

RENESAS RA PARTNER ECOSYSTEM PROGRAM

PROGRAM OVERVIEW
GLOBAL ECOSYSTEM TEAM



EXECUTIVE OVERVIEW

KEY TECHNOLOGIES

Security & Safety
Connectivity & Cloud
Artificial Intelligence
Human Machine Interface
Sensing & Control
Application Specific/ Emerging
Tools & User Experience



STRATEGIC PARTNERSHIPS

Develop Plug & Play S/W Building Blocks
Complement & Expand Our Offering
Accelerate Customer Development
Multi-region Support



GLOBAL ECOSYSTEM

Market Ready Promotion & Launches
Excellent Out-Of-Box Experience
Joint Promotion w/ Partners



Close Collaboration with Customers
Priority on Time-to-Market
Market Driven Use Cases
Focus on Problem Solving



ENABLEMENT AT SCALE

CUSTOMER CENTRICITY

KEY MESSAGES

Expansive 3rd Party Solutions Portfolio

- 50+ Partners, 30+ Solutions & growing
- Coverage across all Key IoT Technologies
- Robust GTM & Strong Digital Drumbeat



Commercial Grade Building Block Solutions

- Commercial Grade Software
- Work Out-of-Box with FSP
- Bundling Options for Select Solutions (Coming Soon)

