Volume 51 No 2 March/April 2025

ACOUSTICS BULLETIN

Institute of Acoustics
Sound • Noise • Vibration

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ACOUSTICS BULLETIN

Acoustics Bulletin Volume 51 No 2 March/April 2025

Institute affairs

Features

Cover image: This incredible photograph of inspiring women was captured at the IOA's 50th anniversary dinner. We couldn't let this opportunity pass by without comment, especially as International Women's Day is 8 March, so find out more about these fantastic acousticians on **Page 18**

Regular

The proposed update of BS 8233

BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*, is undergoing proposed revisions to better align residential acoustic design with current health evidence.

Your opinion on this is very important. See more on page 6 and complete the questionnaire at **https://www.ioa.org.uk/bs8233-members-survey**

Technical articles review procedure

All technical contributions are reviewed by an expert identified by the IOA Publications Committee. This review picks up key points that may need clarifying before publication, and is not an in-depth peer review.

The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society. The Institute of Acoustics is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels.

Institute of Acoustics
Sound • Noise • Vibration

The Institute has over 3000 members working in a diverse range of research, educational, governmental and industrial organisations.

This multidisciplinary culture provides a productive environment for cross-fertilisation of ideas and initiatives. The range of interests of members within the world of acoustics is equally wide, embracing such aspects as aerodynamics, architectural acoustics, building acoustics, electroacoustic, engineering dynamics, noise and vibration, hearing, speech, physical acoustics, underwater acoustics, together with a variety of environmental aspects. The Institute is a Registered Charity no. 267026

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Dear IOA members

As we enter the spring of 2025, I am delighted to inform you of the significant developments and ongoing projects at the IOA. Our progress and plans continue to shape our acoustics community.

Chartered status progress

We have made good progress towards achieving chartered status for the IOA. The Grant of Arms, proudly shown at our 50th anniversary celebratory dinner at Vintners Hall, marks a big step in our journey. I thank Chris Turner for his leadership in drafting the petition for the award of chartered status to the King.

Noise Network Plus

We are pleased to welcome the launch of the Noise Network Plus, a £1.8M EPSRC-funded interdisciplinary network. The launch meeting is 18 March 2025 at the Royal Academy of Engineering. This project will tackle major noise pollution challenges for the next 10-15 years, complementing and continuing our efforts with UKAN+.

UKAN+ SIG integration plans

We are working to integrate UK Acoustics Network Plus (UKAN+) special interest groups (SIGs) into the IOA structure. A working party is developing a detailed integration plan, addressing membership requirements, resource allocation and alignment with IOA's structure. A three-month, no-cost extension for the UKAN+ grant has been secured, now ending on 30 June 2025. This gives us more time to optimise the strengths of both organisations.

Noise impacts on wildlife

To support the UKAN+ SIGs, we are facilitating two EPSRC programme grants through a hybrid workshop on 4 June at the IOA HQ in Milton Keynes. The proposed grants, *Quiet waters: aquatic ecosystem noise management*, and *Quiet earth: terrestrial ecosystem noise management*, will address noise impacts on wildlife. Interested members should contact Helen Whitehead (SIGBio) at **H.C.Whitehead1@salford.ac.uk** or Paul Lepper (SIGUA) at **P.A.Lepper@lboro.ac.uk** for more information.

Research initiatives

The IOA continues to support new research in acoustics and we are delighted to report progress in two key initiatives. The EPSRC Centre for Doctoral Training in Sustainable Sound Futures, led by Professor Trevor Cox, has welcomed its first group of PhD students. Many of these students are supported by our industry members. This project, involving the universities of Salford, Bristol, Sheffield and Southampton, aims to train 70 PhD students over the coming years.

Additionally, the Leverhulme Trust Aural Diversity Doctoral Research Hub, led by Professor Bill Davies, is currently recruiting PhD students for the 2025 group. This interdisciplinary project aligns with the IOA's EDI objectives and focuses on understanding and addressing the wide range of hearing and listening differences among individuals.

Standards revision

The IOA is actively involved in discussions about the revision of the British Standard BS 8233. A task-and-finish group was established in December 2024 to represent the interests of IOA members and help progress this important work. I thank Daniel Goodhand for his leadership of this group. (See more on the revision on page 6).

Communications and digital strategy

As previously reported, we are enhancing our communication with members through a comprehensive digital transformation. You will see roll out of the new website this year. Our new website offers improved functionality and easier access to resources. As part of our digital strategy, we will be welcoming a new Education Director to transform our educational delivery, by exploring innovative learning methods that blend online and in-person approaches. I encourage members to explore these new resources and provide feedback as we continue to improve your IOA experience.

Conclusion

As we move forward, I encourage all members to engage with these projects and contribute to the growth of our field. The IOA remains committed to advancing the science and practice of acoustics, and your participation is essential to our continued success.

Thank you for your ongoing support and dedication to the Institute of Acoustics.

David Waddington

David Waddington, IOA President

BS 8233 draft update

Members will be aware that BS 8233 Guidance on sound insulation and noise reduction for buildings, 2014 is under revision by a BSI committee. The likely main changes were first aired at the Acoustic 2024 conference in Manchester in September 2024, and since then various IOA and ANC workshops and publications have debated the changes and some major concerns have been raised.

By Steve Mitchell, Environmental Sound Group Chair

At the time of writing (19 February 2025) a draft standard has not been published, and the IOA has written to BSI expressing some concern and to request further consultation. The IOA has established a Task and Finish Group to collate and present IOA member views to the BSI drafting committee (see more below). If you would like to express your views to the Task and Finish Group, please complete the questionnaire at **www.ioa.org.uk/bs8233-members-survey** or join an IOA meeting on the standard. Remember, in addition to contributing to IOA responses, you can also respond to the public consultation on the draft when it is published. (See more below.)

Air source heat pumps

Government policy offering incentives to install air source heat pumps is leading to a huge increase in applications to local planning authorities under the Microgeneration Certification Scheme (MCS). This is great for climate change, but as we know, can lead to noise problems if not assessed and designed properly. Local authorities are finding that installers are not following the simple MCS calculation process and are not adequately trained, creating a large workload for them in some cases. The IOA with the CIEH has produced guidance for installers and for home owners (**https://www.ioa.org.uk/publications/briefingnote**) and would urge IOA members to use and publicise this guidance to help improve applications.

BS 8233 draft - share your views in the IOA questionnaire

By Daniel Goodhand, BS 8233 Task and Finish Group Chair

As above, BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*, is undergoing proposed revisions to better align residential building acoustic design with current health evidence. The suggested changes include putting more emphasis on external sound levels in alignment with established research on their links with health effects.

The questionnaire is only concerned with sections that deal with dwellings and rooms in residential use. It will gather views on the following topics:

- external sound exposure categories;
- L_{den}/L_{night};
- room classification; and
- regular individual night-time noise events.

The insights collected through this questionnaire will serve multiple purposes, including informing discussions within the IOA and related bodies. The information gathered may be used in one or more of the following ways:

- for the IOA Task and Finish Group to understand the views of IOA members;
- to collate and publish major themes identified from the feedback;
- to provide the British Standards Institution (BSI) with information to assist in drafting the revised standard; and
- to gather information to assist future work in the field.

Names and membership details are being collected to verify membership, but the data will be anonymised by the office before it is analysed or used further. All personal information will be securely stored and handled in accordance with data protection regulations to ensure confidentiality.

It's important for respondents to understand that this questionnaire does not replace the official consultation for the draft. Feedback collected here will be used to inform discussions within the IOA and related bodies, but formal representations should be made directly to BSI when the draft is published for consultation. For that reason, members may wish to save their comments for future reference. Additionally, proposals have evolved since those originally described and so **it is important to read the draft carefully when published before commenting**.

For detailed information on the proposed updates, the Task and Finish Group has collated supporting material here: **www.ioa.org.uk/bs-8233-resources**

The questionnaire can be filled in here: **www.ioa.org.uk/bs8233-members-survey**

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Your feedback is valuable for the IOA to understand the views of membership, but remember, the questions must be answered only after respondents have reviewed and understood all the supporting material.

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Engineering Division

The IOA Engineering Division will support you through the process to help you become one of more than 229,000 registrants that hold international professional recognition.

By Blane Judd BEng FCGI CEng FIET FCIBSE, Engineering Manager

Well, it's the start of another year and the team at head office is looking forward to supporting another set of members who want to become professionally registered. We do not have anyone who is ready for the next interview period, but that is sometimes the case when people have been away from work on leave for the holidays. We are working with a group of members at present and will bring you more news later in the year as they progress. We have recently been through the review of our license from the Engineering Council and will be making some minor amendments, but nothing that will directly impact the process candidates are working through now.

We can't stress enough how important it is to take the time to look at the example PRI report that we send to every applicant. Just lately we have had some submissions that have not followed the example and so needed extra time to complete their application. We will look at submissions and send them to volunteers to review, but only once we think they are close to being the final draft. If you are asked to re-work your submission it is because we only want to put applicants forward who stand a good chance of being successful. We do not want to waste your time or that of our volunteers which is why we go through this process.

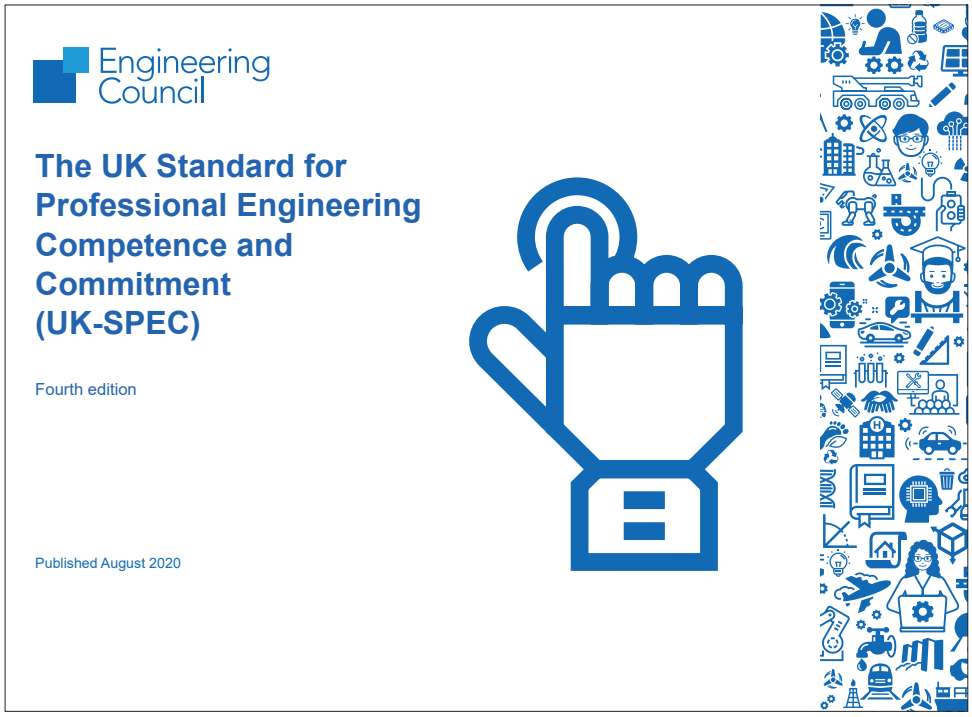
Workings

When drafting the report think if you have selected a particular software to conduct modelling, if so, explain why you chose it, what the shortfalls are, what results you were expecting and how you validated the outputs. These are all part of the A and B competencies and will save you having to do several rewrites.

Because the IOA does not have any accredited training programmes, all applicants must submit an initial professional development (IPD) report. This is a narrative that explains how you have developed from a qualified acoustician into a practicing engineer. We send an example of this report with all applications, so check out the contents and add your own personal information.

Emma Lilliman works hard to make sure everyone gets the interview dates that suit them. Since we have a limited resource, we try to respond as quickly as possible, but high numbers of candidates all looking for feedback at the same time can cause a backlog occasionally so please bear with us as we try our best to turn around your drafts quickly.

Neil Ferguson still helps us with academic equivalence support for those candidates who do not have recognised qualifications. You can check for yourself to see if your qualifications meet the required specification by visiting the Engineering Council website at **http://www.engc.org.uk/courses** But please don't panic if your specific qualification is not listed, as we can still help you through the process using individual assessment (see later in the article).



Above: We are now interviewing using the Engineering Council UK SPEC version 4

We hold several interview events through the year depending on the number of candidates we have coming forward for registration. If you are interested in taking the next step to becoming a professionally registered engineer, contact us on acousticsengineering@ioa.org.uk sending a copy of your CV and copies of certificates and transcripts of your qualifications. It is important that we have all of your further and higher education certificates, not just your highest attainment.

There are two routes to registration:

The **recognised qualification** route, if you have achieved the required learning outcomes through recognised qualifications in acoustics. Qualifications which provide the required level of knowledge and understanding are for IEng and accredited Bachelor's degree and for CEng an accredited integrated Master's degree or a combination of accredited Bachelor's and Master's degrees (see table below).

Recognised qualifications

Incorporated Engineer (IEng) One of the following:	**Chartered Engineer (CEng) One of the following:**
An accredited Bachelor's or honours degree in engineering or technology	An accredited Bachelor's degree with honours in engineering or technology, plus either an appropriate Master's degree or engineering doctorate accredited by a licensee, or appropriate further learning to Master's level*
An accredited Higher National Certificate (HNC) or Higher National Diploma (HND) in engineering or technology started before September 1999	An accredited integrated MEng degree
An HNC or HND started after September 1999 (but before September 2010 in the case of the HNC) or a foundation degree in engineering or technology, plus appropriate further learning to degree level	An accredited Bachelor's degree with honours in engineering or technology started before September 1999
A National Vocational Qualification (NVQ) or Scottish Vocational Qualification (SVQ) at level 4 that has been approved by a licensee, plus appropriate further learning to degree level*	Equivalent qualifications or apprenticeships accredited or approved by a licensee, or at an equivalent level in a relevant national or international qualifications framework†
Equivalent qualifications or apprenticeships accredited or approved by a Licensee, or at an equivalent level in a relevant national or international qualifications framework†	

* See: **www.engc.org.uk/ukspec4th** for qualification levels and HE reference points.
† For example, UNESCO's International Standard Classification of Education (ISCED) framework.

The **individual assessment** route, for applicants who do not have the recognised qualifications and who will have an individual assessment of their qualifications and any other relevant learning such as: formal academic programmes, in-employment training and experiential learning self-directed learning. In many instances, it is likely to be a combination of some or all these options.

Remember we are here to help you get through the process and advice and support is offered to every candidate personally.

For **individual assessment**, the Institute accepts several courses from certain academic centres in relevant subjects, such as audio technology, as being equivalent to accredited courses for the purposes of EC registration, without the need for further assessment.

The Institute recognises the IOA Diploma course and the several Master's courses linked to it as providing evidence if you are looking to gain CEng registration. You could also offer a PhD qualification, depending upon the content of the associated taught element. We can also offer support for registration via a 'technical report' route, if you do not have the relevant qualifications to help you demonstrate you are working as a professional engineer in acoustics. If you need to follow the technical route, we will discuss this with you before you embark on that process.

Election process

The election process is overseen by the Institute's Engineering Division Committee, which is made up of volunteers from the membership, to whom we are extremely grateful. They represent the ever-growing number of members holding EC registration and provide the essential peer review process that affirms that you are at the appropriate level for recognition as an Engineering Council Registered Professional Engineer.

Our video explains how members can gain professional recognition and Engineering Council registration through the IOA.
Watch at https://www.ioa.org.uk/video/recognising-your-professionalism-0

IOA 2025 courses update

Places on IOA Certificate courses for spring 2025 are filling up quickly, so to avoid disappointment and to secure a place on your chosen course, please contact your preferred centre for further details.

By Helen Davies

Subject to recruitment, and in addition to our long-established courses (Workplace Noise Risk Assessment, Management of Occupational Exposure to Hand-Arm Vibration, Environmental Noise Measurement, Building Acoustic Measurements, and the Certificate of Proficiency in Anti-Social Behaviour etc (Scotland) Act 2004 – Noise Measurements), the IOA will introduce three new courses:

- Advanced Certificate of Competence in Report Evaluation;
- Certificate Course in Soundscape Assessment; and
- Certificate Course in Environmental Vibration Measurements.

Details about each of the existing courses are given in the following sections. Unless indicated otherwise each certificate course lasts for five days and examinations take place on the last day.

Advanced Certificate of Competence in Report Evaluation (ACCRE)

This course provides the skills required to critically read and evaluate technical reports in acoustics. While the course is appropriate for a wide audience it is aimed primarily at those in senior positions in pollution control and environmental health practice and anywhere that technical reporting is important. For more information on this course, email the course supplier at **education@kpacoustics.com**
Examination date: 28 March 2025

Certificate Course in the Management of Occupational Exposure to Hand-Arm Vibration (CCMOEHAV)

The course seeks to enable an appreciation of the nature of hand-arm vibration hazards in the workplace, the need to protect employees from hand-arm vibration syndrome and to advise and assist employers to meet their legal duties in accordance with current guidance from the Health and Safety Executive. After completing the course candidates should be able to explain the requirements of current legislation, identify situations where hazards exist and assess the risk, discuss basic techniques for control of vibration exposure and identify areas where vibration reduction is required, assess the effectiveness of vibration control measures, evaluate the daily vibration exposures of employees from information about measured vibration magnitudes and work patterns and explain the uses and limitations of personal protective equipment.
Examination date: 11 April 2025

Certificate of Competence in Building Acoustics Measurement (CCBAM)

The course provides a basic knowledge of the methodology for measuring and reporting sound insulation and aspects of room acoustics, together with relevant provisions of key standards and guidance.
Examination date: 2 May 2025

Certificate of Competence in Environmental Noise Measurement (CCENM)

This course seeks to provide a basic knowledge of the methodology of environmental noise measurement, including the use and accuracy requirements of sound level meters and analysers and to enable them to be aware of the significance of measurement data against the framework of standards and legislation for environmental noise.
Examination date: 16 May 2025

Certificate Course in Soundscape Assessment (CCSA)

This course will enable attendees to understand the concepts of soundscape and undertake the assessment and data analysis required for a soundscape assessment.
Examination date: 16 May 2025

Certificate of Competence in Workplace Noise Risk Assessment (CCWNRA)

The course aims to provide the education and training needed to carry out workplace noise assessments in a competent manner, as required by the Control of Noise at Work Regulations 2005. Demand for competent noise exposure assessments is increasing and this course provides the latest information and training to meet the demands of the legislation, including a background of basic acoustics combined with `hands on' practical experience of industrial noise measurements and associated assessment of workplace noise exposure.
Examination date:
26 September 2025 P12

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New Course under development

Certificate Course in Environmental Vibration Measurements (CCEVM)
This course provides a knowledge of the methodology of environmental vibration measurement including correct selection of vibration transducer and analyser, mounting and positioning of transducers and an appreciation of the role of measurement data within the framework of appropriate standards and legislation.

Holders of certificate courses may apply for Tech IOA membership (further details are available from **membership@ioa.org.uk**).

Information on accredited centres and the IOA Certificate and Diploma courses they are delivering is at **https://www.ioa.org.uk/education-training**

IOA Diploma 2025-26

The IOA Diploma continues to be the 'gold' educational standard on the route to achieving MIOA. Applications for the 25/26 IOA Diploma are now open. Watch introductory videos under the 'course structure' sectoin of the IOA Diploma page.

Accredited Diploma centres include: London South Bank University (LSBU); the University of Derby and KP Acoustics Research Labs who will offer the Diploma in Southampton and Manchester (Salford University).

Please enquire directly for more information on course dates, delivery, course fees and registration.

For tutored distance learning, please direct enquiries to **education@ioa.org.uk**

Please contact your preferred centre directly for information on course dates, delivery methods, course fees and to register for the course.

