### Wednesday 26th August

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<tr>
<td>12:00 – 17:00</td>
<td>Registration open</td>
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<tr>
<td>13:30 – 13:40</td>
<td>Opening remarks</td>
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<td>13:40 – 15:00</td>
<td>Session A</td>
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<td>15:30 – 16:30</td>
<td>Session B</td>
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<td>16:30 – 17:00</td>
<td>Networking</td>
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<td>18:30</td>
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### Thursday 27th August

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<tr>
<td>08:30 – 09:15</td>
<td>Registration, networking, tea &amp; coffee</td>
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<tr>
<td>09:15 – 10:00</td>
<td>Keynote address – Dave Fisher (Emeritus Professor, University of Surrey)</td>
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<td>10:00 – 10:30</td>
<td>Tea, coffee, academic posters</td>
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<td>Lunch and academic posters</td>
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<td>Panel Discussion on Work Experience</td>
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<td>09:00 – 10:30</td>
<td>Session E</td>
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<td>Tea, Coffee, student posters</td>
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<td>11:00 – 12:30</td>
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<td>12:30 – 13:30</td>
<td>Lunch and student posters</td>
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<td>13:30 – 14:30</td>
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<td>14:30 – 15:00</td>
<td>Student research competition results and closing remarks</td>
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<td>16:00 – 17:30</td>
<td>Tour of BBC Scotland</td>
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**Full programme**

Biographies of all contributors are available on the conference website.

**Wednesday 26th August**

12:00 – 17:00 **Registration open**

13:30 – 13:40 **Opening remarks [Main Lecture Hall]**

*David Moore – Conference Chair*

13:40 – 15:00 **Session A – Internationalisation, Network Music Recording**

[Main Lecture Hall]

*Moderator: David Moore – Glasgow Caledonian University*

*Mark Thorley – Coventry University* - Global collaboration and industry-orientated assessment – outcomes of project commissioned by the UK Higher Education Academy

The traditional barriers of geography, organization and culture are being broken down by emerging technology. Applicable to many industries, the concept is particularly relevant for audio professionals and music producers who can work in a variety of digital formats with collaborators around the world. By undertaking such a mode of working, professionals are effectively involved in ‘peer-production’, thereby driving down cost and improving quality. Students also reflect this practice by joining and sharing with peers around the world though this is often outside the formal curriculum. Despite the potential in these practices, Higher Education institutions fail to engage with the concepts often for institutional and cultural reasons. This paper outlines a project funded by the UK’s Higher Education Academy to examine a model for collaboration between international HE institutions and industry practitioners. Managed by Coventry University and initially involving New York University and JAMES, the project has engaged in a number of collaborative activities to facilitate new ways of learning. The paper will outline the academic background to the project, the type of activities undertaken, the technical and organization approaches taken before finally summarising the key outcomes and opportunities for further work.

*David Moore – Glasgow Caledonian University* – Connecting Audio Students through Collaborative Online International Learning (COIL)

This presentation will report on the results of the first iteration of a Collaborative Online International Learning (COIL) course undertaken between Glasgow Caledonian University and the State University of New York Oswego Audio Students. Students from both universities formed cross-institutional groups and collaborated on a 6-week recording assignment with the goal of producing demo quality music recordings. Quantitative and qualitative data was collected before and after the collaboration to evaluate the impact of their interaction. Pre / post survey results shows some weak evidence of an increase in intercultural effectiveness, however further research conducted over a longer period of time is required to investigate this in more detail. Overall it was a positive experience for the students, and during their projects they met a number of technical and cultural challenges, which were considered ‘real world’ by the course instructors and a valuable part of their learning on the course.

*Miriam Iorwerth – University of Highlands and Islands* - Challenges of using Networked Music Performance in Education

Networked Music Performance (NMP) is of increasing importance to music and audio education. It facilitates collaboration across distances and working with learners from other cultures; provides
experience with emerging technology and shaping practice in the area of music performance and production; and allows students to gain confidence and develop flexible approaches to working in areas that are challenging to them. It is of particular importance in distance education - creating opportunities for collaboration and engagement with performers and sound engineers that would otherwise be unavailable. There are major technical challenges when working with NMP. These include latency and reduced audio quality caused by network infrastructure, use of lossy compression algorithms, and physical distances between sites. Poor quality Internet connections are problematic, particularly in remote areas of the country where distance learning is necessary. These issues cause difficulties in communication that have a significant impact on the educational experience of the student. Furthermore, it is common for educators to use non-specialist, readily available video-conferencing and file-sharing software that lacks the technical specification required for NMP, and this serves to exacerbate negative effects on communication and user experience. This paper examines the role of NMP and technical constraints on the experience of stakeholders in an educational context. It presents case studies of successful NMP projects and discusses findings and implications for future NMP based practice.

