

NOISE/NEWS

Volume 26, Number 4
2018 December

I N T E R N A T I O N A L

*A quarterly news magazine
and online digital blog published
by I-INCE and INCE-USA*

■ Summary of INTER-NOISE 2018
and selected papers

■ A tribute to Bill Lang

■ New noise modelling software

■ Noise news from around the globe

NOISE/NEWS

INTERNATIONAL

Volume 26, Number 4

2018 December

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A quarterly news magazine in PDF format with an Internet supplement published by I-INCE and INCE-USA

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The Institute of Noise Control Engineering of the USA, Inc.

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Noise/News International is a quarterly news magazine published in pdf format only by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA, Inc. (INCE-USA). Noise/News International is available for free download to members of INCE-USA, the members of Member Societies of International INCE and others. Thus, the availability of NNI is a benefit to these members, and to the noise control engineering community. Advertising sales are handled by Cathy Vail. Feature articles for this magazine are selected by the editors. Responsibility for editorial content rests upon the authors, and not upon I-INCE or INCE-USA, the Member Societies of I-INCE, or their members.

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SUBSCRIPTIONS: The Member Societies of International INCE and members of INCE-USA will be notified by e-mail when a new edition of NNI has been posted on the NNI website and is available for download. Anyone who wishes to be notified by e-mail of the availability of NNI for download may go to the NNI website and sign up as a subscriber. Any problems related to sign-up or other issues should be directed to the Institute of Noise Control Engineering Business Office, 11130 Sunrise Valley Dr., Suite 350, Reston, VA 20191-4371. **EDITORIAL CORRESPONDENCE:** Address editorial correspondence to Eoin A. King, PhD, INCE-USA Business Office, 11130 Sunrise Valley Dr., Suite 350, Reston, VA 20191-4371. Telephone: +1.703.437.4073; fax: +1.703.435.4390; e-mail: kingea@tcd.ie

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NOISE/NEWS

I N T E R N A T I O N A L

This PDF version of Noise/News International and its Internet supplement are published jointly by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA (INCE-USA). This is the third volume that is being published in PDF format only. The PDF format means that the issues can be read by freely available software such as that published by Adobe and others. It reduces publication time, saves printing costs, and allows links to be inserted in the document for direct access to references and other material. Individuals can sign up for a free subscription to NNI by going to the web site <http://www.noisenewsinternational.net>.

I-INCE

The International Institute of Noise Control Engineering (I-INCE) is a worldwide consortium of societies concerned with noise control and acoustics. I-INCE, chartered in Zürich, Switzerland, is the sponsor of the INTER-NOISE Series of International Congresses on Noise Control Engineering, and, with the Institute of Noise Control Engineering of the USA, publishes this quarterly magazine and its Internet supplement. I-INCE has an active program of technical initiatives, which are described in the Internet supplement to NNI. I-INCE currently has fifty-one member societies in forty-six countries.

INCE-USA

The Institute of Noise Control Engineering of the USA (INCE-USA) is a non-profit professional organization incorporated in Washington, D.C., USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE-USA publishes the technical journal, *Noise Control Engineering Journal*, and, with I-INCE publishes this quarterly magazine and its Internet supplement. INCE-USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE-USA Members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an Associate of INCE-USA and receive both this magazine and *Noise Control Engineering Journal*.

NNI and Its Internet Supplement

www.noisenewsinternational.net

The primary change in this PDF-only volume of *NNI* is the ability to have “hot links” to references, articles, abstracts, advertisers, and other sources of additional information. In some cases, the full URL will be given in the text. In other cases, a light blue highlight of the text will indicate the presence of a link. At the end of each feature or department, a light blue [back to toc](#) will take the reader back to the table of contents of the issue.

The Internet supplement contains additional information that will be of interest to readers of *NNI*. This includes:

- The current issue of *NNI* available for free download
- *NNI* archives in PDF format beginning in 1993
- A searchable PDF of annual index pages
- A PDF of the current *NNI* conference calendar and a link to conference calendars for worldwide meetings
- Links to I-INCE technical activities and I-INCE Technical Reports

From the President of I-INCE

It seems a short time since the international noise control community met for INTER-NOISE 2018, but now is the time to plan for INTER-NOISE 2019 in Madrid, Spain, from June 16 to 19. INTER-NOISE 2019 is happening a little earlier than has been common in recent years due to the number of other meetings scheduled for 2019 in Europe. However, June is an ideal time to visit, as the weather is good, and it is before the main summer holiday period.

The Spanish Acoustical Society (SEA) is very experienced in organizing technical meetings, and Antonio Perez Lopez and his team are hard at work planning for what I am sure will be an outstanding congress. The four plenary speakers will cover topics including rolling noise, perception, loudspeaker arrays, and structural mobility. The special sessions provide a comprehensive range of topics applicable to noise control engineers.

As well as a high quality technical program, there will be some unique events at this INTER-NOISE. Spain is known for its culture and food, and in addition to the usual opening social on Sunday and the opening of the technical exhibition on Monday, there will be an all-inclusive cocktail and tapas on Tuesday as a replacement for the additional-cost "congress dinner" at past conferences. The Tuesday event will mark the 50th anniversary of SEA and include a special musical performance followed by a cocktail and tapas. So make sure you get your abstracts in and participate in this congress for all those involved with noise control engineering. Visit <http://www.internoise2019.org> for more information.

In the international "noise" community, in addition to the annual INTER-NOISE Congress, there are two important events that I wish to bring to your attention. The first is to encourage activities to be held on International Noise Awareness Day (INAD), on Wednesday, April 24, 2019. This day was initiated by the Center for Hearing and Communication (CHC) in 1996 "to encourage people to *do something* about bothersome noise where they work, live, and play." Particularly in recent years, there have been some excellent initiatives from member societies that have gained much media attention and helped to raise the profile of concerns about noise on this day. So I urge the member societies to begin

to begin to plan events for this day. Background information is available at <http://chcheating.org/noise/day/> and https://en.wikipedia.org/wiki/International_Noise_Awareness_Day.

The second event is the International Year of Sound planned for 2020. I-INCE is a founding supporter of this initiative from the International Commission for Acoustics (ICA). The initial intent to gain UNESCO support suffered some challenges, for at the same time, there was a proposal for a Charter of Sound linked with La Semaine du Son (week of sound). So it has become a logical extension to have a year when all the national societies and international groups involved with acoustics are encouraged to have a week of sound. In 2020 there will be activities taking place all through the year and all around the world, and it will become a real International Year of Sound. The ICA will provide a centralized web page to coordinate and report on activities and some special ICA initiatives such as education packages and videos.

The terms of new members of the Board of I-INCE commence at the beginning of the year, and it is appropriate to advise of some changes and welcome two new members. Stephen Hambric has been vice president of Pan-America, and he has accepted the nomination to take on the role of vice president of rules and governance following the end of Dave Holger's term. After completing a term as director at large, Davi Akkerman from Brazil has accepted nomination as vice president of Pan-America. It is relevant to note that INTER-NOISE 2020 in Washington not only will be a celebration event but also will be jointly hosted by INCE-USA and the Brazilian organizations. We welcome to the board in 2019 two new faces: Catherine Lavandier from France has agreed to take on the role of vice president of Europe Africa. Stuart Bolton from USA was elected at the general assembly in 2018 to be the director at large for the Pan-America region. We look forward to their contributions to the ongoing activities of I-INCE.

