EdgeReady solution for smart voice UI based on i.MX RT106V crossover MCUs

This NXP EdgeReady solution for local voice control leverages the i.MX RT106V crossover MCU with integrated VIT Speech to Intent software, offering a voice user interface for Industrial and IoT devices. Now supporting Wi-fi and Matter interoperability straight out of the box. This ultra-small form-factor, production ready hardware design comes with fully integrated software running on FreeRTOS for quick evaluation and proof of concept development. This turnkey solution minimizes time to market, risk and development effort, enabling OEMs to easily add a local voice user interface to any product.

Key features

- i.MX RT106V Crossover MCU with Arm® Cortex®-M7 core, 3020 CoreMark/1284 DMIPS @ 600 MHz
- Advanced multimedia for GUI and enhanced HMI
  - 2D graphics acceleration engine
  - LCD display controller (up to WXGA 1366x768)
  - 3x I2S for high-performance, multi-channel audio
- Secure JTAG PLL OSC eDMA 4x Watch Dog 6x GP Timer 4x Quadrature ENC 4x QuadTimer 4x FlexPWM IOMUX
- Far field audio front end Automatic Speech Recognition Supports 360º far field voice 65dB noise @ >3 meters
- Extensive external memory interface options
- NAND, eMMC, QuadSPI NOR Flash, and Parallel NOR Flash
- Supports 2xPDM or up to 3xI2S DMIC Provides 2 or 3-mic for audio Beamforming

- Turnkey solution, one platform to support local and online control
- Text input tool creates speech models of custom commands and wake words with no NRE
- IW416 integrated on board to support Wi-Fi® 4 (802.11n) + Bluetooth® 5.2

Target applications
Industrial

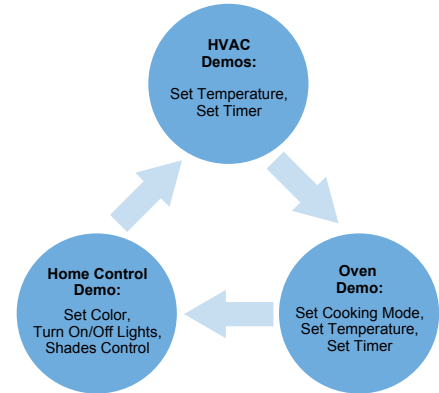- Elevator
- Smart Lighting
- Industrial HMI
- Vending Machines

Smart home

- Home Control Panel
- Washing Machine
- Small and Medium Appliances
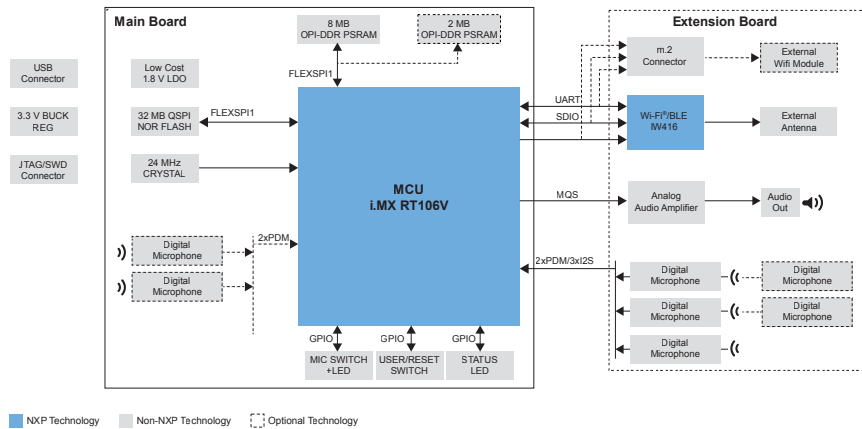- Robotic Appliance
- Smart Fan
- Smart TV