Paul Ferguson – Edinburgh Napier University - Live music recording using LoLa

15:00 – 15:30 Tea, coffee, networking

15:30 – 16:30 Session B - Teaching Critical Listening [Main Lecture Hall]
Moderator: Mark Thorley – Coventry University

William Moylan – University of Massachusetts Lowell - Teaching Listening
Developing the listening skills of our students is central to audio education, and presents significant challenges. Listening is a highly personalized activity—internally processed in isolation, individualized by experience and physiology, unique in one’s perception, cognition and physical location. Add to this the variables of classroom audio playback, the challenge of teaching listening grows. Somehow we must navigate these, and more. Students have been listening since before birth, but most have not learned to listen attentively. We will explore listening as a process that can be learned, and taught. The process is one of active awareness and concentration; one of being open to possibilities of the unknown at any moment; searching with intention for new information or holding sounds in the focus of attention. Importantly, listening brings about hearing, leading to recognition and understanding. Identifying the purpose for the listening guides the process and informs the activity. The elements of sound, level of perspective of the listening activity, and function of the materials are identified in successfully hearing material; these are especially important early on. As sound and music exist within memory, memory must also be developed to improve listening skill. This paper will explore these matters with a focus on teaching the listening process to hear the characteristics of acoustic and reproduced sounds, and recordings. Successful approaches to bringing students to discover new dimensions in sound and to improve their listening abilities substantially will be shared.

Ken Blair – Recording Engineer, BMP Recording – Developing student listening through recording techniques seminars
For many students of sound recording, the approach route will have included a passion for music involving much listening and development of a good musical ear. This is an excellent base from which to develop a new and different type of listening where recorded sounds and mixes can be evaluated using a small number of distinct, easily identifiable and all encompassing categories. In time, this method of listening can become habitual. The time available for sound balancing in productions is often limited and hence a key skill for the sound engineer is being able to quickly and accurately assess the result of microphone and mixing choices. Equally important is to develop knowledge and working practice of
recording techniques with which to solve a range of common issues. Regular listening seminars with groups of students, in a decent audio monitoring environment, where they present their recorded work and listen to that of others, is a crucial element in a course aiming to train sound balance engineers. This presentation, not based on a paper but rather on fifteen years of presenting listening seminars and recording techniques practicals to Tonmeister students, will look at teaching listening skills to sound engineering students and incorporating other important related issues including the development of a vocabulary for discussing recorded work, microphone and mix techniques, studio and location recording practice and safe listening.

16:30 – 17:00  Networking

18:30  Drinks reception at the City Chambers
Thursday 27th August

08:30 – 09:15  Registration, networking, tea & coffee

09:15 – 10:00  Keynote address [Main Lecture Hall]

Dave Fisher - Emeritus Professor of Sound Recording at the University of Surrey

Since the inception of formal audio training, about 70 years ago, the audio industry has undergone enormous change. The range and style of audio educational courses now available is staggering. This talk poses a number of questions which it might be pertinent for educators and trainers to ask themselves, including the relative importance of education and training, the merits and disadvantages of university-based courses, links with the audio industry, and course content. It expresses some views of the author, and so is intended to be thought provoking, rather than a definitive description of what any particular course should be.

10:00 – 10:30  Tea, coffee, posters from academics (see below for poster details)

10:30 – 12:30  Session C [Main Lecture Hall]

Moderator: Clara Hollomey – Glasgow Caledonian University

Nyssim Lefford and Jan Berg - Luleå University of Technology – Training Novice Audio Engineers to Observe: Essential Skills for Practical Development and Analytical Reasoning

Novice audio engineers learn by observing, and our program incorporates observation into the formal education. We have developed curricula to specifically to strengthen observation skills. Concepts are delivered through two modules in two classes that run in parallel. In one class, an introduction to science philosophy and scientific methods, observation is discussed as one of several possible methods suitable for investigation of audio-related research questions. For the other class, on studio recording techniques, students formally observe and report on a session. This paper reviews our pedagogical aims, methods and results.

Charis Coke and Joe Sudlow - University for the Creative Arts - Sharing Best Practice In Audio Software Workshops At Undergraduate Level Or How Cilit Bang and Bruce Willis Saved the day!