I wish you all the very best for the festive season and the commencement of the new calendar year and look forward to your participation in INTER-NOISE 2019 in Madrid, June 16–19.

Marion Burgess
President, I-INCE 



Marion Burgess

From the President of INCE-USA

INCE-USA enjoyed another banner year in 2018. Membership remains stable at about 1,000 members, albeit with some effort spent collecting late dues. Our financial position continues to be strong. The noise control engineering courses (path to board certification) have garnered more interest than anyone expected, which speaks well for our future. Also during 2018, INCE-USA hosted the International Conference in Noise Control Engineering (INTER-NOISE 2018) in Chicago.

The conference was held in August at the Marriott in Chicago, Illinois. More than 950 attendees preregistered. As part of the technical program, 700 presentations were delivered. Over 80 companies participated in the conference exhibition. The conference banquet was held at the Museum of Science and Industry, and technical tours were conducted of Riverbank Laboratories and Columbia College.

Early in 2018, the INCE-USA business office (Drohan Management Group, DMG) underwent a structural change. On January 25, Virtual, Inc. announced that it had joined forces with Drohan Management Group and Professional Credential Services to form a newly combined firm providing professional services to technology, business, and scientific associations and societies and thereby forming one of the largest association management firms in the United States. "We believe the merger will benefit our clients with a greater depth of services," said DMG's Bill Drohan. The change in the name of the management company from

Drohan Management Group to Virtual, Inc. is now in place with all signage and emails.

Other noteworthy and recent news items include the following:

- Due to the unexpected popularity of the noise control courses leading to board certification, a pause has been imposed for signing up for new courses until July 2019.
- The first draft of the INCE-USA Policies, Procedures, and Information document (PPI) was completed during the year. The draft is currently under review in anticipation of board approval at the winter board of directors' meeting.
- As part of restructuring the business office, Virtual, Inc. has been assigned management responsibility for future conference exhibitions. Accordingly, on behalf of INCE-USA, I extend sincere appreciation to Rich Peppin for his many years of ensuring successful conferences while serving as the exhibition manager.

Finally, the success achieved this year for INCE-USA was due to thousands of voluntary hours from its dedicated officers and directors, the maturing of the INCE-USA/IBO relationship, and the enthusiasm of its membership in general. The names for all the contributors is too numerous to list here. Rather, I just ask that we do it all over again in 2019, and I look forward to welcoming you to NOISE-CON 2019 in San Diego.

Steve Marshall
President, INCE-USA 



Steve Marshall

Editor's View

Welcome to the final issue of *Noise/News International* for 2018.

This jam-packed issue looks back at INTER-NOISE 2018 and includes a tribute to Bill Lang, a champion of I-INCE, from Bob Bernhard. We also present summaries of two papers presented at INTER-NOISE 2018: the first reports on some interesting work examining the correlation between a child's attentiveness and their acoustical surroundings in a classroom, and the second describes the development of a tranquility map in New York City. We hope to continue these summaries as a regular feature in *NNI*, so if you would like a summary of your INTER-NOISE presentation to appear here, please do not hesitate to reach out.

Also featured in this issue is a closer look at iNoise, the new software from DGMR Software for

modeling environmental noise from industries and wind turbines.

As ever, we have updates from all around the world in our regional updates and NOISE/NOTES features. October saw the release of the eagerly anticipated World Health Organization's guidelines for environmental noise in Europe. These guidelines define noise exposure levels that should not be exceeded to minimize adverse health effects across Europe and offer significant scientific evidence to support these recommendations. The guidelines likely will be a valuable tool in the noise control community for many years to come.

See you all in 2019!

Eoin A. King, PhD
@NNIEditor 



Eoin A. King, PhD



MEMBERSHIP HAS ITS BENEFITS

Working in Noise Control Engineering, Architectural Acoustics, Noise and Vibration Problem Resolution, Environmental Noise, Product Noise Control or NVH?

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NOISE/NOTES

Eoin A. King, NNI Editor, and Eva Von Dell, NNI Social Media Assistant

NNI is on Facebook and Twitter—we try to keep our readers informed with noise news from all across the globe by highlighting interesting research and projects. Here is a roundup of some of the stories that have been making headlines. Follow [@NNIEditor](#) to stay up to date with all noise-related news.

New App Allows Users to File Airport Noise Complaints with the Press of a Button

A new mobile application has been developed that allows residents to make a noise complaint to local airport authorities instantly. It is specifically for the Montréal–Pierre Elliott Trudeau International Airport, but it could be extended to other airports around the world. The app, AEROplainte, was developed in an effort to make it easier for citizens who deal with aircraft noise at Trudeau airport to file complaints.

Active Noise Control for a Quantum Drum

At the Schliesser Lab at Niels Bohr Institute (University of Copenhagen), researchers have developed a technique similar to that in noise-canceling headphones, but for the quantum scale. The research addressed a key problem in quantum physics—at the quantum scale, any measurement actually disturbs the object being measured itself. To address this, they use a laser to monitor motion at a quantum level.

Diwali and Noise

The *Times of India* reports that Diwali this year was noisier than last year, despite claims that firecracker sales were actually down this year. Out of the 18 locations monitored for noise pollution by the Maharashtra Pollution Control Board, 17 saw noise pollution levels exceed the levels recorded in Diwali 2017. All firecrackers used for this celebration are subjected to a permissible limit of 125 dB.

Acoustic Camouflage to Evade Bats

Researchers in the UK have found that some moths have developed fur coats that serve as acoustic camouflage to protect them from the ultrasonic clicks of hunting bats. This fur can absorb up to 85 percent of the incoming sounds across the entire spectrum of frequencies used for bat echolocation. The work was presented by Thomas Neil (University of Bristol) at the Acoustical Society of America's 176th meeting in Victoria, Canada.

Required Sound Insulation for Apartment Blocks in Malta

The *Times of Malta* reports that architects there are pushing for under-tile floor insulation in apartment buildings in order to prevent rampant noise pollution in the country. However, there is some pushback from developers, who favor the extra few inches of ceiling height.

WHO Release Revised Environmental Noise Guidelines for Europe

The World Health Organization (WHO) released update guidelines for environmental noise in the European region. Following the publication of WHO's community noise guidelines in 1999 and night noise guidelines for Europe in 2009, these latest guidelines represent the next evolutionary step, taking advantage of the growing diversity and quality standards in this research domain. These WHO guidelines—the first of their kind globally—provide recommendations for protecting human health from exposure to environmental noise originating from various sources (including noise from transportation, wind turbine noise, and leisure noise).

