



## upHear Voice Quality Enhancement

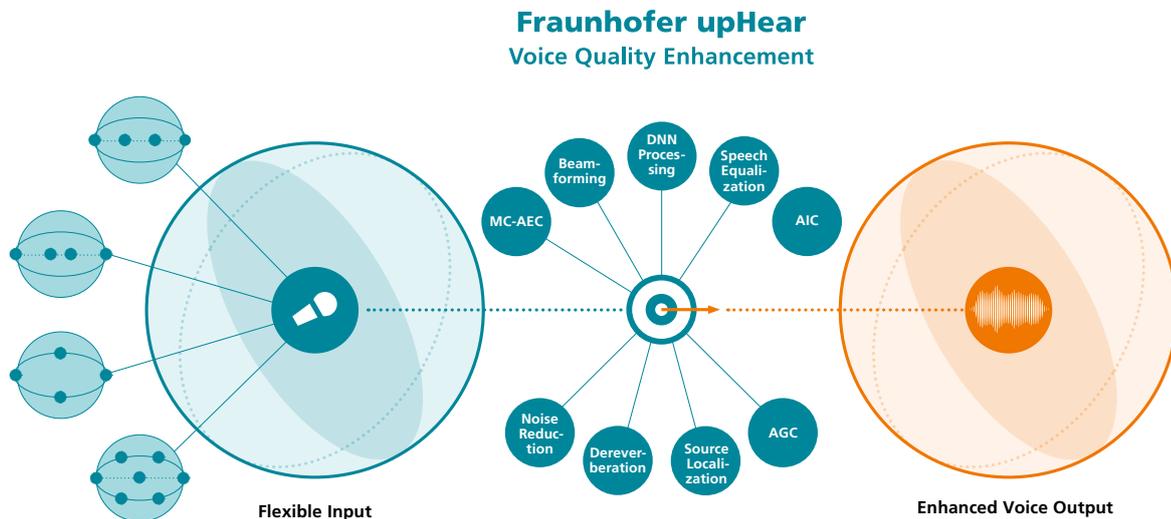
### Advanced Acoustic Front-End

Fraunhofer upHear Voice Quality Enhancement (VQE) is a fully integrated and flexible acoustic front-end solution for conferencing services and voice-controlled devices, such as smart speakers, smart soundbars, and TVs. It removes interfering sounds captured by a device's microphones, extracts users' voices, and cancels out acoustical echoes

by applying advanced classic and AI-based microphone processing algorithms. Thus, it facilitates human-machine interactions with far-field sound capture and barge-in functionality as well as enabling high-quality hands-free full duplex Voice over IP communication.

Fraunhofer upHear VQE is a flexible solution, which can be adapted to the unique housing and computational constraints of a device. It provides flexibility in both the microphone and loudspeaker configuration of the device, ensuring optimal performance, no matter if mono, stereo, surround, or immersive sound is played back.

Moreover, commonly used array geometries such as linear or circular microphone placements are natively supported. Fraunhofer IIS offers support during all phases of the product cycle, from consulting during the design phase to necessary adaptations during the deployment phase, and all the way to major feature updates for next versions of a product.



## Optimized Integration of Functionalities

- Multichannel Acoustic Echo Cancellation (AEC) attenuates echoes originating from the device's loudspeakers
- Beamforming attenuates undesired interfering sounds and extracts the user's voice even in far-field conditions
- Noise Reduction allows the concentration on the desired speech source without being distracted by background sounds
- Dereverberation improves the intelligibility and listening comfort in reverberant rooms
- Source Localization enables effective communication and the possibility to focus on the person who is talking
- Automatic Gain Control ensures optimal input levels for speech signals independent of the distance to the talking persons

## Availability and References

- Available for licensing. The software library can be provided for desktop platforms (Windows, Mac, Linux), mobile apps (iOS, Android), and embedded systems (e. g., ARM Cortex)
- Technology companies such as Kandao, LG, Yandex, Sberbank, and Mail.ru have incorporated Fraunhofer's upHear Voice Quality Enhancement technology into smart assistant speakers

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