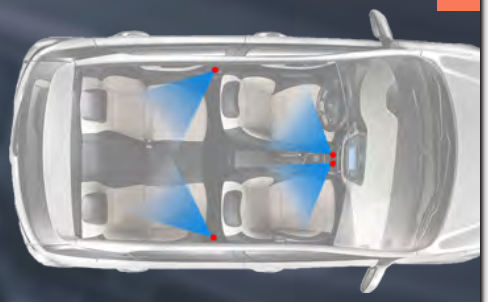
Alango eVCP

Extended Voice Communication Package



Announcing eVCP: Extended Voice Communication Package

Imagine that you are driving a car full of passengers such as your family or friends. You receive a phone call and answer it via the hands-free Bluetooth system. As you start your phone call, everyone else in the car is absorbed in their own conversation.

"It's hard to understand you over all the talking!", says the voice on the call. "Can you just call me back later?"

Wouldn't it be great if you could **restrict voice pickup to specific zones inside the car,** such as just the driver or just the front passenger?

On the other hand, sometimes we want **multiple zones preserved** and mixed into a single output, as when driver and passenger both participate on the same call.

Read on below to learn about the challenges of mixing distributed mic signals, how eVCP's Intelligent Mixer solves these challenges, and example eVCP applications.

About eVCP

Alango's **Extended Voice Communication Package (eVCP)** was developed to enable hands-free voice communication in distributed-microphone systems. A typical setting is inside an automobile where the driver and passenger(s), each in their respective zone, might all desire to speak to the party on the other end of the call. Installing dedicated microphones near the driver and the passengers is merely one part of the solution. eVCP processes each microphone and then intelligently mixes them to preserve the transmitted voice of each person speaking in multi-zone environments.

eVCP Technology

eVCP comprises many individual technologies, or processing blocks. Furthermore, there are additional (optional) technologies such as Automatic Volume and eQualization that can

be integrated into the eVCP package. However, in order to address the specific challenge of the pre-processing of each microphone signal relative to the multi-zone/user environment, we will focus our discussion on the intelligent mixer (IM), which is the fundamental processing block of eVCP.

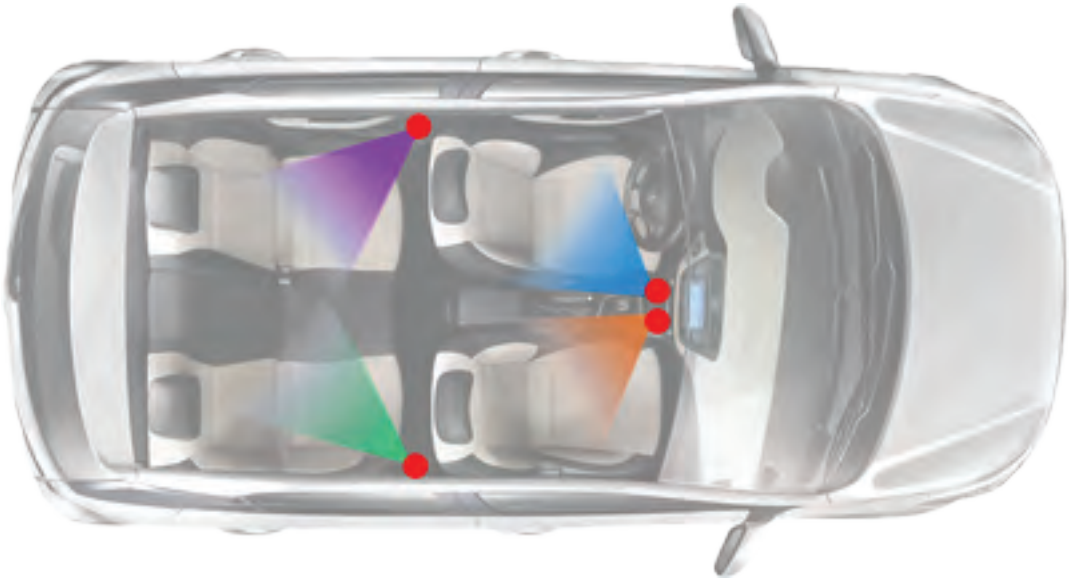


Figure 1: Example of a multi-zone voice communication system for car equipped with four directional microphones

Our example is a car with four communication zones meant to pick up the voice of each occupant—driver, front passenger, and two rear passengers (as shown in Figure 1 above)—while cancelling background noise and echo.