SLN-SVUI-IOT

Hey NXP**
Salut NXP**
Hallo NXP**
Nihao NXP**
Multi-language Support

HVAC Demos:
Set Temperature, Set Timer

Oven Demo:
Set Cooking Mode, Set Temperature, Set Timer

Home Control Demo:
Set Color, Turn On/Off Lights, Shades Control

Hardware block diagram

Main Board
- USB Connector
- 3.3 V BUCK REG
- JTAG/SWD Connector
- Low Cost 1.8 V LDO
- 32 MB QSPI NOR FLASH
- 24 MHz CRYSTAL
- 8 MB OPI-DDR PSRAM
- 2 MB OPI-DDR PSRAM
- FLEXSPI1
- FLEXSPI1
- MCU i.MX RT106V
- Digital Microphone
- Digital Microphone
- 2xPDM
- GPIO — MIC SWITCH +LED
- GPIO — USER/RESET SWITCH
- GPIO — STATUS LED

Extension Board
- m.2 Connector
- External Wifi Module
- Wi-Fi®/BLE IW416
- External Antenna
- UART
- SDIO
- MQS
- Analog Audio Amplifier
- Audio Out
- 2xPDM/3xI2S
- Digital Microphone
- Digital Microphone
- Digital Microphone
- Digital Microphone
- Digital Microphone

■ NXP Technology   ■ Non-NXP Technology   ┌┐ Optional Technology

Software block diagram

Bootstrap
EXIP key management
Image signature check

Bootloader
MSD / OTW update
Image signature check

Application control | Wi-Fi®/BLE connectivity | Matter | AWS OTA | LittleFS filesystem

Codecs
OPUS | MP3
G.711 | WMA
Decimation gain control IDC offset ½ band filtering

Audio framework | Media player | Playlist/queues | Streamer | Sound processing

ML inference engine — VOICE INTELLIGENT TECHNOLOGY Speech to Intent
Text-to-model wake word and commands recognition

Audio front end — VOICESEEKER
Echo cancellation | Noise suppression
Barge-in | Beamforming

FreeRTOS

Driver layer
XIP | Wi-Fi | BLE/BT | DMA | LED | Button | Amp controller
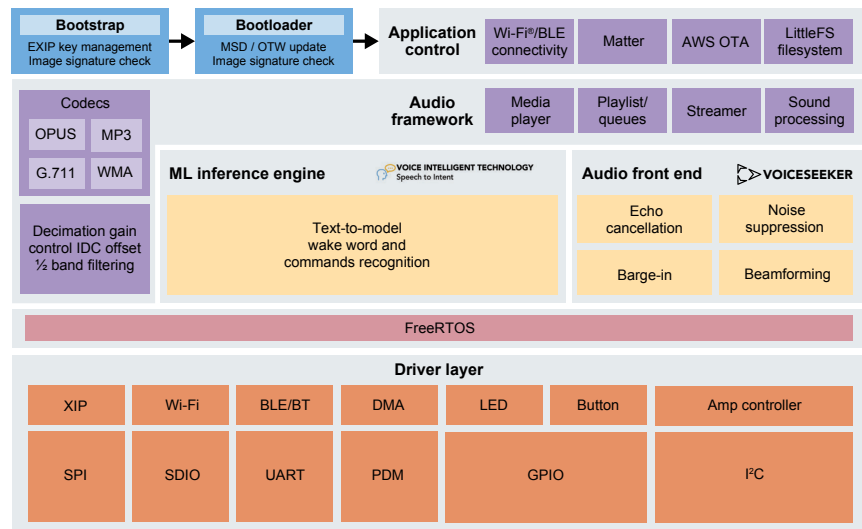SPI | SDIO | UART | PDM | GPIO | I²C

Main Board
- i.MX RT106V MCU
- 32 MB QSPI Flash
- 8 MB OPI PSRAM
- 2 MB QSPI PSRAM (option)
- 2 x PDM DMIC (option)

Extension Board
- IW416 Wi-Fi/BLE (+ m.2 connector)
- Low-cost LDO
- Analog audio amplifier
- 3xI2S DMIC
- 2xpdmDMIC
- JTAG/SWD connector
- LED, Buttons

Integrated Software Includes:
- SDK 2.15 upgrade
- Wi-Fi stack integration
- Matter interoperability
- Acoustic Echo Cancellation demo
- NXP VIT Speech to Intent Inference Engine
- Improved OOBE

Audio Front End
- VoiceSeeker (NXP)

Inference Engine
- VIT Speech to Intent (NXP) Default ASR engine (English)
- VIT Voice Command (NXP) Optional ASR engine
- Cyberon Optional ASR (supports 40+ languages)

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