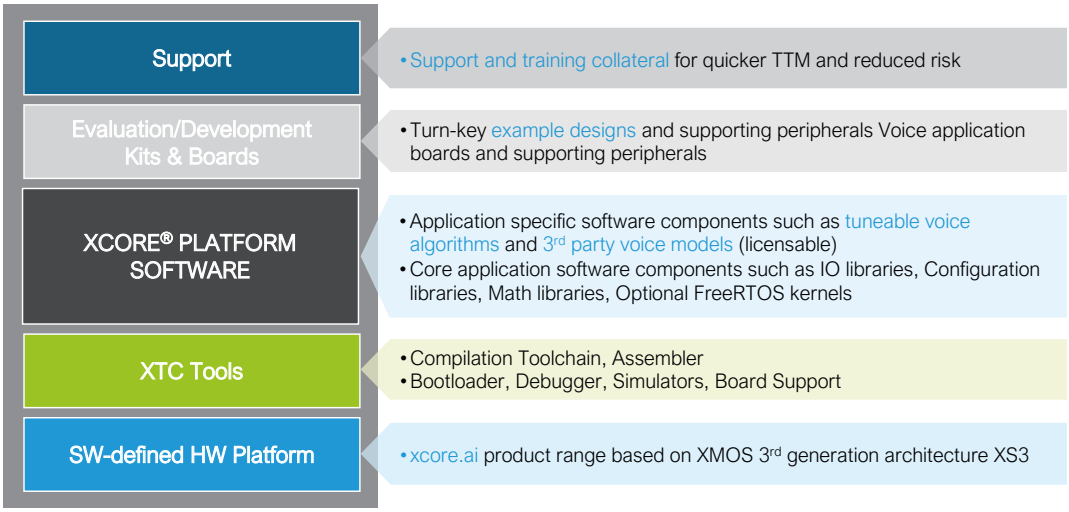
XCORE®-VOICE SOLUTION

BUILT UPON XCORE.AI - THE NEXT GENERATION INTELLIGENT SOLUTION FOR SMART VOICE APPLICATIONS

The XMOS xcore-voice solution is a complete offering built on xcore platform hardware, software and tools.

This solution provides voice pipeline example designs using XMOS industry proven audio front-end, incorporating far-field voice processing and support for third party ISV voice algorithms, such as an automatic speech recognition (ASR) engine for keyword detection or a local command dictionary.

This enables a wide spectrum of applications and end-products such as smart TVs, set-top boxes, and smart home appliances. In particular, the xcore-voice solution enables product designers to deliver "across-the-room" voice interfaces quickly and cost-effectively, whilst achieving the most optimal audio quality.



xcore.ai is the third generation of the xcore processor architecture, delivering unprecedented flexibility through a combination of general purpose DSP (fixed and floating point), AI (32b, 8b and 1b networks) and IO processing (at nano-second resolution.) Unlike traditional SoCs, xcore systems can be architected in software, avoiding the usual lengthy hardware development schedules associated with custom silicon.

The example designs in the xcore-voice solution leverage the processor capabilities though the xcore platform software which provides building blocks for development of a wide variety of applications. The xcore platform software supports development using the C programming language - on-the-metal and/or within FreeRTOS.

The example designs are delivered as source code, or pre-compiled and can be evaluated quickly on the voice evaluation kit, XK-VOICE-L71.

xcore.ai and the voice evaluation kit are available via XMOS sales and XMOS general distribution partners.

FEATURE HIGHLIGHTS

VOICE PROCESSING COMPONENTS

- Two PDM microphone interfaces
- Digital signal processing pipeline
- Full duplex, stereo, Acoustic Echo Cancellation (AEC)
- Reference audio via I2S with automatic bulk delay insertion
- Point noise suppression via interference canceller
- Switchable stationary noise suppressor
- Programmable Automatic Gain Control (AGC)
- Flexible audio output routing and filtering
- Independent audio paths for communications and Automatic Speech Recognition (ASR)
- Support for Wanson speech recognition or chooser-defined 3rd party ASR

DEVICE INTERFACE COMPONENTS

- Full speed USB2.0 compliant device supporting USB Audio Class (UAC) 2.0
- Flexible peripheral interfaces
- Programmable digital general-purpose inputs and outputs

EXAMPLE DESIGNS UTILISING COMPONENTS

- Far-Field Voice Local Command (FFD)
- Far-Field Voice Assistance (FFVA)

