Refining content search criteria
5. Content exchange

The elements encountered along the scenario are deliberately described as abstract entities to allow different modes of navigation and search. They are explained in detail below.

Applied to real-world usage, such a scenario would unfold as follows. A user seeks out new music to listen to. The compass indicates that some friends are nearby. He selects one to approach, and the compass indicates the direction and distance. The user walks following the compass indications. When within range, the system proposes to the two users to bootstrap a proximal network. Once this spontaneous private network is established, the two users compare playlists based on various musical criteria. A song of interest to the first user is then copied.

4. CONCEPTUAL MODEL
The compass is the main element in the conceptual model of the system. It serves as a metaphor for the user’s understanding of the system. It is also the representation by which different entities in the system are organized. Finally, it is the direct visualization of GPS data that guide entities to converge.

4.1 Compass
The use of the compass at different levels of the conceptual model allows for a consistency of usage. High level graphic interface elements are coherent with and directly related to low level information, but nonetheless protect the user from technical details.

The compass has the advantage of being an intuitive navigation interface for the user as it just points the direction to go. At the same time, it leaves the user a freedom of choice of whether to follow the compass’ indications or not. GPS-based car navigations systems are famous for their futility in insisting on the right route with increasing firmness as the user strays. The compass on the other hand, is as accurate, but allows the user to wander, and can even invite the user to a playful misappropriation of the technology, in the spirit of Baudelaire’s flâneur or the Situationists’ dérive.

4.2 Entities
The compass is able to guide the user to one of three types of entities. These are, 1) networks 2) people 3) music. Networks may be public WiFi hotspots. People may be those in the personal social network of the user – friends, and friend-of-friends. Music may be audio content that is stored on people devices, or locations of concerts. The fact that entities are abstracted and that the compass is able to indicate the proximity of any of these three types of entities points out the flexibility of the system to different modes of usage.

4.3 Decoupling Localization
The use of the compass and the entities permits a decoupling of the system from classic uses of localization technologies such as navigation systems. They are typically used to guide a mobile user to a fixed point, such as a concert theater. In the system presented here, a user can be directed to virtual or fixed entities such as Internet connectivity, musical content, or people. Moreover, unlike in navigation systems, these entities can freely move, as the system is able to update their locations according to user movements.

4.4 Technical Design
The Compass architecture is a hybrid – where a client-server interaction facilitates creating a peer network. The server gathers and distributes data about the mobile users, such as their geographical coordinates and the types of music stored on their phones. This information is automatically uploaded to the server.
using the phone data links\textsuperscript{2}. This key element of our proposal makes it possible to always retrieve friends’ locations, even if no other users are available in close range.

Interacting with the server, The Compass is thus able to provide accurate location details to the users. It acts as location database on top of which the bootstrap is performed. For example, the application will be able to display friends at a walkable distance, thus enhancing the quality and the frequencies of users interactions.

5. IMPLEMENTATION

5.1 System Architecture

This server was developed using Django \cite{django}, a web framework in Python, with an Apache 2 HTTP server and a MySQL database. The amount of data exchanged with the phones was carefully tweaked to decrease the volume, and thus cost of GSM/3G communications. The server stores locations of users and hotspots, as well as types of music stored on phones. Moreover, it maintains information about acquaintances of users in order to build the social network, and to push information about the community to the end user.

5.2 On the Phone

The Compass was implemented out on the Symbian operating system, Series 60 running on Nokia phones. Working in Python \cite{python} allowed rapid prototyping, essential in the beginning in order to verify that The Compass was a good conceptual model for users. Moreover, unlike in Java J2ME as implemented on mobile devices, it is possible to easily extend this language to access low-level functionalities of the phone using C++ API. The alpha release was developed on the Nokia N70 with an external Bluetooth GPS receiver.

After this first development stage, the code was ported to the Nokia N95, advanced model that includes onboard GPS and WiFi chipsets as well as a music player. Using custom made Python modules, The Compass is able to scan for WiFi hotspots, and retrieve GPS data directly from the phone. The interface of The Compass was designed to be consistent with the common Nokia User Interface in order to ease its usage. The figure 1 shows what the interface The Compass on the Nokia N95 looks like. This screenshot represents what is displayed to the user when he is heading towards a WiFi hotspot.

5.3 A Typical Usage

The scenario described in Section 3.2 is elaborated to a sequence of actions that The Compass software performs on the phone and with the server.

1. Pushing friends, location and music data: they are periodically uploaded from the phone to the server with HTTP over 3G, GPRS, or HSDPA. On the server side, the database is updated accordingly to store users’ location and the kind of music that they have.

2. Detecting friends in range: on the phone as a background task, using data from the server, The Compass detects friends close enough to the users and switch on its WiFi interface. All the phones use the same ESSID, and are pre-configured with a unique IP address generated from their phone numbers. Using location data periodically updated to the server has the advantage of economizing battery life as the WiFi interface is powered on only with a correspondent in range.

3. Building the social network: using contacts stored into the phone memory and data retrieved from the server, The Compass builds a list of friends and friends of friends that will be displayed to the user. Moreover, the distance to these users is computed using their geographical coordinates.

4. Displaying entities: using the social network’s information, The Compass only displays a list of entities at a walkable distance. The user chooses one element from this list and is then guided to the destination with a compass-like interface.

5. Getting closer to entities: The Compass offers the same user interface while offering to move towards the different entities. While the user is getting closer to the selected goal, the interface automatically updates with the correct angle, and distance the destination.

6. Music sharing: when the user is close enough, to his friends, The Compass will automatically retrieve and display a playlist from his friends’ phone. The user will then be able to download and listen MP3 files over the WiFi interface.

\textsuperscript{2}WiFi, 3G, GPRS, or HSDPA.
6. PERSPECTIVES
The environment, application and metaphor presented above allow mobile users to be loosely guided towards other people in order to share music. The compass may also be used to reach a place which gathers the kind of music sought by the mobile user. The compass may also help users find WiFi hotspots in order to provide them with the lowest cost/highest bandwidth for spontaneous file sharing.

The compass metaphor enhances existing scenarios for music sharing and will create new scenarios. The principal limitation of the current version is the lack of precise orientation tracking. For the compass interface to function optimally, it must respond to the sum of position and orientation, and must update a delta of orientation from a fixed position. In the current implementation, orientation is deduced from direction of successive position. An external magnetic field sensor would be necessary to add precise orientation.

The next step consists of testing this environment on a large scale in order to study its impact on the way mobile users share music. We keep in mind that mobile phones have limited resources in terms of battery and that file sharing thus has a cost (financial or technical). Mobile Social Music Software (MoSoMuSo) networks have characteristics from both peer-to-peer and mobile networks and several questions have to be answered concerning the network’s operation and optimization: with how many people should we share music with? How should users be motivated to share their music despite the battery cost? These issues will be studied in experiments with test users. Their movements and interactions will be logged in real time to extract specific mobility patterns and meeting frequencies. The analysis of these collected data will be used to verify our assumptions that The Compass could enhance music exchange as well as users interactions.

7. CONCLUSION
With its hybrid architecture, The Compass is a tool to study and experiment mobile music navigation. In contrast to other systems where users interactions are limited by the network’s range, The Compass is able to increase the interactions using the appropriate network connectivity. Using the location information retrieved from the server with the phone’s data link, The Compass can lead the users closer to their friends to start music exchanges with the phone’s WiFi connectivity.

Future work based around The Compass will enhance the content that is provided to the users. So far, it is limited to the location of their social acquaintances, and WiFi hotspots. The users are not free to improve The Compass while they walk around a city. The focus will be put on sharing user-generated musical content uploaded to the server from the phone. The users will then be able to do music geotagging enhancing the server's content with information such as concert halls, ephemeral live music event in the streets, or even recorded sound from a café, subway stations or streets sounds.

8. ACKNOWLEDGMENTS
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ABSTRACT
In this paper, we consider musical ringtones of mobile phones to act as virtual, communicative and cultural performances. They appear unpredictably, they communicate signs which are interpreted by a variegated and dynamic audience, and establish stages upon which cultural meanings are portrayed. We will argue that the musical ringtone functions as a musical madeleine in Marcel Proust’s sense, an involuntary mnemonic trigger of a complex web of individual and collective memories. Having this quality, the ringtone lends itself perfectly for the performative manifestation and display of (sub)cultural identities in the public sphere.

Keywords
Performativity, ringtones, mobile phones, communication, representation, identity.

1. INTRODUCTION
In the space of only three decades, mobile telephones have grown from bricklike and inconspicuous attempts to bring communication out in the open, to immensely sophisticated small computer devices that have become as commonplace a personal accessory as, say, wallets and keys. Undoubtedly, this process of “mobilization”, as George Myerson [26] calls it, has had and continues to have a considerable impact on how we, as social beings, experience the network of connections we share with other people. More than at any other time, digitally mediated communication can instantly connect singular but floating points in a communication network, making the mobile phone a unique designator of one’s place amongst others. Moreover, as the cellphone does not only offer ultimate connectivity, but can also be personalized through photos, films and ringtones, it can be considered as a (potentially) omnipresent, high profile locus of identity-tokens. To paraphrase Walter Benjamin [4], unpacking one’s phonebook, agenda, picture library or text messages will disclose reflections of one’s constructed self, consisting of memories of lived experience: my phone is not only where I am, but also who I am.

It is no wonder then that the mobile phone is so often studied as a representation of one’s economic, social and cultural capital. It is a fashion statement, a means to exchange gifts in the form of text jokes or photographs, a catalyst of doing business, a direct line to friends and family, a way to establish and confirm group norms and values. The public presentation of these various forms of capital has always been an important aspect of social behavior, and this has become even more apparent with the advent of the mobile phone, with its pervading use in public: the practice of temporarily laying the mobile phone on a table in a café or restaurant, for instance, has already been recognized by social anthropologists as showing off personal taste as well as claiming territory [27].

In this tension between the public sphere and private use, the mobile phone is bound to capture attention, and arguably no more so than through its ringtone. Its sudden presence in almost every conceivable environment causes it to act as an inescapable announcer of the start of a mobile phone conversation. Although it can be very annoying, we should not be tempted to discard the ringtone as an unimportant object of study. Returning to Benjamin, ringtones (and especially musical ringtones) can function as signifiers of various types of cultural libraries which the owner of a mobile phone carries with her. Moreover, more than clothes or perfume — which also project cultural values — the musical ringtone connects its audience to the vast and powerful world of music, and therefore provides ample room for shared and globally distributed experiences and values.

While the proliferation of mobile phones in the global mediascape has sparked a sizeable amount of research into various uses and impacts of that small apparatus everyone carries around, not so much scholarly attention has been paid to the announcer of its presence, the ringtone. In this paper we will describe how this often overlooked element of the mobile phone plays an important part in its use as a symbol of economic, social and cultural capital. We will do this by studying the ringtone as a virtual cultural and communicative performance. It is virtual, in the Deleuzian sense [8], because it is always silently present and potentially activated; it is a communicative performance because it works as a sign projected by the callee and interpreted by an audience; it is a cultural performance because it employs the performative moment of this communicative act in order to stage cultural meanings for its potential audience. By approaching the ringtone from these different but overlapping angles, a composite picture is drawn of its potential workings, functions and meanings.
2. RINGTONES IN THE PERFORMATIVE SPACE OF COMMUNICATION

A useful framework for analyzing human social behavior has long been provided by sociologist Erving Goffman, whose work has influenced many recent scholars of mobile communication in their methodological approach [19][24][27]. In his seminal *The Presentation of Self in Everyday Life*, Goffman proposed to capture the way people present themselves and their activities to others in terms of a theatrical performance, played on a stage [20]. Although his metaphor has been criticized for being too general and for instigating questionable methodologies, Goffman’s dramaturgical approach offers valuable ways of describing how people construct and present their identity within everyday life, an activity that has become especially manifest in the mobile age. Here, we will shortly explore Goffman’s theory in order to understand the ringtone as a disruptive and cultural performance.

In every social encounter, Goffman argues, we realize that the impression we make on others depends on what signals we give them. Therefore, in order to keep this impression as close to our ‘real’ selves as we want it to be, it is necessary to present the signals in ways that we think will lead to ‘correct’ interpretations. Such a presentation of self Goffman calls a performance, one that continuously adapts itself to either changes in the social setting the performance is played in, or to signals received from others as a result of the performance. At the same time, unconscious — mostly non-verbal — signals are projected onto and received by others, thereby creating a complex web of signs which the performer tries to gauge and control. This web is the *front*, “the expressive equipment of a standard kind intentionally or unwittingly employed by the individual during his performance” [20]. The impression that is made on others is thus comprised of both a performance that can be identified as one of the core performances carried out by easily identifiable teams. In order to understand the ringtone as a disruptive and cultural performance, the signals a mobile phone gives during a conversation are dispersed over multiple channels. Both performances obviously use speech as a way to control which signals are given and received, but the outer performance also uses, as we have seen in unmediated communication, mostly *unconsciously* projected non-verbal signs. What makes this outer performance in mobile communication especially interesting, though, is that, at the callee’s side, it starts with a non-verbal but often very much *consciously chosen* sign, namely the ringtone. This sign is part of what Plant [27] calls *stage-phoning*, a “unique opportunity to put something of [the callee] on display”, and can present a multitude of information regarding the owner of the mobile phone: a confirmation of her connectedness, her agility with digital artifacts, her knowledge of popular culture, or, especially in case of musical ringtones, her connection with certain songs. On all these functional levels, the ringtone’s sudden disclosure initiates a culturally contextualized signal.

