

## CeMFI and Earquake: (Epi-)Centers for Experimental Music, Media and Research

**Aristotelis Hadjakos**  
CeMFI  
HfM Detmold / HS OWL  
hadjakos@hfm-detmold.de

**Steffen Bock**  
CeMFI  
HfM Detmold / HS OWL  
bock@hfm-detmold.de

**Fabien Lévy**  
Earquake  
HfM Detmold  
levy@hfm-detmold.de

### ABSTRACT

The Center of Music and Film Informatics (CeMFI) is a joint institution of two universities: the HfM Detmold and the HS OWL. The CeMFI extends existing activities of the founding universities in the area of music and film informatics. It was founded in April 2013.

Earquake, the epicenter of experimental music, was founded in October 2013 to bundle and intensify existing activities at HfM Detmold in the area of experimental music: studies of composition, ensembles for new music, organization of concerts and events, sound installations, improvisation, studios for electroacoustic music, sound research & design.

### 1. BACKGROUND

The Hochschule für Musik Detmold (HfM Detmold) is a renowned music university in Germany. The HfM offers degrees in various subjects including instrument and vocal performance, instrument and vocal pedagogy, conducting, church music, elementary music pedagogy, music conveyance, composition, Tonmeister (artistic director and sound engineer), and music acoustics. Currently, about 750 students are enrolled. The Erich Thienhaus Institute of the HfM Detmold offers the degrees in audio engineering and music acoustics. Incepted in 1949, it has been the first of its kind and has influenced the foundation of similar institutes around the world. There has been an ongoing cooperation between the Erich Thienhaus Institute and the Department of Media Production of the University of Applied Sciences Ostwestfalen-Lippe (HS OWL), which has led to the foundation of the Center of Music and Film Informatics (CeMFI) in 2013.

The HS OWL has a main focus on engineering science, providing degrees in various disciplines including civil engineering, electronics & computer engineering, and mechanical engineering, but also offers degrees in more artistically inclined courses of study, in particular media production, architecture, and interior design. About 6.300 students are enrolled in 2014. The Department of Media Production of the HS OWL provides degrees focusing on elec-



Figure 1. The logos of CeMFI and Earquake

tronic media, in particular video, audio, computer graphics, animation and interactive media. The students acquire practical, technical and economic skills for working in the audiovisual and interactive media industries.

In order to provide a new basis for the endeavors in the area of music and film informatics and in order to intensify and extend existing cooperations, the two universities founded the joint Center of Music and Film Informatics (CeMFI), which began to work in April 2013. Earquake, the epicenter of experimental music of the HfM Detmold was founded in October 2013 in connection with the re-occupation of the professorship for composition. The logos of the CeMFI and the Earquake are shown in Figure 1.

### 2. GOALS

The CeMFI is subdivided into the areas music informatics and film informatics. Both areas are intended to include technical, methodical, artistic, and scientific aspects. The main goals of the CeMFI are to conduct research and development as well as to support teaching in the area of music and film informatics at the two founding universities. Research and development tasks include in particular:

- Research on new approaches for interaction between musicians and technology / audio engineers and technology
- Research on acquisition and control of music and sound

- Projects in the areas experimental music, film, and new media
- Research and development in the areas audio and video technologies, mobile media, and crossmedia
- Conception and creation of a digital music archive at the HfM Detmold

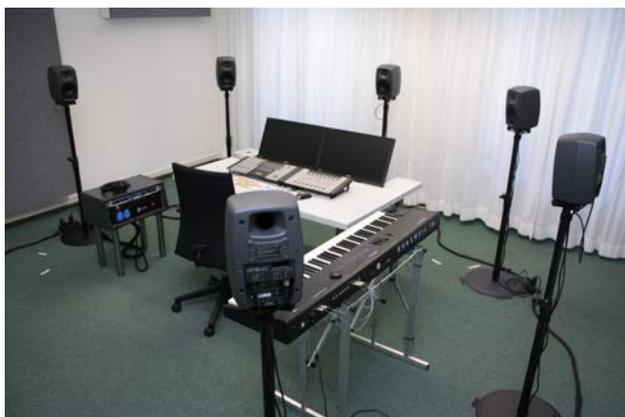
Earquake has two goals:

1. To create a link and a visible platform for the different activities of experimental music at the HfM Detmold: composition studies, ensembles of new music, technology-based experimental music together with the Erich Thienhaus Institute and CeMFI, improvisation, etc.
2. To stimulate experimentation inside the HfM Detmold, a school which like many tertiary music education institutions has a strong emphasis on tradition and instrumental skills.

### 3. FACILITIES

#### 3.1 Electroacoustic Studio

The electroacoustic studio (see Figure 2) is operated jointly by Earquake and CeMFI. The studio features an 8-channel audio system based on a Genelec loudspeaker setup and a RME Fireface UFX audio interface. The acoustics of the room has been altered with sound absorbers to provide typical studio reverberation times of 0.3 to 0.6 seconds. The studio computer features a large variety of music creation softwares, in particular Logic, Max/MSP, SuperCollider, various Ircam softwares and many other.