Large groups, IT suites, Internet connected computers and plenty of other distractions, a recipe for difficult delivery and inconsistent learning environment? It doesn’t have to be so. We can use combat these issues by sharing best practice within institutions and across the sector. Three years ago a dramatic shift in our delivery of AVID Pro Tools workshops happened, we started to team teach the four two day workshops scheduled for our first term second year undergraduates. The results were self evident from the first session. The two of us were able to begin to challenge some of the preconceptions of software workshop delivery, as well as enable a greater understanding of the role of sound in moving image projects, particularly in technical areas. The learning and teaching methods used included the standard ‘chalk and talk’ approach as well as using other more contemporary tools such as VLE’s and online resources such as Lynda.com. Better student understanding, more developed assessment work and a highly engaged cohort have resulted. This is just the beginning; we are still developing our approaches and hope to further refine all aspects of these workshops for the future.
Thilo Schaller - University of Lethbridge, Ian G. Burleigh – Quinta Audio, - Using Web Audio API in web-based tools for ear training of sound engineers

HTML5 and related web technologies support the development of web browser-based multi-media applications. The quite recently added Web Audio API opens possibilities for creating interactive learning materials intended for students of music technology. Integration of Web Audio with interactive vector graphics has proved practical to create intuitive learning tools with immediate auditory feedback that complements theoretical concepts, namely, browser-based “applets” for ear-training of sound engineers. The use of web technologies makes such tools available without the limitation of being bound to a particular workstation, which facilitates regular practice sessions. This paper presents the “noise spiral” that has been designed to teach frequency band recognition. It is one of a selection of ear-training applets used in the Digital Audio Arts program at the University of Lethbridge. The paper discusses its current use within and outside the classroom and presents an outlook on more extensive future integration of Web Audio into technical ear training. The JavaScript source code is freely available on GitHub; we hope that it could be a starting point in the development of more ear training “applets” that would improve the delivery of this essential part of education of young audio professionals.

Daniel Walzer - University of Massachusetts Lowell - E is for Expressive: Branding and Customizing E-Portfolios in Audio Education

A tightly edited demonstration reel showcasing the best snippets of recording studio production, live mixes, broadcast and sound design, music and multimedia compositions, product and interface development, and creative thesis research are a few of the crucial elements to include in the undergraduate audio student's electronic portfolio. Final capstone courses often give students the opportunity to refine their projects, take part in an internship or co-op, and prepare the résumé to research career prospects. Emerging and affordable web-based and mobile technologies, rich with new media applications, allow undergraduate audio students to create an individualized digital narrative that extends beyond the demo reel. Students sculpt their creative, artistic, technical, and reflective personality through video diaries, thoughtful use of new media applications, search engine optimization tools, and targeted networking. This presentation considers the expressive ways audio educators should carefully guide students to create a significant web-based brand identity, giving employers deeper insights into their complete audio-centered persona, thus enhancing employment prospects after graduation.

12:30 – 13:30 Lunch and academic posters (see below for poster details)

13:30 – 14:30 Panel Discussion: Work Placements [Main Lecture Hall]

Ken Blair – BMP Recording
Dave Fisher – University of Surrey
Jim Hunter – BBC
Patrick Quinn – Glasgow Caledonian University [moderator]
Kyle Snyder – Ohio University
Melvyn Toms – JAMES

14:30 – 15:00 Tea, coffee, academic posters (see below for poster details)

15:00 – 17:00 Session D [Main Lecture Hall]

Moderator: Nyssim Lefford - Luleå University of Technology
Paul Thompson and Ben Mosley - Leeds Beckett University - Audio Education: Its purpose and place in formal education and the creative industries

As formal courses in sound recording and audio production continue to develop as preliminary routes into the audio industry, it has become increasingly important to consider the perspective, the place and purpose of audio education within the sphere of formal education and the wider creative industries. There are numerous stakeholders, benefactors and beneficiaries of audio education, which include students, educators, education directors, educational institutions, music industry bodies, music industry representatives and the music industries more broadly. Each group has their own perspective on the purpose of audio education and each has something to add to the discussion on the content and delivery of audio education programmes. Drawing upon current literature, the authors’ experiences of delivering audio-related programmes at a Higher Education institution in the UK, industry and government publications, the following paper explores the often-contradictory ideas that surround the delivery and content of audio education. Each of the perspectives of audio education’s stakeholders, beneficiaries and benefactors are deconstructed, compared and contrasted in order to highlight key themes and common ideas. The paper concludes by drawing all of these perspectives together and identifies further areas of research into the purpose and place of audio education.

