BLUEVOICELINK1

Bluetooth Low Energy and microphones software expansion for STM32Cube

Features

- OSXBLUEVOICE, half-duplex voice-over-Bluetooth Low Energy communication profile (under OPEN.AUDIO license)
- Very low power Bluetooth Low Energy (BlueNRG/BlueNRG-MS) single-mode network processor, compliant with Bluetooth specification core 4.0 (BlueNRG) and 4.1 (BlueNRG-MS)
- Complete middleware to build applications using digital MEMS microphones (MP34DT01-M)
- Digital audio signal acquisition and processing
- Audio input class USB driver to allow a device to be recognized as a standard USB microphone
- Easy portability across different MCU families thanks to STM32Cube
- Free, user-friendly license terms
- Sample implementation available for board X-NUCLEO-IDB04A1 or X-NUCLEO-IDB05A1 plus X-NUCLEO-CCA02M1 connected to a NUCLEO-F401RE, NUCLEO-L476RG or NUCLEO-L053R8 board.
- Compatibility with ST BlueMS app (v3.0.0 or higher), available for Android™ and iOS™

Description

BLUEVOICELINK1 is an expansion software package for STM32Cube. The software runs on the STM32 and includes drivers and middleware for Bluetooth Low Energy (BlueNRG and BlueNRG-MS) and MP34DT01-M digital MEMS microphones. The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers. The software comes with sample implementations of the drivers for X-NUCLEO-IDB04A1 or X-NUCLEO-IDB05A1 plus X-NUCLEO-CCA02M1, when connected to a NUCLEO-F401RE, NUCLEO-L476RG or NUCLEO-L053R8 board.
What is STM32Cube?

STM32Cube Version 1.x includes:

- The STM32CubeMX, a graphical software configuration tool that allows users to generate C initialization code using graphical wizards.
- A comprehensive embedded software platform, delivered per series (such as the STM32CubeF4 for STM32F4 series)
  - The STM32Cube HAL, an STM32 abstraction layer embedded software, ensuring maximized portability across the STM32 portfolio
  - A consistent set of middleware components such as RTOS, USB, TCP/IP, graphics
  - All embedded software utilities with a full set of examples

How does this software complement STM32Cube?

The proposed software is based on the STM32CubeHAL, a hardware abstraction layer for the STM32 microcontroller. The package extends STM32Cube by providing a board support package (BSP) for BlueNRG/BlueNRG-MS and MP34DT01-M MEMS microphone expansion boards, middleware components for audio acquisition, communication with other Bluetooth LE devices, USB streaming of recorded signals and a dedicated profile for half-duplex speech transmission over BLE (OSXBLUEVOICE library, under OPEN.AUDIO license).

The BLUEVOICE profile defines a BLE service including one characteristic for audio transmission and one for synchronization. In a half-duplex system, both sides of the communication (central and peripheral) can act as servers of information. Periodic notifications containing compressed audio data are sent from one server to one client depending on the selected channel: central to peripheral or peripheral to central. OSXBLUEVOICE middleware is responsible for audio encoding and periodic data transmission on the server side and for decoding of received voice data on the client side.

BlueNRG/BlueNRG-MS is a very low power Bluetooth Low Energy (BLE) single-mode network processor, compliant with Bluetooth specification core 4.0 (BlueNRG) and 4.1 (BlueNRG-MS).

The drivers abstract low-level details of the hardware and allow the middleware components and applications to access the devices in a hardware-independent fashion. The software implements low power optimizations to allow system power consumption of just a few microamperes.

The package includes a sample application that developers can use to start experimenting with the code. The sample application enables acquisition, compression and transmission over Bluetooth Low Energy of voice data from the module that is acting as transmitter to the one that is acting as receiver. The receiver is responsible for audio decompression and USB streaming of audio data to a PC. Any freeware or commercial audio recording software can be used to interface with the system.

The Peripheral module can also stream audio to an Android™ or iOS™ device running the ST BlueMS app v3.0.0 or higher.
## Revision history

Table 1: Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Changes</th>
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<tbody>
<tr>
<td>20-May-2015</td>
<td>1</td>
<td>Initial release.</td>
</tr>
<tr>
<td>30-May-2016</td>
<td>2</td>
<td>Updated cover page features and description</td>
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<tr>
<td>26-Aug-2016</td>
<td>3</td>
<td>Updated cover page image</td>
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<tr>
<td></td>
<td></td>
<td>Updated STM32 Nucleo board compatibility information</td>
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<tr>
<td></td>
<td></td>
<td>Added BlueNRG-MS and BlueMS support information</td>
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