

# Co-sponsored Meeting Reports

## FIRST INTERNATIONAL SYMPOSIUM ON AUDIBLE ACOUSTICS IN MEDICINE AND PHYSIOLOGY

Audible acoustic measurement and analysis techniques are being enhanced and applied to a growing array of biomedical research and clinical problems. This emerging field is of increasing importance in:

- orthopedic and sports medicine
- ear, nose, and throat diagnostics and treatment
- audiology and speech-language pathology
- critical care
- sleep medicine
- pulmonary medicine
- cardiology

The primary goal of this symposium was to bring together a wide range of researchers, technology developers, and clinicians to enhance their programs through exposure to novel technologies, techniques, and applications in this diverse field. It was cosponsored by the Acoustical Society of America and the IEEE Engineering in Medicine and Biology Society

The inaugural International Symposium on Audible Acoustics in Medicine and Physiology, held at Purdue University in West Lafayette, Indiana, USA on 8-9 September 2008, sparked wide interest and participation. The symposium was held in the new state-of-the-art Martin C. Jischke Hall of Biomedical Engineering, home of Purdue's Weldon School of Biomedical Engineering. Located a one hour's drive from Indianapolis and two hours from Chicago, Purdue's West Lafayette, Indiana campus and adjacent Discovery Park provide proximity and easy access to a variety of biomedical industry clusters. Attendees stayed at the Purdue Memorial Union Club Hotel on campus, providing easy access to the symposium, schools, and other amenities. Since pre-registration was filled months before the symposium, overall registration was expanded to accommodate a total of 87 attendees instead of the originally announced 50. An informal reception was held on 7 September, with more than 40 participants arriving early to network with colleagues. A walking tour of the Purdue campus was conducted the following morning that allowed participants to visit relevant laboratory and acoustic-related facilities on campus.

The symposium began with Andrew Daubenspeck of Dartmouth College giving an excellent overview of acoustic plethysmography and its application to monitor noninvasively small laboratory animals. John Earis of the University of Liverpool provided great insights into the abilities of optoelectronic plethysmography to provide measures of respiration in humans in conjunction with the transmission of sounds in the thorax. Rob Tepper of the Indiana University School of Medicine reported on a study to relate the amplitude of crackle sounds measured in isolated lung preparations to the size of the airway where these diagnostic sounds arise. Ozan Akkus of Purdue University provided a comprehensive view of musculoskeletal acoustic emissions and their

current evaluation in the detection and monitoring of stress fractures in athletes. Ron Miles from Binghamton University linked the hearing abilities of insects to a novel design of a directional microphone for hearing aid applications.

At the Symposium dinner, Bernie Krause of Wild Sanctuary put forth a fascinating and wonderful plenary audio demonstration of natural soundscapes from around the world. He related the temporal and spectral components that comprise these soundscapes to the many species that inhabit them. He noted though that many of the soundscapes can unfortunately no longer be heard at those sites due to habitat destruction in recent years.

On the second day of the Symposium, Bob Hillman of the Massachusetts General Hospital gave a thorough overview of advances in the acoustic monitoring of voice disorders and their growing impact on patient care. Jessica Huber of Purdue University focused on the study of voice problems in patients with Parkinson's disease and the importance of targeted speech therapies. Janet Slifka from the Massachusetts Institute of Technology overviewed the state-of-the-art in understanding pauses in spontaneous speech as they relate to automatic speech recognition. Mike Heinz of Purdue University discussed the inter-relations between acoustic fine structure and amplitude envelopes and how these relate to the perception of sounds such as speech and music. Martin Kompis from the University of Berne presented the use of adaptive noise reduction techniques to improve the performance of hearing aids. Bob Shannon of the House Ear Institute provided a comprehensive overview of cochlear implants including recent clinical advances. Tom Royston of the University of Illinois—Chicago focused on finite boundary and element modeling of the acoustic properties of the human thorax in health and disease. Jacky Smith from the University of Manchester gave a thorough presentation of cough analysis as applied to patient diagnosis and care. Ian Wells and John Beeton, both from the Swansea Metropolitan University, teamed-up to describe their efforts to categorize snoring sounds as they relate to specific etiologies. Lastly, Jeff Mansfield of SonarMed, Inc. provided insights into the use of sound to guide the placement and monitor the position of breathing tubes in neonates.

In addition to the oral presentations, 26 abstracts from around the world were selected from roughly twice that number of submissions as poster presentations covering a wide variety of ongoing research projects. The poster session was both vibrant and informative, with a wealth of ideas exchanged and linkages formed.

The symposium ended with all agreeing that it would be very desirable if it could be a regular event, e.g., occurring every few years with a growing number of related themes.

George R. Wodicka