Paul Vandemast-Bell, Duncan Werner and John Crossley - University of Derby - Seeking Best Practice for Education and Training in the Recording Studio

This paper reflects on the delivery of a module in recording studio practice. The module is intended to equip level 5 students with the necessary skills to undertake final year project work whilst introducing aspiring recording artists and music producers to a career in industry. These goals are compounded by the expectations of accreditation bodies that work in partnership with academic institutions to raise the standard of graduates entering into the business of music recording and production. Drawing on the authors’ educative experiences and observations the paper highlights the challenges posed by the tension between training and education, and investigates the potential for novel approaches to curriculum design. Key themes explored within the paper include an investigation into institutional constraints and the challenges this poses for educators. The optimisation of studio learning environments is considered alongside these tensions. The authors ask if it is possible to teach producer/engineer interpersonal skills and psychological mindsets, outside of ‘real world’ experience, that are seemingly imperative for career progression. Assessment strategies and group dynamics are also examined to elucidate problems associated with varying skill sets and abilities, and methods for best practice are proposed. A review of existing literature provides perspectives on recording studio education and comments are sought from students, educators and industry professionals through personal interviews and questionnaires.

Richard McIlivery - USC Thornton School of Music - Audio Recording Education: Do we really need another program?

Schools create audio/recording/ music technology programs for a variety of reasons and with a variety of outcomes. The goal of any program is to serve the student. Often little or no actual due diligence has been conducted in determining the current state of the industry. The future needs of the industry as well as employer demands need to be carefully assessed in order to define student outcomes. What will the student be able to do upon graduation is more important rather than merely understanding the basics of audio recording and production. Adding to the uncertainty of new and even existing programs, there seems to be little if any verifiable research into how many graduates are able to find sustainable employment with the prospect for a long and productive career. Education is a vitally important path for students to enter any career field and needs to be structured to provide a lifelong learning and employment experience. Students trust that because a school, college or university offers courses and degrees in audio recording that there is a need for more engineers and that the school actually has the skill sets and facilities to deliver this particular education. As educators we need to be absolutely certain that the student investment in time and money is well spent. An international research initiative should to
be launched that will provide hard numbers that can be used to formulate appropriate curricula and provide a uniform approach to audio education.

*David Carugo* - *Oxford Brookes University* - Fasten your seatbelts! Accelerating students on work experience into positions of responsibility

Students on traditional work experience in the music and audio industry are typically on the lowest rung of the ladder, often working as runners in studios and on film locations, or as general stage crew in live events. It can be weeks, months or sometimes years before junior members of staff are able to take positions of responsibility by actually mixing sound or music for an audience (especially a paying audience). The short nature of many work experience opportunities often leaves students in a shadowing role or even an observation role, and on longer term placements, many are still placed into low level positions. This paper describes how guided work experience opportunities in music recording, live sound and sound for picture can get students working under the direct supervision of experienced mentors, and get hands-on production experience of mixing or systems engineering, i.e. an opportunity to ‘drive the bus’ or ‘fly the plane’.

18:30 – 20:00 **Evening meal at Firebird Restaurant**

The meal will be held at the Firebird (see map in delegate pack). A fixed price per head has been agreed with the restaurant which you can pay upon registering.
Kyle Snyder - Ohio University - Case Study: Expanding Audio Production Facilities At Ohio University To Accommodate Student Needs

Creating a recording facility is equal parts art and science. However, designing and adapting recording studios in higher education environments presents several challenges unseen within the commercial arena. The audio recording program at Ohio University has been in existence since the formation of the College of Communication in 1968; its facilities have been fortunate to evolve radically through the years. In its third, major design iteration since the program's inception, the School of Media Arts & Studies has expanded its facilities to include a new mixing and mastering suite, an expansive 5.1 post-production and critical listening facility, and numerous classrooms and additional lab spaces, more than tripling the space available to faculty, graduate and undergraduate students. This paper describes the design, construction, and integration of facilities and technology, based upon considerations for: current and future enrollment, adaptations given the evolution of studio technology, programmed changes to curricula, instructors with varying pedagogical styles, and most importantly student needs within the Steven L. Schoonover Center for Communication and Radio-Television Center construction and renovation.

Pete Nixon, Tony Young, Evelyn Brown, and Len Wiltshire - North East Scotland College - Interdisciplinary Benefits: Encouraging Creative Collaboration

What pedagogical opportunities can be exploited within an interdisciplinary setting? In this paper the authors describe the merging of two departments at North East Scotland College, with the aim of fostering an environment of creativity and cross-collaboration, simulating industry roles and responsibilities. In particular they focus on how the developing professional identity of the Sound Production student cannot be fully realized without input from other disciplines. An examination and appraisal is made of a tension between scaffolding the natural development of interdisciplinary student relationships, and stifling them. Examples of successful student projects between Sound Production and Music, Radio, Television, and Drama are cited. With each example an analysis is provided of the varying roles of the burgeoning professional identities involved, the resources and support necessary for success, the proximity of the activity to actual industry and employment, and the pedagogical benefits to the individuals. Looking forward the authors discuss the ramifications for extending these practices, given the lens of advantage and pitfall that have been experienced. Further they discuss how the learner experience can develop into multi-disciplinary practice that modifies and enhances their creative output, broadening their professional practice beyond the traditional discipline boundaries.