It is this property of facilitating culturally loaded outer performances that can be identified as one of the core characteristics of the mobile phone, and that can be held responsible for the rise of annoyance over cellphone conversations in public. Much has been said about the disruptive nature of mobile phones, as they have the ability to invade almost every social setting and break common social patterns. The most disruptive characteristic of the mobile phone, however, is undoubtedly the ringtone, as it precedes any actual mobile conversation and pervades social settings uncalled for.

Usually, specific social settings are connected to specific facades, that is, they construct semi-fixed culturally determined performances carried out by easily identifiable teams. In order to expose appropriate behavior, each actor in a team will try to conform to social and cultural conventions belonging to the setting. When an actor does not know these norms or laws, or when team loyalty fails, the performance can be disrupted, or be disruptive for the audience. Interestingly, the ringtone’s socially disruptive nature is actually actively employed to help construct an outer performance. Moreover, the ringtone needs to be disruptive in order to have any impact on the initial structure of the outer performance. What may seem as normless behavior [19] can actually be understood as a carefully orchestrated (sic) moment of self-presentation. With its continuous, though hidden presence in the public sphere, the ringtone — when activated — thus engenders a cultural performance taking place between the callee and her surroundings.

3. RINGTONES ARE REAL

Having established that the ringtone is both a communicative and a cultural performance, the questions are which possible meanings are attributed to it. One could argue, to give but a few examples, that ringtones are neither real or imaginary, that they are highly specific or generic, that their use is personal or social, that they are intended or not intended by the owner of the mobile, etc.

2 It is important to note that we see inner and outer differently from Sadie Plant, who uses similar terms to describe two forms of mobile phone use “[a]mong small groups of friends or associates” — innies take to themselves and try to shield mobile conversations from group interaction, whereas outies tend to integrate their mobile phone usage into ongoing proceedings [27].
3 Except, of course, in cases where the caller accidentally calls a person without knowing it, for instance when redial or preference keys are pressed when tucking away the mobile phone in a tight space.
these performances embody, and which messages they transmit to their audience. In order to answer these questions, we must first determine the medium-specific characteristics of the ringtone — is it music broadcast by way of a wireless medium, a wireless message in the shape of music or a wireless commercial?

Following Adorno and Horkheimer’s line of argument, Gabriele Klein and Malte Friedrich argue that the convergence of digital media technology, telecommunication and entertainment in global cultural industries has resulted in a complete merger of technology and content [23]. As an example of this development, Klein and Friedrich describe the music video, which is marketing device, image/branding medium and artistic expression at the same time. This argument holds true even more for the ringtone. What started out as simple gadgetry has grown into one of the most promising branches of current music industry.4 The enormous commercial as well as artistic success of the ringtone as a musical medium is not only the result of the capitalist laws feared by Adorno and Horkheimer. The new medium of mobile phoning has rather enabled the cultural industry of music to expand its artistic and communicative horizon. Whereas recording technologies liberated music from the stage, mobile technology overcomes even the physical limitations of broadcast media.5 This technological development has had two important consequences for music culture. Firstly, the ringtone emulates the music video as a commercial strategy because of the limitlessness of mobile technology: whereas MTV was dependent on the static medium of TV for its proliferation, the marketing space of the ringtone has virtually no limits. Music broadcasting has thereby gained both spatial width and audience. Secondly, the ringtone has made music part of mobile communication. It transmits cultural messages of variegated content to both intended and unintended listeners, enabling direct interaction between musical content, the cellphone user and her changeable social environment. The content of mobile communication, in short, consists of words, text, images, as well as music.

The ringtone is thus an epitome of the convergence of technology, entertainment, telecommunication and marketing strategies in current cultural industries. The highly technological and commercial form of this medium does not inhibit its artistic expression. Apart from offering an exciting platform for innovative composers of digital music,6 the ringtone has a similar musical authenticity to other mediated music, and therefore still can be considered ‘music’. Even Adorno held the opinion that the LP could render a musical perfection unequalled by most live performances; mass reproduction and mediatization, therefore, do not necessarily diminish music’s authenticity or meaning. Adorno’s statement led Simon Frith to conclude that “‘liveness’, whether defined in social or in physiological terms, is not essential to musical meaning” [15].

In terms of communication, furthermore, recorded music conveys strong messages. Whether this message is related to ‘liveness’ (for instance in case of a DVD registration of an ‘unplugged’ music session), to purely musical aspects (for instance in case of a digitally edited video to a sampled pop song) or extramusical aspects (for instance in the case of a film soundtrack), the recording underlines and strengthens musical expression rather than diminishing its Benjaminian aura. Philip Auslander even argues that live and mediatized music have become inseparably intertwined both in their production and their reception [2]. “Rock authenticity’ is called forth by a combination of live performance of a song, its auditive or visual reproduction and by its technologically enhanced reiteration, for instance in the shape of a ringtone. Just as seeing Clapton on DVD calls forth not only the memory but indeed the re-experience of seeing him live — even if one has not actually witnessed a live performance —, hearing a ringtone calls forth the experience of hearing the song that it plays. The qualitative inferiority of mono- and polyphonic ringtones has only little influence on the remembrance, re-experience and re-enactment of former hearings of the same song: as Proust’s famous petit madeleine [28] demonstrates, the power of memory hardly fades through time or mediation: the synesthetic workings of memory induce the calling forth of a multi-sensual complex of remembrances at the encounter of even the smallest, mono-sensual mnemonic trigger. Tia DeNora has demonstrated how this mnemonic power of music, furthermore, can make it function as a Foucauldian ‘technology of the self,’ linking musically induced memories to notions of self and identity [10].

The empirical user research conducted by Heikki Uimonen [33] seems to confirm these theoretical contemplations. Ringtone marketing revolves around aspects of the music, not of the phone, indicating the primary importance of music over mediation. Ringtones users, too, are concerned with the connotations and memories of the song that is played, not with the device that mediates it. Uimonen’s interviewees are very eager to point out that they have not picked, for instance, Britney Spears-ringing tones, for fear of being associated to the connotations of Spears’ music. It is the subjective and collective meanings attached to a song, not of its ringtone mediation, that constitute the possible meanings of a ringtone. The ringtone is therefore not more and not less than the mémoire involontaire of a song, just like any other music recording.6 It embodies the same meanings and transmits the same messages as the song that it is molded upon.

If we consider ringtones as cultural performances on the one hand and as musical communications on the other, it follows that what is being performed is the cultural meanings of the music being played. In other words: ringtones enable users to appropriate and display the meanings attached to their ringtone in the outer circle of mobile communication. The Gothic girl whose phone plays a Bauhaus song publicly confirms her belonging to the Gothic community. It is important to note that the performative dimension of the ringing tone is always at work, whether or not

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4 In 2005, the US music industry had a revenue of $12 billion; $600 million came from selling ringtones [21].

5 A similar point is made by Paul du Gay et al. in their assessment of the cultural meaning of the Sony Walkman [17]. The ringtone’s cultural implications are larger even than that of the walkman or other mobile music devices because of its active presence in public and private communication.


7 Cf. also Deleuze and Guattari on the (de- and reterritorializing) mnemonic powers of music and its functioning as mémoire involontaire [9].

8 This is an important extension of Caroline Bassett’s idea of the mobile phone as a mnemonic operator [3].
intended: the disruptive sound of the ringtone must be heard by what Hillel Schwartz has termed “the indefensible ear” [30], and it will stimulate the listener’s cultural memory. However, non-analytical and fuzzy inattentive listening is, it still is listening, and it will still generate memories, thoughts, meanings — Muzak thrives on this principle.

Unlike the static musical media of television and radio, the ringtone, like the iPod and the car radio, is mobile and therefore interacts differently with its environment. The constant recontextualization of a song through the mobility of the cellphone user may cause variations on its original connotations, messages or meanings.7 If the above-mentioned Gothic girl would have the latest Eminem ringtone, the cultural meanings attached to that artist would acquire a different reading. Moreover, it would matter greatly whether Eminem’s ‘Gothic’ performance would sound in the neutral environment of a bus or train, or in the circle of the girl’s Gothic friends. Whereas attentive bus passengers around the girl might at most be somewhat puzzled by the apparent subcultural conflict being enacted, fellow Goths might be genuinely appalled by it, to the extent even of doubting the girl’s ‘Gothic authenticity’ and her loyalty to the subculture.8 Even in the globalized cultural industry, local appropriations of musical products still exist and can cause unpredictable differences [23].

As the ringtone adds the dimension of mobility to the cultural performance of music, the appropriation and attached meaning of one and the same piece of music may vary according to its location [7]. Like the walkman and the iPod, the ringtone is an explicitly spatial medium, intricately linking together time, space and communication [32]. Unlike those media, moreover, the ringtone — and therefore its performative effect — is public. The ringtone, in short, proofs to be a powerful communicative medium: the combination of the mobility and public character of the cell phone with musical messages and their strong cultural connotations has created a medium generating very effective cultural performances.

4. RINGTONES AND THE PERFORMANCE OF (SUB)CULTURAL IDENTITY

In his paper “Self and Community in the New Floating Worlds”, psychology professor Kenneth J. Gergen argues that where many of the 20th century’s major technologies have “functioned corrosively with respect to the traditional, face-to-face community”, the mobile phone “offers the possibility for continuous and instantaneous reconnection of participants within face-to-face groups” [18]. This restoration of community does not take a traditional form, however, but one Gergen terms as a “floating world”. Here, he refers to a description from 19th century Japan of free and informal social interchange that takes place in small and loosely connected communities, hidden from government or other authority control. The new floating world of mobile phone users, Gergen argues, replicates the uninhibitedness and unbounded nature of communication within those communities. Yet, while the 19th century floating worlds were “literally ‘grounded’ […] the floating world of the mobile phone user is approaching the point of geographic irrelevance”.

The floating worlds of mobile technology have thus changed the conditions for the understanding of self and community from boundedness and centeredness to relational connectedness through mobile phones. Following cybernetwork theories, Joshua Meyrowitz adds that this new sense of identity can be identified as ‘glocalized’, the term stressing both global connectivity and local attachment [25]. These characteristics of mobile phone communities extend also to their cultural identities. Cultural identity of individuals and groups is no longer definable solely via physical location, but reaches over the borders of time, space and mediation.

Musical subcultures, in line with these developments, have glocalised both in scope and in reach. Various subcultural theorists have stressed that locally confined subcultural scenes now operate translocally through mediation and commercialization.11 The feeling of belonging that is so crucial for the self definition of subcultures has thus come to apply to glocal networks as well as to locally bound communities [23].12 The ringtone seems to function as an active marker of the new floating (sub)cultural communities and their outward appearance, attaching the cultural memory of a certain song to both caller and callee. The disruptive social quality of this medium, moreover, makes sure that the audience, voluntarily or involuntarily, witnesses this cultural performance. Because of its necessarily public character, the ringtone establishes the auditory boundaries of floating subcultures to their participants as well as to outsiders.

Milenia Droumeva asserts that the ringtone subjects audiences to the mobile phone owner’s personal soundscape design, leading to a polluted publie soundscape and to a “lack of real community” [12]. This negative evaluation of the ringtone’s communicative potentialities is based on Schafer’s notion of the schizophrenic separation of a sound and its original context and meanings [29]. According to this theory, the recontextualisation of sound equals loss of meaning. However, although a constant recontextualisation is one of the main features of mobile music, the variable times, places and social contexts of the performed music will engender subtle variations in its embodied cultural meanings rather than completely alter or even eliminate them. As has been argued above, we consider the ringtone as the mémoire involontaire of a song; like the madeleine dipped in jasmine tea, this physically limited object inevitably stirs strong memories to which new

9 Cf. Fischer-Lichte’s analysis of the emergent meanings of auditory performances [14].

10 If, very hypothetically, she might be member of some postmodern eclectic art scene, her combination of two musical lifestyles might be considered perfectly original and acceptable.

11 See for instance Paul Hodkinson’s observations of these aspects of Gothic subcultures in the UK [22].

12 One of the results of these developments is the critical reworking of CCCS subculture theory. This is not the place to discuss the distinctions between subcultures, neotribes, bünde and scenes (for an overview of the research field see Andy Bennett and Keith Kahn-Harris [5]). For brevity’s sake we will employ the term subculture here for less or more coordinated, music-based youth cultures, without attaching stringent or generalising characteristics to them.
contexts make additions rather than radical alterations. Since floating subcultures by no means lack a sense of real community, it seems likely that a strong cultural marker such as the ringtone confirms rather than endangers subcultural belonging.

