![Fraunhofer IIS logo]

upHear
Voice Quality Enhancement
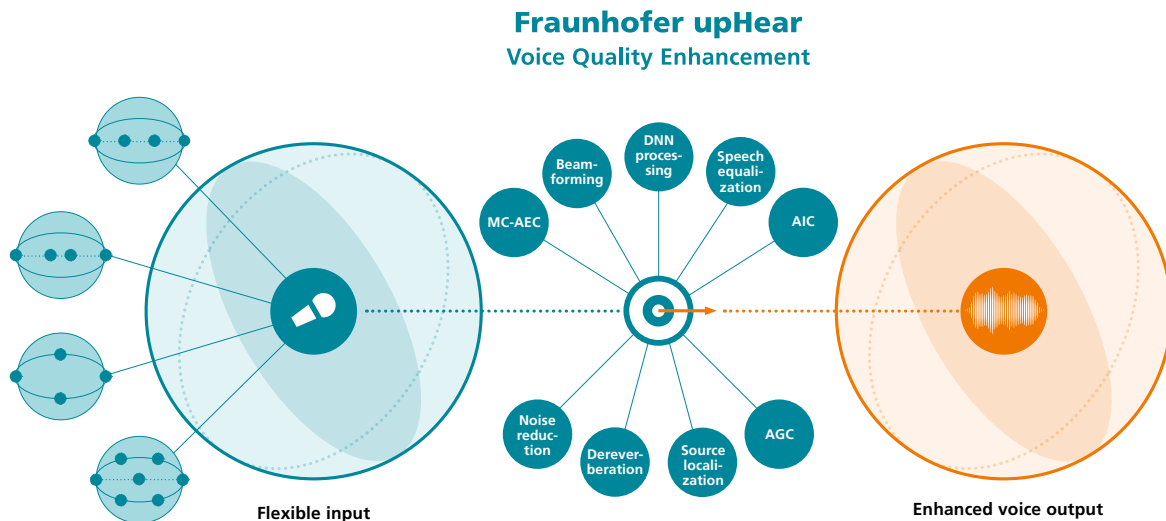
Advanced Acoustic Front-End

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 devices microphones, extracts user's voices and cancels out acoustical echoes by applying advanced classical and AI-based microphone processing algorithms. Thus, it facilitates both human machine interactions with far-field sound capture and barge-in functionality and enables 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 constrains of the device. It offers flexibility in both the microphone and loudspeaker configuration of the device, ensuring optimal performance, regardless of whether mono, stereo, surround or immersive sound is being 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 product cycle, starting from consulting design phase over necesary adaptations during deployment phase, up to major feature updates for next versions of customers product.

Fraunhofer upHear
Voice Quality Enhancement

Beam-forming • DNN processing • Speech equalization • MC-AEC • AIC • Noise reduction • Dereverberation • Source localization • AGC

Flexible input — **Enhanced voice output**

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 to concentrate 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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