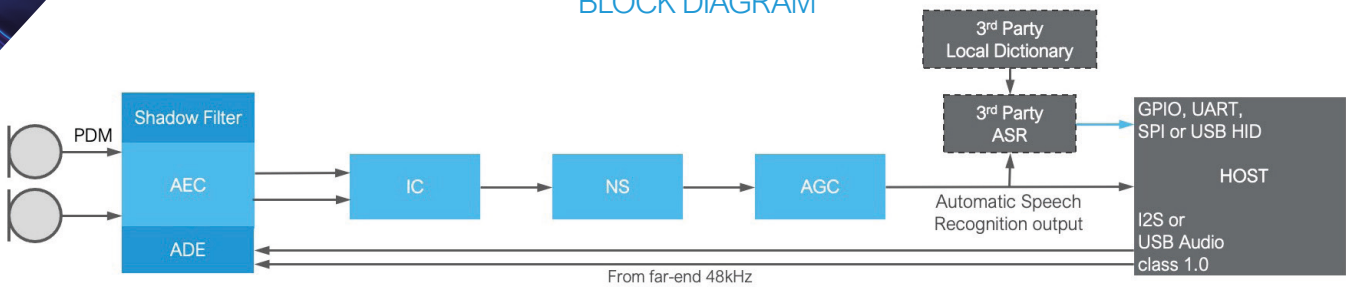
FIRMWARE MANAGEMENT

- Boot from QSPI Flash
- Default firmware image for power-on operation
- Option to boot from a local host processor via SPI
- Device Firmware Update (DFU) via USB or other transport

POWER CONSUMPTION

- Typical power consumption 300-350mW
- Low power modes down to 55mW (using DEMO VNR)

BLOCK DIAGRAM

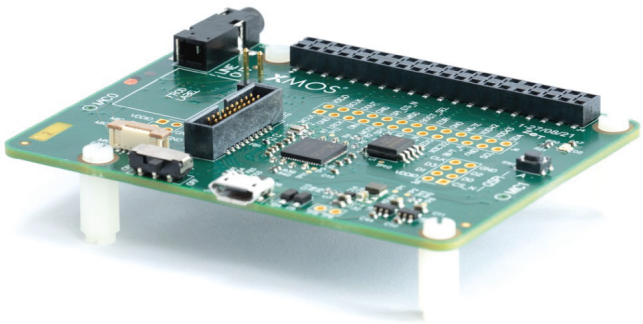


EXAMPLE APPS AND FUNCTIONS

FUNCTION	WHAT IT DOES	VOICE DSP FWK	FFD EXAMPLE APP	FFVA EXAMPLE APP
AEC + Shadow Filter	Nulls audio output from the device for reliable barge-in and improves Signal to Noise Ratio + adapts to changes in the environment or system to decrease convergence time	✔		✔
Automatic Delay Estimator (ADE)	Adjusts the audio reference signal dynamically, for smooth, real-time barge-in	✔	✔	✔
Interference Canceller (IC)	Scans the soundscape of the room and nulls point noise	✔	✔	✔
Noise Suppression (NS)	Removes background (diffuse) noise	✔	✔	✔
Automatic Gain Control (AGC)	Adapts the audio gain dynamically, or apply a fixed gain such that voice content maintains a desired output level	✔	✔	✔
Local Voice Command	Demonstrates ASR engine + local dictionary capabilities		✔	
Low-power mode	Enables low power state for key word detection or voice activation; demo uses XMOS VNR		✔	

EVALUATION KIT

The voice evaluation kit, XK-VOICE-L71, can be used with a Raspberry Pi HAT for integration with example AVS client or used standalone as a USB accessory to a host system.



FEATURES

- XU316-1024-QF60A-C24 xcore.ai processor
- Raspberry Pi HAT connector
- 2 x Infineon IM69D130 MEMS mics
- 71mm inter-mic spacing
- Microphone mute switch
- Speaker output (Line level)
- USB / I2S host interface support

MORE INFORMATION AND AVAILABILITY

PART NUMBER	DESCRIPTION
XU316-1024-QF60A-C24	1.8V IO XCORE.AI PROCESSOR
XU316-1024-QF60B-C24	3.3V IO XCORE.AI PROCESSOR
XK-VOICE-L71	VOICE EVALUATION KIT

xmos.com/xcore-voice/

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