For any other enquiries contact **education@ioa.org.uk**

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27 March 2025
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THE ART OF BEING AN ACOUSTICIAN
Organised by the IOA Early Careers Group
28 March 2025
Mercure Manchester Piccadilly Hotel (NEW VENUE)

12th INTERNATIONAL CONFERENCE ON AUDITORIUM ACOUSTICS 2025 (see advert below)
8-10 September 2025
The Bristol Beacon, Bristol

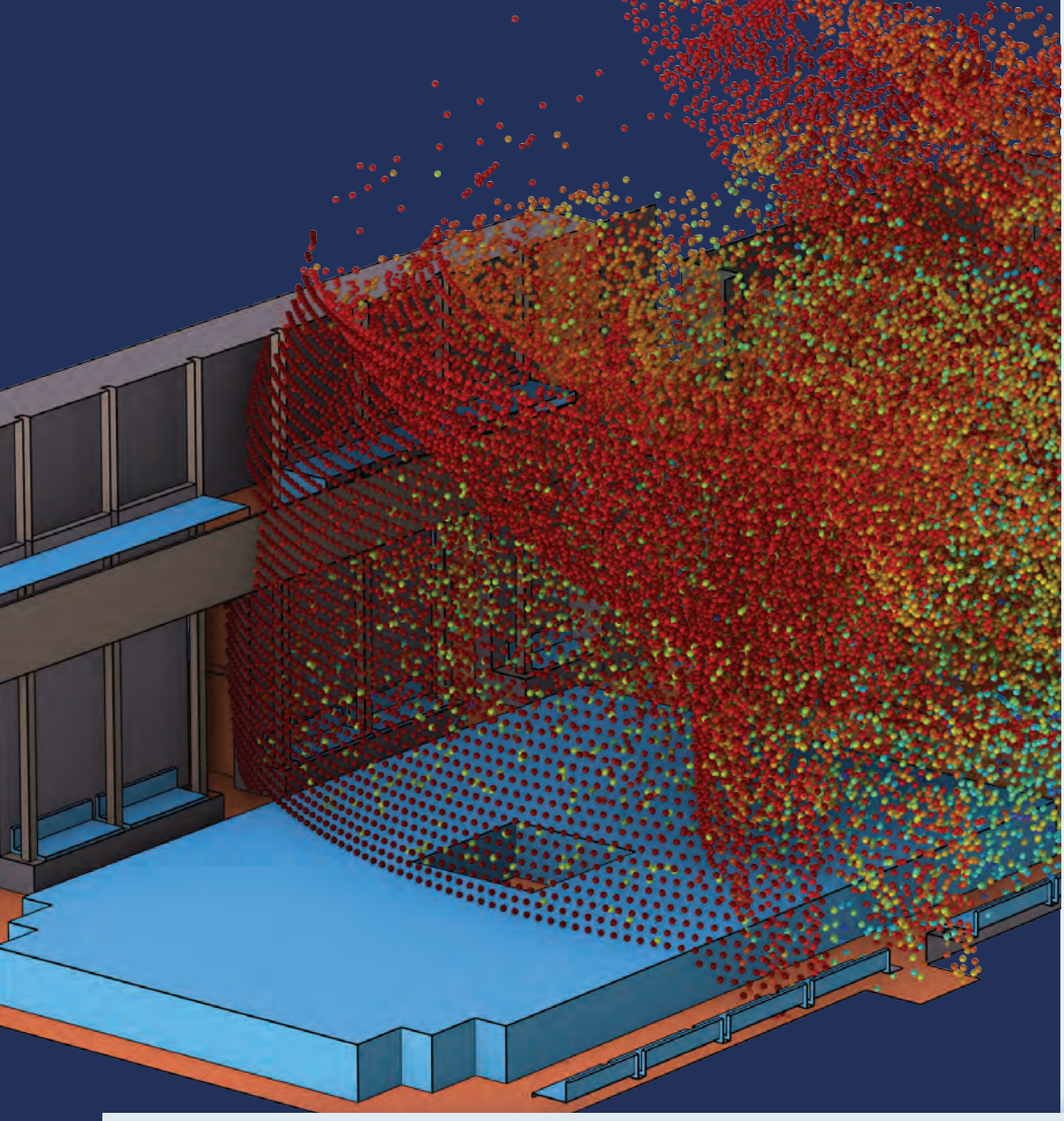
IOA ANNUAL CONFERENCE AND EXHIBITION ACOUSTICS 2025
October 2025

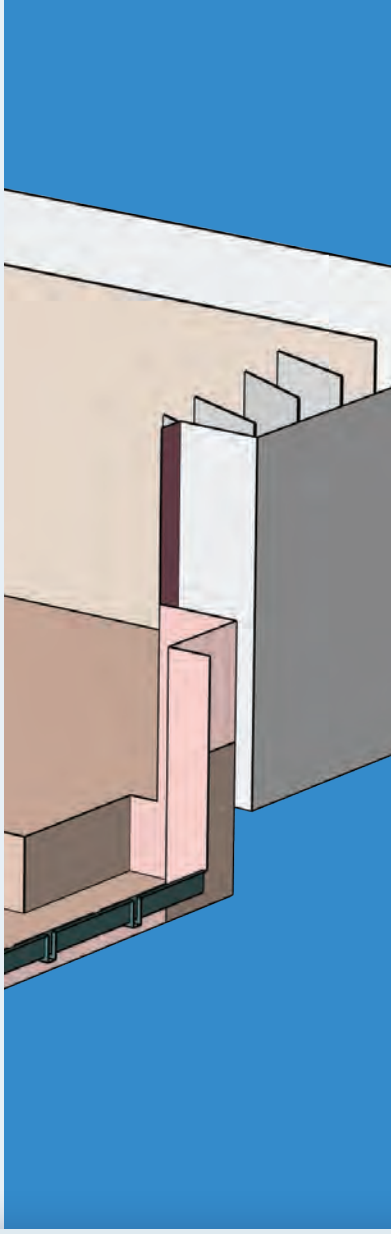
REPRODUCED SOUND 2025
Organised by the Electroacoustics Group
November 2025

Other event

54TH INTERNATIONAL CONGRESS AND EXPOSITION ON NOISE CONTROL ENGINEERING (Inter-Noise 2025)
24-27 August 2025
São Paulo, Brazil
https://tinyurl.com/54internoise

For up-to-date information visit www.ioa.org.uk





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Approved Membership Applications

The Membership Committee reviewed 82 application forms on 21 November 2024 at their Committee meeting held at IOA HQ in Milton Keynes. 40 corporate applications have recently been approved by the Council following the recommendations of the Membership Committee. The Committee saw 42 new candidates joining the IOA, the remaining applications came from members upgrading.

FIOA

Edward Hart Clarke	Louise Morris
Steve Gosling	Matthew Muirhead

Corporate members

Luke Ankers	Thomas Hutchin
Emma Aspinall	Hannah Karban-Williams
Jon Berry	Thomas Keenan
Martha Bird	Kyungmin Kim
Ben Robertson Cartwright	Grace Lampkin
Martin Cockrill	Jacopo Lozupone
Henry Cox	Raymond Marr
Richard Deane	Kira Marshall
Alexander Dell	Karen McCorvie
Patrick Daniel Gomes Schafstein	Laura Mcleod
Daniel Gonsalves	Diego Miguez Abad
Paul Gurney	Simon Needham
Nicholas Haigh	Michael Raven
Gareth Hance	Michael Richardson
Jody Henderson	Adam Shaw
David Hible	Philip Softley
Stuart Hill	Phoebe Webber
Katie Hughes	Lachian Woolf

Associate members

Ameera Ali	Chloe Glenn
Thomas Carvell	Gillean Kennedy
John Caton	George Mackenzie
Jasmine Catubay	Andrew McGillivray
Vishnu Chandran	Joseph Meadows
Lily Channon	Damian Mikolajczak
Thomas Clarke	Luke Owen
Ellen Crockett	Stavros Tagios
Joshua Dagg	George Webb
Toluwanimi Dario	

Technician members

Richard de Mowbray	Holly McCarthy
Tom Suddaby	

Affiliate members

Christopher Finch	Dawid Stelmach
Cyril Joe	Danny Withrington
Sam Hands	

Challenges relating to equity, diversity and inclusion

The IOA, the UK Acoustics Network (UKAN+), the Association of Noise Consultants (ANC), the Chartered Institution of Building Services Engineers (CIBSE) and the Institute of Physics (IOP) are holding a multi-disciplinary workshop on 20 March 2025 to discuss the challenges faced by their members regarding equity and inclusion within the organisations and within their workplaces.

By Angela Lamacraft, member of the IOA EDI Working Group

We will also discuss the challenges faced by members' organisations in recruiting and retaining people from underrepresented groups relating to, for example, gender, race and ethnicity, LGBTQAI and disability and neurodivergence.

The event will be held at the IOP Head Office and as part of the EDI Day: *Integrating Equity, Diversity and Inclusion into Acoustics, Physics and Building Services*, we will be holding online and in-person drop-in sessions to find out more about the challenges people have faced in their professional bodies, in their workplace or when recruiting or retaining staff.

In addition to the event, we have set up an anonymous questionnaire for people who would prefer to use that instead of attending a drop-in session.

You can complete it here **https://forms.office.com/e/2Z93RqL9zC** and please submit your contribution by 18 March 2025 latest.

Details about the drop-in sessions can be found at **https://www.ioa.org.uk/civicrm/event/info?reset=1&id=986**. IOA, CIBSE and IOP members are welcome to join the sessions to provide more detail about answers they gave in their questionnaire or to bring up other EDI matters for discussion.

Deadline for questionnaires:
18 March 2025

EDI event:
20 March 2025

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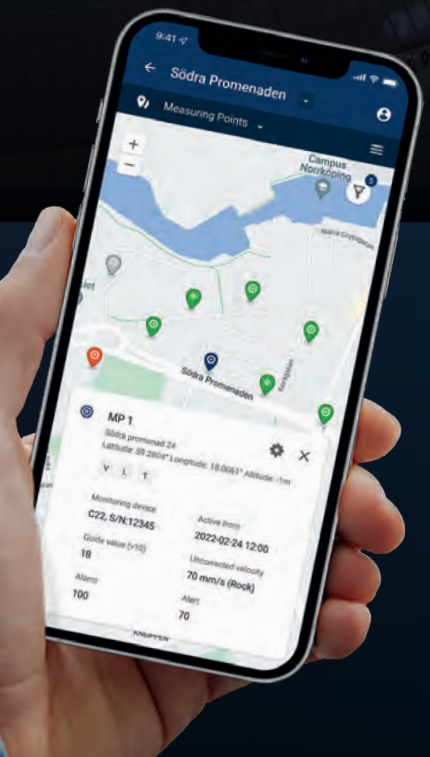

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Inspirational women in acoustics

By Angela Lamacraft (Sustainable Acoustics Ltd), Vicky Wills (AtkinsRéalis), Reena Mahtani (Stantec UK) and Anne Budd (New Acoustics Ltd)

This incredible photograph of inspiring women was captured at the IOA's 50th anniversary dinner, the details of which are covered on page 54 of this issue. We couldn't let this opportunity pass by without comment, especially as International Women's Day is 8 March, so let's find out more about these fantastic acousticians:

Above:
Photo credit: Andrew Beverley, CDM Stravitec UK

1 Professor Dame Ann Dowling (OM, DBE, FRS, FREng), Deputy Vice-Chancellor and Emeritus Professor of Mechanical Engineering at the University of Cambridge. She is a Fellow of the Royal Society, Royal Academy of Engineering and is a Foreign Member of the US National Academy of Engineering, the Chinese Academy of Engineering and of the French Academy of Sciences. She is an Honorary Fellow of the Institution of Mechanical Engineers, the Institution of Engineering and Technology and the Institution of Engineering Designers and a Fellow of the Royal Aeronautical Society, the American Institute of Aeronautics and Astronautics and of the Institute of Acoustics. She has honorary degrees from 21 universities including Oxford, Imperial College London, Glasgow, the Technical University of Eindhoven, KTH Royal Institute of Technology Stockholm, Trinity College Dublin and McGill Canada. P20

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A specialist in aeroacoustics, Dame Ann became the first female professor of Engineering at Cambridge in 1993 and went on to become the Head of the Department of Engineering at Cambridge University 2009-14 and President of the Royal Academy of Engineering 2014-19.

She led the Cambridge MIT Silent Aircraft project, which published its radical new design concept, SAX-40, in 2006 with the aim of raising aircraft industry aspirations. She also chaired the agenda-setting and widely respected joint Royal Society/Royal Academy of Engineering report *Nanoscience and nanotechnologies: opportunities and uncertainties* published in 2004, which highlighted the need for responsible regulation and research around the use of materials at an extremely small scale – only a few millionths of a millimetre.

She was nominated in BBC Radio 4 Woman's Hour power list 2013 as one of the 100 most influential women in the country. For her pioneering work in acoustical engineering, Dame Ann was awarded the IOA Engineering Medal in 2014 and she gave her medal lecture on the reduction of jet noise. In 2016 she was awarded the Institution of Mechanical Engineers' James Watt International Gold Medal and in 2019 she received the Royal Society' Royal Medal for her 'leading research on the reduction of combustion, aerodynamic noise and the design of aircraft and her distinguished services to engineering'.

Finally, Dame Ann was the first female engineer to join the Order of Merit (OM), which only has 24 living members at any time, after being appointed by Her Majesty Queen Elizabeth II in 2016. She is only the tenth woman in over 100 years to join the OM, following in the footsteps of some uniquely accomplished women from politics, science and the arts.

2 **Jenny King** (AMIOA), Acoustic Consultant at AECOM, member and early careers representative of the IOA STEM Committee, is a regular attendee at the London Branch meetings and was awarded Highly Commended for the John Connell Rising Star Award 2024. Though relatively new to the field of acoustics, Jenny has already made significant contributions to our industry through her passion for STEM as well as acoustics as a whole and this has quickly established her as a prominent figure in the community.

3 **Eleanor Girdziusz** (MIOA), Senior Associate and Building Acoustics Lead at Stantec UK in London, an IOA Diploma Examiner in Building Acoustics and part of the team that put together the acoustic work experience on Springpod. She has trained as a secondary school teacher and brings her passion for training and education to the work she does.

4 **Fiona Rogerson** (MIOA), Senior Acoustic Consultant at Arup, Honorary Secretary of the IOA, serving on the Executive Committee and IOA Council, and a long-standing member, and past Chair of IOA Midlands Branch. Fiona has a strong interest in people and their development, as well as a passion for equity, and is currently mentoring champion for the Arup Acoustics team.

5 **Vicky Wills** (FIOA), Associate Acoustic Consultant at AtkinsRéalis, member of IOA London Branch, IOA STEM Committee and ANC Future Acousticians, winner of the IOA 'Promoting Acoustics to the Public Award' and listed as one of the Top 50 Most Influential Women in Engineering in 2016. Vicky has worked at AtkinsRéalis (was Atkins) since 2001, mainly focusing on the assessment of environmental noise from large road schemes. She has brought acoustics to the attention of hundreds of children through her tireless work promoting STEM, and particularly acoustics, within schools and at careers fairs.

6 **Angela Lamacraft** (IEng FIOA), Senior Acoustic Consultant at Sustainable Acoustics Ltd, current Trustee and Council member of the IOA, founder and former Chair of the IOA Equity, Diversity and Inclusion Working Group, Chair of the IOA School Competition Committee, former Chair of the IOA Young Members Group and various other IOA and ANC roles. Angela is an acoustic consultant at Sustainable Acoustics Ltd, working on environmental, industrial and building acoustics projects. She works tirelessly to promote the benefits of equity, diversity and inclusion within the IOA and members' organisations. She was awarded the IOA Award for Promoting Acoustics to the Public in 2024.

7 **Sam Riley** (MIOA), Acoustic Consultant at dB Consultation Ltd. Now working full time in environmental acoustics, Sam previously worked in Environmental Protection for 32 years. She obtained the first Public Space Protection Order after the legislation was released in 2014 to stop car meets in a car park and associated noise from local roads being used as a race circuit.

8 **Elle Hewett** (MIOA, MAAS), Associate Consultant at Stantec UK in Bristol. Elle has worked most of her career in Sydney, Australia and is enthusiastic about good acoustic design. She is part of the ANC's marketing committee and one of her projects in Australia won the 2023 ANC Sustainability award.

9 **Daniela Filipe** (MIOA), Head of Acoustics at Experience Studios in London. She is a member of the IOA Building Acoustics Group and regularly presents for the IOA on events such as *The Art of Being a Consultant*. In 2020 one of her projects won the ANC Environmental award.

10 Jo Webb (CEng HonFIOA), Vice President International of the IOA following a term as President of the Institute 2016-2018, and member of the Parliamentary Liaison Group and North West Branch Committee. Jo has also been part of the IOA Membership Committee and the Noise and Vibration Engineering Group. She was educated at the University of Salford graduating in 1987 from the electroacoustics course and later gaining a masters in acoustics. She is now back at Salford following a 35 year career in consultancy. She was a Technical Director of Wood Group, an Associate at Arup Acoustics where she worked for 18 years, and had jobs at various other consultancies as well as in a local authority, after starting her career with Building Design Partnership. Jo is undertaking research for a PhD sponsored by the Royal Horticultural Society in the potential of natural noise control as part of a wider study of the ecosystem services of hedges. As well as her research work Jo now spends time encouraging and supporting others to build careers in acoustics through the UK Acoustics Network and the university.

11 June McClung (MIOA), Noise Manager at Edinburgh Airport. She started out as an analytical chemist at the Scottish Environmental Protection Agency, moving into Environmental Health in 2005 and spent 12 years in local authority environmental health/ pollution control in Scotland and Wales. For the past eight years June has been managing noise at Edinburgh Airport, involved in airspace change – modernising Edinburgh Airport's flightpaths to minimise the number of people overflown, managing the airport's five-year noise action plan process and public consultation, community noise board and noise insulation scheme. June is also a member of the IOA Publications Committee and is active in the IOA Scottish Branch.

12 Anne Budd (MIOA MASA), owner and Director at New Acoustics Ltd since 2005 and Chair of IOA Scottish Branch. She has worked internationally as a product manager for acoustic instrumentation and standardisation, conducted research into school acoustics, speech intelligibility of young children and teachers' voices, and is currently an acoustic consultant. Anne was the first woman to be elected in a contested vote to the board of the ANC and is a member of the ANC Future Acousticians Group and the ANC Sports and Leisure Noise Working Group.

Anne has previously been Secretary of IOA London Branch, member of and Early Careers Representative on IOA Council, Secretary of the Building Acoustics Group, member of the IOA Women and Families Working Group, member of IOA Scottish Branch committee, has led consultations and drafted responses on behalf of the IOA and has taken an active role in the organisation of IOA conferences and meetings. She is currently a member of the IOA Parliamentary Liaison Group representing Scotland and continues to volunteer in STEM-related activities on behalf of the IOA promoting acoustics wherever she can.

13 Josie Nixon (MIOA), Principal Acoustic Consultant at HA-Acoustics, former Chair of the IOA Early Careers Group, Secretary of the IOA Eastern Branch and member of the IOA Bursary panel. Josie's enthusiasm for supporting people at the beginning of their career in acoustics has undoubtedly helped many budding acousticians. She mainly works in environmental acoustics and her proudest achievement is the diversity of her past projects. Whether undertaking a foundry noise at work survey, monitoring music festivals, producing noise impact assessments to support planning applications or UKAS sound insulation testing.

14 Bridget Shield (MBE FASA HonFIOA), Emerita Professor of Acoustics at London South Bank University and the first woman President of the IOA (2012-2014). Bridget was one of just a few women members when she joined the IOA. After serving on several IOA committees she became its first female Council member, first female Fellow, and first female Honorary Fellow. In 2021 she was awarded an MBE in the Queen's Birthday Honours for her 'services to Acoustic Science and to inclusion in Science and Engineering'.

Professor Shield retired from London South Bank University after 30 years during which time she co-founded the national Women in Engineering Centre at the University and was course director of the MSc in Environmental and Architectural Acoustics.

Bridget's research interests included railway noise, concert hall acoustics, hospital noise and the social and economic costs of hearing loss in Europe. Her major research activity for 20 years, in collaboration with Professor Julie Dockrell of the Institute of Education, focused on the effects of noise and poor acoustics on children and teachers in primary and secondary schools. In 2003 she was appointed by the Department for Education and Employment as editor of Building Bulletin 93 (BB93), which contains the acoustic performance specifications for schools. Bridget has taken an active role in increasing public understanding of science and has prided herself on being a role model for women, promoting women, diversity and inclusivity in acoustics throughout her career.

Professor Shield's work has attracted major national and international accolades; she was elected as an Honorary Fellow of the IOA and awarded the Institute's RWB Stephens Medal. She also received the UK Noise Abatement Society's Lifetime Achievement Award and was awarded a Fellowship from the Acoustical Society of America. P22

15 **Sarah Huskie** (MIOA), Managing Director of CDM Stravitec UK. She is a member of the IOA EDI working group and one of the judges of the ANC awards. She was also the Secretary of the Middle East Branch of the IOA and has led teams in the UK, the Middle East and Asia Pacific, working on projects such as the Marina Bay Sands in Singapore. She has a personal interest in health and fitness, which fits amazingly well in her daily work.

16 **Abigail Bristow** (FIOA), Professor of Civil and Environmental Engineering at the University of Surrey, Fellow of the Royal Society of the Arts and the Chartered Institution of Highways and Transportation, and currently a co-investigator for UKAN+. Abigail has extensive experience in research in the areas of transport management and policy, most notably appraisal of the environmental effects of transport with particular focus on noise and climate change.

17 **Sue Bird** (MBE CEng FIOA) has been a member of the IOA since its foundation. She has been the President of the Women's Engineering Society (WES) twice and helped set up the International Network of Women Engineers and Scientists (INWES) where she was President for three years. She was granted an MBE for 'Services to engineering and to women into engineering both in the UK and abroad' and awarded the Elizabeth Hardwich medal of WES. In 1992 she was part of the government working group which produced the report 'The Rising Tide ' concerning women in STEM.

Sue served as Chair and later President of the Association of Noise Consultants and as the senior examiner for the registration scheme for 10 years. She is also named as an Honorary Member of the ANC. She initiated the CPD committee at the IOA, and is still working on this, helping to assess members' records.

She has worked in the aircraft industry, in local government, and for 22 years as a partner in Bird Acoustics. Even though she is retired, she is still a very active part of the acoustics industry, volunteering her time as Chair of Judges of the ANC awards and on the IOA CPD committee.

18 **Reena Mahtani** (FIOA FWES IEng), Principal Consultant at Stantec UK. She is a Trustee and Council member of the IOA, the Chair of the Bursary Fund, the Secretary of the Southern Branch Committee and a member of the Sustainability and Soundscapes working groups of the ANC. Reena has worked in projects both in the UK and Singapore and has an interest on making the acoustics industry more inclusive and welcoming.

Out of shot: **Louise Beamish** (MIOA), Director of Acoustics at WSP and board member and current Chair of the ANC. Louise has led several industry groups and committees, such as the IOA London Branch, the ANC Marketing Committee, was Chair of the Trailblazer Group for the Environmental Practitioner Degree Apprenticeship and she established the IOA Early Careers Group. She has been able to bring her passion for championing women in STEM careers, as well as her enthusiasm for industry-wide collaboration and innovation, and continues to have a positive influence on the acoustics industry through her role at the ANC.