The simplest method of mixing microphones' signals is to sum or average them into a single output. The result of this calculation is that each of the four voices is attenuated compared to the single-mic voice level of the respective microphone signal in its specific zone. Ambient noises, unlike the driver and passengers' voices, are generally picked up equally by all four microphones. Summing all microphone signals results in preserving noise and attenuating the speech of the summed signal.

Additionally, a person speaking into multiple microphones located at different distances can cause destructive phase-related interference known as the "comb effect". All of this is problematic since the intelligibility of the summed signal meant to be transmitted to the party on the other end of the call is degraded in intelligibility.

Alango's eVCP runs multiple instances of VCP on each microphone, including echo canceller, optional dual or multi-microphone beamforming, noise reduction, equalization, and gain/signal level adjustment, which are then processed by the IM block.

To achieve the maximum performance, each VCP instance utilizes a sub-band processing scheme, wherein each microphone signal is split into narrow bands for processing. VCP performs echo cancellation, noise detection, and reduction in every sub-band, and finally provides the IM with the information of each microphone signal. IM analyzes the background noise, signal quality, and voice activity in every sub-band from all microphones

and then produces a clean, noise-free/echo-free signal into a single data stream.

Furthermore, the IM block facilitates zone-selectable communication, thus preserving or attenuating the voices of various occupants, depending on who is participating in the hands-free call. For example, when only the front occupants are talking to the other party, rear zone noise—such as chatter—is attenuated.

Conferencing Systems and Speakerphones

The examples and explanations above dealt exclusively with the automotive environment, but eVCP pre-processing also applies to conference systems with satellite microphones, multi-directional desktop speakerphones, and portable conferencing devices.

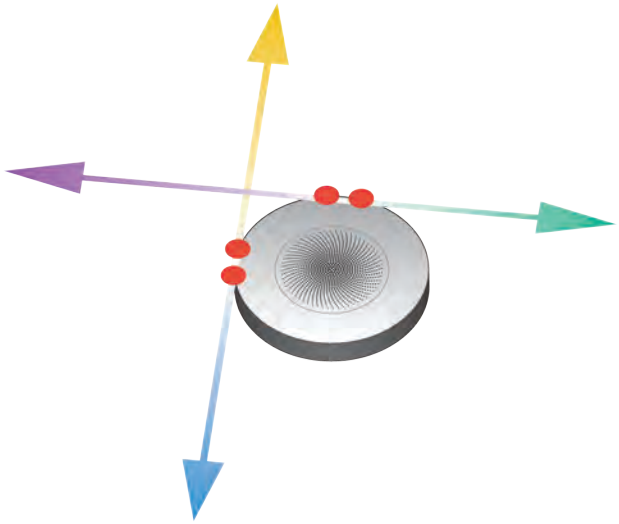


Figure 2: Example of a multi-directional speakerphone

eVCP is designed to preserve (or attenuate) voice in all zones/directions of the meeting room, as shown in Figure 2 above.

Voice Controlled Devices

eVCP can also be used to improve human-to-machine voice communication (i.e. preprocessing for speech recognition/ASR input). In this mode, eVCP's beamforming and acoustic echo cancellation blocks enhance and clean the voice signal from echo without affecting the internal processing done by modern ASR engines.

Alango eVCP helps you to be heard by humans or machines, whether in a car or meeting room.

To learn more about Alango eVCP, please visit http://www.alango.com/extended-vcp.php

As always, we look forward to hearing from you.