**Figure 2.** Electroacoustic studio for experimental music and sound research

#### 3.2 HfM Facilities

The Konzerthaus of the HfM Detmold (see Figure 3) provides an auditorium with about 600 seats. The hall features a WFS-system with over 300 loudspeakers mounted on the sides and the roof of the hall. 16 sound sources can

be positioned at arbitrary virtual locations inside and outside the hall. The hall has a natural reverberation time of about 1.5 seconds, which can be prolonged with a live reverberation enhancement system to up to 5 seconds. The hall contains an organ with four manuals and 50 registers, which has been fully MIDI-fied, to provide both control (MIDI-In) and data (MIDI-Out). A Bechstein CEUS grand piano also provides computer-control over an acoustic instrument. Both instruments are available for experimental music and research projects.



**Figure 3.** The Konzerthaus of the HfM Detmold (left, photograph by Frank Beyer) with its concert hall (right, photograph by Martin Brockhoff)

#### 3.3 Media Production Facilities at HS OWL

The Department of Media Production has a variety of studios and labs, including a video studio with a green screen and a VICON motion capture system, a second video/photo studio with a blue box, audio studios, and video editing workstations. A large collection of audio and video recording equipment is available (cameras, microphones, lights, etc.). Furthermore, the Department of Media Production operates radio triquency,<sup>1</sup> the campus radio of the HS OWL. The facilities and equipment are available for experimental music, media art, and research projects.

### 4. EDUCATION

#### 4.1 Composition

The composition study program of the HfM Detmold provides a comprehensive education, both practical and theoretical. Other than traditional composition tuition, i.e., weekly seminars and one-to-one tuition, the program puts special emphasis on two focus points, namely instrumentation / orchestration and music technology. The presence of the Erich Thienhaus Institute, the institute responsible for the education of audio engineers, and the CeMFI make it possible to provide the composers with a solid education in music technology ranging from studio technology, microphone and recording technology, musical acoustics up to music informatics. Further courses in music theory, instrument performance, ear training, music management, conducting, as well as elective courses ranging from Jazz arrangement to electrical engineering round off the study program. Invited guest lecturers help to provide the students an initiation to a multitude of compositional styles

<sup>1</sup> <http://triquency.de>

and formats: music theater, sound installations, audio design and audio logos, instrumental pieces for large ensembles, live electronics, musique concrete, etc. In the next two academic semesters, Carola Bauckholt, an expert in music theater, and Mauro Lanza, a specialist of physical modeling, will come.

## 4.2 Music Informatics

While generally open to all interested students, the music informatics courses offered by the CeMFI can currently be included in the curricula for composers, audio engineers, and media production students.

- **Fundamentals of Computer Science:** This course is offered in two variations. The course offered for media production students provides an introduction to object-oriented programming while the course offered for audio engineers covers the topics computer architecture, computer networks and basic procedural programming concepts.
- **Live Electronics — Max/MSP:** This two-semester course teaches the basics of graphical programming with Max/MSP. The course is co-taught with Falk Grieffenhagen from the electronic band Kraftwerk.<sup>2</sup>
- **Sound Programming — SuperCollider:** This course covers basic object-oriented programming concepts and sound synthesis based on the audio programming language SuperCollider.
- **Physical Computing — Arduino:** This course teaches how to create and program new controller, sensor and actuator solutions based on the Arduino platform.

## 5. RESEARCH AND DEVELOPMENT PROJECTS

The research and development of the CeMFI is seeking to connect with the communities present at the founding institutions. Currently, there are ongoing projects together with

- Composers: see Section “Distributed Wind Ensemble”
- Musicologists and media producers (interactive media): see Section “Digital Music Edition”
- Tonmeisters: see Section “Music Archive at the HfM Detmold”
- Tonmeisters geared towards contemporary music: see Section “Physical Computing: SPINE”
- Performing artists: see Section “Musical Motion Capture”

<sup>2</sup><http://en.wikipedia.org/wiki/Kraftwerk>

## 5.1 Digital Music Edition

The creation of digital music editions is an ongoing research and development effort at the Musicology Seminar Detmold / Paderborn, which is a joint institute of the HfM Detmold and the University of Paderborn,<sup>3</sup> by a team of researchers. The team develops tools for creating digital editions and also creates actual digital editions, both often-times in cooperation with external partners. [1]

Based on recently acquired third-party funding, the CeMFI will soon begin to contribute to that project with the help of two researchers. The focus of the joint project is to support inclusion, annotation, and interactivity with non-textual media (e.g., images, photos, film, audio, physical objects) in the digital music edition of the future and to develop new modes of interacting with the material and new applications.

## 5.2 Music Archive of the HfM Detmold

Since its foundation in 1946, the HfM Detmold has regularly organized concerts, which have been recorded to a great extent by students of the Erich Thienhaus Institute. The recordings meet the highest artistic and professional recording standards. The collection contains valuable recordings of highly esteemed artists (see the concert programs, Figure 4). The CeMFI and the Erich Thienhaus Institute collaborate to build the archive infrastructure and to digitalize the first 10 years of analog material.