What an incredible bunch, between them committing huge amounts of time and effort into helping the acoustics profession, both technically and in terms of governance and leadership.

There are, of course, many awe-inspiring women in acoustics who were not at the dinner, and there are many other groups of members that could be written about. We would love to hear more about our diverse membership so please submit an article to the IOA or a post for the EDI blog (**diversity@ioa.org.uk**) if you would like to raise awareness of other members.

Dennis is retiring

No sooner has the IOA recovered after the retirement of Linda Canty just before last Christmas, it now learns that Dennis Baylis who started selling advertising for the IOA 23 years ago, has also decided to retire.

Dennis Bayliss, committed Acoustics Bulletin fan

Dennis came relatively late to acoustics when he was 24, prior to that he worked for the Radiological Protection Service, then moved to the noise section of the highways department at Surrey County Council.

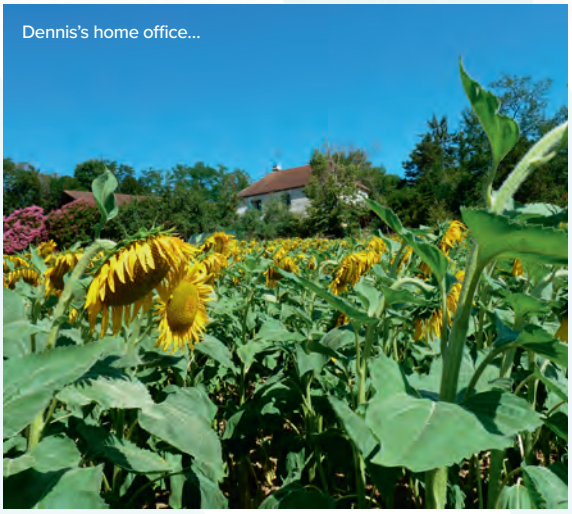
Here, he surveyed noise generated by road traffic as the construction of the M25 drove through Surrey and, at the same time, threw in aircraft noise surveys as Gatwick and Heathrow airports both expanded. Mixed in was some work with local authorities on larger scale noise nuisance studies.

As his interest in acoustics grew, he completed his IOA Diploma studies at North East Surrey College of Technology (NESCOT) under the tutorage of Bob Peters. His first meeting with Bob though was prior to this at Twickenham Tech, in a series of evening classes on noise and vibration.

Dennis joined CEL Instruments in his mid-30s first as Area Sales Engineer, progressing to become UK Sales Manager. He then worked for Casella CEL as their Export Sales Manager.

In his early 50s, redundancy arrived, so ever-resourceful, Dennis contacted everyone he had worked with, including customers, competitors and colleagues, to look for part-time work which he could take to France with him. (Clearly, Dennis was an early pioneer of the working from home generation).

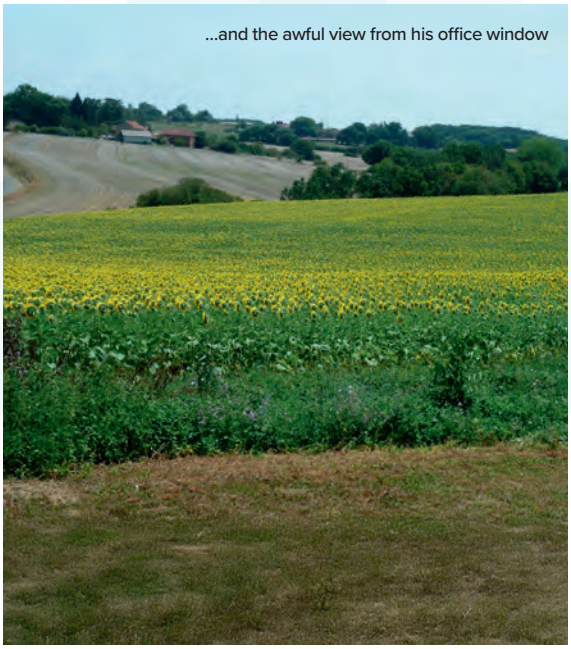
This brings us to 2002 when Dennis joined IOA as Advertising Manager. He credits Fiona Watson for this as she put his name forward for consideration and later told him that 'he had applied' for the post. Dennis said: "I was in France at the time on a (working) holiday and knew nothing about this until I received a message from home to arrange an interview date."


Dennis's home office...

So, to impending retirement and Dennis has plans galore. Living with his wife in a tiny village in the south of France, he could be forgiven for simply loafing about and venturing to the weekend market for cheese and wine but he has a list:

1. the potager (trying to keep the local wildlife from eating his vegetables);
2. house maintenance (old farmhouses are a bit like the Forth Bridge);
3. music (listening);
4. books (reading); and
5. cats (fulfilling their every wish).

Sounds blissful. Enjoy your retirement Dennis and do let us know when you are ready to receive a lot of visitors.


...and the awful view from his office window

Could you be our new ad manager?

This position is ideal for individuals with experience in acoustic sales who are well-acquainted with the industry. Offering flexible, part-time work, it suits those looking to reduce their working hours or transition into retirement. The role requires a commitment of approximately two days per week, with compensation structured at a 25% commission rate. Leveraging the Institute of Acoustics' esteemed industry reputation, the successful candidate can anticipate an on-target earning (OTE) of £30,000 or more annually, based on current advertising business – a figure poised to grow as we increasingly embrace digital platforms. This role is fully remote, eliminating the need to work from our Milton Keynes office.

Further details can be found in a detailed Jobs listing at https://www.ioa.org.uk/jobs-acoustics

Lottie Doll Tour 2024

The IOA celebrated Tomorrow's Engineers Week for the first time in 2023 by taking part in the Lottie Tour. The tour is a Women's Engineering Society (WES) initiative, to inspire young minds by showcasing the diverse world of engineering, or in our case, acoustics.

By Vicky Wills, IOA STEM Committee

In 2023 we sent Lottie to several of our members and they took pictures and made videos of the doll doing work experience in their workplace. We collected the pictures from Lottie's adventures, and through a series of compilation videos we showed that she was learning about the wide variety of careers in acoustics.

The Lottie Tour continued in 2024, with even more companies participating and sharing their experiences. Numerous organisations posted updates on social media, showcasing what Lottie got up to at their workplace and out on site or at events. The companies that posted included AECOM, Anderson Acoustics, AtkinsRéalis, CDM Stravitec, Christie & Grey, Create Consulting Engineers, HA Acoustics, Hann Tucker, Hoare Lea, L-Acoustics, Napier University, New Acoustics, RBA Acoustics, Sandy Brown, Stantec, Sustainable Acoustics, Vanguardia, UKHSA and WSP.

In 2024, the IOA took the initiative further by creating four engaging stop-motion animations featuring Lottie. These animations, designed to spark interest in careers in acoustics, creatively illustrate aspects of the field, from environmental noise control to architectural acoustics.

1. Types of Noise: This video showed the dolls being affected by noise from transportation, workplaces and nightclubs. It received 10 reposts and more than 550 views on LinkedIn. It had five reposts and more than 700 views on X. Additionally, Instagram had 145 views, TikTok 229 views and Facebook 102 views. See the video here: **https://tinyurl.com/Lottietypesofnoise**

2. Tackling Harmful Noise: This video featured the dolls discussing noise and its health effects. It garnered over 400 views and four reposts on LinkedIn. It had over 400 views on X and four reposts. Additionally, Instagram had 69 views, TikTok 219 views and Facebook 56 views. See the video here: **https://tinyurl.com/Lottieharmfulnoise**

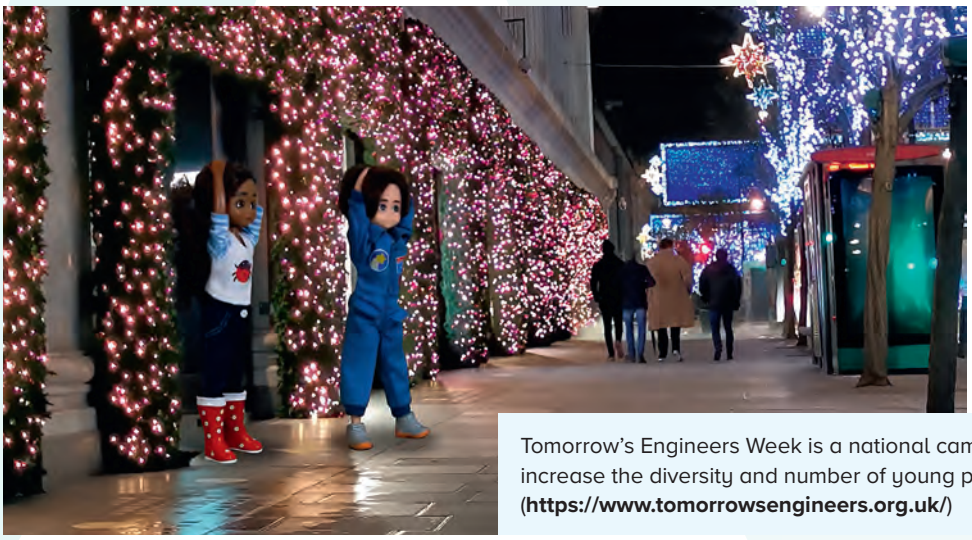
3. Standards in Controlling Noise: Focusing on different types of noise and what acousticians can do to help mitigate unwanted noise, this video was viewed almost 150 times and reposted once on LinkedIn, with almost 400 views and three reposts on X. Additionally, Instagram had 76 views, TikTok 216 views and Facebook 59 views. See the video here: **https://tinyurl.com/Lottiecontrollingnoise**

4. Underwater Sound: This video highlighted how sound acts differently in water and its impact on wildlife, as well as applications of underwater acoustics. It was viewed more than 250 times and reposted five times on LinkedIn. It was viewed more than 500 times on X and reposted three times. Additionally, Instagram had 132 views, TikTok 223 views and Facebook 54 views. See the video here: **https://tinyurl.com/Lottieunderwatersound**

All four videos linked back to careers in acoustics, emphasising the exciting opportunities in this field.

The videos will be reused for the 2025 campaign and will become part of the content for the new public section of the IOA website, which is likely to be launched in 2026.

We are incredibly proud of how the industry has come together to promote this initiative and, along with the other work that the IOA is doing on STEM, we hope we are paving the way for the next generation of acousticians.



Below:
A still from the *Types of Noise video*, with two Lottie dolls covering their ears after a night of clubbing

Tomorrow's Engineers Week is a national campaign run by Engineering UK to increase the diversity and number of young people entering engineering careers. (**https://www.tomorrowsengineers.org.uk/**)

New guidance launched to support compliance with Approved Document O

The Association of Noise Consultants and the IOA have partnered to deliver a comprehensive guide to raise wider awareness of acoustics in relation to Approved Document O.

The 38-page *Approved Document O Noise Guide* lays out the requirements set down in the Building Regulations, focusing on overheating mitigation in new residential buildings.

A working group of industry experts from the ANC and IOA has worked on the advice, which sets out a method to demonstrate compliance to the Building Control Body of the noise constraints in Approved Document O.

It supersedes the *Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O*, which was a draft for consultation.

In the latest document, the statutory guidance relevant to the industry in Approved Document O is explained and the authors have focused on overheating mitigation using methods such as opening windows, ventilation louvres in external walls, mechanical ventilation and mechanical cooling systems.

Louise Beamish, Chair of the ANC, said: "This guide sets out a method to demonstrate compliance to the Building Control Body of the noise constraints in Approved Document O.

"It aims to provide clarity for practitioners and regulators so that assessments can be carried out consistently, and the outcome is repeatable and reliable."

Chair of the Working Group, James Healey added: "Meeting the requirements of Approved Document O has been a challenge for developers, particularly from a design coordination perspective and due to varied interpretations of the approach, which affect the route to compliance.

"This latest guide offers an extensive evaluation of all the methods available to developers of residential properties, with contributions from the principal authors of the Acoustics, Ventilation and Overheating Guide.

"It provides guidance for practitioners to appropriately implement the requirements of Approved Document O, assists the industry in the understanding of what is published in the regulation and uses award-winning research to provide an approach that uses one language form for both acousticians and thermal modellers to increase coordination.

"Whilst the requirements of Approved Document O are succinct, there is some ambiguity regarding important details. Some of these have been addressed in this new guide, which provides interpretation and clarification on content within a published regulation."

The guide is available for free download at **https://www.association-of-noise-consultants.co.uk/approved-document-o-noise-guide/**

Acoustic biodiversity monitoring with hopping robots

Understanding how animals are distributed cross our planet, how they move and how they behave is essential if we are to protect biodiversity in the face of increasing human pressures. However, in practice, collecting insightful monitoring data at meaningful scales and resolutions remains extremely challenging.

By Sarab S. Sethi, lecturer in ecosystem sensing, Department of Life Sciences / I-X, Imperial College London

Traditional approaches to collecting biodiversity data rely on manual surveys conducted by trained experts. For example, in a bird point count an ornithologist will stand at a site of interest and record every single bird that they see or hear over a fixed period. Whilst data quality can be exceptional (e.g. identifying sex, age, or breeding stage is possible), the slow speed and high cost of surveys very quickly becomes a major barrier to scalability.

Acoustic monitoring has recently seen a surge in popularity as a scalable alternative to surveying animals in the wild. Inexpensive audio recorders are deployed to capture natural soundscapes from sites of interest over weeks and months. Audio is then analysed with machine learning algorithms to identify species from their vocalisations (e.g. birds by their calls and songs) or other unique acoustic cues (e.g. mosquitos by their buzzing frequencies).

Still, whilst recorders themselves can be cheap, deploying, maintaining and retrieving them can become prohibitively expensive and time-consuming when species need to be monitored on landscape scales or over extended time periods.

Drones on the hop

In a pilot project funded by the UK Acoustics Network (UKAN+), Dr Peggy Bevan led explorations into whether autonomous robots (e.g. drones) carrying acoustic sensors might be able to transform the scale at which we can monitor biodiversity.

Using a vast dataset of audio recorded from ~300 sites across tropical rainforests and agricultural lands on the Osa Peninsula, Costa Rica, we simulated autonomous drones hopping between sampling sites recording an hour of audio at a time. Whilst the original dataset had complete temporal data coverage at each site, our simulated drones could only record short snippets of audio while they briefly landed at a sampling site.

We found that even when simulating very lightweight sampling networks (e.g. one drone per five-10 sites), we could reconstruct previously published patterns in bird biodiversity and spider monkey occupancy across the region. We also found that adaptive sampling – using real-time data to inform which site the drone visited next – improved the reliability of our downstream biodiversity data.

Above:
Drones carrying acoustic sensors might be able to transform the scale at which we can monitor biodiversity

Reducing costs and increasing scalability

In other research from our group at Imperial (the Ecosystem Sensing Group) and collaborators across Europe, we are developing technologies that will make autonomous biodiversity sensing systems of this type a reality. For example, Mili Ostojic is developing an autonomous drone that can navigate through complex natural environments and Dr Clementine Boutry and Javad Bathaei at TU Delft are developing fully biodegradable sensors that could be deployed from robotic platforms of this kind.

More engineering research and development work certainly remains before robotic sampling systems reach full maturity and are available at reasonable price points. Nevertheless, our research has paved a clear pathway for autonomous robotic platforms to deliver reliable and impactful data whilst reducing costs and increasing scalability of biodiversity surveys in the future.

Above:
Collaborators throughout Europe are developing technologies that will make autonomous biodiversity sensing systems a reality

Nicola and George of SRL Technical Services Limited giving the game away with their tools of the trade

Guess my job

Heulwen Peters reports on her company's visit to Thomas Gainsborough School last November to take part in a career's activity day, *What's my job?*

By Heulwen Peters, SRL Technical Services Limited

SRL were among several local companies who offered to take part in the careers day with local business people who have 'unusual' jobs, including a drag artist, magician, architect, work coach, tackler, fire officer and a physiotherapist. The aim of the game was for the Year 7 pupils to ask probing questions to help them guess the visitors' jobs based on the tools they brought with them and the answers they gave.

Nicola and George went from class to class over the course of the day, armed with various 'tools of the trade', and the pupils, aged between 11 and 12, had up to 15 minutes to try and find out what we do at SRL.

Some questions a bit more random than others

Initial guesses for their roles included DJs, reporters and bomb disposal experts (must have been the peli-cases!). However, with the help of the tapping machine, a speaker, some ear defenders and a sound level meter, Nicola and George were eventually revealed as acoustic consultants.

The pupils then asked Nicola and George some very insightful questions about what they liked about being acoustic consultants, what a typical working day looks like, and what subjects and skills they should study if they were interested in following a similar career path.

However, the favourite question of the day, which was also the final question when the children were itching to get out of the classroom and go for lunch, was "What are your names, because we think you look like Kevin and Linda..."

Continuing support for schools

SRL, Thomas Gainsborough School and various other local primary and secondary schools have been working together showcasing acoustic consultancy as a career since 2018, and Nicola and George look forward to being invited back next year, perhaps with some more 'out there' acoustician props to make it even more challenging.

Left: George facing questions at Thomas Gainsborough School

The IOA Bursary Fund update

In this issue the Bursary Fund update includes the experience of an applicant that was awarded funding back in February 2024. Alessia Frescura shares her experience attending the joint Symposium of the International Council for Traditional Music Study Group on Applied Ethnomusicology and Sacred and Spiritual Sounds and Practices in Istanbul last October. She went to the conference to learn more about how ancient sound healing practises can be applied to health spaces in the UK. Read her account below.

By Reena Mahtani FIOA, Chair of the Bursary Fund

By the time this issue of Acoustics Bulletin reaches you, we will be reviewing the Bursary Fund applications received during the winter round, but the spring round will be open for applications from 1 April 2025. The application form is available on the IOA website, under the 'can we help' header. If you or someone you know could benefit from financial assistance from the Institute, please consider applying. The programme is open to any member of the Institute, including students.

When preparing the application, please pay careful consideration to the personal statement. The review panel needs to understand the circumstances of the applicant, why the Institute should fund the activity and if other means of funding such as a university or research centre have been considered. There is more information about the application process on the website, and if you have any questions, please feel free to email us at **ioa@ioa.org.uk**

Good luck!

Alessia Frescura profile

Supported by the IOA Bursary Fund, Alessia Frescura flew to Türkiye in October 2024 on a mission to learn more about the interaction between sound, healing and spaces. It has had a significant impact on the direction that her future career path is likely to take.

Above: The Sultan Bayezid II Complex and Health Museum

I attended the joint symposium of the International Council for Traditional Music and Dance (ICTM) Study Group on Applied Ethnomusicology and the ICTM Sacred and Spiritual Sounds and Practices Study Group, held at Istanbul University.

This opportunity, combined with a visit to the Sultan Bayezid ll Complex and Health Museum in Edirne, where patients were historically treated with sound and music, provided invaluable insights into my ongoing investigation on how the acoustic design of a space can enhance its healing capacity.

Istanbul's legacy as a cultural and spiritual crossroads over the past two millennia made it an unparalleled location to host a symposium on applied ethnomusicology and sacred and spiritual sounds and practices. The Study Group on Applied Ethnomusicology, founded in 2007, focuses on how ethnomusicological research can benefit communities and societies beyond a purely academic intent. In contrast, the Study Group on Sacred and Spiritual Sounds and Practices is relatively new and it explores sound, music and practices related broadly to sacred belief systems, religious and spiritual doctrines, and their expression worldwide. The gathering took

P30

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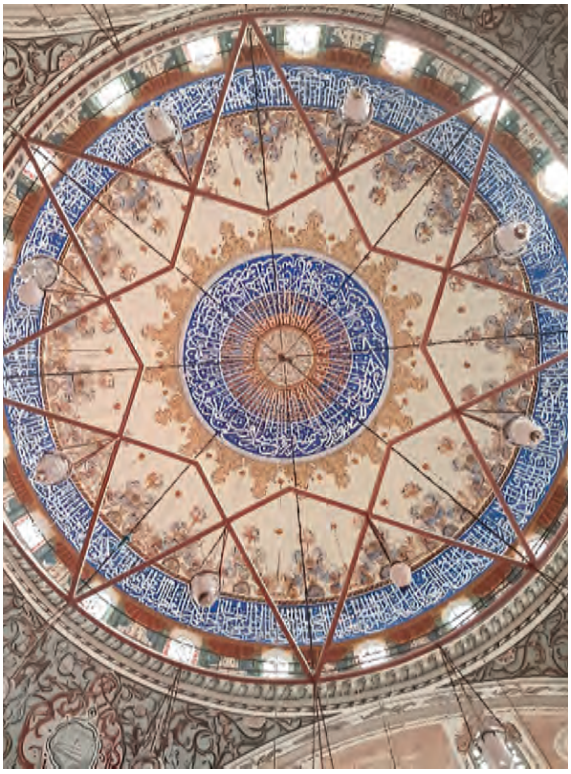
place in the historical courtyard of an 18th century Ottoman School – nowadays Institute of Turkology – and encompassed five days of dialogues between the two circles, featuring presentations, panels, workshops, concerts and performances. The presentations explored a wide variety of topics including, among others, the preservation of sacred sounds practices, identity, AI and digitalisation of music and sacred rituals, decolonisation of indigenous cultures, sacred and spiritual soundscapes, sound worlds, spaces and community wellbeing. The panel discussions revolved around interdisciplinary approaches in the study of Alevi practices, transmission methods in Âşik music, and key principles of applied ethnomusicology in working with communities after human conflict and natural disasters.

