IA611-RDI-01 IA611 Xplained Pro Development Kit

knowles

IA611 Reference Design to develop VUI (Voice User Interface) for IoT

The IA611-RDI-01 is a reference design based on IA611 SmartMic for IoT applications. It enables ultra-low power acoustic event detection, voice keyword detection and voice commands to develop a voice UI. To accelerate prototyping the SmartMic into an IoT application, the IA611 has been integrated with the Microchip SAM D21 Xplained Pro MCU board.

Ultra-Low Power Voice Wake and Event Detection

The core of the reference design is the IA611 SmartMic designed for ultra-low power in a digital mic package. IA611 supports Knowles VoiceQ, the world's first "always listening" voice detector capable to automatically adapt its performance to the acoustic environment and enable voice wake keyword/ command. The reference design also includes a second digital mic to improve performance if required by the IoT application.

Highly Integrated, All-in-One Kit

Knowles intelligent mic solutions are integrated with several leading MCU and AP suppliers. The kit supports a Microchip SAM D21 Xplained PRO with full support via Atmel Studio 7. It allows for rapid prototyping of IoT designs that use an MCU processor that is already tested, optimized for BOM, and performance. A downloadable extension provides sample code for a simple application and required libraries to develop a VUI pre-integrated with the SmartMic as a peripheral.

IA611 Details

DSP Core	Knowles HemiDelta Light
Audio Interfaces	DMIC and I2S/TDM
Control Interfaces	SPI, I2C, UART, available GPIOs.
Memory	168 KB (IA611)
System Requirements	1.8V

Hardware Details

- **IA611 SmartMic** with 40MHz, 32-bit floating point DSP. It has 168KB memory available for user applications.

- **SPK0641HT4H-1 DMIC** serves as 2nd mic for 2-ch voice input capability. It is ideal to support 2-ch voice recognition enhancing algorithm to improve the detection performance.

- **Level Shifter** is included in the hardware in case the MCU does not support 1.8V interface.

- **MCU** is an optional part and a low cost MCU serves as host to control IA611 SmartMic. IA611 firmware will be downloaded from the MCU stored in the flash. Currently, Microchip SAM D21 32-bit MCU is available.

Typical Applications

The IA611-RDI-01 reference design is ideal to facilitate adding a voice enabled VUI or event detection into IoT products such as home sensors, appliances, lifestyle control devices and security systems.
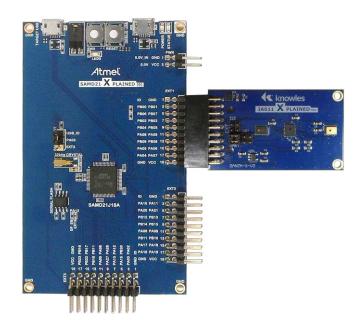
Lighting Control: Controlling a light-bulb or smart electrical controls with voice. Ultra low power consumption allows voice control to fit into a small form factor.

Security System: Activating with a voice command or after detecting an acoustic event (like glass breakage, smoke-alarm, or a dog bark). Additionally, algorithms can detect anomalies in sound, log direction of a noise source. A sensor with such audio processing can then trigger an alarm or sent metadata to a hub for logging and additional processing.

Remote Control: Controlling a TV using voice via a remote control is a viable option and can include typical commands like - Turn on/off TV power, change channel and navigate TV menu.

3rd-Party Algorithm Support

The IA611 is by nature an open DSP platform supporting up to 40MHz, 32-bit floating-point DSP. In addition to Knowles VoiceQ voice wake/command, it can support 3rd-party audio/voice algorithms such as Sensory voice wake/command, Audio Analytic sound event detection. The Knowles Open DSP partner program brings world-class algorithm partners to an ecosystem where a multitude of solutions solve complex audio/voice problem. 3rd-party algorithm support will continue to expand.

Additional Details

Hardware Support
- Simple connection to the Microchip SAM D21 Xplained Pro Development Board.
- Integrated voltage level conversion for low power operation.

Software Capability & Tools
- Integrated sample code with Atmel Studio 7 for the SAM D21 Xplained Pro Development Board.
- Multiple Keyword and Command options
- Simple programming tips available through sample projects

3rd-party Algorithm Support
- In addition to Knowles VoiceQ voice wake/command, the following 3rd-party Algorithms are supported:
    - Sensory THF (TrulyHandsFree™) voice wake/command
    - Audio Analytic ai3™ sound event detection
- More 3rd-party algorithms support on the way.

Ordering Information
For more information, visit solutions.knowles.com.