Computer Music Studio and Sonic Lab
at Anton Bruckner University
Studio Report

Andreas Weixler

Anton Bruckner University
Computer Music Studio
Linz, Austria/EU
a.weixler@bruckneruni.at

Se-Lien Chuang

Atelier Avant Austria
Austria/EU
chuang@mur.at

ABSTRACT

The CMS (Computer Music Studio) [1] at Bruckner University in Linz, Austria is hosted now in a new building with two new studios including conceptional side rooms and a multichannel intermedia computer music concert hall - the Sonic Lab [2].

The Sonic Lab is one of the three concert halls at the new campus building of the Anton Bruckner University. It is designed as a computer music concert hall dedicated to multichannel computer music and electroacoustic music, as well as experimental music in cooperation with JIM (the Institute of Jazz and Improvised Music), among others. The development of the CMS is based on an initiative of Ao.Univ.Prof. Andreas Weixler during the years 2005 - 2015 who drafted a plan for a suite of rooms for the Computer Music Studio: Sonic Lab - multichannel computer music concert hall (20.4), Production Studio (20.2), Lecture Studio (8.1), Research Zone (4.1), Project Room (4 ch), Archive, Workshop, Machine Room and two faculty offices.

1. INTRODUCTION

The colloquium of the Computer Music Studio has been offering lectures and courses in the field of music and media technology, media composition and computer music since its formation 1995 as SAMT (Studio for Advanced Music and Media Technology). The range of subjects it offers is closely integrated with those of the former Institute DKM (Composition, Conducting and the Theory of Music), which since October 2015 has been divided into two Institutes IKD (Institute of Composition and Conducting) and ITG (Institute of Theory and History of Music), as well as JIM. The CMS can be seen as an interface and competence centre spanning several institutes of the Bruckner University, active in the region through numerous co-operations and internationally networked with exchanges and a lively conference scene.

The Computer Music Studio organizes numerous concert and lecture series, regionally, nationally and internationally [3].

1.1. History

The Computer Music Studio was founded in 1995 as the SAMT - Studio for Advanced Music And Media Technology by DI Adelhard Roidinger and the Rector of the Bruckner Conservatory, Hans Maria Kneihs in the buildings of the Software Park Hagenberg.

The staff consisted of three teachers and a technician: Adelhard Roidinger, Karlheinz Essl, Andreas Weixler and Gerald Wolf. The staff was then gradually reduced to one person and the studio lost all its budgets. Since 2008 the University studio, as it became, has been under the direction of Ao.Univ.Prof. Andreas Weixler, who was at that time the only member of staff in an environment concerned with media archaeology (sic!); this firstly prevented the studio from being closed and, secondly, helped restore funding and activities. At the same time an institute directive changed the name of the studio to CMS (Computer Music Studio). In October 2015, Univ. Prof. Volkmar Klien was appointed to a new professorship with emphasis on media composition and computer music. Prior to moving into the new building in September 2015 the CMS consisted of 3 rooms, a lecture studio, a production studio and an office/archive. With the new premises the Bruckner University caught up on international standards, after 10 years of efforts by the authors.

2. THE FACILITIES

The Computer Music Studio has been proudly conceived, constructed and expanded under the direction of Andreas Weixler throughout 10 years (2005-2015) of negotiations with the university direction. Now it comprises a prestigious computer music concert hall named Sonic Lab with an adjacent production studio, a lecture studio (Lehrstudio), a project-oriented space with pesonalized working desks (Projektraum), an experimental research zone (Computermusik-Forschungsraum), a workstation, an archive room/depot and (last but not least) offices for colleagues and the directors.

2.1. Sonic Lab

The Sonic Lab is an intermedia computer music concert hall with periphonic speaker system, created by Andreas Weixler for the Bruckner University to enable international exchanges for teaching and production with other developed computer music studios. 20 full range audio channels plus 4 subsonic channels surround the audience, enabling sounds to move in space in both the horizontal and vertical planes. A double video and data projection capability allows the performance of audiovisual works and also the accommodation of conferences, etc.
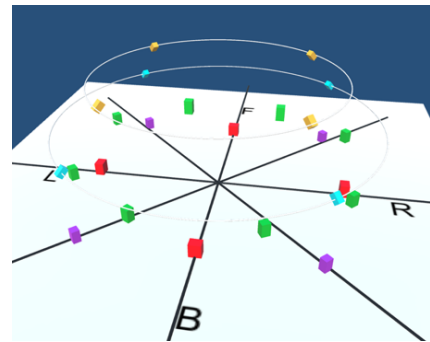

Figure 1. 3D model of the speaker array [4]

The speciality of the CMS is interactive audiovisual performances, in which the sound of acoustic musical instruments produce images and spatial sounds in interplay. However, the Sonic Lab is also a perfect venue for concerts of jazz and improvised music (which often features strong percussive and amplified sounds) and for contemporary music (which frequently requires dry and clear acoustics) thanks to its special acoustic treatment.. The Sonic Lab is thus a place for the music of the future.