Andrew King - University of Hull - Affordances, agency, and music production

The locus of control between human and machine has been considered from a philosophical perspective (Mumford, 1952; or Taylor, 2011). The digitisation of some of the tools associated with record production has led, some would argue, to a democratisation of the recording industry. Learners are now able to use software such as Pro tools to record and mix music. However, how they develop these skills differs from audio engineers who followed a traditional apprenticeship route; Théberge (2012) suggests this has shifted from industry to academy. The aim of this study was to explore analogue and digital approaches to music production. The study draws upon interviews with three engineers/producers that have worked using both approaches: Chris Kimsey; Craig Leon; and Ken Scott. Interpretative Phenomenological Analysis was used to understand the interview data. By interpreting the expertise of leading industry experts the beginnings of a suggested framework could be developed for approaches to music-making with digital technology. Two superordinate themes emerged from the data: Knowledge and Skills; and
Human Perspective. A further eight subsidiary themes (four per super-ordinate theme) were established and will be discussed as part of this paper. The next stage of this project is to investigate approaches to music making from experts who have primarily worked in the digital domain.

10:30 – 11:00  **Tea, coffee, student posters**

11:00 – 12:30  **Session F [Main Lecture Hall]**

*Moderator: Thilo Schaller – University of Lethbridge*

*Jason Fick - The Art Institute of Dallas - Strategies for Removing Fear from Audio Science and Production Math*

Many students enrolling in audio engineering programs are not fully aware of the importance of math and science for audio professionals. In addition, the secondary-education system in the United States has, in many cases, not prepared incoming students with the base knowledge necessary for learning the science of audio production. As a result, many undergraduates are intimidated by their coursework as they learn to support their creative endeavors with a technical background. Audio instructors, faced with these challenges, must find a way to actively engage and support these students in order for them to be successful in their future courses and career. I will demonstrate that introducing math and science through practical audio problems, students can better understand and acquire this level of knowledge. Furthermore, the students are empowered with strategies to succeed as they tackle this perceived weakness and are ultimately inspired to succeed as professionals in the audio industry.

*Colin Grassie, and Fraser Clarke – University of the West of Scotland – An Integrated Approach to Teaching Electroacoustics and Acoustical Analysis to Music Technology Students*

There is a requirement for Music Technology and Audio Engineering students to understand theoretical concepts along with practical experience in areas covering electroacoustic devices, room acoustics and measurements. Traditionally, room acoustics is taught under an assumption of a high level of mathematical knowledge by the student. However, in this paper, an alternative, integrated practical approach to teaching is presented covering these discipline areas which has led to enhanced cross-curricular skills, improved student experience and increased learner attainment. The aim was to develop students’ higher-level cognitive domain skills through active and experiential learning. The approach involved highlighting the relationship between electroacoustic device parameters with practical room impulse response capture and qualitative assessment. These activities enabled integration of taught elements, undergraduate research and data analysis techniques. The self-evaluated resultant measurement materials provided graphical and numerical results for analysis yielding characteristic parameter values for different acoustic environments. The students captured room impulse responses and assessed their subjective qualities within a convolution reverb and from an acoustic analysis platform. Students used acoustic prediction and analysis software packages and were asked to reflect on their operation and user interface. Results show a general preference to experiential learning and an integrated cross-curricular approach within undergraduate study.

*Stuart Cunningham and Richard J. L. Smith – Glyndwr University – Interdisciplinary Experiences of Teaching Audio for Games*

In this work, we describe the experiences, challenges and outcomes from the delivery of a module entitled Audio Technology for Games, delivered at a UK university. The module is at level 5 of the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (FHEQ) and has been integrated within a BSc (Hons) Computer Game Development degree programme since 2008. As such, the module is taught to students with little to no experience of audio engineering and requires them to rapidly develop a range of technical audio skills, workflows and processes that are then to be
integrated within a game and software environment. In this paper, we provide a reflective and critical discussion of the syllabus and teaching processes adopted during the module, which includes analysis of student performance and perception of the module. Crucially, we demonstrate the module is effective at having the desired impact of equipping non-audio students with the required skills and understanding so that they recognise processes, tools and techniques and understand roles of audio engineers, sound designers and musical directors in the games industry.