One reason why the mnemonic working of the ringtone is so strong can be found in the great performative power of music. Simon Frith has argued that the performative working of music can be explained for a large part by the strong connection between the subjective and the collective in musical experiences [16]. Because music induces both individual and shared emotions and memories, the listener can identify both with the musical performers in question and with their audience. Hearing a ringtone and experiencing the cultural memory it embodies can thus induce identification processes in inner — as the callee attaches musically derived meanings to the caller — as well as outer communication — as the callee’s surrounding attaches similarly constructed meanings to her. These listener groups can recognise and identify with subcultural conventions in any aspect of the cultural performance of a ringtone; the example of the Goth girl’s ringtone described above illustrates the various possible types of recognition and identification, all stirred by the connection between personal and collective cultural memories in musical experience.

As has been argued both from a cultural and a musicological viewpoint, performance and performativity are important factors in the construction of social identities [6][15]. Cultural identity can be considered a cultural performance acquiring meaning in interaction with an audience [13][14]. Musical ringtones are attributed meaning in an interactive way as well: the social environment of the callee recognises the subcultural conventions embedded in the ringtone and establishes the callee’s attachment to them. Simultaneously, this audience will — however subconsciously — reflect upon their own connection to this subcultural field as well. The ringtone can therefore be considered as a cultural performance of subcultural identity operating both within floating communities and, because of its disruptively auditive quality, in their immediate surrounding.

5. FLOATING FABULOUSNESS

As we have argued in the previous section, the ringtone, understood as a cultural and communicative performance, co-shapes the floating worlds of musical subcultures. Because of its mobility, the mobile phone enables its users to carry with them a multitude of identity-tokens and to present these in public, making them ‘float’ out in the open. Just as with the walkman and the iPod these identity-tokens can take the powerful shape of music, but unlike the sound coming through a headphone or earpieces the ringtone is heard by an audience. This makes the ringtone an extremely prominent means to establish, confirm or even question an alliance with specific musical subcultures.

Carrying and almost flaunting a specific ringtone and its cultural connotations can, because of the performative nature of such an act, thus be seen as a way to (re)negotiate how this alliance with musical subcultures can be perceived. Through this process, a callee can temporarily become a virtual member of all musical subcultures that, through the possible domain of interpretations, can be connected to her ringtone. The examples and empirical data shown in the second and third paragraph have already illustrated this; we would briefly like to discuss another example in which the ringtone and its disruptive, flaunting character works to confirm group allegiance, namely the gangsta rap scene.

In gangsta subculture, street credibility is the key word. Any hip-hop devotee who cannot convincingly demonstrate having lived a hard life in the ghetto will be dismissed by their peers and fail in music industry (Armstrong). Identity is indeed constructed performatively in gangsta culture: it is the surroundings of a hip-hop devotee that confirms and indeed determines the credibility of her/his performance as a gangsta or a pimp [31]. Surely certain aspects of ghetto fabulousness have been commoditized — but obtaining a big car, shiny jewelry, fur coats and the latest phone does not make one a gangsta. Ghetto fabulousness can only be acquired performatively, in interactive relation to one’s surroundings.

Hip-hop performer 50 Cent (Curtis Jackson) carries the visual tokens of street life with him. He allegedly got shot 9 times in a street fight, and explicitly markets his scars as a sign of his genuine gangsta identity: according to his official website www.50cent.com, 50 is “[...] the real deal, the genuine article. He’s a man of the streets, intimately familiar with its codes and its violence, but still, 50, an incredibly intelligent and deliberate man, holds himself with a regal air as if above the pettiness which surrounds him. [...] 50 is real, so he does real things.”

Since 50 Cent apparently has what it takes to belong to the gangsta subculture, it is interesting to analyze one of his songs and its ringtone along the theoretical framework laid out in this paper in order to study their performativ effects.

The song “Candy Shop” appeared on 50’s album The Massacre from 2005. The song was a big hit throughout the US and Europe, not in the least because of its video, which closely tied together the auditive and visual representation of a pimp fantasy. The text is a typical hip-hop boast celebrating the singer’s bedside manners, referring also to his own former work[13] and thereby reinforcing his status in the gangsta hip-hop world. The story situated in the fantasy world of a candy shop, in which both the shape and taste of those delicacies are clearly to be interpreted metaphorically.

The visuals of the video elaborate on the sensual fantasy laid out in the text. The fantasy world is set in a large mansion which is accessed by the singer in a big ‘pimp’ car. Inside the pastel-colored interior of the mansion we find ladies who dance, who bathe in chocolate and who emerge from seemingly lifeless paintings and statues—naturally all in service of the protagonist of the story. At the end of the video, the latter finds himself having fallen asleep in front of a drive-in restaurant, and only having dreamt all the sweetness.

The music to “Candy Shop” underlines both the fantasy- and the sensual aspects of the song text. The chromatic sample which dominates the musical outline of the song evokes overtones of the exotic, an effect supported by the instrumentation in low strings and the Dionysian flutes in the chorus. The melodic

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13 “Got the magic stick”, for instance, is a reference to “P.I.M.P.”, the song with (among others) Snoop Dogg that established 50 Cent’s fame and career.
ornamentation appearing regularly in the flute sample is another reference to oriental exoticism. The heavily syncopated drum samples playing against the onbeat synthesizer chords and chromatic samples, finally, accentuate the sensuality of the song’s theme. In the video, the beat only sets in when the door to the mansion has been opened and one of the girls begs 50 Cent to enter, indicating that the fantasy starts then and there. Upon the singer’s waking up in his car, the music stops abruptly: the fantasy’s over.

The ringtone to “Candy Shop” is a very brief, but effective musical condensation of the song. It summarizes its key characteristics, playing only the chromatic bassline, the onbeat synthesizer chords, and the flute sample. Whereas both instrumentation and melody of this short extract of the song already are powerful reminders of its musical and textual atmosphere, an added melodic grace note makes sure that the exotic mood is captured in these few seconds. The disruptiveness and performative capacity of this powerful musical madeleine will inevitably induce individual and collective memories related to music, video, artist or gangsta subculture in the audience. Since a ringtone is consciously chosen, they will contemplate the callee’s and possibly their own relation to it. The floating subculture of which this ringtone marks the cultural memory is that of gangsta rap, and by unpacking his mobile music library its carrier stages a cultural performance of what we would like to call ‘floating fabulousness’.

6. CONCLUSIONS
As virtual, communicative and cultural performances, musical ringtones have the inherent capacity to function as publicly disseminated madeleines, which suddenly announce themselves and disrupt everyday social situations. For this reason, ringtones can be seen as a means to actively display and communicate a loyalty to floating subcultures, as well as triggers for cultural performances within the spatial sphere of the ringtone’s carrier. The flaunting character of these performances lends itself perfectly for the display of fabulousness: hearing a ringtone will induce mnemonic reflections.

Our findings concern musical ringtones primarily. Sound effects or recorded speech can equally invoke communicative and cultural performances, but we consider the vast array of individual and shared musical memories to be more powerful in invoking ‘madeleine trails’ and in manifesting (sub)cultural identities. This does not mean that we think that the functioning of ringtones as communicative and cultural performances is only established when complete songs are played; even the smallest musical unit such as, say, a bass line or a vocal timbre can open up a whole archive of other songs—and unpack their (sub)cultural libraries.

7. REFERENCES
ABSTRACT
Taking Soundings is a series of art pieces emerging from an investigation into landscape and navigation. To ‘take soundings’ is a traditional technique of determining the shape and depth of the sea-bed by means of a lead and line, and I find an obvious continuity in the gathering of information from satellites via a GPS receiver. Taking soundings of ones position relative to satellites orbiting the earth rather than relative to ones immediate environment, strikes me as a kind of blind guidance, encouraging feelings of false security. (written for the programme note of Taking Soundings performance, Cologne 2006) [7]

Keywords

1. INTRODUCTION
Navigation is essentially a calculation of position/location derived from points of information in space and time, which are continuously updated to derive moving traces (past) and trajectories (future). By starting from a human scale of navigation, taken historically from direct observation of stars, landscape features, environmental fluctuations, I hope to place recent satellite navigation techniques, into a perspective of layered accumulative technological developments. My aim in this paper is to contribute to the aesthetic development of the emerging artistic research field of locative media/mobile music by describing my experience as an artist/musician in investigating navigations and orientations through sound.

This research suggests strategies for (mobile) musical composition through an enquiry into technologies of navigation. The history of navigation is a history of bodily negotiation with and through space and is bound up with a string of technological developments. By looking at how one type of technology imposes styles of interaction, or a spatial motif of movement, these invisible structures could form a basis of bodily interactions in sound. Examples covered here include, the centrifugal motion of a lighthouse beam where one is located exterior to circular motions, or ones location inside the centripetal motion of orbiting satellites. These spatial motifs for interaction are suitable for sound art and sound installations by nature of ones spatial position within them, and the developments in the field of mobile music are potentially directly related.

The research began during an Artistic Fellowship at the Sound Department (Klanglabor) [9] of the Academy of Media Arts (KHM) in Cologne during 2006, includes a research trip to Sydney during 2007 and is still in progress. The coastline, as an area of dynamism between liquid, solid and air, is a landscape of noise. The coastline is a significant space because it highlights the body’s adaptation to the contrasts of water and land through sound. We use sound for orientation, as reflected in the complex processes of balancing (ears) and moving through space. The different qualities of navigation at sea to navigating on land – land giving predefined paths/streets, views and landmarks, sea-space characterised by tides and winds and open horizon – encouraged me to focus on the navigation of coastlines. The work in this paper introduces three sites, the Atlantic coast of Brittany in France, the Spanish Balearic Islands in the Mediterranean Sea, and Port Jackson of Sydney Harbour in Australia.
2. BACKGROUND OF COASTAL NAVIGATION TECHNIQUES: POINTS OF COMPATIBILITY BETWEEN NAVIGATION AND SOUND

2.1 Techniques of Navigation through Motion

All navigation techniques rely on time and motion as a fundamental for calculating position. An historical context of media technologies is relevant in the accumulative nature of both navigation systems and musical instruments. [14] Historical techniques of navigation at sea include: estimating position from sun and stars using a sextant, lowering a lead and line to "take-soundings" of the (invisible) sea-bed, the (visible) rotating flashing patterns of the lighthouses and the (audible) signals of their foghorns, the (visualised) scanning of radar, and most recently the adherence to an (invisible) satellite system. All offer variations on the perception of movement and subsequent calculation of location, forming an accumulative set of navigation skills and techniques.

Navigation is a combination of relatively slow, simple data of low resolution calculated to increasing precision and speed. An interesting area of technological development in navigation processes is the high precision required in racing yachts. These are now using systems that combine sensors positioned around the boat (wind strength and direction, speed over water) with satellite positioning, to infer speed, and predictive calculations based on continuously updating weather reports to optimise their performance.

2.2 Maps, Charts and Scores

Given the importance of time in navigation, it is relevant to consider the role of the map in locating oneself in space, and the status of the line or score in both navigation and new musical practice involving navigational data. Maps and charts are a notation that when interpreted, enables one to move through an area of land with a precise conceptual understanding of where one is and what is around the corner or under the boat. Likewise, the musical score is a notation or map, communicating a space of interaction that enables us to move in an abstract plane of sounds and forms of balance, rhythm, curve and flow.

Both the score and the map contain a trace, a trajectory, communicate a space of interaction, and require interpretation of events. Certain land-art works from the 1960’s, particularly the map and text works of English artists Richard Long and Hamish Fulton, are relevant for their relation between the navigation, landscape and sound. [2, 8]

In the development of ‘mobile music’ can we investigate the changed status/compatibility between the score and the map? Numerous examples of ‘GPS drawings’, graphic lines or maps made by walking, driving, paragliding suggest an interest in an active creation of traces by the physical body. [1,10,11] The limitation of these projects is that they stop at the point of the image. The initiative C5 addresses questions further the relationship between GPS technologies and land art in the context of landscape [3]. An important point is raised in a recent article [13], about the nature of mapping in relation to national identity and power strategies, and the notion that location based technologies are tied up with surveillance issues. These issues are acutely present in the use of Google Earth as a tool from which to superimpose ones route in real-time. Particularly dominant is the ‘birds-eye’ or ‘satellite eye’ where the dominant viewpoint is from above. In Taking Soundings I explore these ideas through image and sound.

2.3 Spatialisation and Orientation During Navigation

Along the coast an infrastructure of permanent signaling lights provides a network of clearly identifiable nodes, points of light in space, each coded with a unique flashing rhythm. This lighthouse rhythm is specified on a chart as having a certain number of long or short flashes, coloured white red or green,
over a period of sixty seconds that cyclically repeats. Related
together, by taking compass bearings, these nodes and the
moving spatial relations between them, allow one to infer an
exact position and trajectory.