2.1.1. Opening Sonic Lab [5]

The opening ceremony took place on 17th of November 2015 with concerts and workshops featuring honorary guests John Chowing (Emeritus Professor at Stanford University), Jonty Harrison (BEAST, Emeritus Professor at Birmingham University), Karlheinz Essl (University of Music and Performing Arts, Vienna), Gerfried Stocker (ars electronic centre Linz) organized by Andreas Weixler and Se-Lien Chuang. Keynotes were given by Jonty Harrison (*Tuning In to the Future*) and John Chowning (*Loudspeakers as Spatial Probes*).

Figure 2. preparation at the Sonic Lab

In the opening concert compositions by John Chowning (*Voices* - for Maureen Chowning - v.3 for soprano and electronics), Jonty Harrison (*BEASTiary*), Karlheinz Essl (*Autumn's Leaving* for pipa and live electronics), Se-Lien Chuang (*Nowhereland* for extended piano, bass clarinet, multichannel electro-acoustics and live electronics) and Andreas Weixler (*Wetterleuchten - Virtuoso Chances - return home* - video with algorithmic multichannel electroacoustic music), Hassan Zanjirani Farahani (*Das Unlogische notwendig* for soprano, live electronics and light design) were performed by Maureen Chowning (soprano), Ming Wang (pipa), Elvire De Paiva e Pona (soprano), Julia Lenzbauer (clarinet) and Mariia Pankiv (piano). The finale was *Momentum Opening Sonic Lab*, a group improvisation & interactive audiovisual transformation with all-star performers. The following two days of workshops were open to the public: Jonty Harrison (*Final

Figure 3. Momentum Opening Sonic Lab [6]

Frontier or Open Border) and John Chowning (*Sound Synthesis and Perception: Composing from the Inside Out*). The demand for the event by over 100 people was much higher then the capacity of the Sonic Lab, where 55 people can listen in optimal conditions; nevertheless, 80 people squeezed in and the opening events were transmit-

ted to another concert hall in the building, with an eight channel surround sound and a live video transmission. We were very honoured by the presence of Laurie Anderson and Dennis Russell Davies in the audience.

2.2. Multichannel Concept

The teaching studio (Lehrstudio), the production studio and the Sonic Lab itself are all equipped with compatible devices based on a Digidesign C24 DAW controller and 32 channel Protools system as digital mixing console, playback and recording device, together with basic software including ProTools, Ableton Live, Cycling '74's MaxMSP and Final Cut Pro.

2.2.1. Teaching Studio (Lehrstudio)

This has a circle of eight Genelec 1032 speaker and a Genelec 7070 sub. The studio has an on site machine room to keep noise out of the studio.

Figure 4. teaching studio (Lehrstudio) [7]

2.2.2. Production Studio

This has a circle of eight Genelec 1032 speaker and 2 Genelec 7070 sub as well as 12 more speakers, creating a sound dome in 3 quadraphonic layers:
4x Genelec 8040A in 3 m, hi level speaker
4x Genelec 8040A in 5,5 m, ceiling speaker
4x KS Audio CPD 12M, on ground level

2.2.3. The Sonic Lab - Computer Music Concert Hall

This has a ring of 8 Genelecs (two 1037B at the front and six 1032A), all at a height of 1.5 m,
plus 4 Genelec 7070 subs (one on each wall) together with 12 more speakers, to create a sound dome in 3 quadraphonic layers corresponding to the production studio:
4x Genelec 8040A at a height of 3 m (high level speakers); 4x Genelec 8040A at a height of 5,5 m (ceiling speakers); 4x KS Audio CPD 12M, at ground level.

There also is a PA System comprising:
2x Kling & Freitag CA1215-9SP
2x Kling & Freitag SW 115-E SP
4x KS Audio CPD 12M (monitors)
equipped with a 24 channel analog Soundcraft GB 4 and a digital Yamaha 01V mixing console.