12:30 – 13:30  **Lunch and student posters**

13:30 – 14:40  **Panel Discussion: Studio Recording Practice [Main Lecture Hall]**

*Paul Ferguson – Edinburgh Napier University*
*Phil Harding – PJS Productions/JAMES*
*Andrew King – University of Hull [moderator]*
*Calum Malcolm – Music Producer*
*William Moylan – University of Massachusetts Lowell*
*Mark Thorley – Coventry University*

14:40 – 15:00  **Student research competition results and closing remarks**

16:00 – 17:30  **Tour of BBC Scotland**
Robert Davis and Fraser Clarke – University of the West of Scotland – A Comparison of Available Options for Teaching Signal Processing to Music Technology and Production Students

Learning signal processing techniques forms a vital part of any audio student’s education, as these skills have applications both in the artistic and technical fields, e.g. individualised tools to manipulate music and sound or the development of standard or unique audio processing algorithms. However, students in audio or music production programmes often have little or no knowledge of the intrinsic technical or mathematical theories behind many signal processing techniques (e.g. digital filters, Fourier transforms, convolution etc.). The current poster compares the various options available for teaching signal processing, either through graphical or code-based means, highlighting the strengths and weaknesses of each approach. It is also shown how each approach relates to an industry-standard implementation, therefore showing how a student may progress to more advanced techniques or employment. Drawing on teaching experience on the Music Technology degree course at the University of the West of Scotland (UWS), the paper concludes that a combination of graphical and code-based approaches best facilitates the progression of the students’ signal processing knowledge. The approach taken also maintains focus on practical audio applications that are relevant to the interests of the students.

Cormac Donnelly – Futureworks Media College – A proposal for specific industry accreditation for Game Audio Education

Whilst the significant role audio plays in modern game development is not in dispute, specific education in the discipline is still in its infancy. This is particularly true at degree level, where it has generally existed as an embedded module in Audio Engineering Technology curricula. However, the development of game and interactive audio as both a practical and an academic pursuit, has seen a number of UK institutions moving to develop specific degree content in these subject areas. With jobs in game audio being amongst the best paid, as well as the most fiercely contested, there would appear to be scope for establishing a working relationship between the games industry and education partners. This paper will propose the incorporation of an industry centric accreditation body for game audio education. Current trends in audio course accreditation will be reviewed and the relative merits of achieving accreditation will be considered. Examples of industry specific accreditation in other subjects will also be examined where these offer valuable insight. It is suggested that an industry accreditation body would allow for the provision and delivery of consistently relevant education as well as ensuring the employability of game audio graduates in an international job market.

Colin Heron – Glyndwr University – A practical approach to teaching loudspeaker cabinet tuning and testing

The appreciation of the basic relationship between loudspeaker cabinet design and driver Thiele Small parameters is essential for an understanding of the low frequency performance of a given loudspeaker system. Ideally, a pedagogical methodology for this function would include design, model, build and evaluate, allowing the student to gain experience in the creation and modeling of a solution. The build and evaluate phase supports the learning opportunity by verifying the validity of the emulation exercise. Teaching this can be hindered by the physical limitation of cabinet construction. The barriers presented by the construction and cost of building prototypes can be prohibitive. This results in the teaching of the principles of loudspeaker functionality being restricted to theoretical explanation supported by the testing of existing loudspeaker units. An approach has been devolved that utilises an adaptable cabinet. The cabinet is a fixed size with an interchangeable tuning panel that is bolted in place. This allows devices such as ports and ducts to be proposed and added to the design for evaluation and testing whilst retaining the majority of the cabinet structure. From a time and cost perspective, this has offered considerable advantages over an option of a complete cabinet fabrication.
Guillermo Mager – University of New Haven – Legal and Ethical Issues Regarding Unpaid Internships

In an article in the New York Times titled "The Unpaid Intern, Legal or Not", author Steven Greenhouse discusses the fact that some states, like Oregon and California have begun investigating companies for unfair practices regarding unpaid internships. Sound Recording and Music Business programs have used internships and cooperative education in order to support students broadening their education and in some cases, earning academic credit for supervised work experience related to their major or career goal. The University of New Haven requires all its Music Industry majors to complete two semesters of Internship. The purpose of this presentation is to introduce AES members to some of the legal and ethical issues regarding unpaid internships. The bulk of the presentation will concentrate on the United States Department of Labor's Fact Sheet #71: Internship Programs Under The Fair Labor Standards Act. This document discusses the circumstances under which individuals who participate in private sector internships or training programs may do so without compensation. It also lists the six criteria that must be applied when making the determination as to whether or not an internship program meets this exclusion. Some other issues, like Insurance and Liability, will also be discussed.