The satellite trace of my movement made visible on a screen,
updating in real-time, marks my movement across a space. This
trace is not a map in itself, but a record or 'memory' of my
movement in the form of a line. Traditional navigation by taking
compass bearings on visible landmarks and plotting them on a
map ('position fixing') creates a series of points strung on a line,
a daisy chain. Although the data from the satellite navigation
systems are also strings of points, they differ from navigation
using landmarks in that they are regularly sampled (once per
second) regardless of the visible, physical nature of the terrain.
Floating as an abstract data above the perceivable nature of
place, this striated form [4] is literally superimposed on the
details of the land.

3. MOTIVATION BEHIND THIS
PROJECT
3.1 Previous Projects: Video Walker,
Sargasso Sail
Very briefly, the background context for this work has built on
my earlier artistic projects that have explored landscape and
seascape in relation to technologies of sound, video and
navigation. The *Sargasso Sail* (1997) was a sail across the
Sargasso Sea, exploring sounds and the psychological impact of
a journey away from land, particularly navigating across the
legendary Bermuda Triangle famous for disappearing ships (?) It
consisted mainly of observations and diaries over the seven days
trajectory.

Another influence was the Video Walker project (2002-3)
developed in Catalunya in collaboration with Bert Bongers. A
portable projector with sensors to control changes in video, all
controlled via a Max/MSP set-up running on the portable
computer carried in the back-pack, walked along a beach at
dusk. This developed into a double set for the performance
*Between: Two. Duet for Mobile Video Players* in Maastricht
(2003). I developed the video content with the idea that the
interface between real and projected image, and the act of walking carrying a projector much like a torch, could be a powerful experience in hybrid reality. A new much more lightweight version has yet to be built, and with developments in projection technology it should be possible in the near future.

3.2 Conceptual Change of Satellite Navigation

Taking soundings of the satellite data reveals a different kind of relationship to motion and position. Where the lighthouse functions by our position on the outside of a series of circling lights, the satellite navigation system (such as GPS) functions by our position from inside a series of orbiting satellites. Our relation to the points of navigation and position in a terrain have moved with this technological development from one of centrifugal motion to centripetal motion, from being outside circles to being inside them, from one of searching for the lighthouses, to a position of continuous surveillance or watching from above. The installation and performance Taking Soundings takes lighthouses and satellite navigation as its material, sonically combined in the installation as two different positions, motions and ways of navigating.

4. TAKING SOUNDINGS: COMPOSITION

4.1 Sound and Data Mapping

The Taking Soundings sound installation and performance takes these simple geometric patterns and moving signals, slow data, as its basis for both sound generation and spatialisation and control of live video. The set-up consists of a handheld GPS receiver (Garmin GPS 60), connected to an Apple Powerbook via USB using the software MacGPS Pro. This data is then read continuously by Max/MSP+Jitter software where the data is converted to sound using sixteen channels of sound output, and used to control the video.

The cyclical signals of eight lighthouses located on the far Western Atlantic tip of Brittany in France, are 'sounded' in two ways. The first, keeping the original timing of the light signals, uses pure sine-waves to ‘loom’ in and out of focus, and maps the frequency of the sine wave to the distance of the visibility of the light signal in nautical miles. The second, treats the lighthouse signal as a wave-form and makes it audible by compressing the time, creating low rumbles of distinctly different textures. The spatial layout of the Max/MSP patch interface corresponds to layout of lighthouses and speakers – a sort of visual mapping to aid recognition of the sounds and their spatial relationship – also each one is named after the lighthouse.

The satellite data received by the handheld Garmin GPS updates at a rate of once every second. The data used in the installation is the basic data of latitude, longitude and altitude, and the inferred velocity and compass bearing (track degrees true). The characteristic of this data is slow and simple, entirely different from for example meteorological or seismic data used in sonification/audification projects. With a maximum of five changing values per second, and often no change, sounds were chosen to reflect this. Each type of data was given a recognisable sound, such as clicks and short tones, distinguishable from the other data, and the parameters of pitch or timbre change marginally within these limits. The data only sounds when a change is registered, and the tempo of the once per second is kept in the live GPS version of the installation. When using pre-recorded data files, for example those gathered at the same locations as the lighthouses on the Brittany coast, the tempo is increased according to the rate of reading through the data. By keeping this rhythmic quality the regularity inherent in the technological system of satellite navigation is emphasised over any form of complex natural environmental data.
4.2 Sound Spatialisation

The crucial element in realising this piece was the spatialisation of the sound in relation to the visitors sense of orientation in space. The two navigation technologies, lighthouses and satellite, are given two distinct layers in the space, to emphasise the different signaling roles. Eight speakers are placed at ground level, loosely derived from the location of the eight lighthouses in geographical space, where each speaker plays the sound of its respective lighthouse signal. Evenly placed around the top edges of the space are a further six speakers for the sounding of the satellite data. By mapping the change in direction inferred by the GPS (parameter track degrees true), to the location of the sound in the space, a continually moving soundscape of crisp signals is superimposed on the full and bass sounds from the lighthouse strata. Two subwoofers in the space complete the range of sound.

The above image shows the trace created by the GPS hanging in a fixed position in the performance space. The errors in inferred position, and the subsequent apparent direction of movement formed the basis of the audio-visual installation. The line, projected in the space, draws as it updates every second, at exactly the same minute that the sound occurs, somewhere in the space depending on the direction of apparent movement.

5. WORK IN PROGRESS

5.1 Sonic Driving

Experiments for a mobile version of this principle based on driving are called Score for Open Car. By reading the GPS data into the computer in real-time, and transforming this data into sounds, (using Max/MSP) taking soundings by means of ‘clicks and blops’, then transmitting this by radio to the car sound system, I am able to hear the change in location, altitude and speed over time, superimposed on the noises of the car and the passing landscape. I'm not using this as navigational information as I have no map connected to my GPS and I do not expect to be able to navigate by using these sounds. Different priorities arise, instead of 'getting there', I'm suspended in a continuous sound environment that has some direct relationship to my movement and my location. I propose to develop a future mobile version where the audience hears the change in GPS data as they walk, creating their own unique and changing rhythmic soundscape from their moving position.

6. CONCLUSION

This artistic research has looked into technologies and techniques of (coastal) navigation in reference to sound art and its relevance to an emerging mobile field of music. It’s also a way of placing recent navigational developments into an historical context of layered technological stages that do not exclude each other but accumulate. I describe an approach based on treating the technologies in relation to experiential, physical ideas of orientation, which can be re-interpreted in sound and video. The project is ongoing and further work will be presented in installations and presentations over the next year.

7. ACKNOWLEDGEMENTS

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8. REFERENCES


Posters
Egotone: Generative Ringtone Engine

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ABSTRACT
Today’s mobile phone customers are becoming increasingly sophisticated in their demand for personalized audio on their mobile phones. Generative Ringtone Engines give the user the ability to produce a unique, personalized ringtone for their mobile devices on the fly. In this article I present the work in progress of Egotone, a Generative Ringtone Engine that is designed to generate interactive music compositions using mobile device data.

Keywords

1. INTRODUCTION
The communication overload of the 21st century has evolved us into a superhighway society that encounters repetitive doses of information and placed several electronic mobile devices in the centre of our everyday lifestyle. These, playing a prominent role in our daily life experiences, demanding to treat them well, as for certain societies, function as a cultural icon – a brand or a carrier of style and fashion. One of the fundamentals of these devices is our personal mobile phone. The mobile phone’s external characteristics such as its design, its color and the sound it produces, are those that shape its image and appearance. This, in certain sectors of society indirectly relates to the phone user’s own character, lifestyle or social class. Of all these characteristics, the ringtone, the sound made by a mobile phone when an incoming call is received, is probably the most interactive and revealing one, as it interacts, in a fashionably unexpected manner, with the mobile phone’s owner and the environment, sometimes carrying a message or offering an insight into its user’s own taste of aesthetics and style. The rapid increase in mobile phone usage and the advancements in mobile technology have set new standards, where customers are much interested in the uniqueness and originality of their mobile device. The implication of these on the ringtone industry have increased the customer demands for personalized audio content for their mobile phones, and has led mobile music technology developers to explore the idea of Generative Music Systems. These software-based systems allow the user to create constantly evolving music in different genres, which is original, non-repeating and copyright-free.

2. RELATED WORK
There are several mobile technology companies who have already implemented the idea of generative music systems. One of the most popular ones is Tao’s Advanced Polyphonic Ringtone System, intent Sound System (iSS), which incorporates Koan PRO, the award winning interactive audio and generative music authoring system developed by SSEYO. Another example is the MadMixer software developed by MadWaves. MadMixer is based on MadWave’s Generative Music Algorithms (GMA) Technology, which can automatically generate original, non-repeating music in various musical genres. MadMixer enables the user to create his own customized ringtone. While these technologies focus on the automatic generation of ringtones based on parameters and controls adjusted by the user himself, none of them uses the mobile device data content as a source material for generative music composition.

3. EGO TONE
Egotone is an innovative medium of interaction between a mobile phone - its user and the environment. It aims to take the essence of the ringtone towards other directions and to artistically enrich it with intelligence and personal aspects. Egotone is an interactive software system that is designed to transform data retrieved from a mobile device into digital sound, and to arrange it into a musical composition. This embeds itself into a computer sound file format, which is mobile device compatible and can be used as a ringtone. This custom-made ‘personalized ringtone’ is the result...
of logical data mapping processes that lead to generative creation of a musical piece with an exclusive form and sound.

4. THEORY OF OPERATION
The core of the mechanism is an algorithm that converts certain information within a mobile device into plain data, which is then mapped to control and trigger various parameters within a software-based audio engine - a network of audio instruments that are designed to generate musical materials from data and to output a ringtone sound file format. For instance, statistical information from the device such as Free Memory and Used Memory, can be converted into musical parameters like Tempo/Speed, Pitch or Velocity, while other information such as Manufacturer of the mobile device, Model or Company, can be converted to control rhythmic patterns, melodic structures and quality of sound.

Figure 2.: Simplified example of data mapping to musical parameters in the audio engine. Data from the mobile device is classified in three groups – Model/Company, Loudness Level, Used Memory. These are being mapped to variables and control parameters in the audio engine, varying the characteristics of the sound and the structure of the composition.

‘Loudness Level’ is the level at which a mobile phone user adjusts the volume of the ring-tone produced when an incoming call is received.

The algorithmic composition of the ringtone involves dynamic processes of conditional probability and restricted randomness such as Markov chains, Brownian motion and other time-discrete stochastic mathematical models. These are used to add sonic diversity to the ring tones by giving the generating system a bounded life of its own, in which musical variations may take place without modifying the main form – an audible reflection of the mobile device’s characteristics and inner data content. The Biographical note:

system can be implemented as an interactive web application on the Internet, as multi-platform standalone software, or as a mobile application directly running from the mobile device’s operating system.

* The variables used in the described model (Model / Used Memory / Loudness Level), are just an example of a brief method for using mobile device data content. Other variables from the device can be used and transformed to control parameters of the audio engine. The ‘natural’ alteration of each variable may result in a different musical output. Global statistical variables can be reduced to more direct, focused variables, e.g. Used Memory can be reduced to the utilization of the mobile device inner phonebook (the amount of stored numbers in the phonebook).

5. DEVELOPMENT
An experimental version of Egotone was developed for testing the model. The current version is able to automatically generate potentially endless number of non-repeating, original ringtones from three different musical prototypes. Realization of the complete model requires integration of different cross-media technologies and is currently in the works.

6. CONCLUSIONS AND FUTURE WORK
The artistic concept of Egotone is based on the assumption that similar people, whom are users of information storage devices, tend to share similar content of information in which patterns of data can be found. The limitations of a mobile phone as an electronic device, already stands as an initial factor for the generation of patterns in the ways people tend to use the device, and many related content can be found in a group of people who share the same friends or acquaintances, a similar lifestyle or people who come from the same socio-economic class. Egotone is able to give an audible representation to these relations, and to somewhat function as an audible mirror of the mobile device’s owner, a group of people, or a social cross-section. Selected elements from the mobile device’s content will be transformed to parameters, control values and triggers of the implemented audio engine. Various prototypes of ring tones will be generated, and in the abstract result, people who use different machines will tend to generate different prototypes of ring tones, while people who share similar information content will tend to generate ring tone prototypes with mutual musical relations and sound characteristics.

7. REFERENCES
Audio Bombing: Magnetic Cassette Tape Graffiti

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ABSTRACT
Audio Bombing is an alternative form of graffiti that uses magnetic audiotape as its medium. Drawing from hip hop and graffiti culture Audio Bombing starts with a basic cassette tape. Using a tape recorder you can record any information you want on to a cassette (music, poems, philosophy, subversive literature, etc.). After recording you remove the tape and cut out the segments that you want to use. Then take your tape segments and go tag whatever you want (buildings, benches, posters, buses, etc.). Using the augmented playhead spray can you can listen to the tags by running the playhead over the tape.

