

ALANGO COMPANY NEWS

March 3, 2020



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Alango Introduces Short Range Sound Modem (SRSM) Technology

About SRSM

Alango SRSM technology allows for transferring arbitrary digital data, over-the-air, to a device via a narrow-band voice acoustic channel. The frequency of the data is within the human-audible spectrum utilizing a standard speaker from the transmit device to a standard microphone on the receive device; it's simply data-over-sound.

[Watch a video demonstration of SRSM here:](http://youtu.be/sewSZvowuEQ)
[\(http://youtu.be/sewSZvowuEQ\)](http://youtu.be/sewSZvowuEQ)



SRSM can be compared to a traditional telephone modem (without a physical communication line) where data is encoded and transmitted on one side and then received, decoded and passed to the data consumer on the other side. This depicts a one-way communication scenario, but two-way communication is also possible with SRSM.

The proliferation of devices (e.g., smart home, toy/gaming, robot, industrial control, etc.) led to our development of SRSM, a nondestructive method of control and the ability to reconfigure the sealed out-of-the-box device by transferring data when RF means are not available (e.g., in an RF-restricted environment, or with non-RF devices). Even where the device has connectivity through standard RF protocols (e.g., Bluetooth, Wi-Fi) they are limited in auxiliary data transfer and fine-tuning. An example of a non-RF device is a voice-activated toy. If it has a standard microphone, it has the possibility to update its settings via data-over-sound. Hence, there are many cases where SRSM can add extra functionality to the devices in which no other means of non-destructive communication are possible.

SRSM Technology

PSK modulation is used to satisfy the requirement for communication that is short-range, low sampling rate, and high data rate. SRSM filters out signal distortions and follows clock skew to ensure reliable communication since PSK is inherently not robust to reverberation, multi-path propagation, and clock skew. Low bandwidth is utilized (1.2kHz ~ 2.6kHz) since almost all speakers and microphones provide good frequency response in this range. Sampling rates of 8kHz, 16kHz or higher are possible.

SRSM utilizes 8-channel OFDM with PSK (QAM-4) for each channel modulation scheme. It encodes 16 bits of data per symbol with symbol length of 10ms. This provides a net data rate of about 1.5kBits per second. The preamble, a safeguard against spoofing with similar sounds, takes 250ms. Processor load is under 2MHz (on Arm Cortex M4), requiring less than 10kB data memory.

SRSM Applications

SRSM provides a reliable software-only solution for data transfer to sound-equipped devices that does not necessitate the OEM to modify or add existing hardware. Here are some potential applications:

IoT: Configuring “smart” devices engaged in a variety of tasks: Communicating with other devices, monitoring environmental sounds, checking sensors, and sending data to the database. With SRSM the user can change some parameters without intervention to the device itself and without accessing the database. For example, changing a thermostat temperature threshold.

Proximity detection: SRSM is short range and the signal cannot be recorded from long distances for the purpose of spoofing. As such, proximity detection, door opener, and presence indicator are potential applications. The data payload can include the user’s ID and other information.

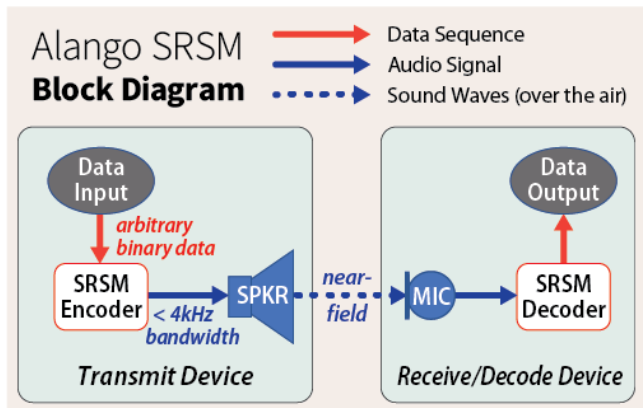
Two-way acoustic communication: There are a variety of two-way communication scenarios where two devices talk to each other. But with SRSM, the dialogue cannot be reliably recorded as with RF communication. This brings key exchange, for example, to a higher level of security.

Communication in an RF-restricted environment: In some cases, no RF communication is possible (in some hospitals rooms, for example). SRSM overcomes this limitation bringing reliable data transfer to these places.

Toy and robot control: As a method, entertaining or otherwise, for novel devices to communicate with each other.

Here at Alango we are using SRSM in our technology packages such as Voice Communication Package (VCP), which is used for human-human speech pre-processing. For instance, SRSM allows for VCP acoustic parameters to be updated during the tuning process without the need for a hard-wired interface. This is especially useful for earbuds and other small form-factor devices, since the process of accessing wired interfaces may undermine the acoustic integrity and tuning of VCP parameters.

Tuning is a repetitive process to advance the goal of achieving optimal acoustic performance. SRSM allows us and our customers to upload updated VCP acoustic profiles “on the fly” ensuring efficient tuning and an acoustically optimized end-product.



NXP announces availability of i.MX RT600 crossover microcontroller family, Alango Technologies as one of first software partners



Voice Enhancement Package (VEP) for far-field human-to-machine voice applications available now

The i.MX RT600 crossover microcontroller is optimized for 32-bit immersive audio playback and voice user interface applications combining a high-performance Cadence® Tensilica® Hi-Fi 4 audio DSP core with a next-generation Cortex-M33 core. The i.MX RT685 family provides up to 4.5MB of on-chip SRAM and several high-bandwidth interfaces to access off-chip flash. In addition, the family offers a rich set of peripherals, advanced security capabilities and extremely low-power consumption with reduced power modes and fast wake-up times.

NXP recently announced market availability of the RT600, with Alango featured as an initial software partner for voice preprocessing solutions. (The full press release can be found here:

<https://media.nxp.com/news-releases/news-release-details/nxp-announces-availability-imx-rt600-crossover-family>)

[Alango Voice Enhancement Package \(VEP\)](#), available on the RT600, provides far-field voice enhancement technologies for improving human to machine interaction in a variety of applications.

Voice Enhancement Package incorporates:

- multi-microphone acoustic beamforming
- stereo echo cancellation
- noise reduction
- automatic gain control
- direction of arrival finding

The package is fully configurable supporting various microphone configurations and direction finding strategies. VEP has been optimized for a variety of DSP and MCU cores including ARM Cortex, Cadence Tensilica HiFi, and Synopsys ARC. For more information about VEP, please visit

<http://www.alango.com/voice-enhancement-package.php>