Patrick Quinn – Glasgow Caledonian University – Work Experience in Audio Technology Education

Work experience plays a vital role in providing a context for academic studies in audio technology and enhancing the student experience. In addition it reinforces the importance of transferable skills in employment such as communications, team work, reliability, time keeping etc. At Glasgow Caledonian University a number of different models of work experience have been developed including formal, assessed experiences and informal opportunities. A range of case studies are presented from different areas within audio with an analysis of the advantages and disadvantages of each. Finally the findings of a student questionnaire are presented which details their views on work experience, it’s perceived value to their learning experience and some of the barriers that prevent them participating in such opportunities.

Andy Wardle and Mark Sheridan – University of Highlands and Islands – Teaching old and new dogs new tricks – challenges in adjusting to the digital audio paradigm shift in Live Event Audio

This paper examines the impact of digital technology on the live sound sector and the educational and developmental challenges posed to sound systems technicians and engineers working on high-end professional music events. Research focussed on the experiences of a group of leading industry operatives (n30) known to be active in the business and all members of a self selecting, self moderating closed social network site. Participants in the research include Front of House Engineers, Monitor Engineers, Systems technicians and RF engineers. Initial research suggests that a high proportion of 'traditionally trained' highly regarded operatives have found the transition to operation and understanding of digital equipment challenging. This, in turn has raised questions regarding technical ability, skills development and continued employment in a rapidly evolving sector. The paper also addresses resultant issues around training, education and knowledge development routes between FE, HE and CPD – highlighting the need for a 'blend' of approaches that benefit both the lifelong learning of industry operatives and employability driven curriculum development for those in structured courses wishing to enter this professional world.'
**Student Poster Abstracts [posters to be presented on Friday]**

_Simon Durbridge – University of Derby – The effect of distortion on perceived loudness in live sound reinforcement_

Distortion is a central concern in audio production, and occurs in many parts of a live sound reinforcement system. Perceived loudness is a key principal in psychoacoustics, and may be strongly affected by factors such as spatial variance and the distinct effects of nonlinearity in the signal chain. The aim of this study is to highlight the relationship between perceived loudness, and different analytical forms of distortion which relate to how loudspeaker systems might behave. Some key factors of loudness perception and basic principles of distortion are discussed. A series of listening tests confirm that there is a relationship between loudness perception and distortion, and that this effect may vary between listeners. The results are analysed using perceptually motivated metrics such as Rnonlin and Loudness Units Full Scale. Overall, the importance of controlled compression techniques and limiting to avoid clipping are reinforced, as clipping may decrease aggregate perceived loudness and increase inter-listener variance in the live events domain.

_Steffan Owens – Glyndwr University – An Investigation into the Effectiveness of Cross-Rhythm and Mono-Rhythmic Metronomes in order to improve Timekeeping Accuracy_

This investigation is a study of the difference in trained and untrained participant's timekeeping accuracy, when accompanied by a digital metronome that uses Cross-rhythms, versus the accuracy when accompanied with a traditional, Mono-rhythmic metronome. Participants were played 6 different audio samples (played twice and in random orders) and asked to keep time, in-tempo. The 6 audio samples were in tempo pairs (60 BPM, 120 BPM and 180 BPM), with one Cross-rhythmic sample and one Mono-rhythmic sample comprising each pair. Participants were asked to tap a sensor pad in time with the metronomic audio samples. The sensor pad used Piezo sensors and a trigger-to-MIDI user interface to transmit the time information to MAX MSP (which also controlled audio playback). All time data for each participant was recorded and analysed. The results of the study suggest that Cross-rhythmic metronomes improve participants’ average performance accuracy, but only in the 60 and 120 BPM tempo brackets. At 180 BPM, there is a marked discrepancy between metronome types and the participants’ respective accuracy. The study also suggests correlation between the observed trends in the test results and Weber’s law, and concludes that further diversity in demographic profiles of participants, tempi and time signatures may offer more accurate results.

_Steven Myles – Glasgow Caledonian University – Re-Synthesis of a Target Audio File in Max/MSP_

The wide range of applications for digital synthesizers, in combination with the expertise that is required to operate them, justify the need for automatic parameter estimation procedures. This paper investigates the ability of Genetic Algorithms and Audio Descriptors in facilitating autonomous target matching. Through a review of the literature and by developing a prototype re-synthesis application in Max/MSP, both theoretical and practical considerations are explored. The prototype system uses an Adaptive Genetic Algorithm optimization scheme to find synth parameters which best emulate the perceptual characteristics of a target sound. The system quantifies the perceptual characteristics of a sound using various Audio Descriptors (measures of spectral, temporal and spectro-temporal sound attributes). Re-synthesis was then applied to real and synthesized tones, of which, the matched synthetic tones were submitted for subjective evaluation. From the responses of the subjective experiment it was discovered that though a moderate correlation existed between perceptual distance and system determined similarity, substantial further work is required to re-synthesise target tones with acceptable accuracy.
Mike Uwins – De Montfort University – Analogue Hearts, Digital Minds? An investigation into perceptions of the audio quality of vinyl