Keywords
Tangible Audio, Ubiquitous Music, Interdisciplinary, New Media Arts

1. INTRODUCTION
The intention of this project was to create a new form of underground expression from a medium that is falling out of use; Reinventing graffiti with cassette tapes which have a long history in hip hop culture. It is open to anyone who has a cassette tape to “audiobomb”. It just takes recording what you want on cassette, cutting the tape up and then tagging it up. Manifesting audio samples into a physical and more visible form while allowing for manipulation of its playback echoes some of the re-appropriation of funk or disco beats seen in productions by DJs in early Hip Hop. It does not require any skill in drawing or traditional graffiti and functions under the radar of most suspicious authorities.

Since this medium is less visually obtrusive, being only a thin black line, it has an undercover versatility which normal graffiti does not. This specifically allows it to infiltrate spaces traditional graffiti can not, such as office buildings, under tables, in elevators, coffee shops, schools, and tight spaces.

The need to physically run a playhead over the magnetic tape in order to hear the audio tag makes the scenario of reading someone’s tag mirror the act of writing that tag. This project questions the role of the reader when taking part in subversive communication. In reading an audiobomb tag the reader is put in the same position as a traditional graffiti writer instead of a traditional (passive) audience. The reader needs to actively engage with the content to receive the content of the tag.

2. PROTOTYPE
Our prototype consists of a hacked and reconstructed cassette player. We removed the casing from the player and then dismantled the play head from the circuit board so it was free to function externally. With the play head free you can run it along a magnetic cassette tape that is on the wall and listen to it. We created a website with step-by-step instructions for building a reader, how to post audiobomb tags, and videos of users tagging and reading tags (http://www.audiobombing.blogspot.com/)

We have explored a number of types of content for the cassette tape tags, including music and spoken word. At the proof-of-concept stage we have been using simple layouts of tape, but the physical form of an audio bomb can be as straightforward as a line...
or as complex as the tangled paste-up of Nam June Paik’s Random Access [5]. This combination of visual complexity and the complexity of the content will be explored in future work.

3. RELATED WORK

Audio bombing is an analog, tangible complement to several digital mobile music scenarios. Sonic City [4] creates music based on sensor inputs polling bodily state and environmental conditions, reacting to the body and the built environment. gpsTunes [8] spatializes the playback of sound embedded by designers at particular GPS coordinates, creating a navigation aid for users in physical space. The Urban Tapestries project [2] enlists entire communities to author audio content and layers it in space, creating sound maps that can be layered, shared, and expanded cooperatively. Sonic Graffiti [3] describes a scenario where traditional graffiti practice is augmented through an audio spray cap. Through a set of learned gestures, taggers can leave patterns of sound clips tied to particular visual patterns marking the space. The result is much like a visual representation of a DJ session, or sonified information visualization.

Our use of the spray can as a reading device for the audio bomb tags is similar to the use of cell phones as tag making and reading devices in Garner et al. [1]. In their system, mobile phones combined with RFID tags, allowed users to virtually mark territory with unobtrusive and socially acceptable devices. These visual tags were made visible only in virtual space and on the display of the cell phones. In contrast, our spray can marks its user immediately as a participant in audio bombing (or graffiti writing), promoting a very different kind of experience.

The physical experience of tagging, the act of arranging the tape at the site, is replicated by the reader of the tags. In some ways the reader has to mimic the motion of the tagger, creating a physical resonance with the act that embedded the memory. The DJammer project [7] uses accelerometers to allow DJs to manipulate sounds using hand gestures. The hand gestures of the reader are equally important with audio bombs. Similar to Sonic Fabric [6] this project uses an externalized play head reading device to listen to re-appropriated audiotape. The reader of a tag has the opportunity to approach the content of the tag from any point and at any speed of replay depending on how they manually manipulate the spray can. The care and slowness in writing/reading audio bombs is in contrast to the ease and speed of many of the digital approaches and can further distinguish the experience of audio bombing from other uses of the public spaces that are tagged, hopefully making the complexity of the content will be explored in future work.

4. FUTURE WORK

As future work we hope to extend the web component of the project to foster a subculture of use. The project largely anticipates actual presence in sites and potential applications, but we would like to gather accounts of user experiences with audio bombs. Audience, not just the taggers but passers-by, and sociality are important aspects of audio bombing. We hope to further explore the distinctions between the subculture and broadcast aspects of audio bombing, and how they may relate to audience reception.

Through more controlled deployment, we will examine specific design choices in content, form, and placement in the built environment. By using specific themes in content we will engage with magnetic tape as a form of collective storage and memory. What kinds of narratives are supported by using tape? How are traditional graffiti practices, like overwriting tags, changed with this new visual and data form? How does preservation of memory, in this case the tape, relate to the fading of visual graffiti?

With further iteration we will examine what sorts of sounds might function well in this lo-fi setting and what sound sources might not work well, due to duration, speed, or fidelity? The magnetic tape is less obtrusive that other graffiti forms but still acts as a form of visual mark-making. Future prototypes will look at the life of the tape in the space – How the ways the tape could call attention to itself, or not? How might the tape accent the architecture or contrast with the architecture? How might the tape reflect paths, or demarcate spaces or zones? Again, traditional graffiti practices, like placing tags in hard to reach sites (“stay-ups”), need to be considered differently when reading a tag requires visual and physical engagement.

5. ACKNOWLEDGMENTS

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6. REFERENCES

Sonic Graffiti: Spraying and Remixing Music on the Street
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ABSTRACT
Sonic Graffiti is a concept for people to spray and remix music on the street. It contains a system of devices for creators, including the sound cap, the controller and the boom box. The sound cap is designed to be put on the real spray can, and makes the sound sample spray out with the paint. The controller and the boom box serve as assist devices during the creating process. Music is composed by overlaying paints. Hence the graffiti is the visualization of the music, and the music is the soundtrack of the graffiti. Passengers can listen to the music with a software player installed in their mobile devices. Music is streamed to the device when the passenger come close to the graffiti.

Keywords
Locative media, music visualization, geo-tagging, graffiti subculture, urban experiences

1. INTRODUCTION
Graffiti is an urban phenomenon with its own prominent subculture. [1] With the rising of locative media, the invisible audio is able to be tagged in the physical space. Here tagging technically means geo-tagging, as a process of depositing digital content in a physical location. This project explores a concept of enabling people spray music on the street and make graffiti with both visual and audio elements.

A system of physical devices is designed for artists to create and tag music in the urban space with real spray cans. For general viewers/audiences Sonic Graffiti provides a listening experience giving a sense of connection with the environment.

Music is abstract to express visually. Some graffiti artists distort letters, design patterns to make abstract works; others do picturesque pieces. I am interested in investigating what new form of expression would evolve from the blending of music and graffiti. The current design of Sonic Graffiti leaves much freedom to artists for developing their own formation and visual languages of music. They can adopt a more improvisational attitude or sketch out their work before painting. The results may be short sound signatures or epic compositions.

2. DESIGN
Devices for creating and tagging music includes the sound cap, the controller and the optional boom box. The sound cap snapped on the spray can forms the main instrument. The controller and the boom box act as assist components.

The method of composing music in Sonic Graffiti is by remixing various sound samples. Suppose each spray can represent one sound sample, when the artist sprays out the paint, he also sprays...
out the sound. Overlaying different paint causes related sounds mixed together. Hence music can be composed layer by layer.

2.1 Sound Cap

The sound cap enables users spraying out sounds. Each cap stores up to 3 different pieces of sound that users upload to the cap before spraying. To make the music creating more interesting and the result more refined, the sound cap equips two remix techniques: fade in/fade out and scratches. Users reach all the functions on the sound cap with gesture controls:

- **Fade in**: turning the spray can from horizontal to vertical
- **Fade out**: turning the spray can from vertical to horizontal
- **Scratch**: scratching diagonally, from top left to bottom right and vice versa
- **Change sound**: holding the shift button on the cap and shaking the spray can vertically for once. Each shaking makes the sound change to the next.

Having the same continuous rhythm through the remixed music is commonly seen. To include this composing technique in Sonic Graffiti, a looping switch is designed on the cap. Turning on the looping switch keeps the sound sample looping through the whole music piece even if the user doesn’t keep spraying. If the switch is off, the sound sample only comes out when the user sprays.

2.2 Controller

The controller provides logistic support for listening, recording and tagging in music creating process. After the user indicates the start of a music creating session with the controller, the controller records the created piece, and geo-tags the music after the user marks the end of the session. During the creating session, the user can play back his/her creation and listen with earphone. One controller can be used with several sound caps. Same as the sound cap, the controller is designed to be operated with one hand. It has a clip on the back hence can be worn or put in the pocket.

The sound sample has to be put on the desired time position to form a composition. Positioning sound samples is also achieved with the controller. There is a set of forward/backward buttons letting users move the playhead on the music timeline, and then spray the sound sample on the time the playhead indicates.

The controller also comes with a recording part for collecting sound samples from daily life, or recording performances to be put in the work. Recorded samples can be uploaded to the computer afterwards.

The intended interface for the controller is not far from the one commonly seen on media players, using buttons for Play/Pause, Forward, Backward and Record functions. The Record button is used both for collecting samples and record created musical tags. The user starts a music creating session by pressing Record + Play/Pause. After spraying out the first layer of sound, the user positions the next sound with Forward or Backward buttons. Upon finishing the user press Record + Play/Pause again to mark the end of this session and the music will be geo-tagged.

The features on the controller are not far from a media player plus wireless/GPS capability. Therefore instead of being a physical object, the controller can be a piece of software on mobile devices such as mobile phones, PDAs, even portable music devices (ex. iPods, MP3 players) and portable gaming devices (ex. Sony PSP, Nintendo DS). It would be more economically sustainable to use the devices people already have.

2.3 Boom Box

Graffiti is usually carried out under secretive circumstances, but for some public practices, a group of artists can use the boom box to share and collaborate their creation. In this situation artists still use the controller to record and tag the music, but listen to their creation from the boom box.

2.4 Experience

Sonic Graffiti fits for both solo or collaborative creation. Since the music tagged at the same location is accumulable, this allows collaboration being both synchronous and asynchronous. One can also imagine an individual creator adds on a little work everyday to complete a piece. On the down side, the accumulation also offers the chance for the malicious to spoil other’s work.

Listeners receive music via a dedicated software player installed in mobile devices. The software player is meant to be kept open when listeners walk in the city. Each graffiti is like a small radio station, having a limited broadcasting range. As the listener passes through different graffiti, the player tunes into the music of the nearest graffiti. In the player application, the listener can also mark the music on the map. The music can also trigger accidental encounters for listeners. People may notice the graffiti because of the music.

![Figure 3. Gestures of the sound cap (a) fade in (b) fade out (c) scratches (d) change sound.](image)

![Figure 4. Listening to graffiti.](image)
3. RELATED WORK

MotoGlyph [2] developed by Digit London is the closest idea to Sonic Graffiti. However it focused entirely on virtual experiences, while Sonic Graffiti is more about augmented reality. MotoGlyph was an installation containing special-made virtual spray cans and three glass panels. Each glass panel had different sound libraries. Visitors were invited to make digital signatures with virtual spray cans, the signature was then translated into ‘the author’s own sound and animation’ [2] which could be downloaded as ringtones.

Taking the urban environment as an interface, Sonic City [4] by Gaye, L. et al explores an interesting concept of transforming body movements and contexts encountered in the city into musical compositions. This project emphasized on personal experiences of interacting with the city. It has realized a scenario that mobility could mediate musical interaction between the user and his environment, and enhance users’ engagement with everyday encounters.

Mobile Music Making [5] by Atau Tanaka provides collaborative music making in wireless networks. Users can use the system to create music with their friends remotely. Each participant is associated with a track of the mixer. The result creation is the sum up of all the tracks manipulated by participants.

4. FUTURE WORK

The initial prototype was made for the sound cap to test out the gesture controls. It was made with an accelerometer and Arduino [6] platform. We used Pure Data for sound programming. On the appearance we would like to suggest a neutral ‘tool’ quality which would remind spray cans, stencils and other spraying caps in an artist’s tool bag.

The prototype was exhibited for three days in Milan [7]. Most visitors felt comfortable with the designed gestures and described the experience as ‘fun’ or ‘interesting’. In the future versions I will keep implementing features for creating music so that a bigger trial on spraying and composing can be carried out.

Other than communicating and making expressions, graffiti also has purposes on declaring public space; or ‘making the city more of my own space’ [3]. It would be interesting to investigate scenarios about what sound tags could mean to people and how them could be used in the urban environment.

5. ACKNOWLEDGMENTS

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6. REFERENCES


Mobile Music Creation using PDAs and Smartphones
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ABSTRACT
This paper reviews the current state of available mobile music creating application software for PDAs and Smartphones. The paper explores developer’s motivations and thoughts on the future of mobile music, and the responses of a few users to questions about how they use mobile music technology, and draws conclusions regarding the future of mobile music making.

