

Call for Participation: Final Symposium on JST-ANR Binaural Active Audition for Humanoid Robots (BINAAHR)

March 18, 2013

Clock Tower Centennial Hall, International
Conference Hall I, Kyoto University, Kyoto, Japan



Sponsored by

- JST-ANR Binaural Active Audition for Humanoid Robots (BINAAHR)
- JSPS Grant-in-Aid for Scientific Research (S) “Deployment of Robot Audition Toward Understanding Real World”
- MEXT Grant-in-Aid for Excellent Graduate School to Department of Intelligence Science and Technology, Graduate School of Informatics, Kyoto University

Organized in cooperation with (requesting)

- Human Interface Society
- Information Processing Society of Japan
- Japanese Association for Artificial Intelligence
- Japan Society for Software Science and Technology
- The Society of Instrument and Control Engineers
- The Acoustical Society of Japan
- Robotic Society of Japan
- The Institute of Electrical Engineers of Japan
- The Institute of Electronics, Information and Communication Engineers
- The Association for Natural Language Processing

Binaural audition, i.e., hearing capability with a pair of ears in humans and animals as well as with a pair of microphones for machines, is a rudimentary function for perception and communication. To make robots, either physical or virtual, be in symbiosis with people, they must be endowed with the ability to localize, separate and process sounds under noisy environments or from a mixture of sounds. This symposium focuses on theoretical and pragmatic aspects of binaural audition. It is organized in the framework of the French-Japanese BINAAHR (BINaural Active Audition for Humanoid Robots) project, jointly funded by the French National Research Agency (ANR) and by the Japan Science and Technology Agency (JST). One-day series of papers will be presented by members of the BINAAHR consortium, as well as from an invited external lecturer.

Machine listening, or binaural active audition are first considered in the following manner:

- Generic design of binaural sensors
- Active binaural sound source localization
- Voice detection
- Binaural speaker recognition
- Ego-noise cancellation

The symposium secondly focuses on theoretical approaches to human binaural perception and on their outcomes in robotics. Theoretical contributions from cognitive psychology which put forward the active and exploratory nature of perception are outlined, as well as some artificial perception strategies which hypothesize the interweave of perception and action. The addressed topics are:

- Psychology of Perception in human hearing
- Geometric space perception based on the Sensorimotor Contingencies theory
- Audio-visual integration and Redundancy reduction based on Psychology of Perception based approaches

Technical Program

- 10:00-10:10 Introduction to BINAHR Project (*Hiroshi G. Okuno*, Kyoto Univ., JAPAN)
- 10:10-10:25 Overview of Japanese Team (*Hiroshi G. Okuno*, Kyoto Univ., JAPAN)
- 10:25-10:40 Overview of French Team (*Patrick Danès*, LAAS-CNRS, FRANCE)
- 10:40-11:40 **[Invited Talk]** Spatial hearing in rooms: Effects on selective auditory attention and sound localization (*Barbara Shinn-Cunningham*, Boston University, USA)
- 11:40-13:00 Lunch
- 13:00-13:20 Binaural Sound Localization and Tracking for Unknown Time-Varying Number of Speakers (*Eui-Hyun Kim*, Kyoto Univ., JAPAN)
- 13:20-13:40 Active Hearing for Auditory Space Learning and Source Localization (*Bruno Gas*, UPMC, FRANCE)
- 13:40-14:00 Active Strategies to Binaural Localization (*Patrick Danès*, LAAS-CNRS, FRANCE)
- 14:00-14:20 Audio-Visual Integration for Robots (*Kazuhiro Nakadai*, HRI-JP/Tokyo Tech, JAPAN)
- 14:20-14:30 break
- 14:30-14:50 Artificial Pinnae (*Makoto Kumon*, Kumamoto Univ., JAPAN)
- 14:50-15:10 Learning the Source Location: A Robust Multimodal Approach to Binaural Audition (*Sylvain Argentieri*, UPMC, FRANCE)
- 15:10-15:30 Multi-Party Dialogue System with Robots (*Kazunori Komatani*, Nagoya Univ., JAPAN)
- 15:30-15:50 Self-organizing of sound representations using neural networks (*Tetsuya Ogata*, Waseda Univ., JAPAN)
- 15:50-16:00 break
- 16:00-17:20 Poster Session
- Extracting Unknown Number of Sound Sources with Two Microphones (*Takuma Otsuka* (Kyoto Univ.), *Katsuhiko Ishiguro* (NTT), *Takuya Yoshioka* (NTT), *Hiroshi Sawada* (NTT), *Hiroshi G. Okuno* (Kyoto Univ.), JAPAN)
 - Bayesian Nonparametrics for Blind Source Separation with Permutation Resolution (*Kohei Nagira*, *Takuma Otsuka*, and *Hiroshi G. Okuno*, Kyoto Univ., JAPAN)
 - Optimal Positioning of a Binaural Sensor on a Humanoid Head for Sound Source Localization (*Alan Skaf*, and *Patrick Danès*, LAAS-CNRS, FRANCE)
 - A Binaural Sound Source Localization Method Using Auditive Cues and Vision (*Karim Youssef*, *Sylvain Argentieri* and *Jean-Luc Zarader*, UPMC, FRANCE)
 - Approaches for Automatic Speaker Recognition in a Binaural Humanoid Context (*Karim Youssef*, *Bastien Breteau*, *Sylvain Argentieri*, *Jean-Luc Zarader* and *Zefeng Wang*, UPMC, FRANCE)
 - Evaluating the Effect of Head Motion on Auditory Streaming Using an Acoustical Telepresence Robot: TeleHead (*Iwaki Toshima*, *Hirohito M. Kondo*, *Daniel Pressnitzer*, and *Makio Kashino*, NTT, JAPAN **[invited]**)
 - Active Pinnae Sound Localization for Binaural Auditory Robots (*Yoshitaka Noda*, *Daisuke Kimoto* and *Makoto Kumon*, Kumamoto University, JAPAN)

Important dates and Registration

For organization issues, participants should register by mail before March 10th 2013 (BINAHR-Reg@zeus.kuis.kyoto-u.ac.jp). In order to encourage scientific exchanges in the field of binaural audition and in connected areas, the registration is free of charge.

Scientific Committee

Sylvain Argentieri (Université Pierre and Marie Curie – ISIR)
Alain de Cheveigné (École Normale Supérieure – LPP)
Patrick Danès (Université de Toulouse – LAAS-CNRS)
Makoto Kumon (Kumamoto University)
Kazuhiro Nakadai (Honda Research Institute Japan Co., Ltd. / Tokyo Institute of Technology)
Hiroshi G. Okuno (Kyoto University)

Local Organization Committee

Katsutoshi Itoyama (Kyoto University)
Makoto Kumon (Kumamoto University)
Kazuhiro Nakadai (Honda Research Institute Japan Co., Ltd. / Tokyo Institute of Technology)
Hiroshi G. Okuno (Kyoto University)

Abstract of Invited Talk

In common everyday settings, echoes and reverberation distort spatial cues like interaural time differences and interaural level differences. This distortion biases sound source localization, and can also reduce the utility of spatial cues in perceptually segregating one sound source from other, competing sources in the environment. However, the distortion caused by room acoustics does not have a severe impact on the ability to selectively attend to a source based on its location. These different, inter-related phenomena will be discussed, and the reasons behind the differences in how room acoustics influence them will be considered.