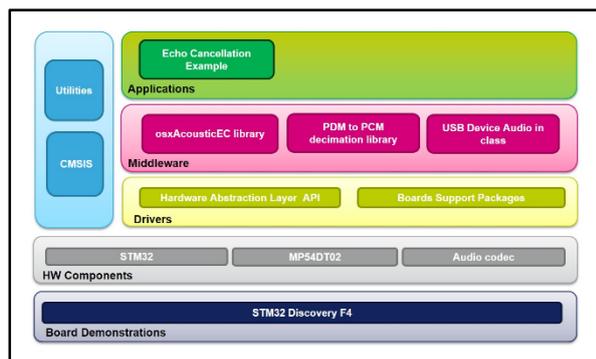


Real-time acoustic echo cancellation software expansion for STM32Cube

Data brief



Features

- Real-time acoustic echo cancellation algorithm (under OpenSoftwareX license)
- Based on the well-known SPEEX implementation of the Multidelay block frequency domain adaptive filter (MDF) algorithm
- PCM input for both primary and reference channels
- SPEEX Preprocess and AGC features included
- Parameters editable at runtime
- Easy portability across different MCU families, thanks to STM32Cube
- Sample implementation running on STM32F407 Discovery board (STM32F4DISCOVERY)

Description

osxAcousticEC software provides an implementation for a real-time echo cancellation routine based on the well-known SPEEX implementation of the MDF algorithm. The secondary features of the SPEEX suite, namely the preprocess options and Automatic Gain Control, have been included as well.

Parameters can be modified at runtime for immediate adaptation to varying ambient conditions. The osxAcousticEC library is provided in binary format, integrated in a software package providing examples running on the STM32F407 Discovery board (STM32F4DISCOVERY).

The example package is designed as an add-on for the standard STM32CubeF4 package; the library can be easily ported to any STM32F4 microcontroller with an FPU unit. The software is based on STM32Cube technology. Information regarding STM32Cube is available on www.st.com at <http://www.st.com/stm32cube>.

What is STM32Cube?

STM32Cube™ represents the STMicroelectronics initiative to make developers' lives easier by reducing development effort, time and cost. STM32Cube covers the STM32 portfolio.

STM32Cube version 1.x includes:

- STM32CubeMX, a graphical software configuration tool that allows the generation of C initialization code using graphical wizards.
- A comprehensive embedded software platform specific to each series (such as the STM32CubeF4 for the STM32F4 series), which includes:
 - the STM32Cube HAL embedded abstraction-layer software, ensuring maximized portability across the STM32 portfolio
 - a consistent set of middleware components such as RTOS, USB, TCP/IP and graphics
 - all embedded software utilities with a full set of examples

How does this software complement STM32Cube?

This software library package is based on the standard STM32CubeF4 package. It provides a board support package (BSP) for the STM32F407 Discovery board (STM32F4DISCOVERY), component drivers for the on-board components and some middleware components for PDM to PCM decimation, among other things. A USB audio input driver is included for audio streaming to a host PC. Thanks to these features, microphone data is made readily available to ease the integration with additional packages performing audio analysis and DSP operation.

osxAcousticEC is an add-on software package for STM32CubeF4 implementing real-time acoustic echo cancellation based on the SPEEX implementation of the MDF algorithm. Parameters can be modified at runtime for adaptation to varying ambient conditions.

The osxAcousticEC package includes a sample application that developers can use to experiment with the code and as a starting point for building customized applications. It acquires on-board digital MEMS microphone data while an audio fragment (saved in the STM32 FLASH) is played using the on-board codec. osxAcousticEC is then executed in real-time taking the microphone data as the primary input signal and the known audio fragment as the reference signal. The processed data is then streamed to a host PC together with one omnidirectional, unprocessed microphone given as reference.

Revision history

Table 1: Document revision history

Date	Version	Changes
26-Oct-2015	1	Initial release.

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