Keywords
Mobile Music creation, Handheld, PDA, Synthesis, Sampling, Notation, Sequencing.

1. BACKGROUND
Palm Sounds (http://the-palm-sound.blogspot.com/) is a blog devoted to all forms of mobile music making and technology. This paper is the first attempt at understanding user and developer views and suggesting possible futures in the mobile music space.

2. INTRODUCTION
The field of mobile music making on PDAs and smartphones is still relatively small. There are only a handful of applications available in a market for PDA software that is comparatively very large. Although the desktop market for music software is huge the handheld market has never experienced the same level of interest. This paper explores some of the current issues.

3. HISTORY
Since the first palm devices appeared in 1996 users and developers have pushed the boundaries of mobile applications. The first music based applications for Palm OS based PDAs were simple keyboard apps creating beeps and allowing simple sequencing. As the platform developed MIDI applications appeared. Similarly the Pocket PC/Windows Mobile platform has allowed developers to explore a range of music making applications from drum machines and sequencers to more complex studio applications supporting synthesis plug ins and mixing capabilities.

4. FUNCTIONALITY
The functionality available in current applications can provide many of the requirements of desktop or laptop users.

4.1 Sampling
A number of applications provide sample editing possibilities such as applying effects, cut and paste functions, and even waveform drawing such as in Bhajis Loops (see figure 1).

4.2 Synthesis
There are a number of applications providing synthesis, from simple synths with drum machines such as Microbe (see figure 3), Phoenix Studio and PocketJam from Ledset (http://www.ledset.com/pocketjam/index.htm) (see figure 2). Other applications allow sounds to be created using FM synthesis and even the building of FX networks in applications such as miniMIXA. Griff uses synth plug ins in a similar manner to VST and AU architectures, and the Audio Box application provides a comprehensive range of synthesis features.

4.3 Sequencing
Most applications make use of some form of sequencing. However, this can come in a variety of different flavours. Step time sequencing is the method of choice for the vast majority, and does not greatly differ in look and feel from one application to the next. However, there are departures from this format. Two handheld applications that follow the tracker standard: Milkytracker (http://www.milkytracker.net/), and also Psytxx (http://www.warmplace.ru/soft/palm/) based on the XM Fast Tracker format (see figure 4). NotePad from miniMusic (http://www.minimusic.com/) uses formal notation (see figure 4). Finally, one of the most innovative is SpinPad (demo) from miniMusic which uses the positions of icons to determine velocity, pitch and instrument (see figure 6).
4.1 Integration
Some applications are extended by use of desktop components for functions such as back up, wav file rendering and preparation for use with desktop music applications.

Applications from miniMusic are designed to work as a suite. The SoundPad application is an FM synth. The sounds it creates are available in the other applications (AxisPad, BeatPad, NotePad and MixPad). In addition both BeatPad and NotePad applications allow songs to be exported to the MIDI format which can then be read and mixed in the MixPad application.

5. Developers’ Views
As part of this review I issued a questionnaire to developers. The questionnaire covered: motivation for development, development path, user requests, reasons for ending development, and attitudes to the future of the mobile music market.

5.1 Motivations
Reasons cited for developing in this area were personal and technical challenge, experimentation, and interest in the platform. Other developers commented that they were excited about the technical challenge, experimentation, and interest in the platform.

5.2 Target Market
Hobbyists, prosumers, professional musicians, and the education sector were all mentioned.

5.3 Development Paths and User Requests
Responses tended toward developments being lead by user request rather than holding to a plan. Often user requests have inspired new releases. One developer had developed a development roadmap that has largely been kept to. However, this was an isolated response.

5.4 Stopping and Starting Development
Many of the developers surveyed were no longer developing their software. Reasons for this vary greatly. Those cited were, profitability / ROI, issues with OS and hardware, and that the application was feature complete. Factors that would influence developers to return to this area were just as diverse such as convergence of desktop and handheld OS, availability of a new platform, new devices and a modern OS. Sadly, of the developers surveyed, few were still active in the market.

5.5 Attitudes to the Future of Mobile Music
Developers’ responses were quite diverse in response to this question. Responses went from long term 10-20 years in the future, to a statement that mobile music making was largely a “fun thing”. One of the consistent responses was around the availability of desktop power in a small device. Other responses suggested two possible options, very small tablet devices with a desktop OS, or dedicated hardware with more a open OS. In both cases, a key factor for success was the backing of a large manufacturer.

6. USER VIEWS
Although a user questionnaire was made available at several sites only a handful were returned, as such the responses may not be entirely indicative of the user community. The range of applications used was broadly consistent with the applications represented by developer responses. In view of the small number of responses I have chosen to take a number of key points from the users who did respond and record them here.

6.1 Location
Many users make music on trains, trams, on the way to work and at lunch breaks. It seems common to use this kind of technology in almost any location. One user cited locations as “on the toilet, when traveling, in bed, but all three at once is not advisable”.

6.2 Handheld and desktop
There was no clear split here. Some users made use of desktop applications, others made portable music and kept it portable.

6.3 Collaboration
Only one user was actively involved in using handheld technology in a collaborative setting. This was a gameboy band.

6.4 What users want next
There were no clear themes here. Responses included: MIDI input, further collaborative facilities, using the handheld as a controller, more accurate effects processing, and the ability to have desktop like software available on the handheld. An interesting response was from a user who wanted “something that combines the worlds of sequencing a field recording. We have devices that do each task, but none that do both at the same time.”

7. CONCLUSIONS
Virtually all of these applications have their root functionality in desktop origins. They are an effect a translation of desktop technologies into a handheld environment. However, if you take the emergence of applications like SpinPad and AxisPad as proof that there musical uses that could be unique to the handheld environment, then where does this naturally lead to? Has handheld hardware technology got to the point where input devices can be used in new ways to enable the device to become much more of an instrument rather than just a translation of a desktop application?

The iPhone’s sensor technology could lead to the use of sensors in music handheld music technology to provide a more directly manipulated and sensitive interface with the possibility of gesture control and recognition. It is a device of this nature which could extend the usage of mobile music technologies and encourage more users to explore the field.

8. ACKNOWLEDGMENTS
My thanks to all the developers who responded to the questionnaire, and the users who replied with so much useful information.
Creative Uses of Virtual Sticky Notes in Art - A Critical Interrogation of The “Bio-tracking” Smart Phone Based Exhibition

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ABSTRACT
This paper looks at the creative uses of virtual sticky notes, a feature of Socialight Smart Phone software, as an artistic medium. The art exhibition “Bio-tracking” used virtual sticky notes to fuse sonic art, photography, microbiology, brain biofeedback, GPS, text and performance. We seek to investigate the possibilities of future artistic exploration of the medium.

Keywords

1. INTRODUCTION
Anna Dumitriu, lead Artist on the Bio-tracking project [1] was introduced to the possibilities of using Socialight during a presentation at the 2006 Mobile Music Technology Workshop. Socialight [7] is a leading-edge smart phone software (suitable for Nokia Series 60), which enables the placement of ‘virtual sticky notes’ around various locations. These ‘virtual sticky notes’ can take the form of picture, sound and text files and are tagged to a specific location. The smart phone user can then access the ‘virtual sticky notes’ as desired; either by keying in a location (postcode or address) or by using a suitable GPS enabled phone and the appropriate version of the software.

2. THE BIO-TRACKING EXHIBITION
2.1 The Artwork
In September 2007 visitors to the International Brighton Photo Biennial Fringe were invited to download the Socialight and view an exhibition of digital photographs, sound works and text messages at various noted cultural locations around the city. To create the photography Anna Dumitriu (whose work is inspired by microbiology) sampled and cultured normal flora bacteria and moulds from locations around the city, revealing this incredible, unseen and sublime world to us through a series of beautifully enhanced digital micrographs. Luciana Haill, Ian Helliwell, Ollie Glass and Juliet Kac created a series of sound works in response to the images, scientific data and locations. Microbiologist Dr John Paul wrote a series of scientific text messages to describe the microbes. The ‘sticky shadows’ were tagged to the specific locations where the biological samples were originally collected.

2.2 Concepts Informing the Work
The photographic images created a dialectic, fusing the pure emotion of the sound responses and the scientific analytical texts. The philosopher Schopenhauer wrote much on music’s ability to capture and express emotion “as an immediate objectification and copy of the whole will as the world itself” by juxtaposing these responses the project sought to create a synthesis between art and science.

2.3 Scale and GPS
By bringing in the use of GPS in the initial creation of the work, mapping the locations where the microbiological swabs were taken, the work draws together the microscopic and the macroscopic, drawing a thread between the satellites orbiting the...
earth, which are used to triangulate positions and the bacteria at our feet.

2.4 Disseminating the Work to a Wider Audience

Smart phones are not common, so currently the use of this medium restricts audience engagement, to overcome this and widen the audience for the work Anna Dumitriu organised a guided performative walk around the sites in September 2006. Participants could see the software in use, hear the music, view the images, read the texts and use GPS to retrace the route. There were some difficulties with the ease of use of the software (currently in Beta test), which this walk was able to overcome.

2.5 The Use of Text Messaging

Each sound work and image was accompanied by a text message, which contained an analytical, scientific explanation of the microbial life found at the locations.

3. BRAIN BIOFEEDBACK MUSIC

A digital multi layered composition “EEG: SEA” was created for realisation at two sites for Bio-tracking, also generating two live brainwave sonifications “West Pier” and “Palace Pier”. Active EEG (brainwaves) were monitored and recorded with portable Bluetooth IBVA [3], and used as reactive influences upon the original score. The resulting tracks are unique, created by conscious interaction with the sights and sensations from each locale. They convey their social pace and presence also with their levels of interaction as perceived by the artist, as her EEG affects the timbre, tempo, tone and recombination of tracks for each. Clearly one suggests the ominous degradation and isolation of the West pier, whilst the second conveys bustle and business, frenetic behaviors (the Palace Pier recording was created as Luciana played the penny arcade games.)

4. CONCLUSIONS

Virtual sticky notes are a powerful means of disseminating sonic and visual artworks. As a medium it is limited only by the artists’ ability to engage with new technology and moreover by current issues with software robustness, which are constantly being improved. The Bio-tracking exhibition is a demonstration of the creative uses of the medium and successfully engages artistically, conceptually and philosophically with the technology.

5. ABOUT THE AUTHORS

5.1 Anna Dumitriu

Anna Dumitriu [4] is a visual artist based in Brighton and her work is involved with the nature of trans-disciplinary practice based research. She is currently working on a project about microbiology The Normal Flora Project [6], funded by Arts Council England, which forms the basis of her practice based PhD research at The University of Brighton. She is also artist in residence at The Centre for Computational Neuroscience and Robotics at Sussex University.

5.2 Luciana Haill

Luciana Haill [5] is an Interactive Neurofeedback artist, proud to have been inspired and mentored by Roy Ascott in Wales for the first degree in Interactive Art in 1994. IBVA sound performances include: The Future of Sound 2004 in BAFTA [2] and The Royal Institute 2005 in London. For 2006-2007 Luciana is on tour again, performing “Psi-Chic” Live brainwave interactive sonifications at FACT in Liverpool, Millennium Gallery in Sheffield, The Sage Gateshead, Norwich Arts Centre, and at Innovation Expo in Udine in Italy in the MTV Pavillion.

6. REFERENCES

An Interactive Musical Installation through Spatial Sensing

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ABSTRACT
This paper describes a sound installation work supported by spatial sensing system with a Personal Area Network (PAN), which may be applicable for such areas as dance performances and mobile music. The introduction section surveys some of spatial technologies that track moving objects and identify these agents. The system design section describes the architecture that makes use of MAX/MSP application. The actual installation is supported by the system.

1. INTRODUCTION
When we consider emerging human behaviors in a new audio-visual space with PAN or WAN, it becomes important to consider the social contexts.

1.1 Technological Survey
Video tracking is one of the most popular technologies for detecting objects in PAN. It is used with dance performance projects [1, 2]. The technology uses differential equation to detect reflective markers on moving objects.

GPS is used for searching agents in WAN. Some musical and visual installations use GPS equipped mobile phones [3, 4].

Multi sensors system is capable of tracing human’s behavior. In such a system, the sensors in the floor, walls, and ceilings in a room are connected, and communicate to each other the tracing information.

1.2 Social Contexts
When we consider the social contexts of special technologies, it is important to point out GPS. Because the use of cell phones has been wide spread, phones with GPS are not only able to give spatial information to the users, but also the knowledge of the social context they are in since most of cell phones can get access to the internet [5].

In this paper however, we used supersonic sensors with PAN and developed a simple example of localization system that can be applied to a musical installation.

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3. INSTALLATION

3.1 Sound Jewelry
The term “Sound Jewelry” was coined by Iwatake, one of the authors of this paper. The original idea is to create interactive musical objects that are worn like necklaces by people. Each of the “Sound Jewelry” then automatically generates “melody” and according to the distance between the persons wearing it the sounds of “melodies” may be changed or exchanged. On the other hand, Yamauchi, the first author, has been researching into real-time localization systems for multiple agents in a PAN. So it was only natural for the two ideas come together.