Digital Noise Meter Results in Spike in Noise Complaints

In an effort to raise awareness of noise, the City of Edmonton in Canada introduced digital displays to present the current roadside noise level at four locations in the city. Unfortunately, the initiative had an undesired effect and saw noise complaints increase in areas with the displays. In fact, in one area the display was turned off within one week. It turned out that some drivers saw it as a challenge and revved their engines to see their numbers on the LED boards! 

INTER-NOISE 2018 Report

INTER-NOISE 2018, the 47th International Congress and Exposition on Noise Control Engineering, was held August 26–29, 2018, at the Marriott Magnificent Mile, Downtown Chicago, Illinois, USA. The conference saw 621 oral technical presentations, 65 poster presentations, 9 classic paper presentations, 4 keynote lectures, and 2 plenaries. INTER-NOISE 2018 was organized by Charlie Moritz (congress president), Joe Cuschieri (congress copresident), David Herrin (technical program cochair), and Teik Lim (technical program cochair). Also assisting with the organization and administration of the conference were Cathy Vail (congress secretariat), Richard J. Peppin (exhibition manager), Dana Lodico (student volunteer coordinator), and Gordon Ebbitt and Sarah McGuire (proceedings editors).

This year the theme of the conference was “impact of noise control engineering,” and contributions came from all around the world. There were a total of 952 registrants in attendance, including 194 students. With 79 technical sessions and 6 poster sessions housed in the conference center, the congress was very well organized and quite successful.

The congress was sponsored by I-INCE and was organized by INCE-USA. The conference also saw participation and organization from the American Society of Mechanical Engineers (ASME) Noise Control Acoustics Division (NCAD). NCAD routinely participates in ASME’s International Mechanical Engineering Conference and Exhibit (IMECE), but every three years the annual conference for NCAD is held in conjunction with INCE-USA, which occurred this year at INTER-NOISE 2018.

Opening the Conference— Sunday, August 26

The opening events for the conference were held on Sunday afternoon, August 26. In the opening ceremony, the organizers provided a very nice opening reception with a warm welcome to attendees from around the world.

The first keynote presentation was by Barry Gibbs, a professorial fellow within the Acoustics Research Unit of the University of Liverpool School of Architecture. The topic of his talk was “Structure-Borne Sound in Buildings: Application of Vibro-Acoustic Methods to Measurement and Prediction.” He noted that the methods required for prediction of structure-borne sound are more complicated than for airborne sound, but practitioners of building acoustics require methods for the former, which are as straightforward as for the latter. His work proposes a database, based on reception plate measurements and on simple calculations, which offers consultants and design engineers a practical approach to predicting structure-borne sound.

Sunday also saw a free STEM workshop that was open to the public. It was hosted by A Quieter Future (AQF) and INCE-USA. The workshop had free STEM kits and curriculum (adaptable for K–8) available. Through hands-on activities and engaging speakers, participants learned about the physics of sound, the importance of sound in marine and terrestrial ecosystems, and the effects of pollution on the environment.

Monday, August 27

The technical program began on Monday, August 27. There were 14 parallel sessions covering a wide array of topics.



Figure 1. Charlie Moritz welcomes everyone to INTER-NOISE 2018.

There were two parallel keynote lectures to begin the day. Jean-Louis Guyader, emeritus professor at the National Institute of Applied Sciences (INSA) in Lyon, France, gave a talk titled “Building Non Modal Vibro-Acoustics Models from Measured System Responses.” This lecture considered the problem of determining the optimal model to describe the vibration of a structure. He proposed a model based on a set of candidate models whose parameters are set by fitting theoretical dispersion curves to experimental ones. In particular, his work considered the Akaike Information Criterion to select the optimal model.

In parallel, Dr. A. R. Mohanty, professor of mechanical engineering at the Indian Institute of Technology, Kharagpur, India, and also the Shyamal Ghosh and Sunanda Ghosh chair professor, gave a lecture titled “Acoustic Materials for Industrial Noise Control.” This work studied the effect of pretreatment procedures on the acoustic, thermal, and physical properties of jute-based composites. It found that

jute fibers and jute composites have high transmission loss, high sound absorption coefficients, low flammability, low density, and high thermal stability; thus, they are an excellent choice for industrial noise control.

The encouragement of young professionals is vitally important, and in recognition of this, I-INCE funds a number of young scientist grants to assist with participation at each Congress. On Monday afternoon, the I-INCE Young Professional Workshop was held. This followed a practice school for young professionals already held on Sunday. At the practice school, four case studies on successful applications of noise control were presented. The goals of the young professional practice school are to provide mentorship via case studies and professional issues presented by world-renowned experts and to hold informal discussions between young professionals and I-INCE leaders and senior noise control engineers. Following the school, all participants were invited to the young professional workshop to gain valuable contacts and view presentations by noise control professionals.

Monday also saw an NCAD Tutorial and the NCAD General Meeting. The Rayleigh Lecture award lecture was also scheduled for this day. This year the awardee was Professor Roger Ohayon for his work with computational vibroacoustics in low- and medium-frequency bands. The Rayleigh Lecture award is given to an individual who has made pioneering contributions to the sciences as well as applications to industry.

The day concluded with the Exposition Opening Reception, held from 5:30 p.m. to 7:30 p.m. There were 81 different exhibitors, spanning interests from instrumentation to building materials, and including participation from us here at NNI.



Figure 2. Eric Wood and Joe Cuschieri at INTER-NOISE 2018. At the congress, Eric Wood received the INCE Distinguished Service Award to recognize his long history of service to the institute.



Figure 3. The INTER-NOISE 2018 Exposition.

Tuesday, August 29

On Tuesday there were 14 parallel technical sessions in operation covering a wide range of topics. Both the technical sessions and the exhibition continued through this day. There was active participation in both with many excellent papers.

There were two more keynote talks on Tuesday morning. Truls Gjestlan, a fellow of the Acoustical Society of America, delivered a talk titled “Fifty Years of Aircraft Noise Annoyance—Time to Introduce New Ideas.” This talk was based on his experience as a research scientist at SINTEF for 50 years. His

lecture pointed out that the conventional search for a “holy grail” of annoyance prediction is futile. Instead he offered a modern, causal approach to creating dose-response relationships for aircraft noise annoyance, which systematically treats nonacoustic factors and quantifies their influence.

In parallel, Dr. Li Cheng, chair professor of mechanical engineering and the director of Consortium for Sound and Vibration Research (CSVSR) at the Hong Kong Polytechnic University, gave his keynote titled “Sound Absorption of Micro-Perforate Panels in Complex Vibroacoustic Environments.” This work

considered the in situ sound absorption behavior of microperforate panels in various vibroacoustic environments, the modeling of their coupling with the surrounding acoustic medium, the underlying sound absorption physics as well as the influence of grazing flows.

Tuesday also saw the Women in Noise Control Engineering Lunch, the William Lang Memorial Session, and the Congress Banquet, which was held at the Museum of Science and Industry.