This study investigates the vinyl revival, with particular focus given to the listener’s perception of audio quality. A new album was produced using known source material. Subjects then participated in a series of double-blind listening tests, comparing vinyl to established digital formats. Subsequent usability tests required subjects not only to re-appraise the audio, but also to interact with the physical media and playback equipment. Digital vinyl systems were used in order to investigate the influence of non-auditory factors on their perception of sound quality. Both qualitative and quantitative data was also gathered from subjects of the usability tests, with the correlation (or contradiction) between the results being analysed. The study concludes that sound quality is not the sole defining factor and that listener preferences are profoundly influenced by other, non-auditory attributes and that such factors are as much a part of the vinyl experience, as the music etched into the grooves.

Shannon Bolen – Glasgow School of Art – Integrating Sound Literacy in Secondary Education

By integrating sound literacy in secondary education, students’ awareness of their own sense of hearing and listening to sounds will grow. They will be able to distinguish how sounds are used to affect their personal decisions and opinions, visuals they see each day (films, media, games), their moods and emotions, and their sense of environment. With sound literacy, students will be able to independently and critically assess sound and its influence and meaning. My definition of sound literacy is the ability to listen, create, and comprehend sounds within a broad range of contexts. An important aspect of being literate in sound is the ability to do so independently. By the time students graduate or leave secondary school, they need to be equipped with tools to help them distinguish and assess the information they receive both visually and aurally. Sound literacy will push aural comprehension to be just as important as visual literacy and reading comprehension. By conducting interviews with educators and sound specialists, I gained feedback about teaching sound literacy and created a curriculum. By teaching introductory lesson plans at the secondary level, students showed a general interest in sound design and a natural curiosity towards the psychology of sound and the relationship between sound to emotion and sound to image. Sound education can be taught from a constructivist approach. It will also use the basic frameworks of music education plus some basic topics from the STEM subjects. With similar aims and assessments to music education (such as aural skills, identifying sound sources, composition), teaching sound literacy in secondary school would be a similar process but without the need to perform a standard instrument. Sound literacy lends itself to a practical application of science and math which in turn, ultimately becomes a creative art. Sound literacy will teach students to understand the relationship between sound, music, and visual media. As technology and the creative arts develop, sound and music are interchangeably equivalent in visual media. It is essential to prepare future generations to utilize their sense of sound for their own benefit and wellbeing.

Gianni Massi – Glasgow Caledonian University – Exploration of Timbre features as analytic tools for sound quality perception

An increasing use of perceptual encoding in popular audio distribution models is among the main reason that has led to a demand in recent years for an objective method for evaluating audio from a perceptual point of view. In addition to this timbre has been the subject of many publications recently that have identified successful tools for quantifying it such as MFCCs and the Echonest Analyser. A new approach to objective audio quality evaluation is proposed, in which, in order to find computationally the perceptual differences between two tracks, timbre features are retrieved using the Echonest Analyzer and MFCCs. A distance measure derived from speech recognition research, Dynamic Time Warping, is used in conjunction with the Euclidean distance of two vectors representing the first four statistical moments of the features derived, to acquire a 6-dimensional feature set detailing dissimilarity between two tracks. These feature sets are then used as the basis of a system that predicts perceptual audio quality by
training a K-NN Regressor. The quality prediction are found to correlate with subjective ratings ($r = 0.83$) and are compared with the PEAQ standard, which is found to perform better ($r = 0.96$).

**Adam Craig – Glasgow Caledonian University – Think About Sound: A novel application for the assessment of environmental soundscapes using mobile technology**

*Think About Sound* is a cross-platform mobile phone application (for iOS and Android platforms) which has been developed to support soundscape research by implementing an experience sampling method. Over the last decade, smart phone ownership has increased immeasurably and it is the availability of this technology that has been exploited here in order to allow in-situ soundscape assessment as users go about their day-to-day business. The application allows for the collection and assessment of environmental soundscapes using a set of response questions and the native audio recording application on a GPS-enabled smart phone. This poster serves to provide detail on the technology behind the application as well as the motivation behind its development. This novel approach to soundscape assessment shifts the traditional paradigm of experience sampling from traditional day-diary methods to a more modern approach by utilising progress technology suitable for today’s research methods. The application will be further used in the development of an online map whereby soundscapes are crowd-sourced and assessed for dissemination to the public.