Fig. 2 shows the localization system. There are two “listeners” on the wall and eight “senders” to be held by the participants. The “senders” transmit supersonic waves to the “listeners”, and the master server which is connected to the “listeners” measures the locations of the “senders” based on the distance estimation subroutine in the middleware. The results are sent using OSC protocols to the sound generating application, whose outputs are heard from 4 surrounding speakers in the environment.

The actual “Sound Jewelry” turned out to be an environment that consists of two layers of sounds. In the foreground, “melodies” are dynamically generated by measuring the distances between the participants. In the background, ambient sounds are automatically generated using the distance data. When many people move in a 4X6 m² space, the sound only changes based on the nearest relative distance. However, as the number of people increases, the sound changes become more complex. Sound complexity was used as part of the installation. Users recognized sound changes as they moved in real time in the space.

4. CONCLUSION AND FUTURE WORK

The picture above shows the “Sound Jewelry” installation. People with “senders” walked around the floor in a location system zone and they recognized the changes of sounds according to the relative distance between them.

Table 1 shows the number of users that recognized the changes of sounds at the relative distance. The percentage of the total users is also shown. Most users recognized the existence of nearest user at the distance of 2 meters, and most users recognized changes of sounds at a distance of between 1 and 1.5 meters. However, obstacles that could cause interference in the location system zone need to be considered. The system assumed that obstacles did not exist in the zone. Naturally, it is difficult to use the system in a cluttered or crowded room. To solve this problem, a hybrid system that is equipped with wireless LAN, Bluetooth, or RFID readers can be considered to estimate the user’s position correctly. Furthermore, the system needs to be adaptable to many different software languages. We assumed that a WIF can be used to implement the system. However, in the near future, we would like to consider new frameworks.

5. ACKNOWLEDGMENTS

This project is supported in part by a grant from CREST, JST. We would like to thank the members of CREST for their helpful suggestions.

6. REFERENCES


[7] Open Sound Control (OSC)
http://www.cnmat.berkeley.edu/OpenSoundControl/
The Extended Enviro-Guitar (XEG): A Mobile Acoustic Profiling Resonating Filter

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ABSTRACT
In this paper, I explore the initial research and development regarding my mobile experimental "Extended Enviro-Guitar" (XEG) instrument/s as a type of resonating acoustic profiling device. It also explores the possibilities of using multiple XEGs within site specific physically spatialised multi-instrument installations and the deconstruction of this abstract sonic terrain via emerging mobile technologies.

1. INTRODUCTION
As part of my arts practice I utilize the XEG as a mobile resonating acoustic profiling filter within a creative context. This instrument, which is still in a research and development stage is essentially a specialized transducer and unlike conventional professional microphones which aim not to colour the sound recording, the interesting element about the XEG is how it does filter (or colour) its surroundings in sound recordings. Just like an infra-red filter or thermographic camera reveals a heat based topography of locations or objects, the XEG acoustic profiling filter (in its various configurations) reveals a sonic topography concealed by conventional transducers.

2. THE XEG
Because fluctuating waves of air pressure and flowing air can actuate the XEG's 2 -15 meter long strings, (which function in a similar way to a conventional microphone’s diaphragm) and as the XEG is a device that changes this physical kinetic energy into electrical energy the XEG is clearly a type of transducer. The XEG also resonates as a result of a phenomenon known as vortex shedding. During periods of flowing air a vortex is formed behind the string causing it to vibrate at a frequency which is the speed of the wind divided by the size of the string [1]. This resonating indicates the presence and to some degree the intensity, of a velocity vector to the propagating sound waves within the environment [2]. When the XEG is used in stereo multi-

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instrument installations this reveals a kind of sonic goniometrical recording of this physical medium.

To date I have only utilized strings with various lengths and diameters made from various mediums but I am aiming to experiment with various light weight sheets of metal and other materials suspended and attached to the conventional strings of the XEG (and/or other mounting techniques) across the spaces of selected location to actuate the XEG.

Combining synchronous conventional X-Y configured stereo recordings (using a Rodes NT4 mounted inside a Rycote windshield) and the XEG stereo multi-instrument installation in alignment with each other results in a binaural sonic interplay between the two sources.

To date I have used this interplay as a source of inspiration for the creation of a major sound art / radio art work entitled "Alien In The Landscape", which was commissioned by Deutschlandradio. This sonic art work reaches into remote locations that the enigmatic Australian explorer Ludwig Leichhardt passed through, “spiritually tracking the residue left by this alien” in the Australian landscape with the XEG, an adaptation of the traditional guitar that is actuated by the various specific out back environments.

Data collected during the field trip (which resulted in the creation of "Alien In The Landscape") demonstrates the spectral differences between the XEG and conventional transducers. Both Figure 2 and Figure 3 where recorded at East Alligator River (approximately 3 meters from the river bank) located within Kakadu National Park (Australia) synchronously at around 6 am. The Sennheiser MKH 416 – P48 3U Condenser Microphone was chosen as a sonic control due its flat frequency response between 40 – 20,000 Hz (see Figure 1).

No audio effects were added to these recordings in Figure 2 and Figure 3 other than gain to achieve a balanced level between the two sources. Assuming that Figure 2 is a close approximation of an uncoloured sound recording then the difference between Figure 2 and Figure 3 illustrates the spectral characteristics of the XEG for this sonic instance. It must be noted that the XEG’s signal to noise ratio is less than that of the Sennheiser MKH 416 and benefits from noise reduction plug-ins which typically reduces the XEG higher frequency response pattern from around 2kHz and upwards, but for the purity of data I have not included these results in this paper.
Figure 1. Frequency response of the Sennheiser MKH 416 – P48 3U Condenser Microphone.

Figure 2. Sennheiser MKH 416 – P48 3U Condenser Microphone spectral analyzer snapshot.

Figure 3. XEG spectral analyzer snapshot.

Figure 3 reveals the XEG's selective enhanced response to frequencies around 1 kHz and 200kHz and lack of response at around 6 - 8kHz resulting in a significantly different frequency response compared to the Sennheiser MKH 416 in Figure 3.

As the XEG displays noticeably different characteristics (spectrally and resonantly) in the act of transduction regarding kinetic energy, specifically the physical medium air into audio, I think of my XEG practice as a kind of audio filtering producing "sonic resonating spectroscopy". The review of this data to date has revealed a wide range of sonorities that have various artistic applications when collated and enhanced or examined through various processors.

Acoustic ecology has shown how time based factors have impacted on soundscapes from highly defined acoustic profiles of the rural environments to media rich and mechanical modern day cities [3]. As the XEG, when used in stereo and/or multi-instrument installations reveals a kind of sonic goniometer, I see my XEG practice as an ongoing investigation into the acoustic profiling of specific sites through a type of "sonic resonating spectroscopy" resulting so far in a chiefly artistic interpretation of the collected data. Simply put the XEG is a kind of mobile acoustic profiling resonating filter that documents selected sites and have been used to create artistic sound art works.

Mobility of the XEG acoustic profiling resonating filter and associated equipment is a necessity for the XEG to carry out its site specific function as demonstrated with recent recordings made in the Australian desert and remote locations.

While types of Aeolian Harps and/or transducers are not new the application of the XEG as a mobile acoustic profiling resonating filter and the development of spatialised multi-instrument XEGs may be? To date I have not been able to find other similar practitioners but that not to say conclusively that there are none.

3. FUTURE XEG RESEARCH AND DEVELOPMENT

The possibilities of using multiple XEGs within site specific physically spatialised multi-instrument installations and creating complex surround sound resonating filtered acoustic profiles offers potential for extended artistic expression. The deconstruction of these abstract sonic terrains via emerging mobile technologies, including positioning mapping and dynamic virtual interactive surround sound panning and proximity of multiple XEG streams delivered via headphones to the interactive audience/performance space, offers exciting new immersive sonic territory.

With the aid of emerging mobile technologies, artistically the interesting factor for the development of XEG is how it could reveal a dynamic spatialised sonic topography concealed by conventional transducers. Sites like Stonehenge’s circumference could be profiled using multiple XEG’s at midnight during the winter solstice to evoke an abstract spatialised interactive sense of place.

This type of development of the XEG could of course explore the interface between two classes of physical kinetic energy being acoustical energy and human movement. This new interactive immersive sonic territory could possibly be “performed” by a dancer trans-navigating and interacting with the dynamic spatialised sonic topography.

4. ACKNOWLEDGMENTS

My thanks to Dr. Götz Naleppa and DeutschlandRadio’s Klangkunst program for assisting the initial development of the XEG by commissioning the major sound art / radio art work entitled "Alien In The Landscape".

5. REFERENCES


Pocket Gamelan: swinging phones and ad hoc standards

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ABSTRACT

In this paper, we discuss how mobile phones have been used as devices for active music making, how mobility affects sound and how communication between phones has been integrated into the fabric of a new genre of interactive performance by groups of musicians. We identify some of the issues that stood in the way of developing two new musical applications for mobile phones, discuss aspects of performance works developed so far using this technology and point the way to future development.

Categories and Subject Descriptors
J.5 ARTS AND HUMANITIES - Performing Arts (music)

Keywords
Doppler shift, Bluetooth, j2me, java 2 micro edition, microtonal.

1. INTRODUCTION

Computer music has had two persistent technological legacies. One is its dependence on performance interfaces designed around 12 equal divisions of the octave. The second is the desktop computing environment where musical resources are concentrated in the hands of a single user. As technological development shifts away from this towards mobile computing, new computer performance paradigms have begun to emerge.

The Pocket Gamelan project is motivated by a desire to explore the features of microtonal intervals found in many non-Western musical traditions and seeks to develop applications that allow microtonal music to be composed and performed using mobile phone technology. The combination of flying sound sources and remote controlled sound using hand-held technology has resulted in a new kind of interactive performance genre in which microtonal instruments are easy to play, quick to learn and readily accessible to large numbers of people [6]. Musical interaction involves using sound sources that are physically relocatable and wireless communication that allows moving sound sources to be controlled using hand-held devices.

Two new works that represent this genre are Mandala 3 and Mandala 4 performed at NIME in Paris in June 2006. In performance Bluetooth-enabled mobile phones attached to a cord are swung in a circular fashion to produce Doppler shift. Phones are used either as a flying sound source or as wireless hand-held controller to alter the behaviour of other sound sources.

1. BLUETOOTH PERFORMANCE NETWORK

2.1 Piconet – Mandala 3

A bluetooth piconet is created when a master device is connected to one or more slave devices, each operated by a player. Each slave device (6230) communicates with the master (7610) whenever one of the players presses a button on the handset. The master then relays messages received to other slaves in the network. This scenario was first developed for Mandala 3.

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2.2 Ad Hoc Connection – Mandala 4
An ad hoc connection is created when one device connects to another device. Point-to-point connection can occur between any pair of phones (6230) with either being master or slave. The master connects to a slave phone, transmits control information then disconnects. Only one device may be connected at any time. This scenario was first developed for Mandala 4.

Figure 4 Ad hoc network

2.3 Bluetooth Initialization
Bluetooth devices are initialized at the start of each performance. This initiates a bluetooth discovery sequence to detect Bluetooth-enabled phones and identify phones required for the performance. Initialization is also necessary to synchronize each client phone.

In Mandala 3, initialization is done by the server (7610). The server is the first application to be launched. Initialization synchronizes the clocks that drive each of the three slave phones.

In Mandala 4 initialization is done by phone A (6230), which synchronizes the start of sequences on phone A, B, C and D. This helps players anticipate cues that allow them to interact with one another.

Figure 5 Bluetooth initialisation sequence

3. JAVA IMPLEMENTATION
We encountered several anomalies in both MIDI and Bluetooth implementation of the 6230 phones. By describing these we hope to highlight the benefit of adopting standards that will extend the user base for phones in future.

3.1 Pseudo Note Envelope
On the Nokia 6230, note envelopes must be formed by using MIDI in a non-standard way. A pseudo note envelope is formed by sending a single note ON, followed by a stream of MIDI Controller Change and MIDI Pitch Wheel messages.

It was necessary do this on the Nokia 6230, because a continuous stream of more than 30 MIDI Note ON - Note OFF messages caused the 6230 to crash. The problem only occurred when code was executed on the phone but did not occur during emulation using Eclipse. However the Nokia 6230 had no such problem playing a MIDI file even if the file contained hundreds of MIDI Note-ON – MIDI Note-OFF messages.

MIDI Controller Change Messages (Controller No. 7) were used to create amplitude envelopes that artificially turn notes on and off. MIDI Pitch Bend was used in a similar fashion to define pitch. The Nokia 6230 proved to have remarkable tuning resolution. Even with pitch bend spanning a range of four octaves, the 6230 phone has a tuning resolution of less than 0.3 of one cent.

