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WELCOME TO SOUND INNOVATION

Welcome to the second issue of *Sound Innovation*, a quarterly newsletter created by Akustica to keep you abreast of technology advancements that can help you deliver the voice improvements demanded by your customers for your products. Each quarter, we will explore the timeliest topics affecting voice communications and provide you with access to leading-edge information that will help you understand emerging trends and evaluate new offerings.

This issue of *Sound Innovation* focuses on how to overcome the challenges associated with integrating a multi-microphone solution into a variety of consumer electronics products to improve overall voice quality.

MULTI-MICROPHONE SOLUTIONS FOR IMPROVING VOICE QUALITY IN CONSUMER ELECTRONIC DEVICES

The use of multiple microphones can dramatically improve the sound quality of consumer electronic devices of all kinds. However, integrating more than one microphone into the small factors that are common in many consumer electronic devices can be challenging since these devices tend to be noisy environments for microphones. Therefore, despite the improved acoustic performance that can be enabled by a multi-microphone approach, widespread adoption of multi-microphones has not yet been achieved. Recent advances in microphone technology can help overcome the integration hurdles. In particular, the next generation of silicon microphones can allow the simple implementation of microphone arrays and ultimately lead to a better end-user experience.

Read full story

AKUSTICA SENSORY SILICON™

Get more info on Akustica Sensory Silicon

AKUSTICA NEWS

- Akustica Raises Series B Round Funding of $15M
- *Sound Innovation* No.1 - Taking Voice Quality to the Next Level

INDUSTRY NEWS


Customers willing to pay extra for better voice call quality


VoIP is killing traditional telephony


Voice-controlled TV gets closer to reality

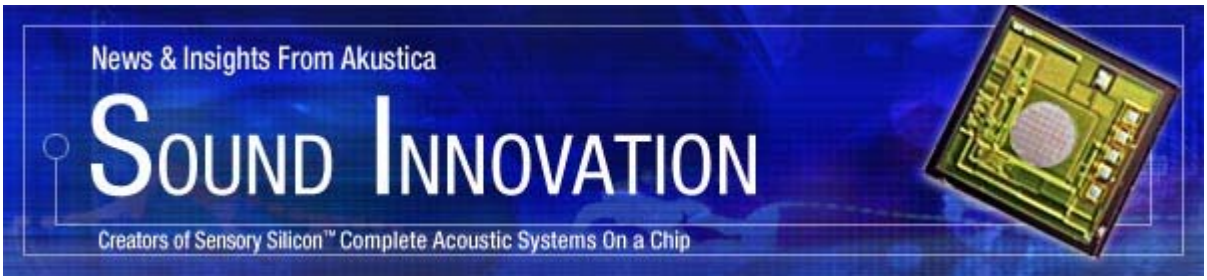

Green Hills rolls in-car infotainment platform


Mighty morphin' MEMS

INDUSTRY EVENTS

- **118th AES Convention**
  May 28-31
- **COMPUTEX**
  May 31-June 3
- **Transducers '05**
  June 5-9
- **Sensors Expo**
  June 6-9
- **SpeechTEK**
  August 1-4
- **Intel Developer's Forum**
  August 23-25
- **MEMS Executive Congress**
  September 20

Click here to meet with Akustica at any of these events



MULTI-MICROPHONE SOLUTIONS FOR IMPROVING VOICE QUALITY IN CONSUMER ELECTRONIC DEVICES

By Dr. Marcie Weinstein, Director of Product Marketing

A single microphone embedded in a mobile phone, wireless headset, or personal computer can do a reasonable job of transmitting voice when used in a quiet room. However, move into any real-life environment and suddenly your voice is competing with ambient noise such as traffic going by on a busy street. This additional noise can be both frustrating and tiring to the person you are talking to as they hear and understand less of what you are saying. In these types of noisy environments, multi-microphone systems used in conjunction with beam-forming, noise suppression, and acoustic echo cancellation algorithms can produce a clear, high-quality voice signal and provide a new way to differentiate consumer electronics products.

Some markets have been quick to adopt multi-microphone solutions for improved communications. For example, the automotive market has been using microphone arrays mounted in rear-view mirrors for hands free communication for a number of years in high-end vehicles. However, there are many markets which are still not taking advantage of this technology due in large part to the many challenges associated with implementing a high performance multi-microphone solution.

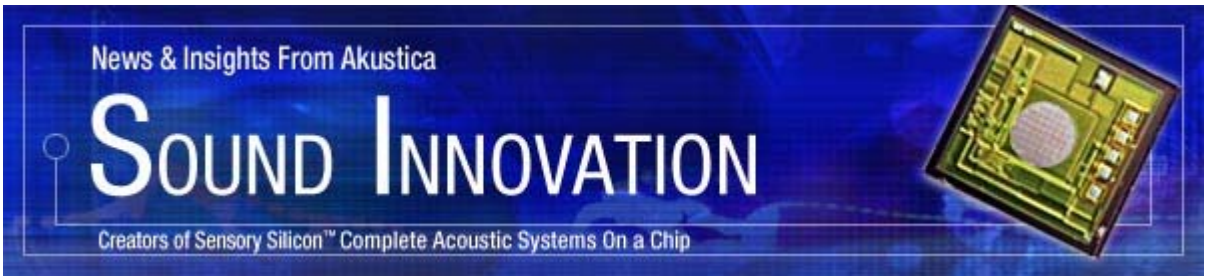
These challenges include:

- ***Size***: Standard microphones are too big for more than one to fit into a small consumer device such as a wireless headset.
- ***System Noise***: The interior of a mobile phone is inherently a noisy environment for the microphone both mechanically (e.g. keypad clicking) and electro-magnetically (e.g. RF/EMI interference). This noise gets amplified with each microphone added to the signal path.
- ***Manufacturability:*** The optimum acoustic location for a microphone array in a personal computer may be in the bezel of the monitor, requiring long lengths of shielded cables around the display and through hinges. This increases the bill-of-materials cost and limits microphone placement flexibility.
- ***Compute Power***: Many consumer electronics do not contain a processor that is configured to run the noise suppression and/or beam-forming algorithms required to optimize the performance of a differentiating multi-microphone solution.

While the above issues may have prevented successful multi-microphone implementations in consumer electronics, recent advances in microphone technology have made it possible to overcome many of these challenges.

For example:

- ***Small, surface-mountable microphones*** make it possible to fit one or more microphones into the small form factors required by consumer electronic devices today.



- Microphones with **built-in *RF/EM immunity*** can overcome the extra design time and expense required to route shielded audio cables through noisy environments.
- ***Microphones that are highly matched*** in sensitivity and phase enable the highest performance of noise suppression and beam forming algorithms and require the least processing power for on-going microphone calibration.
- Microphones with ***on-chip signal processing*** enable optimized noise suppression, acoustic echo cancellation, or beam-forming in applications without an embedded processor or with a processor platform that is not easily customized.

Using next-generation microphone technology with the above characteristics enables the simple implementation of multi-microphone solutions that dramatically improve the sound quality in your products and ultimately the end-user's experience.

For more information on companies and products that currently employ multi-microphone solutions or provide support for microphone arrays, please click on the links below:

- **Microphone Array Support in the Next Generation Windows Operating System**
  Microsoft Research
  Take me there ...
- **Three concept PCs designed to ignite innovation**
  Intel Corporation
  Take me there ...
- **Multi-microphone usage in wireless headsets**
  Gennum Corporation
  Take me there ...
- **AKG Supplies Array Microphones for New Mercedes-Benz E-Class**
  AKG Acoustics
  Take me there ...

Please contact Akustica if the above links are inactive.

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