Throughout the event, the workshop *Rebuilding Beyond Bricks* addressed the increased awareness of the role of (and research on) music projects after major disruptions of communities. Additionally, a rich series of evening events included the concert *Harmonies for a Broken Earth* and visit two lodges, the Erikli Baba (Alevi Bektashi) Lodge, and the Karagümrük Cerrahi Lodge for participating in cem and zikr worship rituals. Although the daily programme was intense, its thoughtful curation allowed it to flow lightly and hold space to cultivate a beautiful and vibrant atmosphere of connection and exchange among the delegates.

Right:
At the entrance of the darüşşifa, the fountain is positioned at the centre of the main area under a vast dome to diffuse the sound of water

Below:
The dome in the mosque at the Sultan Bayezid II Complex



The symposium provided a wonderful opportunity to raise questions about the role of acoustics within these disciplines and gather brilliant insights on specific research directions for the investigation of sacred and spiritual sounds, belief systems and healing spaces. Additionally, it provided a unique chance to explore new methodologies and approaches for documentation and research dissemination. During those days I explored fascinating studies ranging from sacred chant and recitation of the Tibetan Yungdrung Bön tradition, to Indian sacred sounds of Malabar. I discovered the beautiful sound of Bulgarian cast mumming bells, Ukrainian Bandura, and Afghan Rebab. I was refreshed by all the dialogues, visions and new perspectives on how sound has not only been a medium of expression but also a profound tool for healing individuals and communities across the world.

During my stay, I visited the library of the Orient-Institut Istanbul, a research institute within the network of the Max Weber foundation, occupied with a variety of different research areas including music in the Ottoman Empire and Türkiye. The library research collection includes a wide variety of literature in English, which allowed me to consult few acoustic-related items, mainly on Islamic architecture, and access some material to integrate lessons learned during the symposium.

The second part of my journey took me to Edirne, which is near the border with Greece and Bulgaria to the Sultan Bayezid II Complex, serving today as P32

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the Health Museum. The complex opened in 1488 and comprises several buildings including the darüşşifa (hospital), the tip medresesi (medical school) and a mosque, all surrounded by gardens. As a Turkish musicologist explained to me, sifahane-s (healing place-s) – also known as darüşşifa-s – a centuries old practice. These places offered medical care and emotional treatments relying on music and scents tailored for the recovery of patients dealing with mental health conditions. Şifahanes, many of which are still in place scattered in Anatolia, were passed down from the Seljuks, who came before the Ottomans, together with historical documents and manuscripts that state which makam (tonality) is beneficial for which part of the body or illness. In these places, the sound of water was also used for treatment purposes and a small fountain can be seen still today standing at the centre of the Edirne Darüşşifa under a vast reflective dome. Below the dome, the hospital plan is hexagonal, comprising six winter and summer bedrooms, directly connected to the central area where the musicians' stage stands around the fountain. According to archival material, musicians went to the hospital three times a week to perform. The tonalities, its duration and the time of the day at which they were delivered were defined based on the specific psychological and physiological effects they evoked, aiming at helping patients' recovery.

When visiting Sultan Bayezid II Complex it is evident that acoustics was a key sensory departure point for the design of all its spaces, not only the ones intended for healing; intimate carpeted rooms with low domed ceilings for studying and learning can be seen in the medical school, vast volume and geometry of the mosque help create a contemplative atmosphere for praying and reflection, gardens blend diffused sounds from birdsong, footsteps and murmur of fountains to connect the various areas. In fact, the complex exemplifies a remarkable multisensory congruency by integrating acoustics with multimodal design aspects including sight, smell and touch, facilitating a sense of restoration and wellbeing for contemporary visitors as well. This visit marked the first time I saw careful consideration of acoustics put into practice in an existing healthcare context. I left Edirne pondering whether a future could emerge where the integration of sound, space and multisensorial aspects could become a central focus in healthcare design, transforming clinical spaces into fully functional and beautiful environments, able to promote healing and wellbeing on multiple levels.

This journey represented a pivotal moment in my academic and professional development because it integrated the work I have been conducting over the past year investigating the role of acoustics in sacred spaces and the interplay between sacred and spiritual sounds and beliefs in the facilitation of healing experiences. It also provided a unique platform for intellectual exchange and collaboration. Engaging with a diverse community of researchers and practitioners allowed me to establish meaningful connections with scholars who also shared an interest in incorporating acoustics and architecture discourses into their work. These interactions enriched my perspective, broadened my methodological toolkit and inspired new approaches for the exploration of the role of sacred sounds in healing spaces. Moreover, the visit to the Sultan Bayezid II Complex in Edirne offered an invaluable historical context to my research, reaffirming the potential of acoustics and multisensorial design in healthcare environments.

I thank the IOA for their financial support and willingness to help me in establishing an independent identity as investigator.

Below: Symposium delegates at the Orient-Institut, Istanbul

Tomorrow belongs to those who can hear it coming

Ruth Moslin recently achieved a first class degree in audio engineering from the University of the Highlands and Islands in Scotland. For her research she wrote a paper on soundscapes and how they affect our creative, mental and ecological worlds. This is a shortened version (complete with sound effects).

By Ruth Moslin

***'Tomorrow belongs to those who can hear it coming'* – a phrase used by David Bowie to promote his 1977 album *Heroes*.**

Although Bowie was most likely referring to the fluctuating political and fashionable trends prevalent at the time, the phrase has since been used in discussions relating to the earth's sonic landscape and it's ever-changing biophonic, geophonic and anthrophonic soundscapes.

The first known audio recording of a biophonic non-human source was captured on the earliest available commercial recording device, the wax phonograph cylinder. Frankfurt born, Ludwig Koch, caught the song of a captive shama bird in 1889 and while this is an impressive achievement alone, Koch was only eight years-old at the time. Since then, birdsong has been used in extraordinary ways as both artwork and in healing practices. (Listen here **https://www.bbc.co.uk/sounds/play/b00jn4m2**)

Birdsong

Combining human sound and the environment in 2015, Robin Perkins released the album *A guide to the birdsong of South America* which contains calls from endangered birds across the continent to raise money for non-profit organisations. While birdcalls vary through species, they are known to be beneficial to mental health, but setting aside the pig-like grunt from the Atlantic puffin, why do humans find birdsong so calming?

Birdsong falls within the frequencies known as the 'sweet spot range for human hearing' (1,000Hz-8,000Hz). Electroencephalography (EEG) measures brain waves and is broken up in to gamma, beta, alpha, delta and theta frequency bands, which fall within our sweet spot range. Theta waves have been shown to be strongly present during internal focus activities, such as meditation and relaxation – possibly providing the insight into why birdsong is used so widely for therapeutic uses.

Below: Setting aside the 'pig-like grunt' of the Atlantic puffin, humans find birdsong calming

These days recorded birdsong is not just found in relaxing Spotify playlists or BBC's Springwatch. Alder Hey Children's Hospital in Liverpool has played birdsong in its corridors since 2010, the recordings, which were captured at a nearby park, are seen to uplift spirits and boost relaxation. A similar concept can be found in Amsterdam's Schiphol Airport where birdsong recordings are used in lounges to promote relaxation before flights. (Listen to birdsong therapy here **https://www.birdnote.org/podcasts/birdnote-daily/birdsong-therapy**) P34

However, unlike Ludwig Koch's shama recording, the most mesmerising bird song will not be recorded from those in captivity – so what is the best way to capture these sounds? Paying homage to the Heinrich Hertz 1888 parabolic antenna, the parabolic shield has it's uses for birdcall recording, its concave design, which gathers sound into a focal point can be paired with an omni-directional microphone that provides the ability to capture the very best of dawn choruses. In his book, *The Singing Life of Birds*, ornithologist Donald Kroodsma compares the parabolic shield and shotgun microphone for their qualities in bird call recording. Kroodsma suggests that the parabolic microphone is far more capable of capturing soft and distant sounds, however, it doesn't capture the birds as heard by the human ear, such as that of a quasi-binaural microphone set up. Although the parabolic microphone covers a much larger area than that of a shotgun, the shotgun manages to capture more echo and uncertain sounds – making birdsong sound a little 'smudgy'. Despite the disadvantages they pose on recording birdsong, shotgun mic's are better at capturing low frequency sounds and are used for recording outdoor sounds such as psithurism (the sound of wind blowing through trees), which brings us neatly to the next sonic attribute – geophony.

Geophony

Geophonic sounds describe any sound created by nature, reminding us how powerful the earth can be and how it is continuously on the move. In 2020, the sounds of the melting Kongsvegan glacier in Norwegian archipelago, Svalbard, were recorded by researcher, Ugo Nanni[1], using a seismometer, where the frequencies recorded fell between 1-100hz. These infrasonic recordings were processed to be audible and contained the constant sound of cracking ice around the melting glacier, despite its visual stillness.

According a 2021 study by Noise & Health[2], low frequency sounds can be dangerous to humans. The study concluded that within one hour of exposure to infrasonic sounds of more than 100 dB, there is interference with the human cardiac muscle, increased nausea and sleep disorders in participants.

London's Gatwick airport is home to the largest soundscape installation that incorporates geophonic sounds – *A Living River*. Using over 60,000 meters of speaker cable, the installation contains a series of hydrophone recordings captured along China's Yangtze river that plays to those walking along Skybridge, the 180m-long airport corridor, the installation is supported by WWF who also promote alternative methods of travel over aeroplanes to cut aviation pollution and aircraft noise. Listen here: **https://www.dandad.org/awards/professional/2016/branding/25407/living-river/**

Under water

In 1490, Leonardo Di Vinci was credited for the first noted evidence that sound travels under water. One of the most influential uses of a piezoelectric hydrophone dates back as far as World War I when Canadian inventor, Reginald Fessenden, used a hydrophone in 1914 to detect an iceberg in the hope of avoiding a repeat of the Titanic disaster two years prior. Further developments using hydrophones include arrays where several are placed across the ocean floor to record data. This method has uses for recording the position of marine life and has been modernised by the US navy who tow a hydrophone line array behind ships to locate enemy submarine positions.

Forming a creative use, the muti-platinum album, *Songs of the Humpback Whale* (1970) by Roger Payne showed that whales could sing and communicate in rhythm. Payne's album is the most successful nature recording of all time and kick-started the *Save the Whales* movement, which eventually led to the banning of commercial whale hunting in 1986. More recently in 2023, James Crutchfield developed a hydroambiphone – a 3D underwater audio recorder which he used to record humpback whales in Alaska.

Below: Songs of the Humpback Whale (1970) by Roger Payne showed that whales could sing and communicate in rhythm

References

1 **https://edm.com/lifestyle/ambient-glacier-sounds-climate-change-effects**

2 **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8411947/#:~:text=Exposure%20to%20high%20levels%20of,as%20one%20hour%20after%20exposure**

Continuous research into anthropocene soundscapes on marine life has been studied due to the qualities of hydrophones recording. The EU set limits on underwater noise pollution, so since March 2024, no more than 20% of a marine area can be exposed to continuous underwater noise during a given year and no more than 20% of a marine habitat can be exposed to impulsive noise over one day – an incredible step forward given the EU's continuous and expanding shipping traffic.

Archeoacoustics

The combination of archaeology and acoustics (archaeoacoustics) uncovered large granite rocks known as gong rocks in the Serengeti National Park in Tanzania, believed to date back as far as the middle-ages. Similarly, 'The Ringing Stone' in Tiree, Scotland is thought to have arrived from the Isle of Rùm during the last ice age. These carved and decorated rocks are lithophones and when hit with a stone produce sounds believed to have been a form of communication for gathering people, warning signals and rituals. Listen to the gong rocks here **https://tinyurl.com/gongrock**

Sound anthropologist, Iégor Reznikoff, studied sound within painted caves and rocks and found that areas with a higher resonation rate generally contained more paintings dating back to the palaeolithic period, providing evidence that they were used as very early amphitheatres. Today, a more contemporary use of these resonating caves is found inside the Luray Caverns in Virginia, USA. An organ is fixed in place to vibrate the caves' stalactites and is now known as the largest musical instrument in the world. Listen here: **https://www.sonicwonders.org/great-stalacpipe-organ-usa/**

Urban landscapes

The best example of an anthrophonic soundscape is, of course, a city. In 1928, The Daily Mail recorded the urban soundscapes of London with the specific aim to highlight traffic noise. Five of those recordings were published on gramophone, played on BBC radio and almost instantly, officials in London took immediate action to minimise traffic noise by placing limitations on the use of car horns. Fast forward to 2020, these recordings were made available to visitors at the Museum of London[3] alongside updated recordings from the same locations to allow listeners compare (recognising that because of the pandemic the streets of London were significantly quieter at that time).

Lead by R Murray Schafer, the World Soundscape Project aimed to bring together research on the scientific, sociological and aesthetic aspects of the acoustic environment. *The Vancouver Soundscape* was one of the group's first releases in 1973 where listeners could be re-cast to late 1970's Vancouver with the recordings capturing the reality of a working industrial city. Two of the group's members, Barry Truax and Hildegard Westerkamp were involved in the 1996 re-issue of the project aiming to highlight the changes in Vancouver's soundscape over the years and provided an audible difference from the stereo Nagra analogue recorder used by the group for the first recordings.

Infrasonic sounds

Of course, another way to identify sound is to visually inspect the frequencies in audio signals from spectrogram software. By using spectrograms, bioacousticians have been able to research a range of mammals' infrasonic sounds, particularly those of elephants. Researchers at Cornell University's *Elephant Listening Project* estimate that because of elephants' infrasonic range humans can only hear around 40% of the animals' sounds. But by using acoustic arrays to record elephant calling, researchers have discovered that elephants have a four-octave frequency range, reaching between 27Hz and 470Hz – pretty handy when you are trying to reach your friend over six miles away. Creatively, spectrograms are also used as an artform. In late 90s a trend of artists 'hiding' spectrogram artwork in their music began, one of these was Cornish artist, Aphex Twin, whose track *Equation* was hiding his own face at the end of the track using a spectrum of frequencies, of course it could be argued that animal calls are a lot more pleasing to listen to! Listen here: **https://www.youtube.com/watch?v=M9xMuPWAZW8**

Biophilia

There is now evidence that humans find that biophonic and geophonic sounds more relaxing than anthropogenic sound. Naturalist Dr Edward Wilson, used the term 'biophilia' to describe the tendency that humanity as a whole has to be drawn towards nature. Supporting his theory is the trend of shinrin-yoku (forest bathing) – a Japanese practice of surrounding oneself in nature. To test this, researchers for BBC series, *Forest 404*, immersed participants in sounds of rainforests, woodlands and coastal areas to record the psychological impact it had on them. Results recorded from the study in those who practiced it included lowered blood pressure, lower heart rate and a decrease in the stress hormone, cortisol – assisting the stress recovery and the attention restoration theories. In 2017, the University of Sussex exposed 17 participants to a series of natural and artificial sounds. During listening, functional magnetic resonance imaging (fMRI) scans were produced, allowing the researchers to have a visualised demonstration on the effects of natural sounds. The results showed improved internal focus, lowered blood pressure, decrease in the body's sympathetic response (flight or flight mode) and an increase in the body's parasympathetic response (relaxation).

Given that every soundscape has its own unique elements which create its sonic characteristics, it would be challenging to provide only one explanation as to why they provide us with the affects they do. Without a doubt one aspect is for certain – as urbanisation grows rapidly and our natural surroundings change, this could well be an opportune time to capture our sonic landscape and map the continuous changes in our rapidly changing world.

References

3 **https://www.londonmuseum.org.uk/blog/recording-londons-soundscapes-past-present/**

Reproduced Sound 2024

The Reproduced Sound 2024 conference and exhibition was held last November in Bristol. The conference represents the cutting edge of modern audio and acoustics in an informal environment that allows consultants, manufacturers, contractors, end users, academics and students to mingle and share insights and information.

By Adam Hill


EAG Chair, Ludo Ausiello

Organisation of the conference was led by IOA Electroacoustics Group (EAG) Chair, Ludo Ausiello (University of Portsmouth, UK), supported by the 14 committee members and the IOA's Linda Canty. Complete audio-visual support was coordinated by EAG committee members, Adam Hockley and Andrew Horsburgh, along with student assistant, Jamie, from dBs Institute of Sound & Digital Technologies, Bristol.
d&b audiotechnik have generously provided technical support for Reproduced Sound for many years, to the great benefit of the conference.

The conference was held at the Bristol Hotel where there were around 60 delegates, representing a healthy balance between industry and academia.

Pre-conference activities

Reproduced Sound (RS) often includes a special event the evening before it officially opens, consisting of a more informal talk and demonstration from members of industry or academia. The RS organising committee sourced several examples of classic analogue synthesisers and modern digital/hybrid clones for this year's Tuesday evening workshop. The session saw attendees discussing multiple synthesiser technologies from pure analogue, hybrid, to purely digital, and debated about timbre, soundwaves and perception while attempting measurements on various devices.

Conference day one

The first formal day of the 40th RS conference was launched by Ludo Ausiello, who welcomed delegates and thanked the technical team for their hard work preparing for the conference in order to deliver excellent audio and video support, something RS delegates have benefitted from for many years.

Awards

Peter Barnett Memorial Award – Keith Holland

The 2024 Peter Barnett Memorial Award recipient was long-time RS attendee and former IOA EAG Committee Chair, Keith Holland. IOA Past President, Alistair Sommerville, was on hand to present the award to Keith. Glenn Leembruggen read out the award citation citing Keith's inspirational work over many years covering a wide range of research topics, which has had a huge impact on electroacoustics, specifically on loudspeaker and studio design. P38

Below:
Keith Holland receiving the Peter Barnett Memorial Award 2024 from IOA Past President, Alistair Sommerville

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OSCAR acoustics

Keith's lecture, *Acoustics: inside out and back to front*, provided a fascinating overview of Keith's life in audio and acoustics, starting back in the 1960s when he built his first Hi-Fi. He progressed to working in live sound while studying at ISVR in the 1980s, where he began a long-term collaboration with Philip Newell in 1987, when Philip sponsored Keith's PhD.

Keith talked about how he spent a good deal of time during his career looking at acoustics problems including:

* acoustic reciprocity;
* acoustic inversion methods; and
* nonlinear horn modelling.

With this laid out, Keith went through a series of interesting and challenging projects he worked on, from noise control to jet engine noise analysis with Rolls Royce.

Keith's excellent teaching ability was on show, as he was able to explain what could be seen as complicated ideas in an easy to grasp manner, especially his treatment of Green's function at various points in the presentation by relating the mathematics directly to the real-world.

The talk was very well received by the delegates and there were numerous questions, largely focusing on analytical modelling and its limitations.

Below:
Jamie Angus-Whiteoak delivering her talk

SESSION ONE – Spatial audio 1 (Chair, Keith Holland)

Beyond the frame – textural realisation in cinema sound

The first paper of the conference was delivered by Sharon Coleclough from Staffordshire University. Sharon spoke of the importance of a nuanced and active sound design for film, ensuring audio is synced with all the other senses. She highlighted the usefulness of 'juicy audio' to provide positive feedback. This approach to sound design has already been implemented in her teaching, where her students are encouraged to play and experiment with their work.

And then it turned outside-in: new insights into spatial game audio

The next paper on spatial audio was delivered by Sharon's colleague, Mat Dalgleish from the Staffordshire University Games Institute. Mat spoke on a gradual move away from realism in game audio ('inside-out'), which was supported by a brief history of sound for games. Now there is perhaps a need to move back towards realism ('outside-in') to provide a better sense of closeness, which is integral to effective gameplay.

Demystifying crosstalk cancellation

The final paper of the session was delivered by Jacob Hollebon from Audioscenic. Jacob began his talk with a general explanation of how crosstalk cancellation works, highlighting the issues with half wavelength propagation path differences between sources. In his work, the approach isn't to tackle this problem head on, but to add more loudspeakers to decrease spacing between transducers. This allows for a lower direct to reverberant ratio, leading to shorter impulse responses for use within the crosstalk cancellation system. Results looked to be promising, where headtracking is used to maintain accurate localisation.

SESSION TWO – Transducers (Chair, Ludo Ausiello)

Looking at the ear as a compressed sensing system

The second paper session of the conference, on transducers, was kicked off by long-time RS contributor, Jamie Angus-Whiteoak. This year, Jamie talked about the ear as an optimised compressed sensing system, which takes advantage of signal sparsity. While audio signals are dense in the time domain, they are sparse in the frequency domain, which is effectively how our ears process incoming signals. In terms of sampling, this is governed by when our nerve fibres fire, which turns out have random spacing in time. This leads to the conclusion that the ear may be a front end for a compressive sensing system, taking advantage of sparse sampling, which should be explored with further research.

Iterative metric-based waveguide optimisation

Lewis Macdonald from Celestion delivered the second paper of the session, looking into a method for waveguide optimisation, specifically the new 'lensguide' technology. This is achieved through corrugations and thickness variations to control wave propagation through a device. The optimisation procedure uses a set of performance metrics within an iterative procedure. These metrics are stretch (corrugations) and thickness (seen area). While this provides extended high frequency control, it does result in higher manufacturing costs. Lewis concluded his talk with several example applications of this work, which prompted many enthusiastic questions and comments from the delegates. P40

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Tuning and performance evaluation for surface mounted audio haptic transducer systems
Stephen Oxnard, current Chair of the Audio Engineering Society UK Section, delivered the third paper of the session, which was a continuation of his research into surface mounted haptic systems. The focus of the work is on transparency of the audio tactile response. Essentially, the question is what makes a good system and how can this be quantified. Stephen detailed an experiment looking into how different participants affect the performance of the haptic system mounted to a seat. It was shown that there was a change in behaviour based on the person using the system. As before, it was shown to be clear that resonance reduction with parametric equalisation is very important.