Throughout the building there are rings of MADI lines which can connect to the sound recording studioTON, located in the basement of the university, and to its other concert halls, as well as to the rooms of JIM.

2.3. Replica Room - The Production Studio

As the usage of the Sonic Lab is also for the JIM and open to everyone in the building, as with all the concerts-halls at Bruckner university, the production studio is a complete replica of the Sonic Lab, where you can work for longer period with the same settings as in the Sonic Lab. Both share a machine room to accomplish silence.An acoustically treated window between the two rooms create a great combination of production and performing venue.

2.4. Project Room

This room aims to develop social interaction and the sharing of collective know-how between CMS students. It has six computer workstations with iMacs and basic software including ProTools, Ableton Live, Cycling '74's MaxMSP and Final Cut Pro. Workstations can be dedicated to individual students or, if necessary, a group.

2.5. Experimental Research Zone

This is dedicated to future PhD candidates. In the meantime, it has combined functions: as a place for experimental work (enabling set-ups to be left for longer periods of research), a laptop lecture room and a second social room where students can work freely.

2.6. Workshop (Werkstätte)

This is a room for soldering, repair and construction .
It also contains a media archeological workstation to read out dated formats such as DAT, VHS, ZIP, JAZ, SCSI, etc.

2.7. Depot / Archive

As well as storing the equipment of the CMS computer music studio, this has computer facilities for the digital archive and also provides a physical archive for scores, flyers etc.

3.   THE STUDIES

Since its start in 1995, music and media technology was the main aim of former SAMT (Studio for Advanced Music and Media Technology). In 2008 when the Studio was renamed CMS (Computer Music Studio), graduate students - mainly in Jazz and improvised music among others - could choose an emphasis in music and media technology for their degree as well as a pedagogical Masters in music and media technology.

In 2014, a new Bachelors program was established in media composition and computer music.
The four-year study includes:
• composition in computer music, intermedia works
• performance computer music, machine musicianship
• production and programming

4.   CMS SERIES

Since its new incarnation in 2008 under the direction of Andreas Weixler, the CMS has initiated several series of concerts and exchanges:

4.1. SonicIntermedia

This series of intermedia concerts and lectures for international exchange in Deep Space [8] at the Ars Electronica Center started in 2009. Sonic Intermedia is a media concert series initiated by the composers and media artists Andreas Weixler and Se-Lien Chuang with the artistic director of the AEC, Gerfried Stocker, to give contemporary intermedia computer music a presentation format in Linz. With Sonic Intermedia a new concert format for intermedia art of sound is presented as a co-operation between the Anton Bruckner University and the Ars Electronica Center. The intention of SonicIntermedia is to create exciting concerts of experimental computer music and intermedia composition with a renowned team of composers, researchers, media artists and musicians.
Guests of SonicIntermedia have included:
2009 SARC: Pedro Rebelo (Portugal/UK), Franziska Schroeder (Germany/UK), Imogene Newland (UK), David Bird (UK), Brian Cullen (UK), Orestis Karamanlis (Greece/UK); 2010 UEA: Simon Waters, Ed Perkins, Bill Vine, Anton Lukoszevieze (UK) and a piece by Nick Melia & Ed Kelly; 2012 BEAST: Jonty Harrison, Scott Wilson, Chris Tarren und Tim Moyers; 2013 NOVARS:
David Berezan, Constantin Popp, Mark Pilkington and pieces by Manuella Blackburn and Claudia Larcher.

4.2. Sound & Vision

This is an experimental series for students and artistic research projects across institutions and cooperating universities. Events to date: Sound and Vision I - AVI: with the ensemble for new music and audiovisual interactivity,

Linz; Sound and Vision II - musical inspiration and digital concepts: interaction and improvisation with students of Andreas Weixler; Sound and Vision III - Double Concerto: Electronics and three pianos. Concert of music and media technology with interaction, improvisation and composition with students of Martin Stepanik and Andreas Weixler; Sound and Vision IV - KUNST:MUSIK in cooperation with the University of Arts and Industrial Design, Linz; Sound & Vision V - concert of music and media technology and alternative concepts for ensembles; Sound & Vision VI - intermedia concerts of CMS students; Sound & Vision VII - InterAct: computer music and intermedia concert, pieces with sensor technology, Kinect and others; Sound & Vision VIII - react: computer music with students and guest of the CMS; Sound & Vision IX - Interface: intermedia concert in cooperation with InterfaceCulture students of University of Arts and Industrial Design, Linz; Sound & Vision X - Periphonic-Sonic: first Sound and Vision concert in the Sonic Lab using the periphonic multichannel sound system.