Wednesday, August 30

Technical sessions continued until 3:00 p.m. on Wednesday. The day also saw the INCE-USA Award Ceremony held in the afternoon. There were three major awards announced. Michael Bahtiarian received the William W. Lang Award for Distinguished Noise Control Engineer, Noral Stewart received the 2018 Laymon N. Miller Excellence in Acoustical Consulting Award, and the Martin Hirschorn IAC Award Best Paper Prize was announced as Hugo E. Camargo, Amanda S. Azman, and Lynn



Figure 4. The NNI booth at the INTER-NOISE 2018 Expo.



Figure 5. Noral Stewart—the 2018 Laymon N. Miller Excellence in Acoustical Consulting Awardee.



Figure 6. Michael Bahtiarian (left)—the 2018 William W. Lang Awardee for Distinguished Noise Control Engineer.

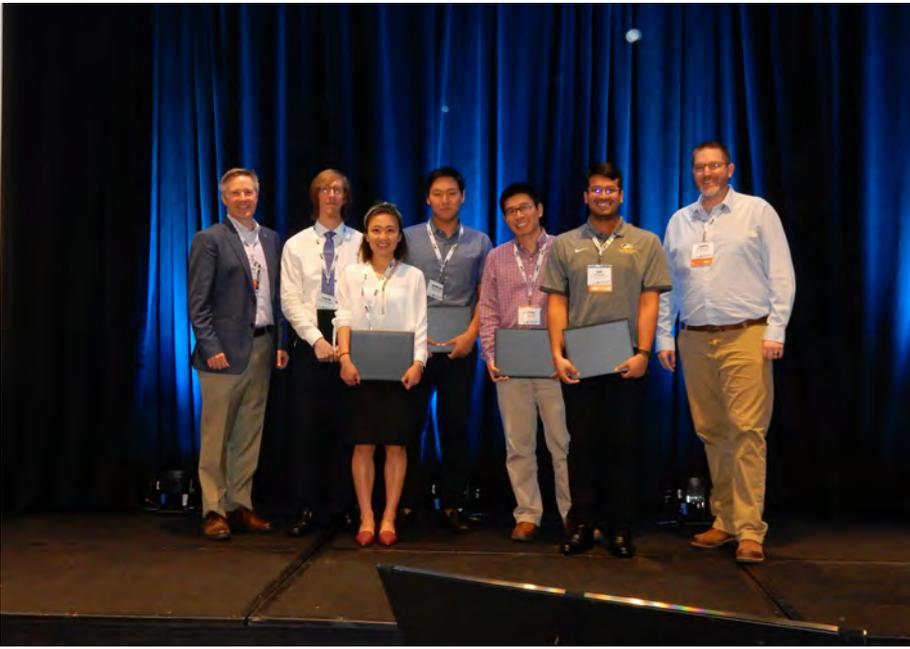


Figure 7. Student Award Ceremony—I-INCE recognizes the encouragement of young professionals is vitally important.



Figure 9. Jack Mowry, who received special recognition from INCE-USA for his contributions to the noise control community as editor and publisher of Sound and Vibration.



Figure 8. Jeff Fullerton (left) introducing the new INCE-USA fellows (left to right): Mandy Kachur, Judy Rochat, and Rick Kolano.

Alcorn’s “Development of Noise Controls for Longwall Shearer Cutting Drums,” published in *NCEJ* in 2016 (see vol. 64, no. 5:573–85).

The final plenary lecture was by Patricia Davies from Ray W. Herrick

Laboratories, Purdue University, and was titled “Perception-Based Engineering: Integrating Sound Perception into Engineering Design.” This lecture reported that the integration of sound perception into engineering design requires an understanding of the models

of noise generation, propagation, sound perception, and sound evaluation. Prof. Davies noted that such acoustical modeling need to be complemented by models of nonacoustic aspects of the design, and the parts of the multidisciplinary design and product realization team should collaborate throughout the process to find creative ways to satisfy the various needs of the user of the product.

The closing ceremony was held on Wednesday evening. I-INCE President Marion Burgess declared the closing of INTER-NOISE 2018, and the ceremony concluded with an invitation to Madrid for INTER-NOISE 2019. 

Social Media Round-Up: #INTERNOISE2018

INCE **INCE-USA** @INCE_USA · Aug 30
I-INCE President Marion Burgess declaring the closing of Inter-Noise 2018. If you were in Chicago, thanks for attending. If you were not, you missed a very good, high technical quality Congress.



INCE **INCE-USA** @INCE_USA · Aug 30
Next is Inter-Noise 2019 in Madrid



 **Lily Wang** @LilyMWang · Aug 29
Congrats to two of the newest INCE Fellows: Judy Rochat and Mandy Kachur! Two great female role models working in noise!!



Noise/News Int. @NNIEditor · Aug 28
#InterNoise2018 expo is back in full swing this morning. Be sure to drop by the #NNi booth! @INCE_USA



INTER-NOISE Session in Honor of Bill Lang

On Tuesday afternoon, August 28, 2018, at INTER-NOISE 2018 in Chicago, Illinois, I-INCE and INCE-USA held a session in memory of the contributions of Bill Lang across the perspectives of his family, his work in international standards, and his technical society contributions, especially to I-INCE and INCE-USA. A complete record of the session is being prepared by the INCE Foundation and should be available next spring.

The program of the session included the following points.

Bill Lang—Family and Personal Perspectives

Bob Lang, Bill's son, shared poignant memories of Bill as a father and a side of Bill other than the one we knew from his technical society work. Bob shared anecdotes of Bill's work style and the

family's glimpses of Bill's challenges and accomplishments.

Bill Lang's Seminal Contributions to INCE-USA, I-INCE, the INCE Foundation, and IBM

George Maling was unable to attend but contributed a paper that was summarized for the audience by several individuals in attendance. George focused on a high-level history of Bill's innovation and his contributions to IBM and to a significant number of technical societies. One society contribution that is less known in the I-INCE and INCE-USA communities is Bill's contribution to resurrecting what eventually became the IEEE Signal Processing Society. George also provided commentary on the origins of the INTER-NOISE series, INCE-USA, I-INCE, and the passage of the Noise Control Act of 1972.

Bill Lang's General Contributions to IBM Acoustics and IBM in General

Matt Nobile and Dave Yeager documented Bill's contribution to the establishment and growth of a global network of well-staffed acoustics and noise control laboratories at IBM. They noted Bill's establishment of the IBM Academy of Fellows, which still exists today and is acknowledged by the current leadership as a continuing significantly important contributor for IBM.

Bill Lang's Contributions at the National Academy of Engineering

Dan Mote, the president of the National Academy of Engineering, provided an audio tape acknowledging Bill's passion and his contributions to the NAE report "Technology for a Quieter America." In addition he



related an effort developed by Bill to “unleash the brilliance of the members of the national academies.” In the initiative, based on Bill’s proposal announced in 2016 just prior to Bill’s passing, the three national academies organized approaches to work together on member-initiated joint efforts that are bearing fruit today.

Bill Lang’s Contributions to International Standards Work

Bob Hellweg described Bill’s many efforts to lead international standards organizations in the development of acoustics and noise control standards. Bill held significant responsibility for a broad set of ISO standards development activities and, through that, established a significant network of contacts that were helpful to his society activities.