Representation of directional loudspeakers in a finite element room acoustic
The final paper of the session was given by another RS regular, Patrick Macey. The focus of this work was on how to include a directional sound source within a room model. The traditional approach is to replace drivers with equivalent sources along with optimisation, which can be problematic in terms of accuracy. Patrick explained how this can be overcome by using spherical harmonics and then represent it as a point source on a sphere. A simple example was provided, although Patrick noted that for high frequencies, higher order spherical harmonics are needed.

SESSION THREE – Hearing health for audio and acoustics professionals (Chair, Adam Hill)

After his extremely interesting and engaging session on hearing health at RS 2023, Ian Wiggins from University of Nottingham, was invited back to lead a panel session to expand upon what he discussed the previous year. Before introducing the panel members, Ian provided a compact review of the human hearing system, how it works and how it can be damaged. Following this, he introduced the panel which included Philip Newell (consultant), Rob Shepheard (NHS), and Simon Lewis (consultant).

A focused discussion followed, first looking into hearing testing that is currently available. Philip explained that in the early 2000s, he discovered that he couldn't hear high frequencies as well as he once could and was also hearing certain elements of distortion, but this was not clearly picked up on standard audiometric tests. Rob agreed with this, saying that such tests are inadequate to assess all types of hearing loss – it's not enough. The next useful test, that is already given to newborn babies, is the otoacoustic emissions test (OAE), which measures the outer hair cells' function, providing an early indicator to hearing issues. Additionally, speech in noise testing can be useful to gauge the amount of 'hidden' hearing loss, which is common among audio professionals. Despite these additional tests, Rob expressed the need to develop better testing.

Simon, who was on the panel representing those with significant hearing loss, gave a brief description of his career in audio and acoustics, explaining that he had to develop coping mechanisms early on as he has relied on hearing aids his entire life. Critical listening with such devices is problematic due to the lack of control of the multi band compression and equalisation that is standard to most modern hearing aids.

Philip made clear that in this line of work, it is often difficult to avoid high sound levels and occupational regulations aren't designed to protect hearing in these situations. Rob commented that the campaign he's leading, *Listen For Life*, is specifically for the music industry, providing advocacy, education, hearing testing and information. OAE testing is set to roll out throughout the UK high street this year alongside easily available and affordable high quality hearing protection. This is set to spread beyond the UK with many other countries interested.

Ian concluded the session by thanking the panel and expressing a certain optimism that things are moving in the right direction around hearing health in our industry and it's encouraging to see this topic being more openly discussed than it was only a few years ago.

Below:
Hearing health for audio and acoustics professionals panel (L-R) Ian Wiggins, Philip Newell, Rob Shepheard, Simon Lewis

SESSION FOUR – Live sound and venues (Chair, Andy Horsburgh)

Enhanced sound level monitoring at live events using loudness meters
The first paper within the live sound and venues session was delivered by Jonathan Digby from the University of Derby. Jonathan detailed work carried out while working as a sound engineer at several large-scale events, where he found L_{Aeq}-based sound level limits difficult to work with when mixing a band because of the time lag in level data due to measurement averaging over anywhere between five minutes to one hour. In this research, Jonathan trialled the use of audio programme loudness meters that are used in the broadcast industry. Such a meter will monitor the electrical signal coming out of the mixing desk and calibrated to the acoustical output of the sound system to align with any limits in place. The three

different time frames in the loudness meter allows an engineer to create a dynamic mix and respond in real-time to any issues, all while complying with an imposed L_{Aeq} limit. He presented data gathered from a selection of recent events, showing how such an approach can benefit sound engineering practice.

How to shoot yourself in the foot with arrays of point-and-shoot loudspeakers

The final paper of the day was presented by Glenn Leembruggen, who is another regular at the conference. Glenn discussed a very practical approach to troubleshooting point source loudspeakers on various real-world installations. In one case study, it was revealed that the system showcased low intelligibility and was due to an inconsistent polar response of the point source cluster as well as a high reverberation time in the space. In this case, the angles of the loudspeakers couldn't be changed, but signal processing was available. Glenn's approach was to maximise the direct to reverberant ratio and to also add delay between units to increase the density of the comb filtering. This may seem a counterintuitive approach (applying further time offset to the system), but if done correctly, avoiding echoes, it can be quite effective. In the end, Glenn found an acceptable solution using 3ms of delay and seven all-pass filters, significantly increasing intelligibility.

Conference reception and dinner

Reproduced Sound's reception and dinner were held at the Mud Dock Cafe. Delegates enjoyed an evening of networking and catching up with each other. EAG Chair, Ludo Ausiello, once again brought his guitar (which we assume was appropriately optimised) to provide an enjoyable musical accompaniment for the evening.

Conference day two

The second day of RS 2024 began with a special presentation by IOA Past President, Alistair Sommerville. The occasion was the retirement of long-time IOA staff member, Linda Canty. Linda has worked for the IOA for 35 years, providing expert conference organisation with her usual calm and patient demeanour. Specifically, she has been instrumental in the planning and running of most RS conferences. Alistair expressed his sadness to see Linda retire and wished her all the best for the next chapter in her life. He presented Linda with a watch from the IOA and later, Keith Holland presented Linda with a card and voucher from the EAG. The presentation concluded with a rousing ovation from the attendees for Linda.

SESSION FIVE – Measurement (Chair, Bob Walker)

An internet of sounds-based method for acoustic profiling of rooms and audio spaces

The first paper of the second day was jointly presented by Izzy MacLaclan (Birmingham City University) and John Crawford (Ingenious Audio). The pair described an expansion on previous work on sonifying historic churches. In this case, a system was set up to take simultaneous wireless measurements using a closed WiFi network to improve overall workflow. A description was given of how the hardware works, with suggested future applications of the technology.

Characterisation of a resonating system by means of electrical impedance measurement

EAG Chair, Ludo Ausiello (University of Portsmouth) delivered the second paper in the session, which formed the next installment of his work looking into the optimisation of resonating systems, specifically acoustic guitars. Ludo described an affordable test setup to inspect impedance. Results indicated that the exciters did not impact the resonant behaviour of the device under test, so therefore shouldn't be treated as added mass. A lumped element model was used to confirm the impedance measurements, which provided a clear explanation for the multiple observed resonant peaks.

Measurements of multitone distortion in octave bands of a cinema-mixdown loudspeaker system

The final paper of this session was delivered by Glenn Leembruggen. For this paper, Glenn focused on an alternative method for measuring system distortion. Traditional THD measurement signals aren't like music, therefore he proposed using multitones, as they produce harmonic and inharmonic distortion and potentially serve as more rigorous test signals. In this case, the tones were split into octave bands to allow for easier identification. This was tested in a cinema with the results clearly presented. P42

Above: Stephen Oxnard delivering his talk

Above: Glenn Leembruggen delivering his presentation

SESSION SIX – Intelligibility (Chair, Paul Malpas)

Word score vs STI tests of a public address system in an underground train station platform

The final paper session before lunch was kicked off by Glenn Leembruggen, this time presenting a case study looking into the rescue of an underground train station's sound system. The focus was on improving intelligibility to an acceptable standard while not forgetting about the tonal balance – the system should still sound pleasing. The existing system was designed poorly, with inappropriate aiming and signal processing, operating in a poor acoustic environment. Reverberation time was identified as the major problem. While the STI test failed, a PB word test was used with the resulting word scores converted for direct comparison to STI. In this case, it was found that the system passed, allowing the station to open to the public.

Multi-channel audio processing for music therapy analysis

Continuing the session on intelligibility was Arina Epure (KU Leuven), who presented on the Unmuted Project, focused on new form of treatment for those with autism. She explained how room acoustics were addressed, using the appropriate standards, along with an onset detection algorithm, which was then tuned to allow a microphone array to monitor sessions in a non-intrusive manner. Early results from trials were presented, offering encouragement for this new approach.

Challenges in the assessment of spatial audio in automotive environments

The final paper of the morning was delivered by Bogdan Bacila (University of Southampton) and focused on various hurdles that need to be overcome when designing and conducting subjective assessments for automotive applications. Key challenges include suboptimal loudspeaker placement and highly reflective surfaces, which make for a poor listening environment. Additionally, there needs to be a way to access audio quality in such scenarios, something that the AES is looking into at the moment, with the key being a link between objective metrics and subjective impression. While in situ testing is best, this is often challenging. Bogdan therefore presented his current approach to running such tests, using a tablet for user interface, a camera for headtracking, and methods to eliminate visual bias.

EAG AGM

The annual general meeting of the Electroacoustics Group was held prior to lunch and was chaired by Ludo Ausiello. Ludo gave an overview of the activities of the group over the past year, the central focus being the organisation of this conference. He expressed thanks to the committee members for their efforts with the conference planning and specifically thanked Adam Hockley, Andy Horsburgh and the rest of the technical crew for their excellent support on the technical side of the conference delivery. Discussions were held regarding the current committee composition as well as the possibility for new members to join. A conversation was also held regarding the future location of Reproduced Sound, with some options identified.

Below: Delegates listening to the presentations

SESSION SEVEN – Spatial audio 2 (Chair, Keith Holland)

3D auralisation of wind turbine sound for VR

Day two's afternoon started with a paper by Dan Pope. Dan talked about a recent project concerning wind turbines, where he was tasked with auralising these for use in a VR application. The client brief made clear that a cost-effective solution was required. The solution used ambisonics recordings in typical conditions (which can be difficult to accurately capture). The resulting auralisation was used as part of a public consultation surrounding the replacement of an existing turbine with one with a quieter motor. Overall, the project was successful and the client was happy.

A subjective comparison of ambisonics rendered using virtual stereo microphone techniques

Bruce Wiggins from the University of Derby presented the second paper of the session which looked into different virtual stereo microphone techniques within an ambisonics system. This work was prompted by demand from the industry, where it was requested to decode to virtual stereo omni microphones. A series of tests, primarily relying on a multiple stimuli with hidden reference and anchor (MUSHRA) test, were used to judge the overall subjective quality of the resulting virtual microphone configurations. As could be expected, the results indicated that 'it depends' in terms of which stereo technique is best, but overall, it was proven that decoding to any arbitrary stereo microphone technique is possible within ambisonics.

Radial filter design for open spherical microphone arrays

The final paper of this session was presented by Nara Hahn (ISVR). Nara's work focuses on the use and optimisation of open space spherical arrays, as opposed to the more traditional rigid spherical arrays. The aims of the array optimisation were efficiency, accuracy and robustness, where there would be one IIR filter for each notch. Additionally, the magnitude response of each filter was limited to less than 40 dB to avoid excessive peaks. The array was tested virtually with time, frequency and spatial performance was evaluated for a beamforming application. The results appeared to be promising, with further work identified.

SESSION EIGHT – Diversity presentation and discussion (Chair, Mark Bailey)

Mark Bailey introduced the diversity session at the conference by noting that the conference is still falling short on diversity but there are signs of encouraging progress. Mark reminded delegates that the number one rule for all of this is to be kind. Mark handed over to James Hipperson (Funktion One), who gave a thought-provoking and engaging talk on neurodivergence. He noted that neurodivergence is quite often overlooked but should really be celebrated as it provides diversity of thought within groups. A recent study by the Institution of Engineering and Technology (IET) found that one in five of its members identified as neurodivergent, suggesting that it is much more common in the RS (and wider technical) community than in other areas. As with all items related to diversity and inclusion, it is important to adjust, as appropriate, to improve things for everyone. A lively discussion followed James's talk.

SESSION NINE – Signal processing (Chair, Ludo Ausiello)

Complex-valued neural networks for the reproduction of single frequency sound fields

The final paper session of RS started with a paper presentation from Issac Lambert (ISVR), which looked into the issue of spatial aliasing due to microphone grid spacing within wavefield synthesis systems. A convolutional neural network (CNN) was used to help in this area. In this work, the target sound field was compared to the results from both a multilayer perceptron (MLP) and least square error (LSE). All were in agreement at low frequencies, but there were noticeable differences at higher frequencies. Nonetheless, the approach was shown to be effective for single frequencies, but further work is required to inspect it under more complicated scenarios.

Above: Conference dinner at Mud Dock Café

Sound field analysis using a complex-valued neural network

The final paper of the conference was delivered by Vlad Paul (ISVR). In Vlad's work, the focus was similar to that of the previous presentation but focused on the reconstruction of a single plane wave. Again, a complex-valued multilayer perceptron (MLP) was used. Even under test conditions with increased aliasing and noise, the results were quite good.

Conference close

Reproduced Sound 2024 was formally closed by Ludo Ausiello, who expressed his gratitude to all the presenters, session chairs, committee members and, of course, to the IOA's Linda Canty for her years of service to the conference, wishing her a happy retirement. The papers were interesting and informative, resulting in a wonderful conference. He specifically thanked the technical crew from d&b audiotechnik and dBS, for their hard work throughout the event. We hope to see you all again in 2025 – bring your friends!

Below: Special presentation to Linda Canty on her retirement from the IOA

Popping balloons can be more harmful than it seems

It is hoped that research carried out at London South Bank University on popping latex air-filled balloons for whatever purpose, will influence expert panels, professional bodies and safety regulators to incorporate the new knowledge in relevant future standards, codes of practice and safety advisory labelling.

By Dr Luis Gomez-Agustina of London South Bank University

Bursting latex balloons filled with air is a convenient method widely employed by acousticians and researchers to generate high intensity impulse sound signals in room acoustics investigations (Figure1). This approach appears briefly in ISO 354:2003[1] as a potentially suitable impulse sound source for the determination of the room impulse response. The method is extensively employed in acoustic professional practice, education and acoustics research[2-7] due to its portability, convenience, low cost and other practical merits[8].

It is also a common activity performed at entertainment occasions and parties etc but owing to its harmless appearance, fun and leisure connotations, acoustic practitioners and lay users often inflate and burst air-filled party balloons unprotected and unsuspectingly, without being aware of the potential auditory risk that those bursts may have on their hearing health.

Below:
Figure 1: An air-filled balloon being popped during an acoustic survey

Rationale, aim and significance of the study

In addition to the intentional puncturing and subsequent bursting, balloons often pop accidentally or unexpectedly. The apparent high loudness and close proximity to the exploding balloon, suggests a potential risk of noise induced hearing loss (NIHL) or hearing damage could occur to the persons inflating, handling or holding and puncturing the balloon, as well as to anyone else present in the room.

The total absence of noise exposure, auditory risk information and lack of safety guidance or standardisation in the execution of the balloon burst method in the literature motivated the investigation into the subject. The potential irreversible hearing damage risk and the large population that can be affected added further motivation and significance to the study.

The study aimed to provide for the first time a comprehensive investigation to determine and assess the noise exposure and the risk of hearing damage from bursting air-filled latex balloons as utilised in room acoustics surveys, education and leisure activities.

Another aim was to raise awareness and educate acoustic

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practitioners, professional bodies, and lay users on the associated auditory risks.

Derived from its findings, the study provides novel and detailed guidance on safe procedures to be adopted during acoustic measurements or other purposes such as leisure activities.

Method and materials

The experimental method consisted of taking peak sound pressure level measurements at several distances from the bursts of manually punctured balloons previously inflated with air to the same inflation level. Three suitable hand-held acoustics analysers performed the measurements simulating unprotected human receivers being exposed to the balloon burst impulse sound (figure 2).

The test procedure replicated typical test procedures and practices employed by professional practitioners in room acoustics surveys while satisfying the relevant European Directive 2003/10/EC[9] and UK occupational Control of Noise Regulations 2005[10] test requirements.

To examine the effect of the balloon size, three common sizes of commercially available latex party balloons were used and named here in reference to their nominal inflated size measured at the equatorial line: small (23cm), large (38cm) and giant (91cm).

To evaluate the influence of the acoustic environment, three types of rooms of different dimensions, volume, shape, reverberation, absorption and diffusion properties were chosen (a home cinema, a hall of residence lounge and lecture theatre). The combination of the three variables (balloon types, exposure distances and rooms) generated 27 exposure scenarios. (In this article only results for the lecture theatre are shown.)

To investigate the effect of the distance between the burst and the receptor's ear, three measurement distances were used to represent the exposure distances of the person holding and puncturing the balloon at 0.5 metres (reference exposure distance, see figure 1) and of people present in the same room positioned at three metres and six metres from the burst.

Above:
Figure 2: Puncturing a large balloon at a distance during acoustic measurements in a lecture theatre

Three microphones were positioned at the three exposure distances and were connected to calibrated acoustic analysers to measure simultaneously at the three distances levels of L_{Cpeak} and L_{peak}.

Measured values were assessed against the limits specified by relevant international occupational noise regulations[9-11,12-14] to determine the level of exposure and the risk of hearing damage.

Based on the values measured and by means of calculation, other relevant information was obtained (presented elsewhere[15]) such as the unprotected critical distance, the predicted effect of hearing protection on exposure levels and of estimated exposure to multiple burst events. P46

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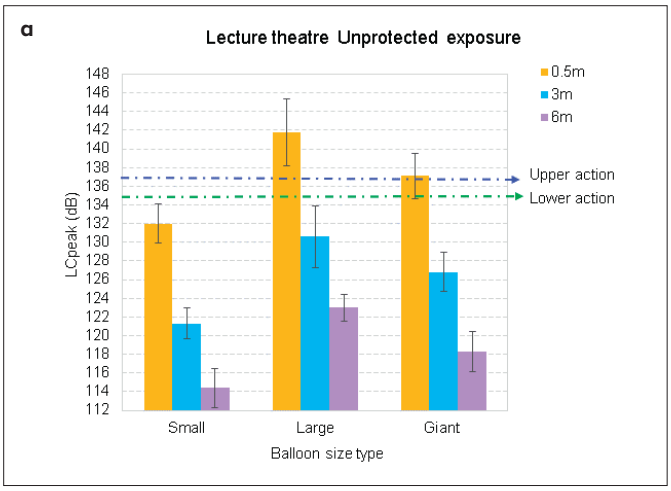

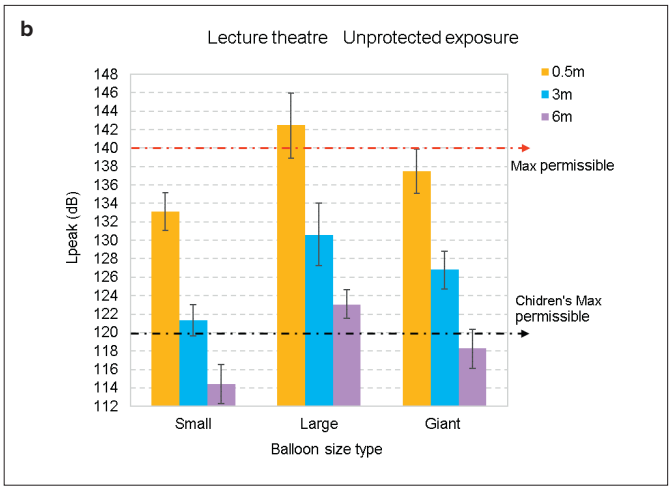

Results and analysis

Figure 3 presents balloon burst unprotected noise exposure levels measured in the lecture theatre at three exposure distances. Values shown are the average of 15 bursts of the same balloon size type and error bars denote the corresponding standard deviation (std).

Horizontal purple and green dotted arrows in figure 3a indicate the upper and lower L_{Cpeak} action levels respectively (L_{Cpeak}= 137 dB and L_{Cpeak}= 135 dB) for impulsive sound for the unprotected ear of the European Directive 2003/10/EC (noise)[9] and the UK Control of Noise at Work Regulations 2005 (Noise Regulations)[10].

Horizontal red dotted arrows in figure 3b indicate the USA and Canadian occupational health and safety agencies' maximum permissible limit (L_{peak}= 140 dB) for impulsive sound for the unprotected ear[11-13]. Black dotted arrows in figure 3b denotes the World Health Organization (WHO)[14] maximum permissible unprotected impulse noise exposure level for children (L_{peak} = 120 dB).

In figure 3a it can be seen that the large balloon and the giant balloons in the lecture theatre exceeded the Noise Regulations[10] upper action level at the reference exposure distance (0.5m) by 4.8 dB and 0.1 dB respectively. Reaching or surpassing any of the two action levels implies that a risk of hearing damage increases considerably[10].

Figure 3b shows that the large balloon in the lecture theatre surpassed at the reference exposure distance the maximum permissible impulse noise exposure level of the USA and Canadian occupational regulations[11-13] by 3 dB.

Considering the maximum permissible unprotected impulse noise exposure level for children, in figure 3b it shows that level was exceeded at the reference distance by the three balloon sizes between 13 dB and 23dB.

Above graphs: Figure 3: Unprotected exposure levels measured in the lecture room at three exposure distances for three different balloon size types. a) shows values of L_{Cpeak} and b) shows values of L_{peak}

Conclusions

Latex party balloons filled with air are widely used in a variety of activities. In acoustic research and professional practice, the burst of the balloon is employed as an impulse sound source to obtain room acoustic parameters.

Due to its presumed harmless appearance and leisure connotations, acoustic practitioners and lay users often inflate and pop balloons unprotected and unsuspectingly without being aware of the serious auditory risk that those bursts may entail to their hearing health.

This research investigates for the first time the noise exposure from popping air-filled latex balloons for a range of likely settings and assesses the risks of hearing damage against a range of relevant international occupational health regulations.

The bursts from two commonly used balloon sizes (large and giant) produced peak sound pressure levels at the ear of an unprotected person holding and puncturing the balloon that exceeded various international occupational health regulatory exposure limits.