4.3 CMS Invited Lectures Series

This is the international lecture series of the Computer Music Studio at the Bruckner University for external guests. So far we have hosted CMS invited lectures up to #27: 2009: Pedro Rebelo, SARC - Sonic Arts Research Center, Belfast, Northern Ireland; 2010: JYD - Julian Weidenthaler, Linz, Austria; Dr. Simon Waters, UEA Studios, University of East Anglia, Norwich, UK; 2011: Martin Kaltenbrunner, InterfaceCulture, Kunstuniversität Linz; Thomas Grill - Austrian Research Institute for Artificial Intelligence (OFAI) and Institute of Composition and Electroacoustics at the University of Performing Arts and Music, Vienna; André Bartezki, co-director of the electronic music studio at the TU-Berlin; 2012: Jonty Harrison and Scott Wilson, BEAST - Birmingham ElectroAcoustic Sound Theatre, The Electroacoustic Music Studios at the University of Birmingham, UK; 2013: João Pais, composer, Portugal; David Berezan, Electroacoustic Music Studios, Novars, University of Manchester and MANTIS, Manchester Theatre in Sound, University of Manchester, UK; Constantin Popp, PhD research student at Novars, University of Manchester, UK; Mark Pilkington; composer and performer of electroacoustic music, Novars, University of Manchester, UK; 2014: Gonzalo Díaz Yerro, Conservatorio Superior de Música de Canarias; Andrew Lewis, Bangor University, Wales/UK; Mike Frengel, Northeastern University, Boston, USA; Tony de Ritis, Northeastern University, Boston, USA; Sebastian Frisch, freshmania; 2015: Andreas Zingerle, University of Arts and Industrial Design, Linz, Time-based and Interactive Media; Tristan Murail, composer, Paris; Jonty Harrison; BEAST (Birmingham ElectroAcoustic Sound Theatre), Emeritus Professor of the University of Birmingham;

John Chowning, Emeritus Professor at Stanford University; Seppo Gründler, FH Joanneum, Graz; 2016: Christian Tschinkel, composer, Vienna; Rose Soria & Constantin Popp, University of Manchester and Liverpool Hope University, UK.

4.4 CMS Lecture Concerts (Gesprächskonzerte)

This series of events introduces a guest to present concepts and compositional work:
2011 #1 André Bartezki
2014 #2 Gonzalo Yerro
2014 #3 Andrew Lewis
2014 #4 Mike Frengel "prepared guitar and electronics"
2015 #5 Seppo Gründler "Once I was a guitarist"
2016 #6 Christian Tschinkel "The Kuiper Belt Project"
2016 #7 Rosalía Soria & Constantin Popp

4.5 CMS Research Residency

The CMS Research Residency program allows external artists to work with professors and students of the CMS to explore the arts, new concepts, technologies and interactions. The projects so far have been: 2013: Sina Heiss (A/NYC), Lia Bonfilio (NYC), Daniel Rikker (A), "display - mind leap", Tanz, interactive visuals, Stimme, live processing, skeleton tracking; 2014: The CMS CEUS Projekt, research week for students of computer music, music and media technology and guest. This was a workshop in open access for visitors to explore the possibilities of the famous Bösendorfer CEUS grand piano. It was a collaboration of between CMS and Austrian piano manufacturer Bösendorfer hosted by the piano house Merta. The final concert and installation works were by and with: Hassan Zanjirani Farahani, Michael Enzenhofer, Se-Lien Chuang, Andreas Weixler, Daniel Rikker, Thomas Ecker, Martin Stepanik, Elvire de Paiva e Pona and Barbara Mayer; 2015: CMS - composer in residence Jens Vetter (Berlin/Linz) with his project of DMX controlling, video tracking and interactive sound generation; 2016: Christian Tschinkel, „The Kuiper Project" for the Sonic Lab, 2-Track sound distribution for the Sonic Lab.