Technology for a Quieter America and Follow-On Workshops

Eric Wood described the “Technology for a Quieter America” report and the seven

follow-up workshops that have resulted from this effort. Bill contributed to this effort financially and participated in the workshops until his passing.

Bill Lang and Global Noise Policy

Tor Kihlman provided a video tape that briefly described Bill’s efforts to bring European participation to the global noise control engineering community. His presentation focused primarily on the efforts he and Bill invested in outreach to policy makers and eventually to the work they did to engage national academies globally through the International Council of Academies of Engineering and Technological Sciences (CAETS).

Bill Lang’s Contribution to Noise Control Engineering in Japan

Hideki Tachibana spoke about the pivotal role Bill played in the establishment of INCE/Japan and his many contributions to the development of noise control engineering in Japan.

Bill Lang and I-INCE

Bob Bernhard chronicled Bill’s many contributions to the conceptualization, launch, growth, and sustainment of I-INCE. These recollections were drawn from the I-INCE archives, which document the incorporation of I-INCE in 1974, its early days led by Bill and Fritz Ingerslev, Bill’s presidency from 1988 to 1999, and Bill’s postpresidency contributions.

The session was followed by a reception with a toast to the amazing legacy left by Bill Lang. 🍷



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Bill Lang and the International Institute of Noise Control Engineering

Robert J. Bernhard

University of Notre Dame

Introduction

The passing of William (Bill) W. Lang has been cause for reflection and examination of Bill's many contributions across an array of important fronts. One of those, and the one where I had the most personal interaction with Bill, was with the I-INCE. My personal memories have been significantly supplemented by access to the I-INCE archives, which consist of much of the correspondence and notes of the early days of I-INCE from Bill and the first president of I-INCE, Fritz Ingerslev. It is from these records that I draw much of what I write in this paper. In addition to recording Bill's contributions to I-INCE, it is also perhaps an interesting record of the phases of formation, launch, and growth of an organization that ultimately has had a significant impact on the developed world. (Perhaps some readers would be interested in taking up the task of digging deeper into the record to synthesize such lessons learned!)

By way of an introduction to my relationship with Bill, I first met and worked with Bill in connection with the INCE-USA Board of Directors starting in the mid-1980s. At the time I was a newly graduated PhD with a tenure-track assistant professor position at Purdue University and was relatively new to the noise control engineering community. I suspect I was elected to the board more to represent the strong noise control engineering program at Purdue than for my own contributions. Bill was

almost 30 years my senior and very well established. We had one interesting connection: we were both alumni of Iowa State University. I found Bill an excellent mentor and colleague. Bill brought me on to the I-INCE Board in about 2000, first by nominating me to be the vice president for the Pan-American region and then by proposing my election as the secretary-general. Overall, Bill and I worked together for 30 years.

The Founding of the I-INCE

From the distance of many years, the founding of I-INCE appears to be a confluence of Bill Lang's global network established through his representation of IBM at international standards meetings and technical conferences, the successful founding of INCE-USA in 1971, and the success of the early INTER-NOISE congresses in 1972, 1973, and 1977.

In his personal correspondence with Rich Peppin, reflecting about his career and the founding of I-INCE, Bill highlights the invitation of Fritz Ingerslev to INTER-NOISE 1972, the first of the congress series. As a result of that visit, Ingerslev invited INCE-USA to hold the second INTER-NOISE in Europe. It was held in Copenhagen in July 1973. The idea of an international organization of societies was formulated there, although there is evidence that Bill had hatched the idea earlier and discussed it with various colleagues prior to the discussions in Copenhagen. I-INCE was founded at

a meeting in London on July 28, 1974. The organization was announced at the plenary session of INTER-NOISE 1974 on September 30, 1974. It was registered as a Swiss *verein* and established formally on October 1, 1974. Early correspondence about I-INCE, before and after the formal establishment of the institute, focused on many issues, but prominently on the establishment of the by-laws and on the interaction of the nascent institute and the International Commission, which had been established in 1951 as an international organization of societies and to which many of the prospective members of I-INCE already belonged.

The first board meeting was held on August 26, 1975, in Sendai, Japan, at the INTER-NOISE 1975 congress. The original board of directors consisted of President F. Ingerslev, Secretary-General E. Rathe, Directors-at-Large W. Lang and J. Mattei, and directors representing the INTER-NOISE series: M. Crocker (1972), J. Pederson (1973), and J. Johnson (1974). The business of the first meeting consisted primarily of discussion of membership growth, finances, changes to the by-laws and congress planning for INTER-NOISE 1976 and 1977.

Growing I-INCE

The early years of I-INCE were devoted to establishing the INTER-NOISE series, formalizing governance, and growing the membership. The archives show the substantial work of Bill and Fritz Ingerslev

in contacting their network of acousticians worldwide. In those days, before the internet and email, these contacts were primarily through traditional mail. There is evidence as well of long delays as the acoustical societies deliberated about joining I-INCE. Bill and Fritz also note follow-up conversations and discussions at standards meetings and technical conferences. The I-INCE launched in 1975 with 5 members: INCE-USA, the Danish Acoustical Society, the Acoustical Society of Norway, the Acoustical Society of Japan, and Schweizerische Gesellschaft für Akustik. These 5 societies were joined in 1976 by 5 additional societies: the Acoustical Society of America, VDI-Kommission Lärminderung, the South African Acoustics Institute, the Australian Acoustical Society, and INCE/Japan. By 1984 the report of the state of affairs of I-INCE reports 23 member societies and 5 sustaining members. It also records contacts made to 18 additional technical societies. Solicitation of membership was carried out largely by Fritz Ingerslev and Bill Lang, with occasional assistance from others.

During this period, quite a bit of attention was paid to governance. There are records of continual improvement of the by-laws, the documentation of the responsibilities of the officers and directors, and guidelines for how to host INTER-NOISE congresses—efforts that continue today but were made very early on by I-INCE founders.

I-INCE also established a newsletter in its early days. The board minutes reflect considerable effort to solicit news from international correspondents and adjustment of the content and audience. In those early years, publication and distribution was also a frequent topic of discussion, as international mailings could be a logistical challenge and quite expensive.

I-INCE President

Bill served as president of I-INCE from 1988 to 1999. This period is marked by

significant growth and formalization of I-INCE. The membership grew from 27 members in 1988 to 42 members and 3 observers in 1999. The board of directors grew from 9 to 14 over this period with the notable establishment of officer positions for technical initiatives and communications and the beginnings of the offices of the regional vice presidents. The credit balance grew from BEF 620,000 (approximately US\$14,000) in 1988 to BEF 2,800,000 in 1999.

Notably, during Bill's tenure as president, the first I-INCE Rules of Operation were developed and approved. I-INCE Rules Part 1: I-INCE General Assembly and I-INCE Rules Part 2: I-INCE Technical Study Groups were approved in 1998. I-INCE Rules Part 3: I-INCE Congress Selection Committee was approved in 1999. The I-INCE Rules are complementary to the by-laws and have become a major and efficient organizational structure for I-INCE.

