Promoting Global Acoustical Collaboration

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Introduction

The International Liaison Committee (ILC) of the Acoustical Society of America (ASA) underscores the importance of global interaction and cooperation in the expansive realm of acoustics. The Excellence in Acoustics Around the World session (held virtually in June 2021 at the 180th ASA meeting; see bit.ly/3QWDg3y, pp. A47-A49) was a testament to this commitment, serving as a vibrant forum for acousticians from across the globe to connect and share their expertise.

Charting Acoustical Horizons: A Global Perspective

Led by Brigitte Schulte-Fortkamp, chair of the ILC and founding advisor of the East and South East Asia Regional Chapter of the ASA (ESEA), and Andy Chung, representative from the ESEA, this session hosted experts from Asia, Europe, and the United States. Featuring nine invited papers, the participants presented and engaged in discussions on the most recent developments and collaborative initiatives in acoustic research and education. Four themes emerged from this globally minded session (Chung and Schulte-Fortkamp, 2021).

Here we highlight the themes in acoustics research, education, and the sharing of expertise on a global scale. We also take a deep dive into the acoustical advancements across the Asia-Pacific (APAC) landscape to spotlight the technological vanguards of that region.

Crossing Traditional Boundaries in Arts, Engineering, and Earth Sciences

The transformative power of acoustics extends well into architecture, urban development, and environmental preservation. Its role is not only evolving but is also revolutionizing these fields, becoming a vital component in their planning and execution strategies.

The Power of Partnership

Embracing international synergies aligns with broadening markets and fostering mutual growth. Synchronizing our initiatives with comprehensive goals, like those set by the United Nation's sustainable development objectives (see tinyurl.com/4hamwbh4), transcends mere expansion of influence. It creates a domino effect of beneficial outcomes, spreading through diverse industries and crossing national boundaries.

Charting Excellence with "EXCEL"

In the spirit of international cooperation, a universally adaptable guideline becomes invaluable. The "EXCEL" framework is crafted with this in mind, aiming to advance global acoustical excellence. It is built on five foundational pillars:

E, Empowering knowledge transfer;
X, eXtending application of acoustics to other sectors;
C, Capacity building;
E, Engaging stakeholders; and
L, Long-term strategic management toward healthy and harmonized cities and societies.

This framework is not just a guideline but a globally adaptable model that ensures we remain harmonized, setting standards that have a universal resonance and facilitate robust, impactful international collaborations.

Digital Pioneering

The digital outreach of the ASA's international chapters is carving out a new frontier, spotlighting an enthusiastic digital community ready to connect and evolve. Members of the ILC hosted virtual events during the pandemic, with the hope of linking up with acousticians in the APAC region. With over 430 active participants from a registration pool of 700 engaged in these events, this high level of engagement indicates a rich untapped potential in online education, virtual collaboration, and digital commerce within the acoustics industry.

https://doi.org/10.1121/AT.2024.20.1.67

Acoustical Advancements Across the Asia-Pacific Region

The APAC region exemplifies a harmonious blend of heritage and progress in the field of acoustics. Here we present key highlights, emphasizing the diverse acoustical approaches across the Asia-Pacific region. Drawing from insights shared by the speakers in the aforementioned session Excellence in Acoustics Around the World, we present the following highlights.

Soundscapes and Perception

At Tokyo Denki University, Tokyo, Japan, Akita (2021) delves into soundscapes, concentrating on their perception and the complex web of factors that shape this experience (see www.a.dendai.ac.jp). Anchoring his work in the International Organization for Standardization (ISO) 12913-1:2014 standard (Schulte-Fortkamp, 2019), Akita (2021) highlights a gap in Japan's research on soundscape perception and cognition. He brings attention to the profound influence of individual backgrounds, values, and even visual stimuli on the perception of soundscapes, suggesting a layered understanding of the concept. To cultivate enriching soundscapes, Akita advocates for more in-depth research. His goal is to design acoustic environments that are not only audibly pleasing but are also reflective of the cultural and personal nuances of the audience.

A Symphony of Tradition and Innovation

India's acoustical narrative is characterized by a deep-seated cultural heritage enriched by innovative technological strides. Agrawal (2021) has cast a spotlight on the country's advancements, particularly in AI-driven acoustical systems, suggesting a future where technology and traditional soundscapes intersect to transform everything from residential living to healthcare diagnostics. This is with the backdrop of integrating a nuanced production of classical music and the resonant acoustics of ancient temples with cutting-edge research and technology.

Complementing terrestrial acoustics, India's commitment to oceanic acoustic research is evident through the efforts of the National Institute of Ocean Technology, Chennai, India, and the Indian Institute of Technology Madras, Chennai. Researchers like Potty et al. (2021) are delving into the ocean's depth, seeking to unravel its secrets while fostering international partnerships that underline the country's extensive research capabilities.

Innovating Urban Acoustic Solutions

Singapore's metropolitan heartbeat brings with it the challenges of urban noise. Leading the charge for such challenges is Lee (2021) from National University of Singapore. Lee's research is a testament to the innovation required in tackling noise pollution in bustling urban environments. His exploration into sonic crystals, acoustic metamaterials, and noise barriers showcases cutting-edge solutions that can redefine urban acoustic landscapes.

One of Lee's standout proposals is the integration of features like Helmholtz's resonators and microperforated structures into sonic crystals. Such innovations promise optimal noise reduction, a boon for densely populated areas. Ventilated acoustic metastructures, combined with Helmholtz's resonators, further enhance this noise reduction capability, highlighting Singapore's commitment to acoustic comfort. He also advocates allowing smartphones to double as precise sound level meters, making environmental noise measurements more accessible to the masses.