According to various international occupational health and safety regulations that exceeded exposure from a single ballon burst found in this study constitutes a risk of permanent hearing damage.

Children's maximum unprotected permissible exposure limit was virtually exceeded by the large and giant balloon sizes at all exposure distances in all rooms.

Motivated from the concerning findings presented in this study, the authors propose the creation of an international normative to require a prominent safety warning label and/or basic safety instructions to accompany every balloon package as an effective and inexpensive measure to minimise risk of hearing damage from balloon bursts.

It is expected that the findings, insights and safety guidance generated in this study will raise awareness, change attitudes and practices of acoustic practitioners and general lay users. This consequently will reduce the risk of hearing damage and aid professionals to comply with applicable occupational health and safety regulations.

This article summarises research undertaken at London South Bank University and is based on a journal article published in *Applied Acoustics* entitled *Noise exposure and auditory risk from air-filled balloon bursts* authored by Dr Luis Gomez-Agustina, Antonella Bevilacqua and Pedro Vazquez-Barrera. The journal article is freely available here **https://doi.org/10.1016/j.apacoust.2025.110568**

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Current parliamentary and policy news

Mary Stevens supports the IOA to bring acoustics to the attention of policy makers and this edition's parliamentary round up covers plans for reforming the way infrastructure is approved.

During a busy January the Government announced their promised proposals to reform infrastructure planning, reduce underwater noise and set out a proposal for a land use strategy across England, intended to support the building of infrastructure and homes while protecting nature. Comments on any sound, noise and vibration aspects of the proposals are invited from members.

Airports and wind farms included in Government plans to accelerate development

During the last weeks of January the Government made several statements on proposals for changes to the planning process to support their Plan for Change, which is intended to support economic growth by accelerating the building of infrastructure and homes. Working papers on reforming infrastructure planning and a 10 year infrastructure strategy have been published. These are not formal consultations so there is no deadline, but comments are invited. Proposals include overhauling the planning system for major infrastructure projects across England, Wales and Scotland and to 'streamline' the approval process for nationally significant infrastructure projects (NSIPs) in England. These include solar and wind farms, electricity networks, roads and public transport infrastructure and water supplies. Many of these

Below: Wind farms are included in Government plans to accelerate development

developments are subject to noise impact assessments and impact soundscapes. On more specific development a press release announced 'unlocking' 13 major offshore wind projects, unleashing an '**offshore wind revolution**'. The announcement refers to targeted changes to the management of underwater noise that will support nature recovery at scale as part of a proposed strategic, rather than site by site, solution to nature recovery. In a series of statements on the forthcoming Planning and Infrastructure Bill the Chancellor Rachel Reeves announced proposals for more homes near commuter train stations and support for expansion of Heathrow airport "in line with UK's legal, environmental and climate obligations."

The IOA are considering the sound, noise, acoustics and vibration implications of these proposals. We will advocate that these are properly considered for any project in the context of overall Government policy on these issues. Members are reminded that the IOA's position means we do not take a view about the merits or otherwise of specific projects. **Comments from members on the acoustic aspects of the proposals are encouraged – please send asap to mary.stevens@ioa.org.uk**

See the working papers here: **https://www.gov.uk/government/publications/10-year-infrastructure-strategy-working-paper**

Planning Reform Working Paper: Streamlining Infrastructure Planning – GOV.UK

Offshore wind noise consultation anticipated

The Government has announced that plans to accelerate the development of offshore wind power will be accompanied by measures to reduce underwater noise. In a press release they stated developers will be required to demonstrate they have made clear efforts to reduce underwater noise from pile driving and clearing ordnance from the seabed during installation of offshore turbines. The Government has partnered with The Crown Estate's Offshore Wind Evidence and Change programme and representatives from the explosives and offshore wind industries to test and develop new, quieter technologies for bomb clearance, and pilot proposed noise limits during offshore wind construction. It was also stated that a public consultation on setting a future noise limit for offshore wind construction is anticipated with no timeline for this given.

Read the full announcement: **New measures to curb underwater noise and accelerate renewable energy – GOV.UK**

England: consultation on land use

As part of ongoing reforms Government have issued a formal consultation on a strategic national approach to land use in England. They say: "The Land Use Framework will provide the principles, advanced data and tools to support decision-making.... This will help deliver the different objectives we have for England's finite land, including growing food, building 1.5 million homes this parliament, and restoring nature." Workshops are being held to engage farmers and landowners, and the proposal has been broadly welcomed by conservation groups. The IOA will be responding to the consultation highlighting aspects where acousticians can support land use planning, for example managing impacts of noise pollution from and on any development, and supporting the growth of healthy, vibrant soundscapes. **Comments from members are encouraged – please send asap to mary.stevens@ioa.org.uk**

The consultation is open until 25 April 2025.
Land use in England – GOV.UK

Comments on future of UK aviation consultation

Questions relating to noise have been answered in the Civil Aviation Authority consultation on the future of UK aviation. We have made several suggestions that would facilitate comparison of noise management performance across airports, in terms of how noise efficient an airport is at providing flights with minimal impact. In addition to reporting the number of people exposed to aviation noise in the UK, the IOA would like to see metrics reported to cover the national noise impact, which will be of interest to track progress to achieve DfT aviation noise policy aims and to assist stakeholders affected by noise from individual airports in understanding their noise, how it has changed and how it is being managed. We would also like to see the number of houses insulated to reduce aircraft noise recorded. In addition, the noise performance of as many airports as possible should be reported, given noise impacts are a location specific local issue.

See the IOA full response here **https://www.ioa.org.uk/publications/response-consultations**

Ireland: EPA consultation on Guidance Note for Noise (NG4)

The Environmental Protection Agency (EPA) in Ireland has consulted on revisions to Guidance Note for Noise (NG4). The draft revision includes updated sections on licence application requirements, including interaction with the provisions of the Environmental Noise Directive agglomerations. It also covers expansion of noise impact assessment using calculation methods and expansion of details required in Environmental Noise Compliance Survey Reports for licensed sites. Also included are updated information and methodologies on measurement of tonal, low frequency and impulsive noise; expanded sections on noise complaints, noise control and mitigation; updates on the assessment of low frequency noise, intermittent noise and other sound characteristics and changes to penalties for noise sensitive locations for both tonal and impulsive noise. The IOA Irish Branch commented on the consultation, which closed 28 February 2025.

See the consultation document here **https://tinyurl.com/NG4consultation**

Fireworks Bill introduced to Parliament

A private members' bill introduced by Sarah Owen MP had its second reading in Parliament in January. The Bill seeks to amend the Firework regulations 2004, P50

to include noise definitions for fireworks, defining a low noise category F2 firework as one with a maximum noise level of 90 dB or lower; and a high noise category F2 firework as one with a maximum noise level higher than 90 dB, and restricting the sale of high noise F2 fireworks. This follows on from a Westminster Hall debate on fireworks sale and use last December. The chair of this debate concluded: "A common theme of all Members' speeches was that we must push the Government for stronger licensing, noise reduction and restrictions on sale, and for more enforcement powers to be given to our police and local authorities so that they can properly enforce the existing legislation and anything that comes down the line."

See the draft bill here: **https://bills.parliament.uk/bills/3791/stages/19048**

Wales: Infrastructure Wales Act 2024

The IOA Welsh Branch provided observations and feedback to the Welsh Government consultation on Implementing the Infrastructure Wales Act 2024. Comments cover noise assessments, environmental health involvement, statutory nuisance, and the pre-application consultation stages. It was also stated that there should be a formal requirement for local environmental health teams to provide input during consultations, particularly on noise and related environmental issues.

See the consultation and IOA's full response here: **https://www.ioa.org.uk/publications/response-consultations**

New briefing note: acoustic classification of buildings

The IOA have published this new briefing note, making the case for the use of the ISO/TS 19488:2021 framework which defines six acoustic classes for dwellings, ranging from Class A (highest quality) to Class F (lowest quality). This system allows builders to set expectations for acoustic performance and assess the acoustic performance of existing housing, particularly before and after renovations. While building regulations specify minimum acoustic performance requirements for new dwellings, these often fall short in ensuring an adequate living environment and residents still experience high levels of disruptive noise, especially in multi-dwelling buildings. This briefing note highlights the need for a more detailed acoustic classification system that addresses these shortcomings and promotes higher standards of acoustic comfort.

Read the briefing note here: **https://www.ioa.org.uk/publications/briefingnote**

European Briefing: transport noise impacts on children's learning

The impact of transport noise on the reading ability and behaviour of children is the subject of a new research briefing from the European Environment Agency (EEA). The report is based on data submitted by EEA member countries under the EU's Environmental Noise Directive (END). Key findings include that children living or attending school in areas impacted by transport noise tend to score lower on reading comprehension and face more behavioural challenges; over half a million children in Europe experience impaired reading ability due to environmental noise from road, rail and air transport and almost 60,000 cases in Europe of behavioural difficulties in children are due to environmental noise generated from transport. The report concludes that impaired reading ability and behavioural difficulties can be largely prevented through interventions to reduce environmental noise at homes and schools. Interventions outlined include considering noise in planning building orientation, landscaping and engineering measures.

Read the full report here: **The effect of environmental noise on children's reading ability and behaviour in Europe.**

Left: The impact of transport noise on the reading ability and behaviour of children is the subject of a new research briefing from the European Environment Agency

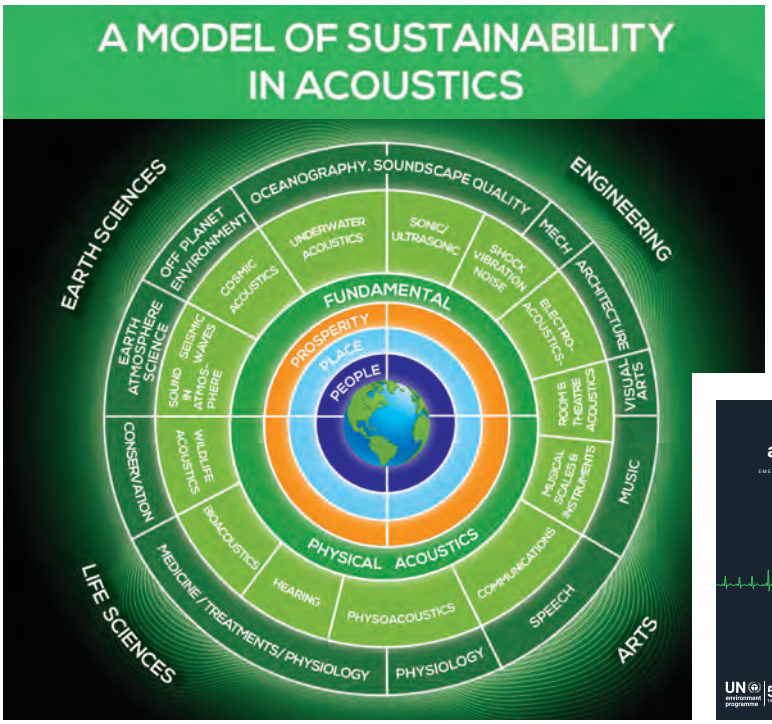
Mary Stevens

The ANC's approach to sustainability and acoustics:

acoustics industry begins bold and proactive stance on sustainability

The Association of Noise Consultants (ANC) recognises that how we design sustainable environments and how we can sustainably conduct our work and run our businesses – is one of the most important and urgent challenges for any modern acoustic consultancy.

By Peter Rogers FIOA, and Heulwen Peters, Chair of the ANC Sustainability Committee



Left: *(Lexicon image courtesy of Peter Rogers, Sustainable Acoustics Ltd)*

Above: *The UN Frontiers Report 2022*

The ANC's Sustainability Committee, formed by a team of consultants volunteering their time and expertise, aims to raise the profile of sustainability within the ANC and beyond.

We are pleased to showcase our series of guides and highlight the documents which will be issued this year. Special thanks must be given to the committee for the hard work, time and effort which they have put in (and continue to put in) to create these resources.

You can find the ANC Sustainability Series here: **https://www.association-of-noise-consultants.co.uk/resources/sustainability/**

The ANC welcomes and encourages your thoughts and feedback – please email us at **info@theanc.co.uk** The documents will be reviewed again between six and 12 months after issue in response to any comments received on them and in line with any new sustainability guidance which the ANC feels need to be incorporated into the documents.

Introduction

The ANC's dedicated Sustainability Committee aims to address the growing intersection between acoustic consulting and environmental responsibility and to guide member companies. This initiative aligns with both the UN's sustainable development goals[1] and insights that emerge from the UN Frontiers Report 2022, which identifies noise as one of three key global challenges[2].

The ANC's sustainability framework operates on two critical fronts:

- firstly, it focuses on internal practices, helping member companies develop more sustainable operational methods; and
- secondly, it addresses external client services, ensuring that acoustic consultants provide environmentally and sustainability-conscious design and construction advice, forming part of the solution and delivery of sustainability through the work that they do and the legacy they create, in a quickly changing world. P52

References

1 UN Sustainability Development Goals, https://sdgs.un.org/goals (accessed 3/2/25)
2 UN Frontier Report 2022 – Noise, Blazes & Mismatches, **https://www.unep.org/resources/frontiers-2022-noise-blazes-and-mismatches** (accessed 3/2/25)

With the threat of climate crisis demanding immediate and sustained action by companies with purpose and organisations across all disciplines the ANC has 'grasped the nettle' to accelerate the positive change needed. It has done this by splitting down the challenge of determining clear and appropriate guidance by considering specific steps on topics that can be taken as part of the bigger journey of humanity to a sustainable future, by which is meant a future that next generations will not be disadvantaged by.

This approach responds to the UK Government's policy on sustainability to baseline emissions and reduce to net zero by 2050. Whilst this is an energy-centric metric the ANC's vision also emphasises the importance of wider effective action by the acoustics industry in pursuit and promotion of both long-term human health and quality of life; while signposting for member companies how they can begin (or supercharge) their journey to delivering sustainable acoustic practices as part of their net zero journey.

The ANC recognises sustainability as not an optional addition but a fundamental, integrated part of the DNA of modern acoustic consulting, with acousticians playing a vital role in creating a sustainable future. The specific guidance on how to do this by specialist disciplines within acoustics is an evolving picture but by integrating environmental and social considerations into acoustic consulting practices, the ANC has adopted a framework and developed a suite of guidance documents that help to ensure that acoustic solutions contribute positively to broader sustainability goals, while maintaining high standards of acoustic design for clients.

The lexicon (on page 50) provides a lens through which a client's problem can be considered, beginning with regard for the planet being central in minds as a 'silent' client; adding elements of sustainable principles as embedded concepts into the application of the fundamentals of acoustics through to the rim of the lexicon in the particular field of application.

The authors of the ANC Sustainability series, and ANC, recognise that each and every user of the documents will have differing experiences, knowledge and views. The language and terminology used within the documents has been peer reviewed by leaders in each topic area, who provide a robust but balanced view in an inclusive set of documents which include differing views from small to large companies. Two documents have been issued so far with more on the way. None of the language within the documents is intended to offend anyone and we don't seek to represent one view above any other, but a consistent direction of travel and signposting.

The areas that have been identified as the first wave for guidance are summarised below with those in draft also listed:

- sustainability & acoustic consultancy – internal document (in flight);
- quality education (published);
- biodiversity and inclusion (published);
- energy and acoustics (in flight);
- sustainable materials and acoustics (in flight);
- acoustics and sustainable transport (in flight); and
- inclusivity in acoustic design: neurodivergence and aural diversity (in flight).

A short summary of each section by the authors is included below:

Internal facing document on sustainability and acoustic consultancy, by Peter Rogers, Pam Lowery, David Hible (in flight)

This document focuses on how acoustic consultancies can become sustainable businesses fit for the future, so that the work they do can be achieved as part of a regenerative system. It proposes guidance for how consultancy business can get their house in order, as the 'business-as-usual' model is no longer adequate to justify credible involvement in the delivery of sustainability in practice.

The guide emphasises practical ways for companies to play their part by aligning their business models (big or small) with net zero and away from solely a profit-based business, to one based on prosperity that also provides social value and equality, planetary regeneration and biodiversity net gain. By achieving multiple wins the benefits are far broader than those based on the exploitation of resources for profit. This can benefit businesses by resulting in happier, healthier staff, better staff retention, improvement in place and biodiversity at a local level, and a contribution to the national and global solution through the application of science and engineering through acoustics. It sets out how to establish a baseline of the emissions of the business in order to tackle direct and indirect emissions. It also explains the terminology and how to prepare and act on a net zero roadmap, as well as the broader aspects of sustainability that are covered by the UN sustainable development goals and accreditation schemes such as B Corp. This is intended to avoid 'greenwash' and provide a defensible and robust pathway for ANC companies fit for delivering acoustic services for a regenerative future.

Quality education, by Mat Tuora, Heulwen Peters and Emma Greenland (reviewed)

The ANCs quality education guide focuses on approaches to education design which, in the view of the group, best serve sustainable design objectives and meet acoustic objectives. UN Sustainable Development Goal 4 asks us to '*ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*'.

The guide recognises a need to provide a holistic approach to education design which is accessible and inclusive, whilst meeting usual acoustic design objectives and satisfying clients' desires and needs.

The guide signposts and builds on recognised and developing guidance for education design. It aims to support acousticians with an understanding of common acoustic considerations needed to fulfil optimised education design sustainability objectives, such as consideration of learning differences, aural diversity and the wide range of users who need to and want to access education facilities.

Biodiversity in acoustics, by Reena Mahtani, Mat Tuora and Jo Hughes (reviewed)

The biodiversity in acoustics document discusses the impact that acousticians can have when considering strategies on the requirement to protect and restore natural habitats to enhance biodiversity and mitigate climate change.

Natural soundscaping and habitat creation are discussed alongside strategies for noise mitigation, in addition to incorporating ecological features like earth bunds and planted façades in the design to provide habitats for local wildlife. It also acknowledges that additional input from other disciplines is necessary for this approach to be successful as part of a cross-collaboration effort.

Energy and acoustics, by Peter Rogers and Barry Joblin (in flight)

This guide aims to explore how acoustics can be central to the delivery of the renewable energy transition, with regard for supportive infrastructure including wind turbines, solar farms, air source heat pumps and other aspects which make energy generation in the UK, its provenance and security a government priority.

It is important to recognise that acousticians also have an important part to play in the sustainability of energy production systems when sited close to communities, and how, through good acoustic design, their impact on residents and businesses can be limited.

Sustainable materials and acoustics, by Clement Luciani, Mat Tuora, Vince Taylor and Momo Hoshijima (in flight)

This guide aims to raise awareness of the options available to inform, promote and specify more sustainable alternatives to conventional construction materials and products.

The guide introduces the core aspects of sustainability being considered by the industry for building materials and how they are assessed and compared, highlighting the complexity of the task and the lack of standardised methodologies.

Three overarching strategies are presented and discussed to reduce the environmental impact of building materials:

- avoiding unnecessary extraction and production (circularity);
- shifting to regenerative bio-based materials; and
- decarbonisation of conventional materials.

The role acousticians can play within each of these strategies is discussed and suggestions for next steps made.

Acoustics and sustainable transport, by John Fisk (in flight)

Our guide on acoustics and sustainable transport starts with discussion of the noise impacts of the three most popular transport modes (road, rail and aircraft) and how these affect health and wellbeing. It then points to current practice methods for assessing the impacts and briefly presents ways to control these noise impacts. Noise control methods will generally also have adverse and beneficial impacts on aspects other than acoustics (e.g. economic, cost, energy efficiency, visuals and ecology etc.) This is discussed along with some examples and how the overall sustainability of a control method might be weighed up given these competing interests. The guide finishes with a look at how transport modes might change in a more sustainable future and how this might affect the noise environment around them and planning decisions made.

Inclusivity in acoustic design: neurodivergence and aural diversity, by Reena Mahtani, Mat Tuora (in flight), Joshua Yardy (review comments)

The inclusivity in acoustic design guide is focused on acoustic design for individuals and provides a short introduction to the concept of aural diversity and its application in practice. The intention of the guide is to promote that everyone's auditory experience is unique and emphasises the importance of considering these differences in the design of spaces to ensure inclusivity and accessibility for all.

It is widely known that robust acoustic design can mitigate the sensory sensitivities experienced by some individuals and enhance the functionality of spaces. The guide includes a review of the guidance already available on the topic and summarises some basic considerations that should be considered during the design of spaces.

The importance of balancing the acoustic design in conjunction with other disciplines, such as lighting, to create truly inclusive and supportive environments is also mentioned to achieve a truly inclusive design.

Conclusions

A start has been made with this suite of guidance to help ANC companies rise to the challenge of our age. They signpost a consistent way forward and suggest ways that positive action by acousticians can be taken to deliver sustainability through the work they do, and to get their house in order as companies fit for the future.