During Bill's presidency, the major activity of I-INCE, the INTER-NOISE congress series, grew substantially and moved from a cycle where the congress was held every second year in the United States to a cycle where the congress rotates on a three-year cycle between the Pan-American region, the Europe-Africa region, and the Asia-Pacific region. The new rotation resulted in increased exposure of I-INCE internationally and greater participation in the meetings.

Postpresidency

Following his presidency of I-INCE, Bill served as past president for the period of 2000 to 2003, vice president for global noise policy from 2005 to 2008, and vice president for rules and governance from 2009 to 2015. He served as a distinguished board member in 2016, the year of his passing.

Almost from the beginning of his postpresident tenure, Bill assumed the role

of “parliamentarian” of the organization. He was the board resource for governance issues. And particularly as a new generation of officers and directors were elected to the board, Bill served as the primary bridge to the founding of the organization and as organizational memory of policy and purpose. Often, as a result of his awareness that policies needed to be updated or that current practice did not match written policy, Bill volunteered to update and rewrite the I-INCE Rules of Operation and the by-laws. Almost every meeting of the board included a proposed update or new policy. Without Bill's leadership in this area, it would be hard to imagine how the I-INCE practice and policy would be in its current good state of alignment.

Bill also devoted considerable energy to global noise policy. His history dating back to standards work, his involvement with the development of the US Noise Control Act of 1972, and his role in other international noise control policy deliberations gave him more insight than many other noise control engineering practitioners of the merits of activity on the front of informing and advocating for policy. His awareness was also enhanced by his observation of the impact and role that the US National Academy of Engineering, to which he was elected in 1978, had played on a wide front.

He took on a large role at the I-INCE Board of Directors throughout his tenure, but with a formal designation as vice president of global noise policy over the period from 2004 to 2008, his efforts focused on raising I-INCE's voice as an advocate, in the policy community, for a quieter world. While he was a willing ambassador for noise control engineering in any venue, the focus of his efforts to affect global noise policy was to engage the national engineering academies. To do so, he and Tor Kihlman engaged the International Council of Academies of Engineering and Technological

Sciences, Inc. (CAETS). A comprehensive summary of the effort is included as an attachment of the 2012 minutes of the board of directors. The effort with CAETS started at their convocation in 2007. In 2010, CAETS established a Noise Control Technology Committee (NCTC) for the purpose of providing science-based support for policy makers on technological options for a quieter world. The NCTC is listed, as of this writing, on the CAETS website at <http://www.caets.org/cms/7123/9996.aspx>, with a summary of activities and symposia.

In a similar effort, Bill was persuaded and contributed to the funding of the Technology for a Quieter America project at the US National Academy of Engineering. The effort led by George Maling, Eric Wood, and others has been a huge undertaking to convene discussions about various noise control challenges. The original 14-member committee produced a report in 2010, which was published by the National Academies Press. It explored four themes: noise control engineering and public concerns, applications of current technologies, research and development initiatives, and intragovernmental and public relations

programs. The publication of the report was followed by six workshops in the period from 2012 to 2017. A seventh workshop on noise from unmanned aerial vehicles will be held in 2018. Details and reports from past workshops are available on the INCE-USA website at <https://inceusa.org/publications/technology-for-a-quieter-america/>.

Conclusion

I closed my memorial to Bill Lang at INTER-NOISE 2017 in Hong Kong by characterizing Bill as a founder, builder, leader, and sustainer. These were not idle words. Bill's thinking and energy were central to the idea of I-INCE. If not *the* founder, he was certainly the principal founder. Bill and Fritz Ingerslev were the champions of I-INCE as it grew from newborn to adolescent. Bill took over as president in 1988 and grew I-INCE into a mature organization with the requisite formality as well as the inclusiveness to expend far beyond the influence of its founders. He spent the last 15 years of his life supplementing the new generation of leaders and filling gaps to do what needed to be done. His contributions were enormous and selfless, enduring and wise.

Acknowledgments

This paper above all acknowledges the many important contributions of Bill Lang to the founding and building of I-INCE. In addition, the author wishes to acknowledge the historical record of the I-INCE archives, some of which has been uploaded to the I-INCE website, particularly the papers of Bill Lang and Fritz Ingerslev. And the author wishes to thank George Maling for his helpful comments on early drafts of this paper.

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Quality Assured Implementation of ISO 9613 in iNoise

Erwin Hartog van Banda

DGMR Software, the Hague, the Netherlands

Introduction

Uncertainty in prediction is usually considered to be related to the accuracy of the input data and the accuracy of the prediction method. This article addresses another very important kind of uncertainty that is related to the (un)clearness of the prediction method and the interpretations software developers are forced to make while implementing ambiguous prediction algorithms. For most noise calculation standards, there are no quality requirements and no test cases. The ultimate benefit of quality requirements would be that the calculated results with different software programs, using the same data input, can be expected to show just about the exact same results within a narrow margin, thereby avoiding incorrect comparisons between two different software implementations. This paper describes the findings of DGMR, member of the ISO 17534 working group, while using the recommendations of TR3 for the implementation of ISO 9613 in their new iNoise software.

Why QA

The ISO 9613-2 standard is a well-known method for the calculation of industrial

environmental noise. The standard was published in 1996 and since then has been implemented in numerous commercial software applications. The standard, however, does not contain quality requirements for software implementation, such as test cases and recommendations on interpretations of potentially unclear algorithms. Therefore, the calculated results of different implementations for the exact same situation cannot be expected to be the same. When comparing different software implementations of ISO 9613-2 the results of different applications can differ up to 5 dB for simple situations and up to 10 dB for complex situations. This makes the result of noise prediction software even more uncertain—not because of bugs or errors in the software, but because of unclear text and ambiguous algorithms in the standard. For many years now, this has been an inconvenient truth in the world of noise prediction. At the Forum Acusticum Congress in 2005, special focus was put on uncertainties while implementing noise prediction standards. More papers on quality requirements for software implementation were presented in the years following. This has all contributed to the new quality standard ISO 17534 in 2015. In TR3 (ISO/TR

17534-3) test cases and recommendations for implementation of ISO 9613-2 are described in detail. This should make ISO 9613-2 unambiguous and should make it straightforward to implement in software.

The Effect of QA

The main goal of ISO 17534 is to minimize the differences in calculated results of different implementations of noise prediction standards. To examine the effect of ISO 17534, two commercial software implementations were compared using the 19 test cases described in TR3, one of the packages being the new iNoise software developed by DGMR. Both software packages are available with and without the recommendations of TR3. The comparison could therefore be made for two cases, with and without the recommendations of TR3. The results of the comparisons are shown in table 1.