3.2 Bluetooth Multicast
On the Nokia 6230, Bluetooth messages can only be sent from one phone to another on a single channel and cannot be broadcast from a single phone. This limitation was overcome by using a separate mobile phone (7610) as a dedicated server. In performance, this is not used as a mobile sound source and is not visible to the audience. During initialization, the 7610 identifies the Bluetooth UUID of slaves taking part in the performance and prevents unwelcome contribution from uninvited participants.

In future network implementations we will use a dedicated mobile server with a Bluetooth configuration similar to the Nokia 7610. This will give more robust interaction between one player and another as well as allowing any player to transmit to every player in a single bluetooth operation. Implementation of the mobile server in future will best be done using a phone that can multicast rather connect, transmit and disconnect to a single phone.

4. CONCLUSION
For many people irrespective of their cultural background, the mobile phone has increasingly become an important part of the technological landscape. Yet this technology has largely been used as a means of delivery mono-cultural media content to a world of passive consumers. The widespread availability of this technology allows it to impose a single system of tuning that evolved as western musical instrument makers gradually adopted a standardized system of tuning. By appropriating mobile phone technology as a medium for interactive musical performance interface we hope to allow communities of non-expert performers to experience the richness and diversity of microtonal music.

5. ACKNOWLEDGMENTS
This project was funded by an Australian Research Council Discovery Grant for 2003-2005.

6. REFERENCES
Demos
ABSTRACT
This article presents the human-computer mobile performance project entitled “robotcowboy”. robotcowboy consists of a "one-man band" wearable computer system dubbed “unit” composed of a mobile computer and various input devices such as midi controllers, game controllers, and environmental sensors.

Keywords
wearable computing, mobile music, performance art

1. INTRODUCTION
“By its very nature, performance [art] defies precise or easy definition beyond the simple declaration that it is live art by artists.” [1]

robotcowboy is a performance project centered around using the power of the computer for active, mobile expression. The main goal of the project is mobility: performers can use the system as an instrument - an extension of themselves. They are free to roam the stage, the street, and the world performing computer-based music, becoming “more than an extra” to the machine. In the vein of Terre Theimlitz smashing a laptop on stage, it is an attempt to challenge the nature of live computer music performance: "a type of risk or 'break' with the electronic spectacle, in order to develop a genuinely new practice" [2].

2. BACKGROUND
Performance art and music have a close relationship which is utilized by one-man bands, DEVO, and Maywa Denki, among others. The one-man band, as a performance, is a "single musician playing more than one instrument at the same time" and its artistic motivations mirror the essence of art:

“There is something deeper at work in this extraordinary impulse to play it all, alone, at one time, with all the requisite physical agility, and to play it so joyfully. There is a radical independence at work here, an urge to confront and explore human capabilities and possibilities, an urge to realise a unique and playful thought.”[3]

As an acoustic one-band roams his environment and interacts with people and objects, so can his digital version. Previous mobile music projects have focused on the “soundwalk” - mapping environmental information into live sound: Gaye, Mazé, and Holmquist's Sonic City, which maps “mobility as interaction” through the everyday walk of a city dweller to generate sound using movement, light, and sound sensors [4]; and Maeybayashi's Sonic Interface is "an extension for the ears" which highlights previously unnoticed sound through real time remixing as the user traverses the environment [5]. Several projects have also built active wearable instruments, notably: Bodycoder, a body sensor array which controls live sound through a Max/MSP environment [6]; the MIT Musical Jacket, a capacitive fabric keypad and tiny General Midi synthesizer [7]; and CosTune, a wireless jam session involving users wearing custom mobile gestural instruments including gloves, a jacket, and pants [8].

3. IMPLEMENTATION

The robotcowboy unit system consists of a “one-man band” Xybernaut MA V wearable computer and various input devices such as midi controllers, game controllers, and environmental sensors. The main aim of the system is for mobile computer performance in both traditional venues as well as out on the street. Utilizing a wearable computer mounted on a belt (see Figure 1), as opposed to a laptop, allows much more flexibility for use in 'digital busking' — digital music performed on the street — since it is designed to be worn, hardened for active use, and power efficient. An external sound card functions as a microphone preamp, stage monitor, and midi interface and a direct box allows for a seamless connection to an existing amplifier system — walk on stage, plug in, and go.

Audio is generated in real time via Miller Puckette's graphical audio programming environment Pure Data [9] running on GNU/Linux. Pure Data was chosen for its audio application
prototyping speed, cross platform compatibility, and the relative ease of use for designing complicated and intriguing audio results. Linux is a free, open source operating system designed after Unix and allows for a high degree of customization and optimization. The Pure Data patches used in robotcowboy are designed to generate audio results based on incoming input data in real time, there is very little sequencing. As a result, each performance of the same patch will follow the same theme but will vary due to imperfect timing, changing sensor data, and shaky human hands. Aesthetically, this is a vital decision in that allowing for error will result in a much more rich output and interaction between performer and machine.

Input device audio mapping is kept simple in order ensure ease of use and link the motion of the performer with the sound being produced. Patch control is facilitated through a custom song selection application and is controlled by a serial play button, which returns audio feedback upon an action. Current input devices include drumpads, a gamepad, a webcam glove, a dance mat, a midi guitar, and an accelerometer and photocell (see Figure 1). The midi guitar contains an amplifier which is used when the user is mobile.

4. FUTURE
As of April 2007, robotcowboy is in the active testing and experimental stage with more patches, audio mappings, and interactive audience performances on the way. Extended software interfaces for Bluetooth-enabled mobile phones will be investigated for audience participation ala CosTune.

5. CLOSING
robotcowboy aims to be a human-computer performance system allowing the user to produce a dynamic audio-visual experience for the audience. There is a history of one-man band acts and performance troupes producing music in the course of the exhibitions, why not attempt to combine both using wearable computer technology?

6. ACKNOWLEDGMENTS
I would like to thank the guidance of Mats Nordahl, Palle Dahlstedt, and Martin Friberg; and the support of my fellow students, Oscar Ramos, Michael Idehall, and Olle Huge.

1. REFERENCES
In this paper, we describe the staging of a play which unfolds interactively while the listeners are wandering through a high-rise area on their own, wearing headphones and a mobile computing device.

1. INTRODUCTION

In Craving Bernhard Garcnicig and Gottfried Haider aurally stage the late Sarah Kane's (1971 – 1999) play "Crave" in public space. Through headphones and a portable computer, aware of the listener's position through sensor technology and equipped with a customised spatial sound simulation, the text is placed in Vienna's “Donaustadt” district as a composition for voice and sound. There, the listener drifts through a radically changed environment, in which the limits between reality and production blur.

2. CONTEXT

Behind the walls that shape the city and within the minds of strangers passing by in public space, things happen that we know nothing about. Sarah Kane's "Crave" offers insight into the lives and minds of four sketchy characters. What they reveal from their hearts and inner thoughts is exemplary for the processes behind the anonymous faces surrounding us. Her phrases, sometimes seeming like mere scraps of thought, and the loosely structured narrative reflect our very own inner voice that shadows us night and day.

"A: Only love can save me and love has destroyed me." (Sarah Kane: “Crave”, 1998)

The space we live in influences our perception and behaviours in a major way. We adapt our movements, thinking and emotions to its structural requirements. The urban soundscape's dynamics defy control. To cope with the resulting chaos we apply strategies to delimit our intake of information. The media is a significant part of these strategies. In the context of urban design the visual in its various forms – ranging from advertising design to architecture – has prevailed and resulted in the development of diverse stylistic elements and textures. Despite the uninterrupted presence of every noise imaginable in our civic habitat the cities' resonating space and the ever transforming noise, however, have been left unattended. This seems almost reasonable considering that most of it is unconsciously emitted waste, a signal at best, but in any case lacking deliberate texture or control. Nevertheless, ever since the advent of the transistor radio, people have used sound represented in music to shape their individual selective reality. This phenomenon is the foundation of the artists' work, as they transform a strategy of selective constriction into an extension of the perceptible.

"M: Absence sleeps between the buildings at night." (Sarah Kane: “Crave”, 1998)

Today's culture has us moving through the city driven by specific rationally comprehensible goals. Places associated with different functions and results are starting point and destination on our way through a public space, which itself is dominated by the infrastructure necessary to dispatch humans and goods. This utilitarian pattern of behaviour leads to a partial dullness when presented with new stimuli as well as to the meaning and value of differences. The majority of the elements that make up a city are perceived as repetitive and futile. Craving opposes this phenomenon by offering the possibility of a fundamental change in the perception of the self-evident. Through the concerted construction of situations for specific places and with regard to the randomness of movements, events and changes these locations are exposed to, the artists create a new gestalt of the environment, only by manipulating the site's soundscape, and invite us to discover a reality transcending mere purpose.

"A: I don't have music, Christ I wish I had music but all I have is words." (Sarah Kane: “Crave”, 1998)

3. PROCESS

By simulating perspective (binaural) listening, the artists blend voice and sound sources into the participant's soundscape like a Trompe l’oreille. These sources are scenically affiliated to specific locations in the area and can be directed both spatially and temporally. The origin of these sources can be acoustically located because the entire range of human movement as well as the auditory physiology are incorporated into the spatial sound rendering. The resulting soundscape is composed of the location's actual ambient sounds and the constructed overlay, generating an extended reality that feels just like a real-time recording of the place surrounding the listener. Following the situationist dérive, the participant is supposed to allow himself to be led by the ambience of these sites, thereby forming his own narrative sequence in the act of walking.
An environmental analysis conducted beforehand resulted in the creation of a geographical and emotional map of the Viennese „Donaustadt“, which contributed to the process of mapping Kane's drama and additional sound to the emotional state of the area. This was accomplished loosely based on the principles of psychogeography (cognitive mapping). All numerically ascertainable qualities were recorded with a custom developed data logging device. In addition to the existing topography, different architecture related data, such as the sites' temperature patterns, people’s common movement paths or the location of closed-circuit television cameras resulted in a three dimensional map of the site.

“In girum imus nocte et consumimur igni.” (Anonymous palindrome) (We walk in circles at night and are consumed by fire.)

4. SPACE

The artists’ production is staged in Vienna DC, a modern complex of tall commercial and residential buildings in the city’s Donaustadt district. This most preeminent area is defined by a branch of the river Danube in the south and the United Nations building in the north. This building once stood for modernity in an architectural as well as geopolitical sense, but lately has received more attention for its contamination with asbestos. The actual setting, Vienna DC, was conceived in its entirety on the drawing board in 1991 after plans for a World Fair on the very same spot had been vetoed in a referendum that same year. Nevertheless, ten years after its opening, the area is still _urbanity in progress_ as various vacant lots create a layered surface, whose heaps of dirt contrast with the spotless facades otherwise dominating the view.

The place is not only housing multinational corporations and information technology firms in the obvious office skyscrapers, but there are also vivid residential zones scattered in between. One can literally walk around a corner to see the number of suits leading people’s lives in a slower and more informal way. There is a bizarre city within, whose 4000 inhabitants have adapted to the given system of open spaces and the spatial logic of the complex. For them the architects envisioned a place of worship (coined Gebetsreaktor – prayer reactor), a most out of place museum exhibiting works of an Austrian sculptor, a bilingual school and kindergarten, an ordinary supermarket, a number of expensive cafés located in the lobbies of skyscrapers, and a restaurant.

Other unique architectural features also have a strong influence on the perception of the space: e.g. a wide flight of stairs leading up to nothing, surveillance cameras placed at eye level, deserted children’s playgrounds or a vast empty space whose floor is covered in glaring white paint.

This entire microcosm allows the artists to use the place’s emotional tectons and possible associations while breaking with the normal patterns of movement, perception and interaction with the environment and other people.

5. REALISATION & TECHNOLOGY

The participant is equipped with a portable computer and headphones. Customized software determines his position via GPS, tracks his head- and body movements through a gyroscope and accelerometer and based on their results renders the audio composition in real-time. Through the simulation of binaural hearing sounds previously affiliated to certain places now become audible from their specific direction. The software incorporates a real-time virtual acoustic environment rendering engine, developed by the NASA Ames Research Center. It is based on a head-related transfer function (HRTF), describing how a given sound input (parameterized as frequency and source location) is filtered by the diffraction and reflection properties of the torso, head and pinna before reaching eardrum and inner ear. These location-specific filter effects provide the human neural system with enough cues to properly locate the sound’s source. Through the realistic simulation of these effects it is now possible to place “invisible actors” and sound emitting props into the listener's environment and allow him to immerse himself in the theatrical composition.

The process of composition consists of positioning monophonic sound sources in the geographic coordinate system, assessing their acoustic, spatial and temporal properties, and setting up interaction between multiple sources and the listener. The result is a script of the whole scenery which can be read by computers. The framework allows for timing and keyframe animation of all relevant parameters. This way, for example, a voice can follow an animated path after being triggered by the approaching listener. The underlying technology enables the artists to work in any place on earth to create site-specific narrative compositions.

6. ACKNOWLEDGMENTS

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7. REFERENCES


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