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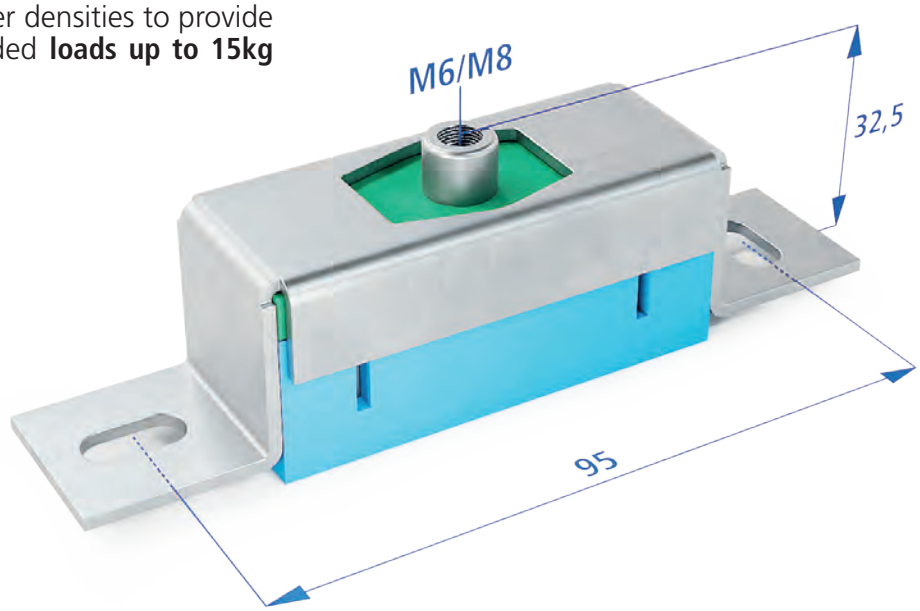

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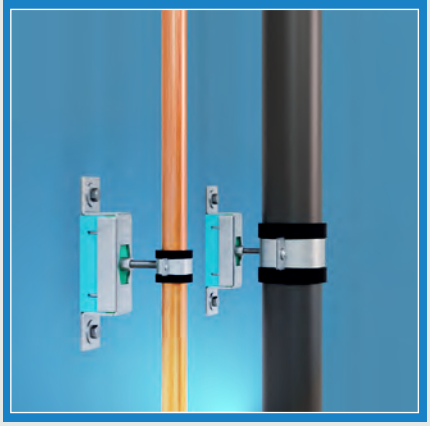

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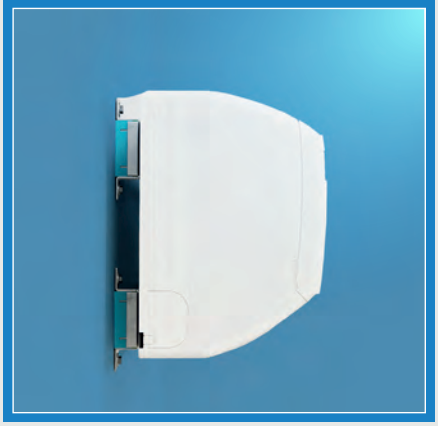

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IOA's 50th anniversary celebratory dinner

1974–2024

On the evening of Wednesday 27 November 2024, just over 100 members travelled to the opulent surroundings of the Vintners' Hall in central London for the celebratory dinner to mark the 50th anniversary of the IOA.

By Stephen Turner

Every effort had been made to give all members the opportunity to attend and, gratifyingly, there was so much interest that a ballot had to be held to determine who could finally go.

The evening began with a drinks reception in the drawing room where there was an opportunity to inspect the Institute's new coat of arms, which had conveniently arrived in time for the dinner. (Acquiring a coat of arms is part of the IOA's application for chartered status).

A three course meal was enjoyed after which a delightfully entertaining and educational speech was given by the guest of honour, Alderman Dr Sir Andrew Parmley, a former Lord Mayor of London and a Past Master Vintner. He concluded his speech with a toast to the health of the IOA and David Waddington, the IOA's President gave a reply.

With the formalities completed, Stephen Turner thanked Reena Mahtani and Chris Turner for all their hard work in making the arrangements for the evening, and also Linda Canty, who although not able to be at the dinner, nonetheless helped hugely in one of her final duties before her well-earned retirement. In response, the diners spontaneously rose to their feet to give Linda a standing ovation.

Left: IOA 50th anniversary dinner guests

Further drinks were enjoyed in the drawing room before it was time to leave. However, for some, the evening did not finish then as mobile phones were scrutinised to work out which nearby pubs would still be serving and word soon spread regarding the next venue.

The activity on social media platforms indicated that the event was thoroughly enjoyed and was a great way to mark the end of the Institute's 50th anniversary year.

Left: (L-R) Chris Turner and Stephen Turner with the IOA coat of arms

Below: Vintners' Hall, London, venue for the IOA's 50th anniversary dinner

Regulator irritates competent consultants

By Tim Britton BSc (Hons) MIOA

Right:
From Acoustics Bulletin September/ October 2024

FEATURE

Regulator cracks down on rogue consultants

By Dr R M van Besouw, HM Specialist Inspector of Health and Safety (Noise and Vibration)

Content warning: The following story is fictional but contains examples of failings taken from real reports that may be disturbing to the readership of Acoustics Bulletin.

Barry Bumbler, BSc. SSc., packed his ACME 500 high precision decibel meter and his ZP-3 Professional digital noise meter into his rucksack, with his phone, a note pad and a Thermos. The ACME 500 was his favourite. He had got it for a bargain £18.95 online where it had an average customer review of 4.9 stars. Mr E. Fudd had given it five stars, affirming that it *'Works as advertised. I have no way to check the calibration, but seems close enough for the money'*.

Works as advertised. I have no way to check the calibration, but seems close enough for the money.

It had a large colour screen, a button to flip between A- and C-weighted measurements and a pause button. The ZP-3 Professional had been reduced from £45.40 down to £26.33 and he could see why. It didn't have a colour display, he had not been able to decipher from the manual what all the symbols meant and the foam ball kept falling off, but at least he could make recordings with it.

The job today was a workplace noise assessment at Wile E Woods Ltd on the Isle of Wight, a joinery site just outside of Ryde that would earn Barry £450. He had agreed with the Managing Director to turn up at 10:30 and reckoned that, allowing for a 45-minute lunch break at Tony's Fish & Chip Shop, he could be away on the 13:00 ferry and save a few quid with a saver ticket.

On arrival at Wile E Woods it turned out that the MD was working from home on the mainland. The Operations Manager, Steve, greeted Barry instead, showed him around the site and made him a cup of very hot tea in a mug that had 'measure twice, cut once' on the side of it. Barry pointed out to Steve that he would indeed be measuring twice with his two high precision noise meters.

The site was pretty straightforward, an upstairs with an office, boardroom and kitchen area, and a machine shop downstairs with various woodworking machines. As he was upstairs and his tea hadn't cooled down enough to drink yet, Barry decided to start his noise survey in the office. He waved the ACME 500 around slowly in a wide figure-of-eight to sample as large an area as possible before pausing the measurement and jotting down the value on his note pad. He repeated this process with the ZP-3, and then repeated it again with the foam ball rammed firmly back on the microphone. p29

The September/October 2024 issue of Acoustics Bulletin included an article by the Health and Safety Executive (HSE) titled *Regulator cracks down on rogue consultants*. This piece seemed to deflect blame onto the likely audience of the magazine, even though the issues it highlighted stem partly from the HSE's own regulatory shortcomings.

The article pointed out that some consultants are conducting occupational noise assessments that are not up to standard. This revelation is hardly surprising to those of us who adhere to the IOA Code of Conduct, ensuring our work meets good practice and relevant standards, who have been undercut for years by consultants who do not invest in qualified staff, high-precision equipment and robust quality assurance processes. It is somewhat hypocritical for the HSE to criticise poor practices when their own lack of regulation has allowed such an environment to thrive.

The real issue: lack of accreditation

The title 'noise consultant' is not protected, meaning only the HSE can effectively regulate the quality of these assessments. Asking employers to judge is a shirking of responsibility and akin to letting the fox guard the henhouse. Many of us have spent countless hours crafting cost-effective proposals for occupational noise assessments, only to lose out to competitors offering significantly lower prices. This disparity drives competent consultants away from this field and provides little incentive to improve standards. These budget assessments are also less likely to recommend improvements, saving clients further money unless they face prosecution.

Where are the prosecutions?

A quick internet search reveals that the last known prosecution of a noise consultant by the HSE was in 2020, resulting in a mere £1,400 fine. There is no indication that the consultant was barred from continuing their services. If poor assessments are as widespread as the HSE suggests, one must wonder where all the prosecutions are and whether the fines are sufficient deterrents.

Where do we go from here?

While the HSE's new Workplace Noise Intervention programme may address some issues, it feels like a case of closing the stable door after the horse has bolted. The buyer's guide mentioned in the article allows consultants to '*show that they have a suitable level of experience*,' but workplace health and safety managers may not be qualified to assess this, especially when pressured to justify higher costs. A more effective solution would be a paid registration process, similar to the ANC's register of accredited sound transmission testers. This would provide a straightforward enforcement mechanism for the HSE to ensure employers use accredited consultants. Although this might increase costs for employers, it would guarantee high-quality consultancy, compliance with legislation and protection for employees from hearing damage. Until the HSE implements proper regulation or enforcement, the problem will persist, and no amount of articles in Acoustics Bulletin will change that.

Some manufacturers of BESS provide no noise data at all and hardly any provide frequency spectrum data

Questioning the quality and accuracy of noise assessments of battery energy storage systems

As those consultants working in the renewables industry will know there has been a rapid rise in applications for battery energy storage systems (BESS) over the past few years, either as stand-alone or attached to solar or turbine developments. Noise consultant, Dick Bowdler, has reviewed about a dozen noise assessments for these systems and, in this letter, voices his concern over their quality and accuracy.

There are three problems: the poor quality of manufacturers' information, the technical accuracies of the calculations and the variety of assessment methods. I will outline the issues in a bit more detail in the hope that it will lead to improved quality and accuracy of assessments.

Taking manufacturers' information first, it is perhaps no surprise that with new plant being developed at a fast rate, manufacturers do not produce good quality data until a range of models has been established. However, it is as much in the developer's interest as anyone else to get good data because it reduces the commercial risk and it is also very much in the consultant's interest to get it as accurate as possible for obvious reasons.

Noise data are almost all of low quality (and hence, high uncertainty) or simply absent. Most of the data that are available are presented as 1m (or some other distance) from the equipment. For example, the sound pressure level of a transformer P60

9m by 6m by 6m is quoted as 68 dB at 2m. This really tells us very little. Is that the level at the one noisy part of the transformer, or the average level at 2m all over the transformer, or is it the average of a few spot measurements? Some manufacturers provide no noise data at all and hardly any provide frequency spectrum data. Others provide data under an NDA so it becomes more difficult to verify that it is valid.

On my second point on the accuracy of the calculations, in the transformer example above, the consultant simply converted the 68 dB at 2m to 82 dB SWL. That treats it as a point source with hemispherical propagation. Of course it is extremely unlikely that it is a point source as it would only be so if all the sound from the transformer came from a single point 2m from the microphone and none from anywhere else on the transformer. If the sound was equally emitted from all over the transformer at 68 dB at 2m, the SWL would be about 94 dB. Unfortunately, using point source calculations where it is clearly not a point source is still common and will most likely under-estimate the noise at sensitive receptors very significantly.

On my final point of the assessment method, nearly all of the assessments say how wonderful SoundPLAN or CADNA is, as if their use means the result must be correct. Some assessments discuss uncertainty in the calculations of ISO 9613 but not one of the assessments that I have seen discusses the uncertainty of the input data. Hardly any assessment put a comprehensive list of the inputs.

The guidelines for assessment are certainly inadequate and this is apparent from the methods put forward. In one case, a specific noise of 44 dB with background level of 26 dB in the evening is low impact and minor adverse. In another a specific noise of 31 dB compared with 25 dB background is rated as high impact. Almost everyone focuses on BS 4142 but most also mention or use one or more of BS 8233, WHO Enger, WHO night guidelines, NR curves. In fact, in some instances, the reader might be forgiven for thinking the assessor had gone through all the guidelines in turn to find one that worked.

Some sort of coordinated agreement is needed to create an element of standardisation. Maybe BS 4142 is the correct approach but there is certainly widespread agreement that, at low noise levels, an absolute level is more realistic. How this latter point is dealt with is the crucial matter.

I've avoided introducing my personal view so far, but I would like to make one comment, that any use of BS 8233 is not appropriate. Since its origin as Chapter III of CP3 in 1972 it has always been about the design of sound insulation of buildings. It is nothing to do with industrial developments affecting existing houses. The Scope of BS 8233:2014 says it '*... does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.*'

To summarise:

Assessments should be transparent. Where data is inadequate consultants should attempt, or ask their clients to attempt, to get better data. Failing that the inadequacy of the data should be clearly described.

Make sure your calculations are right.

Failing any agreed assessment method, each consultant needs to consider what their own view is and, of course, use the same method on all similar projects. The assessment method should be clearly defined at the start of the assessment.

Dick Bowdler

Response to: Questioning the quality and accuracy of noise assessments of battery energy storage systems

I read with interest the letter from Mr Bowdler regarding the prevalence of battery energy storage system (BESS) planning applications in recent times (page 59 of this issue) and respond as a member of the IOA's Renewable Energy Advisory Group (REAG). Please note this is my personal response and does not represent the REAG as a whole.

Within the REAG we have a sub-group, which has been formed to focus on producing a good practice guide (the Guide) for the assessment of noise from BESS and solar developments.

The formation of the sub-group was presented in a wider paper regarding the REAG at the Acoustics 2024 conference, which was subsequently summarised in Acoustics Bulletin Nov/Dec 2024. The Guide is still in its preliminary stages but the group has already expressed similar concerns to Mr Bowdler and we hope that when it is published it will help to normalise the approach to noise assessments for such developments. In particular, we share Mr Bowdler's concerns over the use of manufacturer supplied

noise level data, both in the quality of the data that is published and in the various approaches that consultants attempt to use it.

One of the most significant problems we perceive, is that of a lack of knowledge about how a BESS site (and similarly related solar plant) actually operates, both in terms of layout design, and in respect of operating parameters and related noise output.

In terms of layout, this includes: what plant is required, how many batteries and inverters do you need for a particular capacity and how does that vary by manufacturer, what is the difference between a two-hour storage facility and a four-hour storage facility? Maybe most critically, how can we be sure that appropriate candidate plant is being specified and how does that affect the required layout?

In terms of operation and noise, this is particularly complex; when do cooling fans start to operate, is cooling based on load or ambient temperature (or both), is more noise generated during charge or discharge cycles, and often the most difficult question, what do I do with this poorly presented source noise level data?

This lack of knowledge is not just present at the acoustics consultant level, but also within councils (many of whom treat BESS the same as substations), and even for the developers themselves. Accordingly, the Guide will seek to provide guidance, not just through purely acoustics assessment terms, but also by introducing the reader to what makes up a typical BESS (and solar) layout, how the noise output might vary depending on plant specifications, layout and operation, and what mitigation options are available (and realistic).

I hope that the Guide will also encourage manufacturers to 'up their game' when it comes to providing source noise level data and encouragingly, Over the past 12 months or so, I have seen noise being taken more seriously by some manufacturers. At TNEI, we have undertaken ISO 3744 measurements for several plant suppliers, who now have 1/3 octave sound power level data for each façade and top of their battery and/or inverter units, operating at various different fan capacities and similar, and that is the type of data that the Guide will seek to encourage plant manufacturers to provide to consultants and developers. The fact is, however, that currently many manufacturers do provide sub-standard noise level data, so the Guide will need to demonstrate how to manage this data, how to consider uncertainty (both for the noise data and the operational status of the plant), and how best to use this within a noise model.

The Guide should also encourage manufacturers to provide more detailed noise and operational data, penalising, for example, the use of noise data without accompanying operational data, by assuming that all plant is always operating at 100% capacity (and maximum noise level output). I am sure Mr Bowdler will remember a time when wind turbine noise level data was provided in a multitude of formats and of varying degrees of quality, though nowadays, thanks to standardised measurement procedures and in no small part to the publication of the IOA GPG[1], the way that wind turbine noise level data is considered within assessments in the UK is generally agreed upon, and a common approach to modelling has been adopted. I do hope that we will get some way there soon for BESS plant and similar.

With regards to the use of BS 8233 and other standards and guidelines that sometimes seem to be adopted inappropriately, I am not sure that is isolated to just BESS noise assessments and I personally share similar concerns to how and where these 'guideline levels' are used more generally for industrial and commercial noise assessments. I expect the proposed changes to BS 8233, if adopted, will help to alleviate this issue somewhat.

We now have enough people within the sub-group to produce the Guide, however, I have invited Mr Bowdler to join the wider peer review team and if other IOA members are also interested in being part of the peer review, then please feel free to get in touch.

Jim Singleton
jim.singleton@tneigroup.com

1 A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise

EARLY CAREERS GROUP

Introducing our new Student Rep for the University of Salford

By James Dawes, IOA ECG Student Rep

I'm currently in my second year studying acoustics and audio BEng at the University of Salford, and having a great time. When not studying, I spend most of my time playing the trumpet in various ensembles round Manchester.

Whilst discussing my interest in musical acoustics with my personal tutor, he suggested that I get in contact with Alan Taylor to have a chat about his research in pipe organ acoustics. I did and was pleasantly surprised to be invited to his workshop with a couple of other Salford students.

Alan gave us a tour of all the goings on at A J & L Tayor – I'd be here all day if I discussed everything going on, so onto the acoustics!

We were shown a small organ in one room, and Alan demonstrated the different timbres achieved from different shapes and different combinations of pipes playing together.

A brilliant revelation for me was a technique for tuning the individual organ pipes – as the invention far predates electricity, there would've been no computational way of tuning two pipes of the same pitch to the same frequency.

As far as I understand it, two different wave interactions are used when tuning: First is beating – this sound became very clear as the pipes approached the pitch, and the beating slowed. Once the beating was so slow as to be tricky to determine any change, the second method was used – room modes! By subtly moving our heads, we could make out the minima and maxima of the wave, using this to ensure both wave's maxima occurred at the same point in space.

Above: James Dawes, ECG student representative for University of Salford

I'd like to thank Alan again for being so kind for the tour.

If you want to find out more about IOA student membership generally, visit **www.ioa.org.uk/membership/student-membership**

ECG celebrates 50 years of IOA

On the evening of 13 November 2024, members from the Early Careers Group (ECG) met at Cuckoo, Leeds to celebrate 50 years of the IOA. A mixture of consultants, engineers, academics and students shared stories from their time in the acoustics industry over pizza and drinks. We laughed about trudging through muddy fields to gather background sound levels or to lugging heavy speakers up and down construction site stairs. We lamented over hours spent staring at broken code and 'buggy' software.

Although early in our journey of acoustics, we are grateful to be part of such a diverse community. We're excited to see where the field of acoustics will lead us (or where we'll lead the field of acoustics!) for the years to come.

Electroacoustics

By Ludovico Ausiello

The IOA Electroacoustics Group is working hard to secure a new location for RS2025 (almost certainly York), and sent out a survey to all the members of the electroacoustic community at IOA to better understand how the audience has changed in the past five years of the conference.

Those who are interested and wish to add their views to the survey can email **Sheema.ali@ioa.org.uk**

The Group is also happy to welcome new members to the committee:

- **Rita Campos** (working for L-Acoustics in their application/ education department); and
- **Arina Epure** from KU Leuven (Belgium) who is the Group's Early Career Rep.

Again, email **Sheema.ali@ioa.org.uk** if you need further details.

Peter Barnet Memorial Award

We have shortlisted a few very important contributors to the field of electroacoustic for the next Peter Barnet Memorial Award and we'll vote soon to decide who will be the next recipient and special guest at RS2025.

The Art and Science of Sound: A Day of Acoustic Discovery seminar

Finally, I presented a seminar on behalf of the IOA, *The Art and Science of Sound: A Day of Acoustic Discovery* on 12 February 2025 at Mary Ward House, 7 Tavistock Place, London WC1H 9SN. The purpose of this REMS 'At Home' event was to create a stronger liaison between the electroacoustic community and the IOA Musical Acoustics Group and to establish a working group which, with the support of BSI and ISO/TC 43, might foster the drafting of a new standard to test musical instruments using methods that have been consolidated in the past 30+ years in the loudspeaker/microphone world.
Hosted by Mike Quinton (REMS Chairman) and Stephen Desbruslais (REMS committee) expert speakers included:

- Keith Attenborough (IOA)
  Reducing the environmental impact of noise mitigation
- Gianluca Memoli (University of Sussex)
  Sound and light: differences and similarities
- Kirill Horoshenkov (University of Sheffield)
  Acoustic sensing with robots in buried pipes
- Ludo Ausiello (University of Portsmouth)
  Acoustic measurements applied to the musical industry
- Paul Lepper (Loughborough University)
  Underwater acoustics: WWII Unexploded Ordnance (UXO) and offshore windfarms
- Matthew Muirhead (AECOM, London)
  Approach to teaching and promoting acoustics in schools
- Trevor Cox (Salford University) *Sonic Wonderland.*

Environmental Sound Group

By Steve Mitchell

On 25 November 2024 the Environmental Sound Group held their autumn meeting in the usual lunchtime, online format and 170 people joined. As one of the last celebrations of the Institute's 50 years, we were very fortunate to see Rupert Thornley-Taylor give a fascinating presentation on environmental sound management over the 50 year lifespan of the Institute. Rupert described what acoustic consultants did in 1974 when there were no desktop computers or sound level meters as we know them.
By looking back at the huge progress we have made over 50 years he was able to give some insight into what might be next.

Rupert's fascinating slide deck can be seen at **https://www.ioa.org.uk/catalogue/publication/environmental-sound-looking-back-and-forward-50-years**

Eastern Branch

By Jody Blacklock

The Eastern Branch celebrated the IOA's 50th anniversary last October with a fantastic tour of FläktWoods in Colchester followed by a joyous dinner afterwards.

The afternoon spent at FläktWoods involved us splitting into three groups. Each group received a tour around the factory floor, seeing the different types of fans being manufactured along with the testing areas (including the acoustic testing suite) and design areas. The tour was hosted by Simon Chapman.

