Voice command Solution

Target Markets and Applications
- Voice command solution is suitable for various applications, especially in edge-side scenarios where network connection is not required. Such as Home appliances, Medical, Industrial, and even Automotive applications.

Specifications

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<th>Renesas voice command solution Specifications</th>
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<td>Voice command solution demo system feature:</td>
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<td>1. Low power, High security and Flexible Software Package (FSP) support by RA6M1.</td>
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<td>2. Local voice recognition algorithm. No network connection needed and perform real-time control without latency caused by network.</td>
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<td>3. Global language support: Up to 34 language support worldwide now.</td>
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<td>4. Voice recognition algorithm requires low resource: CM4@60DMIPS, ROM: ~256KB Flash, ~50KB SRAM. It depends on how many commands supported.</td>
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<td>5. High accuracy: ~98% (per 200 commands).</td>
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Hardware specification:

- RA6M1 MCU specification:
  1. High performance Cortex-M4 running at max. 120MHz. With large 512KB Flash ROM and 96KB SRAM. High security crypto engine support.
  2. FSP (Flexible Software Package) provides high efficiency drivers and compliance with open software ecosystem, which is easy for customers to implement and expand.

- Digital Microphone specification:
  1. One channel digital microphone as minimized requirement.
  2. The Digital Microphone supports IIS output 24bit data format. With 64dB SNR and 120dB AOP.
  3. In case of noise reduction function is needed. It requires two channels of digital microphones input.

- Noise reduction by CX20921, specification:
  1. It supports acoustic audio pre-processing and post-processing for noise reduction.
  2. Supports far-field feature. With 24bit, 106dB dynamic range ADCs.
  3. Supports full duplex stereo Acoustic Echo Cancellation (AEC).

The product is designed for Manufacturing (DFM) but provided "As-is". We are not responsible for damage caused by accident or abuse, or caused by operating the product outside the permitted or intended uses described by Renesas. Specifications may change.

Talk to our official Distributors for more details, how Renesas can support your quick Time-to-Market.

Note: Current basic firmware does not support all listed hardware capabilities and features (designed for in hardware).
System Diagrams/Graphics

Voice recognition algorithm

- **Streaming speech input**
- **CSpotter engine**
  - Command Set 1
  - Command Set 2
  - Command Set 3
- **Feature Extraction**
- **Feature Vectors (MFCC)**
- **Lexicon**
- **Search Algorithm**
  - Acoustic Model (HMM)
  - Command List

- PMOD I/F
- USB power
- Debug
- Speaker out
- RA6M1
- Noise Reduction
- Flow Sensor I/F
- UART I/F
- Digital Mic
- Digital Mic
- Noise Reduction
- CSpotter engine
- Command Set 1
- Command Set 2
- Command Set 3
Cyberon Corporation, founded in 2000, with its headquarter in Taipei, Taiwan, is a leading embedded speech solution provider and supported by experts experienced in Speech Recognition and Text-to-Speech technologies for tens of years. Cyberon's speech solution is developed specifically for mobile & portable devices to provide users a convenient, natural and reliable user experience.

We not only commit ourselves to deliver highly reliable products, but ensure partners to acquire professional and real-time support. Developers are supposed to integrate our solutions at least effort. Furthermore, Cyberon's ability in customization gives our partners more ideas to show differentiation in today's competitive market.

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