As displayed in table 1, there is a significant positive effect when applying QA. The large difference of 15.6 dB in test case 17 is now reduced to 0.0 dB. The reason for this is the new unambiguous rubber-band method to calculate lateral detours. In ISO 9613 the left and right detours are in many cases unclear and

Table 1. Absolute Differences in dB between Two Software Packages with and without QA for ISO 9613

Test Case	1–10	11	12	13	14	15	16	17	18	19
With QA	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	2.4
Without QA	≤0.2	3.9	1.8	2.4	0.3	3.8	0.9	15.6	2.6	0.1

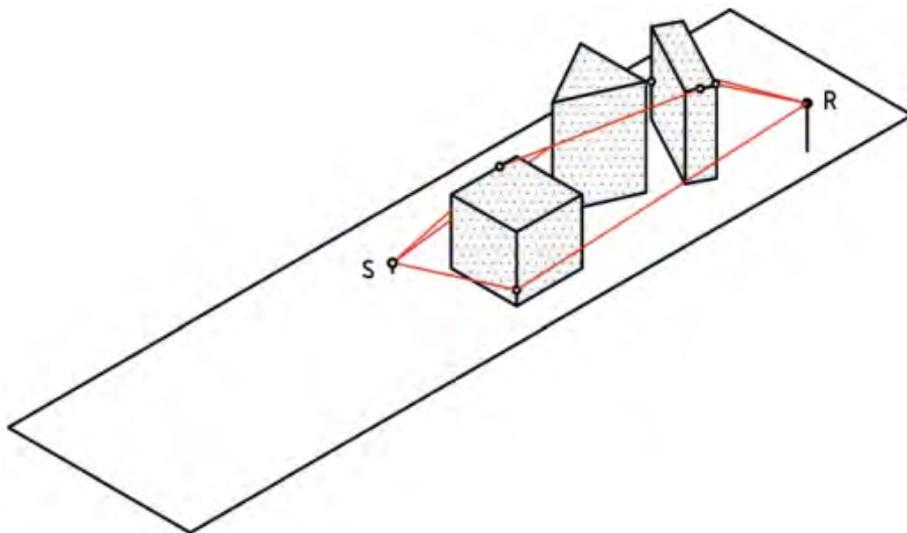


Figure 1. 3-D presentation of test case 17.

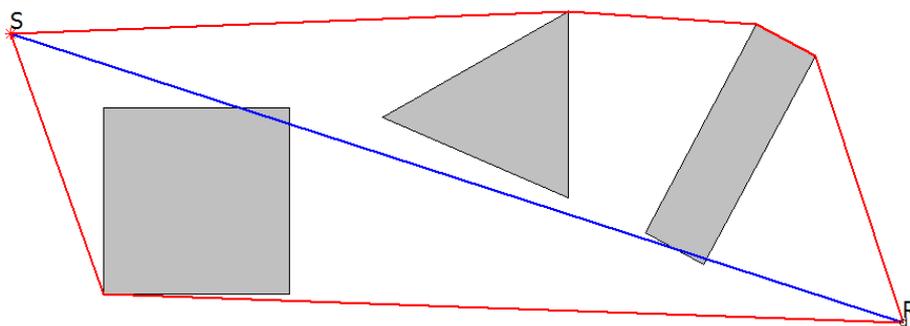


Figure 2. The red lines show the lateral detours using the rubber-band method for test case 17.

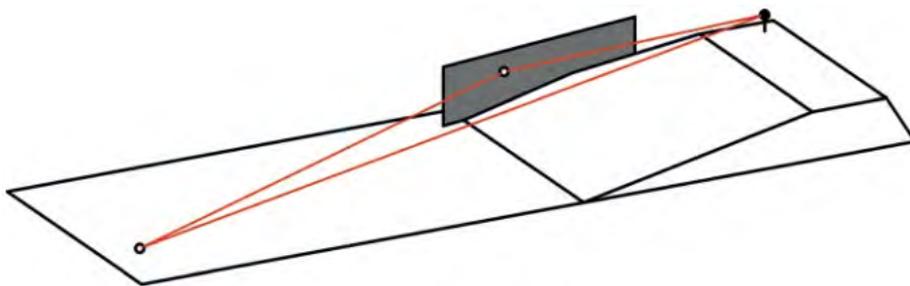


Figure 3. 3-D presentation of test case 19.

ambiguous. One could choose to select the screen that has the highest screening effect. In TR3 the combined effect for all screens, according to the rubber-band method, is always used as shown in figures 1 and 2.

The difference of 2.4 dB for test case 19 (fig. 3) is caused by a contradiction between TR3 and ISO 9613-2. In test case T19, a reflection is calculated in a barrier that is located on a slope and the length of which is larger than its

height. According to the test results of TR3, there is a reflection contribution for 500 Hz until 8,000 Hz octave bands. However, according to ISO 9613-2, this reflection should only occur for the 8,000 Hz “octave band due to the low height of the reflecting facade in respect to the wavelength.

This omission has already been reported to, and acknowledged by, the ISO 17534 working group.

For the other software package used in this comparison, the option to include the recommendations of TR3 obviously also deactivated the wavelength criterion for the height of reflecting barriers and automatically included a node to the barrier.

Conclusion

The ISO 17534 standard fulfills its aim. The differences in results between separate software implementations of ISO 9613 are strongly reduced when using the recommendations of ISO 17534-3. A similar positive affect can be expected when using this approach for other methods such as the new CNOSSOS-EU.

iNoise-Free

iNoise is the new intuitive and quality assured software from DGMR Software for modeling environmental noise from industries and wind turbines. The free configuration can handle impact studies with up to 20 sources and 100 objects. iNoise is now used in over 80 countries worldwide. The latest version includes a valley correction for wind turbines. For more information and download of the free configuration, visit <https://dgmsoftware.com/products/innoise/configurations/>.

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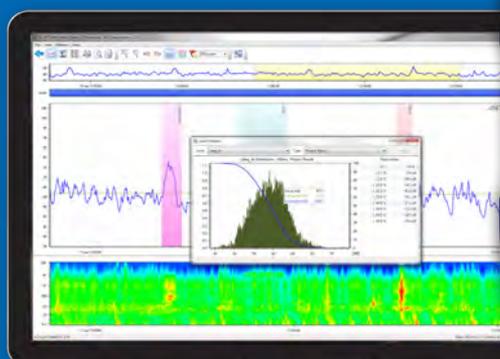
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Mapping Tranquility within Central Park, New York City

In urban areas it is important to provide citizens with green spaces to relax and unwind to enhance psychological and physical well-being. These areas can be considered restorative settings, giving relief from overload and stress, and cities must do more to provide and protect these areas. The EU requires all authorities to protect quiet areas in cities; they recognize that access to quiet areas have clear health and economic benefits. In New York the NYC Plaza Program aims to ensure that all New Yorkers live within a 10-minute walk of quality open space.

In order to help identify appropriate spaces for citizens to unwind, early research considering the concept of tranquility has yielded the Tranquility Rating Prediction Tool (TRAPT). TRAPT assesses the overall noise level together with visual features in the space and has been used in the development of tranquility trails in the UK. These are walking routes that allow space for citizens to reflect and recover while receiving the benefits of healthy exercise.

For this study, researchers at the University of Hartford, Connecticut, applied the concept of a tranquility rating to develop a map of tranquility within Central Park in New York City. A team of 14 participants walked predefined paths throughout Central Park and monitored noise levels simultaneously within their location as they walked through the park. Participants also took photographs at regular intervals. All data sets were time stamped and geo-localized, and together they were used to develop a map of tranquility in Central Park (figure 1).