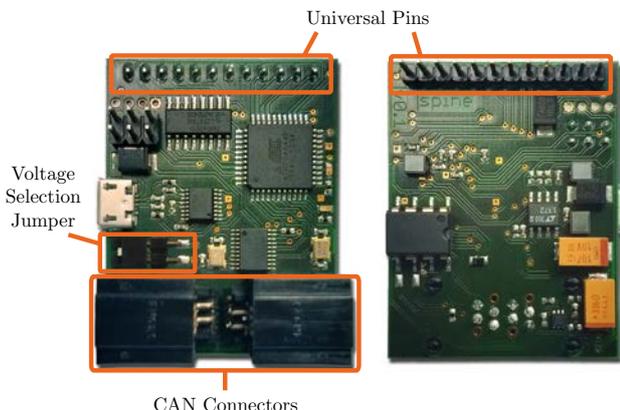
**Figure 4.** Early programs of concerts organized by the HfM Detmold (at that time called “Nordwestdeutsche Musik-Akademie Detmold”)

## 5.3 Physical Computing: SPINE

Physical computing platforms such as the Arduino have significantly simplified developing physical musical interfaces. However, those platforms typically target everyday programmers rather than composers and media artists. On the other hand, tangible user interface (TUI) toolkits, which provide an integrated, easy-to-use solution have not gained momentum in modern music creation. In [2] we propose a concept that hybridizes physical computing and TUI toolkit approaches. This helps to tackle typical TUI toolkit weaknesses, namely quick sensor obsolescence and limited choices. We developed a physical realization (see Figure 5) based on the idea of “universal pins,” which can

<sup>3</sup><http://muwi-detmold-paderborn.de>

be configured to perform a variety of duties, making it possible to connect different sensor breakouts and modules. We evaluated our prototype by making performance measurements and conducting a user study demonstrating the feasibility of our approach.



**Figure 5.** spine: a TUI toolkit and physical computing hybrid

#### 5.4 Ubiquitous Musical Motion Capture

Today movements are oftentimes captured with rather expensive and complex setups, e.g., with optical motion capture, where multiple cameras with high temporal and spatial resolution are employed. On the other hand we are surrounded by a multitude of sensors (the Kinect depth camera, inertial sensing in mobile phones, etc.). However, those sensors are oftentimes not directly usable for capturing the movements of musicians. In the project “ubiquitous musical motion capture” [3, 4] we develop applications and algorithms that help to leverage the possibilities of those sensors for musical applications, e.g., to enable new pedagogical movement research and feedback as well as experimental music projects.

### 6. CONCERTS

#### 6.1 Earquake Concert Series

To spread information about experimental music concerts and events, an Earquake calendar and newsletter has been established. In five months (November to March) 14 events have been announced over the mailing list, some organized by Earquake itself but most contributed by others, showing the significant activity and interest for experimental music at the HfM Detmold.

#### 6.2 Distributed Wind Ensemble

The piece “Sonneries de Cantenac” by Fabien Lévy [5] is a piece for a wind ensemble where the players are spaced apart in a foyer, large room or a hall. Because of the distance between the musicians, they can not see each other and do not hear each other well. To help the musicians to play synchronously, a computer application provides auditive and visual cueing as well as a metronome signal. This

application, which was originally developed by Frederic Roskam in 2010, used to run on a single computer so that several graphics cards and long cables were needed to distribute the audio/video signals in the room. For a concert in the Konzerthaus of the HfM Detmold, this application was modified by the CeMFI in order to run on several laptop computers that were using NTP to synchronize themselves with a local NTP server. A follow up of this basic idea with a new piece and a more advanced synchronization concept is planned to premier at the Darmstadt Ferienkurse für Neue Musik 2014. The piece will be played by the Klangforum Wien.<sup>4</sup>

### 7. REFERENCES

- [1] J. Veit, “Digitale Edition und Noten-Text: Vermittlungs- oder Erkenntnisfortschritt?” in G. Dane, J. Jungmayr and M. Schotte (eds.): *Im Dickicht der Texte*. Weidler Buchverlag, Berlin, 2013.
- [2] A. Hadjakos and S. Waloschek, “SPINE: a TUI toolkit and physical computing hybrid,” in *Conference on New Interfaces for Musical Expression*, 2014 (to appear).
- [3] A. Hadjakos, T. Grosshauser, and W. Goebel, “Motion analysis of music ensembles with the Kinect,” in *Conference on New Interfaces for Musical Expression*, 2013.
- [4] A. Hadjakos, “SmartSense: using your smartphone for music performance research,” in *International Symposium on Performance Science*, 2013.
- [5] F. Lévy, *Sonneries de Cantenac*. G. Ricordi & Co., Berlin, 2008.

<sup>4</sup> <http://www.klangforum.at>