We were also lucky to be provided with two really engaging talks on aerodynamics by Tom Gardner and Aleff Duarte, who took us through the history of FläktWoods, the physics behind aeroacoustics and the importance of fans.

We then continued by heading to the Queen Charlotte, where we enjoyed a social dinner and drinks. It was lovely to get to know some more people from the Central Branch. Following discussions there the committee came away with several good ideas for future webinars – some of which we are putting into action already for this year.


Eastern Branch members at their FläktWoods tour

In December we had a fantastic presentation by Olivia Irven titled *An evening with Cellecta*. Olivia provided us with some lovely festive nibbles as she presented on different products developed by Cellecta, the performance requirements and various design solutions. A few of us even finished the evening by heading for a curry after the event. It was a lovely final presentation to round up a great 2024 at the Eastern Branch.

Join us on 27 March for our next meeting hosted by Mark Scaife from Cahill Designs on *All the fun of the fair – assessment of sound from theme parks and similar attractions.* Note this will be an in-person event only, to be held in Chelmsford and booking is essential.

Please contact Jody Blacklock (**Jody.Blacklock@createce.co.uk**) Chair of the Eastern Branch, or Josie Nixon (**Josie.Nixon@HA-acoustics.co.uk)** Secretary of the Eastern Branch, if you have any questions about any of the Eastern region events.

Irish Branch

By Damian Brosnan

The Irish Branch held the GerryMcCullagh Memorial Lecture on 28 November 24.

The lecture is given each year in memory of Gerry, one of the founding members of the Irish Branch. This year the lecture was held online, which nicely fitted with the reduced-carbon ethos of our guest speaker, Peter Rogers FIOA of Sustainable Acoustics. Peter has over 30 years' experience in sustainability matters, with a background in physics and medical physics. Titled *Birth of a new ProPG and the heavy lifting involved – Gym Acoustics Guidance (ANC, IOA, CIEH)*, Peter's talk provided a fascinating insight into the work that goes into producing a new guidance document from scratch and the various hurdles and conundrums faced by the working group.

Peter's involvement in the new gym acoustics guidance document stems from years of dropping heavy weights on gym floors, although he did not clarify if this was through his acoustic work, or part of a fitness regime. After years of this, and presumably now in great shape, he concluded that gym acoustics needed a more consistent approach. This led him to present a paper in 2018 in Crete in relation to standardisation of structure-borne noise assessments for gyms in lightweight mixed-use structures. The paper was met with an enthusiastic response, convincing Peter to set up a working group through the ANC in 2019. The working group, consisting of a mix of respected consultants, suppliers and environmental health representatives, decided that producing a ProPG document would be the most appropriate approach.

In an impressive feat, the group produced a draft document in only three years, despite the covid upheaval. Even more impressively, the work was not funded, and the entire group contributed their time and knowledge for free. The initial draft was submitted to the IOA and CIEH for their input, and subsequently opened to a wider consultation stage. The final version, titled *ProPG: Gym Acoustics Guidance (GAG),* was approved in December 2022, and published in March 2023. The 67-page document includes sections on criteria, testing and predictions, as well as several informative appendices.

Peter took us through the various sections of the guidance and invited challenges from the attendees. Particularly interesting elements of his presentation included the rationale behind criteria selection, and how the G curves used in the document were derived. The development of a predictive modelling methodology proved challenging, as this had not been comprehensively done before. Although BS 6472:2008 has been withdrawn, the working group decided to stick with the vibration guidance included in the standard, as it is robust and practical.

Given that it features prominently in airborne noise emissions associated with gyms, the working group decided to include gym music guidance in the document, not expecting that the guidance would eventually find its way into court hearings relating to bar amplified music. In the subsequent Q&A session, Peter's view was that the GAG document is more up-to-date than other documents such as the outdated concert COP document, and this might explain its use in amplified music noise cases, although he certainly did not see that one coming.

The GAG document has now been in circulation for nearly two years and is currently undergoing its first review. The working group has received submissions from various parties, and Peter gave us a flavour of the comments and requests received to date (anonymously of course). Peter also invited feedback from the attendees, which segued us nicely into an engaging Q&A session. In an unusual twist, this included a question from the presenter himself – Peter asked attendees if they would use the GAG document now, if they hadn't used it before. The consensus was that they would, although it was not teased out if this would be for gym acoustics or bar music!

London Branch

By Jack Tunstall, Hilson Moran

Over the past few months, the London Branch has been busy hosting its regular meetings alongside the 38th Branch AGM.

December Branch meeting

On 5 December 2024, the meeting took place at the AECOM offices in Aldgate. Dani Fiumicelli delivered an in-depth critique of the traditional reliance on A-weighted levels, arguing that this metric underestimates the impact of low-frequency 'bass' and 'sub-bass' elements essential to the live music experience. Through data analysis, he demonstrated that while A-weighting suffices for many environmental noise sources, it fails to capture the nuances of low-frequency energy that contribute to both perceived loudness and the rhythmic groove of modern concerts. Dani proposed using C-weighted music noise levels (MNLs) as a more accurate measure, highlighting the benefits of applying a differential between A- and C-weighted levels to reduce off-site noise impacts without compromising sound quality or cultural value.

38th AGM

Following the Christmas break, on 9 January 2025, Branch Chair, Roslyn Andrews, opened the 38th AGM with the Chairperson's report. Some existing committee members stood for re-election, and the committee welcomed new faces, including Haydar Aygun and Shaliny Denardi Vattathara as full members, while Jonas Lopez stepped down. The full 2025 committee comprises:

Branch Chair: Roslyn Andrews (AECOM)
Branch Secretary: Ben Southgate (Sandy Brown)
Committee members:

- Haydar Aygun (LSBU)
- Nigel Burton (Temple Group)
- Tony Garton
- Luis Gomez-Agustina (LSBU)
- Shaliny Denardi Vattathara (AECOM)
- John Sails (Sandy Brown)
- Jack Tunstall (Hilson Moran)
- Vicky Wills (AtkinsRéalis)

January Branch meeting

Immediately after the AGM, the Branch hosted another meeting featuring a presentation by Stephen Turner and Graham Parry on construction noise management for the Thames Tideway Tunnel project. Building on insights shared at Acoustics 2024, Graham and Stephen discussed their roles as Chair of the Independent Compensation Panel and Independent Complaints Commissioner, respectively. The presentation explained how conventional noise assessments may overlook the heightened sensitivity of certain groups such as night workers. In response, they outlined an approach of awarding bespoke compensation based on individual circumstances.

The committee extends its sincere thanks to all the presenters for their excellent contributions.

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Middle East Branch

By Harout Taghilian

We had an unforgettable evening at the Middle East Branch on 13 December 2024, as we celebrated the 50th anniversary of the IOA. It was especially meaningful to host Professor David Waddington, the IOA President, who travelled from Manchester to join us in Dubai. His presence highlights the importance of this event for our Middle East members and reinforces the Middle East Branch's commitment to being an integral part of the IOA community. We were also thrilled to witness the remarkable growth of the Middle East Branch, as membership has quadrupled over the past four years.

In honour of the 50th anniversary, we were privileged to recognise the outstanding achievements of our members with the inaugural Middle East Branch awards. This was the first time such event was held by any IOA Branch, and the response exceeded the expectations. The initiative drew an impressive 17 entries, showcasing the talent, dedication and innovation within the Middle East acoustics community.

During the event, there were five interesting presentations by the members, and these were as follows:

1. *Massive scale noise modelling* by Gerald Stewart from Inhabit;

2. *Acoustic design solutions to reduce embodied carbon* by HIBA Aijaz from Knauf Insulation – Middle East;

3. *Adapting with emerging technologies* by Jacob Mathew from Ramboll;

4. *Elevator noise mitigation* by Manav Bhatia from WSP in the Middle East; and

5. *Etihad Railway* by Monika Pachla from Cundall.

For further details about the presentation, please reach out directly to the presenters.

Coming back to the awards, the high-calibre of submissions in all three categories:

- Sustainability Project of the Year;
- Innovation Project of the Year; and
- Outstanding Engineering Project of the Year

serves as a testament to the exceptional work being carried out in the Middle East region. These awards not only celebrate outstanding projects but also offer a platform to highlight the talent and innovation within the Middle East acoustics community. They reflect the ongoing commitment to recognising and encouraging excellence in the field.

Sustainability Project of the Year 2024

As sustainability is a core value of the IOA, we are proud to honour projects that embody this principle. The winners in this category were Mohammed Afaque for the Highly Commended Sustainability Project of the Year, and Jacob Mathew and Serrah Jacob for the Sustainability Project of the Year award.

Innovation Project of the Year 2024

This award recognises projects that push the boundaries of acoustic design and application. The winners in this category were Rolins Thomas Roy for the Highly Commended Innovation Project of the Year, and Ali Aurangzeb, Andreas Lejholm Nilsson and James Powlson for the Innovation Project of the Year award.

Outstanding Engineering Project of the Year 2024

The Outstanding Engineering Project of the Year award acknowledges projects that demonstrate excellence in acoustic engineering. There were an exceptional nine entries for this award and the winners in this category were Andreas Lejholm Nilsson, Manav Bhatia, and Krishna Chaitanya Siragam for the Highly Commended Outstanding Engineering Project of the Year, and Daniel Harrison, Omar F. and Badruddin AK for the Outstanding Engineering Project of the Year award.

A heartfelt thanks to the judging panel for dedicating their time and expertise to ensuring a fair and thorough evaluation of each project. Special thanks also go to the recently retired Linda Canty, IOA Office & Events Manager, and Hilary Notley, our VP for Groups and Branches, for their tireless efforts in organising these awards, to Professor David Waddington for joining us in person all the way from Manchester and to WSP for hosting this event.

Branch members are looking forward to the next event and further expanding the acoustics community in the region, while making a change in the construction industry with a focus on sustainable design.

Southern Branch

By Sebastian Woodhams

Bowers & Wilkins welcomed a small group of Southern Branch members to their factory last December for a fascinating tour to see how they build their loudspeakers.

The tour began with a look at how they manufacture cabinets from scratch by pressing and curving wooden sheets into shape followed by trimming, sanding, painting and inserting the internal structure. We then moved on to see how the speaker drivers are assembled and installed into the cabinets, from woofers to their diamond dome tweeters, and how the company manufactures crossover boards in-house. Finally, we moved over to the visitors' centre for a presentation on the latest technology and innovations Bowers & Wilkins are introducing to their products, followed by lunch and a demonstration of their loudspeakers in use.

Many thanks to Bowers & Wilkins for welcoming IOA Southern Branch members.

Bowers & Wilkins cabinets in production

South West Branch

2024 started with our online AGM in May. In June we had the SW Chair, Jon Tofts giving a hybrid live and online talk about the new Environment Agency *Method Implementation Document for BS 4142, which* clarifies the requirements the EA have for BS 4142 noise impact assessments. In November we hosted our IOA 50th anniversary event at Clifton suspension bridge, exploring the echoes of their underground caverns. Jon also presented a short IOA 50th anniversary video, interviewing an IOA member for each of the five decades. You can watch the video at **https://www.youtube.com/results?search_query=IOA+SW+50th**

We finished off the year with a padel tennis Christmas social event.

For details, please contact South West Branch Chair, Jon Tofts (**Jon.Tofts@environment-agency.gov.uk**)

Right: The underground caverns at Clifton suspension bridge – the dramatic venue for the IOA South West Branch 50th anniversary event

NEWS

Firearms amnesty for Turkish top-venting blank firers

Many IOA members still use starting pistols to get a quick measurement of room reverberation time, so may have one of the pistols mentioned in this news story.

To ensure that no-one ends up in breach of this new law, they should contact their local police force.

Suffolk Police held a firearms amnesty in February for Turkish manufactured top-venting blank firers (TVBFs) which are now illegal to possess following testing by the National Crime Agency (NCA) and policing.

Now, anyone in possession of a TVBF could be subject to prosecution and up to 10 years' imprisonment.

Tests by the NCA and policing, funded by the Home Office, show models produced by four Turkish manufacturers are readily convertible and therefore illegal. TVBFs are **legal** to buy in the UK without a license by people aged over 18 **unless** they are readily convertible.

In their original state TVBFs have a fully blocked barrel and are designed to discharge only blank cartridges. When discharged, combustion gases vent from the top of the weapon. TVBFs are sold with at least 50% of their visible surface painted a bright colour however, criminals may paint them black so they look like an original lethal purpose (OLP) weapon as well as convert them to a lethal purpose firearm.

Since 2021, UK law enforcement has recovered more than 800 of the guns in criminal circumstances and converted blank firers have been used in at least four homicides in the UK in the last two years. The firearms are the Turkish brands: Retay, Ekol, Ceonic and Blow.

Firearms legislation has not changed; the weapons are illegal to own under the Firearms Act 1968 and recent testing completed by the NCA has demonstrated that they can be readily converted using common household tools and without specialist skill on the part of the person carrying out the conversion.

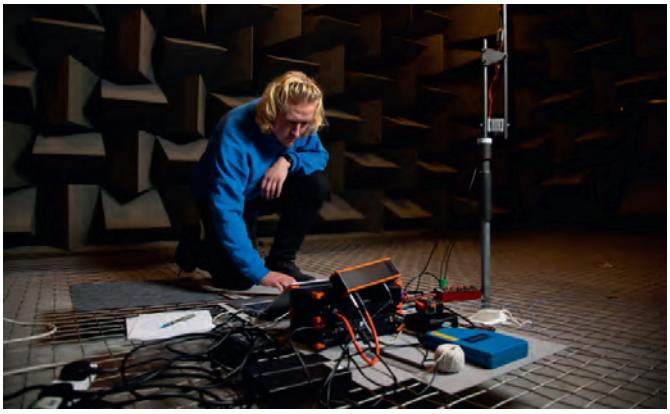
Assistant Chief Constable Tim Metcalfe, National Police Chiefs' Council Lead for the Criminal Use of Firearms, said: "During the last two years, policing and the NCA has identified and disrupted several workshops used to convert these pistols into lethal weapons.

"In the same period, large numbers of converted weapons were recovered across multiple locations, alongside thousands of rounds of blank calibre and modified ammunition.

"One investigation recovered more than 400 converted weapons from a single crime group. There is a strong demand for them evidenced by the numbers imported and subsequent recovery from criminals.

"Stopping the sale of these top-venting blank firers from being converted will go a significant way to help protect the public."

Addressing the grand challenges for noise pollution



Above: Noise measurements in an anechoic chamber *(image courtesy of University of Salford)*

Noise Network Plus is a new interdisciplinary network designed to address the grand challenges for noise pollution for the next 10-15 years.

Awarded more than £1.8 million in funding, Noise Network Plus is one of six research projects to receive a share of £10 million from the Engineering and Physical Sciences Research Council (EPSRC). Together they form part of its wider community engagement initiative to address 'Tomorrow's Engineering Research Challenges' (TERC), which focuses on tackling the most pressing issues facing the engineering sector.

To address the challenges in noise, a new research and innovation network is to be created to bring together diverse, dynamic teams from across disciplines to promote dialogue, co-design missions, form lasting and inclusive collaborations, and build unprecedented noise research capabilities.

The Network will support pilot projects to test new research ideas, gather missing evidence and carry out feasibility studies. It will also reimagine the education and training of engineers to include systems thinking in general, and sound and noise in particular, across engineering education.

The Noise Network Plus will be led by Mark Plumbley and Abigail Bristow (University of Surrey), Charlotte Clark (City St George's, University of London), Simone Graetzer and Antonio Torija Martinez (University of Salford) and Alan Hunter (University of Bath). The network is supported by more than 60 partners, including the IOA.

The Network one-day launch meeting will be held on 18 March 2025 in London, to identify the key challenges and explore how the network can address them. To help us, we'll be bringing together a broad cross-section of people from engineering and other disciplines including researchers, industry, professional institutions, policymakers, charities and other stakeholders.

https://www.ukri.org/news/tackling-tomorrows-engineering-research-challenges/

Consultation: National Policy Statement for nuclear energy generation

A draft of a new National Policy Statement for nuclear energy generation has been published for consultation as part of the ongoing review of planning policy. This follows a consultation last year on an approach to site assessment for nuclear energy. The draft consultation states 'While significant noise, vibration, or air quality issues are unlikely during operation, construction-related transport may have local impacts.' Noise is covered in detail in the Appraisal of Sustainability here **https://tinyurl.com/AppraisalofSustainability** and the consultation is open until midday 3 April 2025. Read the draft here: **https://tinyurl.com/draftNPS**

Music can touch the heart, even before birth

Researchers from the Autonomous University of the State of Mexico, the Metropolitan Autonomous University, the General Hospital Nicolás San Juan, and the National Institute of Cardiology Ignacio Chávez studied the effect of classical music on a foetal heartbeat. The team used mathematical analysis tools to identify patterns in heart rate variability, which measures the time between individual beats and can provide insight into the maturation of the foetal autonomic nervous system, with greater variability often indicating healthy development.

To test the effects music can have on foetal heart rate, the researchers recruited 36 pregnant women and played a pair of classical pieces for their babies; 'the Swan' by Camille Saint-Saëns, and 'Arpa de Oro' by Abundio Martínez.

By attaching external heart rate monitors, the researchers could measure the foetal heart rate response to both pieces and by employing nonlinear recurrence quantification analysis, they could identify changes in heart rate variability during and after the music was played.

"Overall, we discovered that exposure to music resulted in more stable and predictable foetal heart rate patterns," said author, Claudia Lerma. "We speculate that this momentary effect could stimulate the development of the foetal autonomic nervous system."

In addition to the overall effects of playing music, the researchers looked at the differences between the two classical pieces. While both were effective, they found that the Mexican guitar melody had a stronger impact on some measures, indicating that it produced heart rate patterns that were more predictable and regular.

The authors plan to continue to explore this effect, looking at different genres and types of music to further their understanding.

Stolen SLM

A 01dB class 1 Black Solo sound level meter, serial number 60673 has been stolen from a site at Bognor Regis hospital.

It has been reported to relevant authorities, but if you come across it anywhere, please phone its owner, Scott Castle, Acoustic South East, on **01273 455074** or email **info@ acousticse.com**

What music sounded like 500 years ago

Scholars from Edinburgh College of Art and KU Leuven in Belgium have been investigating the origins of the musical score, which contains only 55 notes, to cast new light on music from pre-Reformation Scotland in the early sixteenth-century.

The scholars made the discovery in a copy of The Aberdeen Breviary of 1510, a collection of prayers, hymns, psalms and readings used for daily worship in Scotland. Known as the 'Glamis copy' it is now in the National Library of Scotland in Edinburgh, it is a rare example of music from Scottish religious institutions 500 years ago and is the only piece which survives from the northeast of Scotland from this period.

Despite the musical score having no text, title or attribution, researchers have identified it as a unique musical harmonisation of *Cultor Dei*, a night-time hymn sung during the season of Lent.

The discovery was made as researchers examined numerous handwritten annotations in the margins of the Glamis copy and of primary interest to the scholars was a fragment of music spread over two lines on a blank page in a section of the book dedicated to Matins, an early morning service.

In the absence of any textual annotations on the page it was not clear whether the music was sacred, secular or even for voices at all, the researchers say.

After investigation they deduced it was polyphonic when two or more lines of independent melody are sung or played at the same time. Sources from the time say this technique was common in Scottish religious institutions, however very few examples have survived to the present day.

Looking closer, one of the team members realised that the music was a perfect fit with a Gregorian chant melody, specifically that it was the tenor part from a faburden, a three- or four-voice musical harmonisation, on the hymn *Cultor Dei*.

Dr James Cook, of Edinburgh College of Art, said: "For a long time, it was thought that pre-Reformation Scotland was a barren wasteland when it comes to sacred music. Our work demonstrates that, despite the upheavals of the Reformation which destroyed much of the more obvious evidence of it, there was a strong tradition of high-quality music-making in Scotland's cathedrals, churches and chapels, just as anywhere else in Europe."

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Committee meetings 2025

DAY	DATE	TIME	MEETING
Thursday	**13 March**	**10.30**	**Council**
Tuesday	1 April	10.30	CCWPNA Examiners
Tuesday	1 April	13.30	CCWPNA Committee
Thursday	10 April	10.30	Membership
Thursday	24 April	10.30	Meetings
Thursday	1 May	11.00	Publications
Thursday	8 May	10.30	CCHAV Examiners
Thursday	8 May	13.30	CCHAV Committee
Tuesday	13 May	11.00	CPD Committee
Wednesday	14 May	10.30	Research Co-ordination
Thursday	22 May	10.30	Executive
Tuesday	3 June	All Day	Engineering Interviews
Thursday	**5 June**	**10.30**	**Council**
Thursday	12 June	10.30	Engineering Meeting
Tuesday	17 June	10.30	ASBA (Edinburgh)
Tuesday	8 July	10.30	Distance Learning Tutors WG
Tuesday	8 July	13.30	Education
Wednesday	9 July	09.30	CCBAM
Wednesday	9 July	10.30	CCENM Examiners
Wednesday	9 July	13.30	CCENM Committee
Tuesday	15 July	10.30	Membership Meeting
Thursday	17 July	10.30	Meetings
Thursday	24 July	10.30	Membership
Thursday	7 August	10.30	Diploma Moderators Meeting
Thursday	14 August	11:00	Publications
Thursday	21 August	10.30	Executive
Thursday	**4 September**	**10.30**	**Council**
Tuesday	7 October	All Day	Engineering Interviews
Thursday	9 October	11.00	Publications
Thursday	16 October	10.30	Engineering Meeting
Thursday	23 October	10.30	Membership

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