This tranquility map was then further analyzed to select the most tranquil areas



Figure 1. A tranquility map of Central Park.

within the park. From this, two separate tranquility trails (north and south) were created. A summary of each trail is shown in figures 2 and 3. The north path winds through the North Woods of Central Park, taking walkers away from the city, up the Great Hill for some skyline views, then along the peaceful loch and into the conservatory garden before finally meandering the edge of

the Harlem Meer. The south trail starts and ends at the Metropolitan Museum of Art; this trail will take one through the Ramble, along the Lake, and close enough to the Mall to people watch, but it is removed enough to preserve the tranquility.

Overall, if we can predict or measure the tranquility of spaces, especially in



Figure 2. Tranquility trail 1.



Figure 3. Tranquility trail 2.

urban environments, it will be easier to identify or create more tranquil spaces, providing even more areas where individuals can escape from the stresses of modern-day life.

Editor’s Note

This is a summary of the work presented in King, Caltagirone, Steers, and Slaboch. 2018. “Mapping Tranquility—A Case Study of the Central Park

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Noise in Preschool Classrooms

When someone thinks of acoustics, they usually think of large performance halls and the orchestras that perform there. However, the field of acoustics has multiple applications in almost every facet of a regular person's day. From the sound that their microwaves make to the quietness of their cars, acoustics (specifically psychoacoustics) is an ever-evolving field, aiming to better the sound quality of everyday persons, including children.

In recent years, psychoacoustic studies on children's productivity have been conducted. Due to any combination of loud HVAC units, poor room acoustics, or simply ineffective classroom layouts, it has been observed that the acoustical properties of a classroom have an extreme impact on a child's development in the classroom. If a child is sitting at the back of a fairly reverberant classroom, right next to the large old gas heater, that child's academic success will be significantly less than that of someone sitting in the front row. To ensure an equal level of opportunities to learn, acoustical measures should always be considered.

While the correlation between a child's attentiveness and their acoustical surroundings hasn't been officially recognized in most countries and states, it is obvious that unwanted noise can distract anyone from concentrating on a task. To measure the effectiveness of an acoustically treated room on a child's attention, researchers in Japan did just that on a real group of kindergartners.

To control this experiment, two average kindergarten classes (30–40 kids) were analyzed in two rooms with similar layouts. The reverberation times of each room were measured, and simple acoustical treatments were applied to one of those rooms. Because kindergarten rooms are multiuse rooms, with a large play area, shelves and cubbies, and desks, acoustical measurements of the classroom were only made when children were being taught lecture style or being read a picture book by their teacher. To measure the attentiveness of the children, the team created a concentration time ratio (CTR), which was the percentage in 10-second intervals that the children looked at their teacher. After measuring the CTRs of

both classes, the team acoustically treated the other room and remeasured the CTR for the two classes. The results were as expected; when the acoustical treatment wasn't in the room, the CTR for both groups were around 50 percent, or about *half* the time. With acoustical treatments in the classroom, the CTR was between 80 and 90 percent.

While this experiment was very conclusive in its results, it doesn't tell the whole story. There are many acoustical factors that impact the performance of a room, such as outside/seasonal noise and neighboring rooms and hallways. These factors can also provide distractions to students and weren't included in this study. However, in this ongoing research, one thing is for sure: there's nothing quieter than attentive kids!

Editor's Note

This is a summary of work presented in Kawai, Yoshidome, Muta, and Masumoto. 2018. "Effect of Sound Absorption on Children's Concentration to Listening to Teacher's Speech in a Child Daycare Room." *Proceedings of INTER-NOISE 2018*, Chicago, IL, USA. 

Regional News

Pan-American News

Brazil

The International Day of Noise Awareness was observed in São Paulo earlier this year. For this event the Brazilian Association for Acoustical Quality (ProAcústica) partnered with the Municipal Secretariat of Green and Environment of São Paulo (SVMA) (for more details, see www.proacustica.org.br).

The Brazilian Society of Acoustics (acustica.org.br/sobrac) held their annual meeting in October 2018 in Porto Alegre, Brazil.

Canada

The 176th Meeting of the Acoustical Society of America (ASA) was held jointly with the Acoustics Week in Canada 2018 of the Canadian Acoustical Association (CAA) in Victoria, British Columbia, Canada, November 5–9, 2018. The 26th International Congress on Sound and Vibration (ICSV26), the annual congress of the International Institute of Acoustics and Vibration (IIAV) will be held in Montreal, Canada, July 7–11, 2019, with the support of the CAA and the involvement of J. Voix as general convener.

A number of awards were recently announced:

- Shaw Postdoctoral Prize: The winner is Olivier Valentin (École de technologie supérieure, Montréal), for the project “EARtrode, a Wireless In-Ear Custom-Fitted Intelligent Brain Computer Interface.”
- Bell Student Prize in Speech Communication and Hearing: The winner is Megan Keough (University of British Columbia), for the project



Figures 1 and 2. Annual Autumn Conference of the Korean Society of Noise and Vibration Engineering, October 2018.

- “Reafferent Feedback and Aerotactile Integration.”
- Fessenden Student Prize in Underwater Acoustics: The winner is Josee Belcourt (School of Earth and Ocean Sciences, University of Victoria, Victoria) for the project titled “Bayesian Geoacoustic Inversion of Seabed Reflection Data at the New England Mud Patch.”
- Bregman Student Prize in Psychological Acoustics: The winner

is Sean Gilmore (Department of Psychology, Ryerson University, Toronto) for the project titled “Feeling the Beat: An Investigation into Tactile Beat Perception.”

- Northwood Student Prize in Architectural and Room Acoustics: The winner is Magdalenn Bahour (Department of Architectural Science, Ryerson University, Toronto) for the project titled “Living Wall and Acoustic Comfort—A Case Study.”
- Canada-Wide Science Fair Award: The Canada-Wide meeting was held in

Ottawa, Ontario, in May. The winner is Zachary Trefler (Waterloo Collegiate Institute) for the project titled “VoiceShield: Teaching Computers to Distinguish Real Data from Fake.”

Congratulations to all.

Asia-Pacific News

Korea

The annual autumn conference of the Korean Society of Noise and Vibration

Engineering (President: Heung Sik Kim) was held October 17–20, 2018, at the Ocean Resort in Yeosu.

Under the conference theme of “With Noise and Vibration,” more than 255 papers along with 1 invited special lecture, 2 tutorials, 1 mini lecture, and many exhibitors’ sessions were presented. The conference was attended by more than 550 participants, and exhibitions offered by 30 corporate exhibitors and a beautiful Yeosu night cruise added to the excitement. 🏠

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■ June 16–19, 2019

INTER-NOISE 2019

2019 International Congress on Noise Control
Madrid, Spain
<http://internoise2019.org/>

■ August 25–28, 2019

NOISE-CON 2019

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Books Available

Noise and Vibration Control, edited by Leo L. Beranek
Noise Control in Buildings, by Cyril M. Harris

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