4.6 CMS Instructional Series

This is a forum for students, undergraduates and professors of ABPU dedicated to a specific topic related to computer music and production to share the in-house expertise. The Admission is free and open to the public. Series I - 2013: *Software, die sich wie ein Instrument spielt* Live Tutorial by Daniel Rikker giving a introduction in Ableton Live - performance, sequencer and producer software. Series II - 2015: Hassan Zanjirani Farahani *Realtime Processing* showing audio realtime processing and performance in Ableton Live and Max. Series III - 2015: Hassan Zanjirani Farahani, technical realization of

the composition - *Das unlogische Notwendig* for Soprano, live-electronics und interactive DMX light design; Series IV - 2015/2016: *CMS Sonic Experimental Demos* Introducing the Sonic Lab and Live Processing with Andreas Weixler, Se-Lien Chuang and CMS students, as well as the demonstration of multi-channel works by Jonty Harrison, John Chowning, Fernando Lopez-Lezcano and Christian Tschinkel among others.

4.7 Cooperations

The CMS is cooperating with and supporting other institutes and institutions. *JIM communicate*, for example, is a monthly concert series with faculty and students of the Institute of Jazz and Improvised Music, but also projects with the actors and the dulcimer class are on the list, among many others. There are currently co-operations with and connections to many institutions. Internally, these include: the former Institute for Composition, Conducting and the Theory of Music (DKM), Institute for Jazz and improvised Music (JIM), Institute for Theatre and Drama (ACT), Institute for Keyboard instruments (TAS), Institute of String Instruments (SAI), Institute for Music Education (EMP). One of our goals is to be a competence centre for computer music in the region in cooperations so far with the AEC - Ars Electronic Center, University of Arts and Design, Linz, InterfaceCulture, JKU - Johannes Kepler University, ElisabethInnen Hospital, SCCH Software Park Hagenberg, Klanglandschaften (Soundscapes), Musik der Jugend (Youth Music), Province of OÖ, DorfTV, Klavierhaus Merta. The CMS is also reaching out to other related institutions in Austria, such as the ELAK (Institute for Composition and Electroacoustics, Vienna), MDW (University for Performing Arts and Music, Vienna), Prima la Musica, Salzburg and the piano manufacturer Bösendorfer. Through the personal contact and art work of the authors and a lively connection to international conferences we created a series of international cooperations with JSEM (Japanese Society for Electro Acoustic Music), TU Studio, Berlin, SARC (Sonic Arts Research Centre) Queens University Belfast, Northern Ireland, University of East Anglia, UK, BEAST (Birmingham ElectroAcoustic Sound Theatre), University of Birmingham, UK, NOVARS, University of Manchester, UK, Hope University Liverpool, UK, Northeastern University, College of Arts, Media and Design, Boston, USA, Center for Computer Research in Music and Acoustics (CCRMA), Stanford University, California.

4.8 Students Works

Beside a large number of pieces in the field of electroacoustic composition, interactive and algorithmic composition, sensor technology and light design by CMS students in the field of contemporary composition, beat mu-

sic, vocal, instrumental and electronic music within audiovisual realtime processing and also time based music and video, there are outstanding Bachelors and Masters theses recently published in the library of the Bruckner University: *The score at the touch of a button* - (*Die Partitur auf Knopfdruck? Computergestützte algorithmisch notierte Komposition mit MAX und LilyPond*), a master thesis 2015 by Michael Enzenhofer, as well as Daniel Rikker´s Masters thesis *Hands on Max for Live*, a great introduction to learning Max4Live and Ableton Live - and emphasis Kinect driven music - last but not least Christoph Hörmann´s very informative *Mixing with Digital Audio Workstations - A guide for home recording musicians* Bachelors thesis in 2015, among a large number of others. Outstanding pieces worth mentioning are *Highway Lights* for drums, four channel audio and light design by Markus Rappold 2015, installation for the CEUS grand piano by Michael Enzenhofer *Wahrscheinliche Wahrscheinlichkeiten* and the above mentioned composition by Hassan Zanjirani Farahani - *Das unlogische Notwendig for Soprano*, live-electronics und interactive DMX light design.

5.   OUTLOOK

With the new facilities of the Computer Music Studio, its outstanding arrangement of multichannel computer music studios and the acoustically specialized Sonic Lab, as well as the new appointments of Volkmar Klien as professor of electroacoustic composition and Carola Bauckholt as professor of composition for music theater, in combination with the long time existing professor for music and media technology, computer music and electroacoustic music and director of the Computer Music Studio (CMS) Andreas Weixler, we are looking forward to a new generation of students and a continuing wide range of cooperations, and we hope to contribute with our artistic work, research and educational offerings to the music of the future.

6.   REFERENCES

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6. Group Improvisation OSL, © Shayan Kazemi

7. lecturing studio showing Hassan Zanjirani Farahani (©).

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