A Beacon of Acoustic Excellence in the Asia-Pacific Region

Taiwan demonstrates a profound commitment to acoustic excellence, as outlined by Juan and Tsaih (2021). The nation boasts comprehensive acoustic regulations and standards, pioneering particularly in addressing low-frequency noise with regulations for the 20- to 200-Hz range. This foresight in sound management reflects Taiwan's holistic approach and alignment with international benchmarks. The local Taiwan Acoustical Association (established in 1987) also plays a pivotal role in uniting sound professionals and enthusiasts.

Taiwan's academic institutions, including at least 14 top universities offering specialized acoustics programs, contribute to its acoustical innovation. The National Taiwan University of Science and Technology, Taipei, has been particularly influential, with its architectural acoustics program involved in high-profile projects like the Taichung Metropolitan Opera House, Taichung, Taiwan, and the Taipei Pop Music Center, Taipei, Taiwan. With around 187 acoustic-related patents since 2004, Taiwan's academic and practical contributions to the field are both substantial and impactful.

From Melodies to Modern Sound Practices

The Philippines, with its rich cultural and colonial history, holds a unique position in the acoustical world. Hermano and Galan (2021) offered insights into the Philippines' acoustic environment, capturing its essence from historical, cultural, and modern perspectives. They highlighted the nation's musical prowess, which has given rise to world-class talents. Yet, the gap in sound education has led to misconceptions about sound and its health implications. The duo emphasized the pressing need for sound education, advocacy for sound measurement tools, and the formulation of legislation promoting sound practices. By addressing these gaps, the Philippines can harness its innate musical talents while ensuring sound health and well-being for its citizens.

Navigating the Urban Acoustic Landscape

In Hong Kong, a city characterized by its dense population and ceaseless activity, acoustical challenges are a central concern. Yeung from Hong Kong Institute of Acoustics (2021) showcased the city's innovative strides in managing environmental noise, notably through the creation of the world's first three-dimensional traffic noise mapping. This tool not only locates noise pollution but also provides valuable data for those shaping the city's future. The city's commitment to understanding how urban noise affects residents' health and quality of life is further underscored by their extensive noise-health survey, with inputs from over 10,000 households.

Advancements in indoor and architectural acoustics are also at the forefront, driven by the development of luxury hotels and sophisticated performance centers as Hong Kong evolves into an international financial hub. The demand for acoustic excellence has fostered local and international collaborations, leading to remarkable developments such as the largest theater for traditional Chinese opera and innovative residential designs featuring open-type windows for noise reduction.

Collaboration in Acoustics Research and Education

Zhang, University of Mississippi, Oxford, and Wang, Chinese Academy of Sciences, Beijing, (2021) discuss the current state of acoustics research and education in China, emphasizing mutual interests in collaboration with American acoustical societies. The talk highlights joint efforts like conferences, funding for scholars, and exchange publications, with examples like the *Journal of Applied Acoustics* and the *Chinese Journal of Acoustics* featuring bilingual greetings from the ASA Editor in Chief (Lynch, 2019). The speakers address challenges in initiating collaborations and emphasize the importance of ongoing international communication and cooperation for future advancements in the field.

Current and Future Challenges

The role within the ASA ILC is not only to bear witness to the acoustic innovation in the APAC region, but it also serves as a venue for our members to actively engage, contribute and shape the narrative of acoustic excellence. This region is emerging as a hub of acoustical innovation, filled with both potentials and obstacles. Delving into these challenges helps us understand what we must overcome to progress:

Language Barriers

The linguistic mosaic of the APAC region enriches its culture but can complicate communication. Differences in acoustical terminology and subjective perception can disrupt the exchange of knowledge and understanding.

Cultural Variations

Acoustics is intrinsically tied to our environments and thus our cultures. It is shaped by diverse traditions, as seen in India's music and Hong Kong's urban planning. Recognizing and respecting these cultural nuances is key to successful collaboration.

Logistical Challenges

The dichotomy between urban and rural areas in the APAC region presents unique obstacles and opportunities. Projects like three-dimensional (3D) noise mapping and AI-driven systems highlight the contrasts between densely populated cities and expansive rural areas. Infrastructure limitations, regulatory diversity, and supply chain issues pose additional difficulties. But with adaptive strategies and cooperation, we can strive for acoustical excellence across the region.

Trust Building

In fostering international collaborations, trust is crucial. It goes beyond technical partnerships to mutual respect, understanding, and shared objectives.

Technological Adaptation

Keeping pace with rapid technological changes is a formidable challenge. Ensuring that these technologies are accessible and beneficial across the region is essential.

Despite these hurdles, we are committed to harmonizing the future of acoustics in the APAC region and beyond by cultivating trust, understanding, and sharing our expertise.

Summary and Way Forward

The insights presented in this essay are derived from a specific session, representing only a glimpse into the acoustics landscape of the Asia-Pacific region, with a specific focus in the areas of arts, engineering, and earth sciences. Moving forward, we plan to engage with other regions for a more comprehensive understanding as well as extending to areas in the life sciences (e.g., communications sciences where the diversity of languages play an especially important role). Nonetheless, these recent discussions underscored the importance of international education and research collaboration for the ASA and the broader community. The Excellence in Acoustics Around the World session served as a pivotal platform for acoustic experts worldwide to share insights and collaborate on research and education. The collective momentum is clear: there is a push for enhanced international collaboration and communication to further the field of acoustics, benefiting both the ASA and the larger community.

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