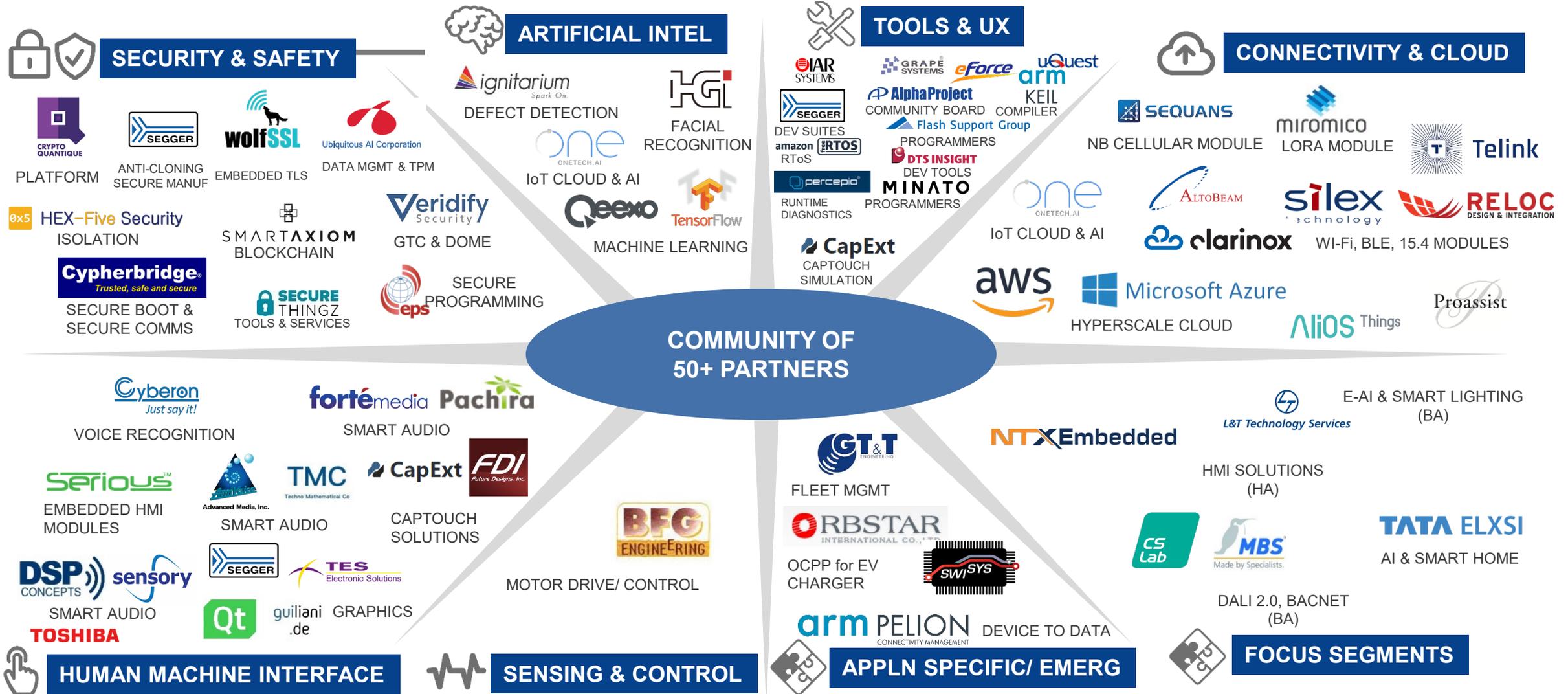


Problem Solving at Heart

- Address Specific Design Problems
- Address Specific Skill-set Gaps
- Customer-Centric Approach



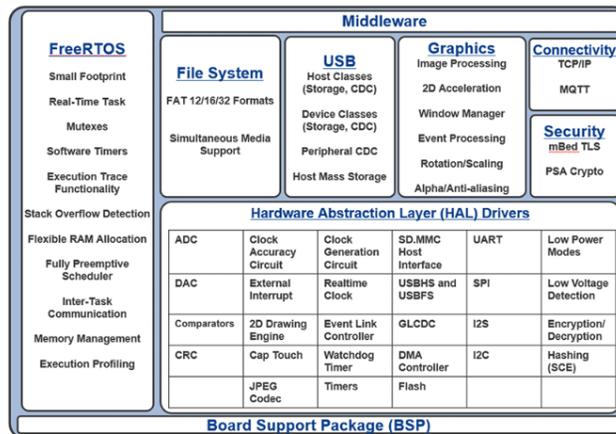
EXPANSIVE 3RD PARTY SOLUTIONS PORTFOLIO



COMMERCIAL GRADE BUILDING BLOCK SOLUTIONS

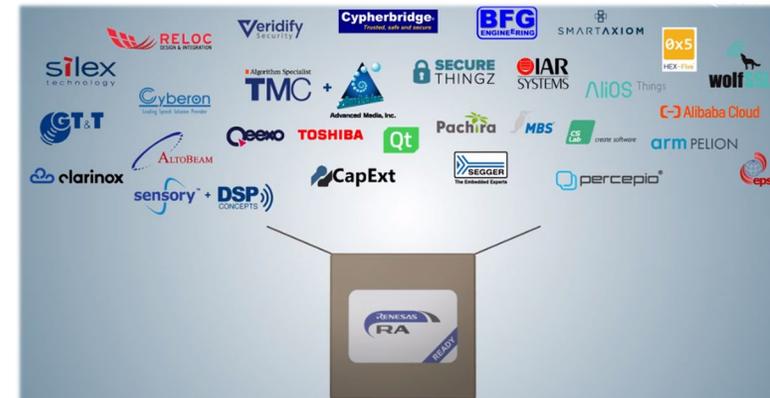
Flexible Software Package (FSP)

- Software Building Blocks
- HAL, RTOS, Middleware Stacks
- Flexible with legacy and 3rd party code



3rd Party Building Block Solutions

- Commercial Grade
- Work Out-of-Box w/ FSP
- Renesas Trusted Partners



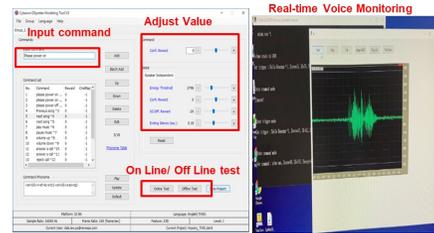
PROBLEM SOLVING AT HEART

DESIGN PROBLEM

MARKETING WANTS VOICE AS A USER INTERFACE! LANGUAGES, ACCENTS, MODELING, TESTING.... THIS IS TOO DAUNTING

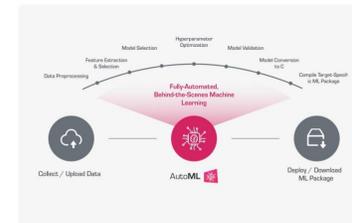


Leverage an intuitive do-it-yourself modeling + testing suite from Cyberon. It supports 34+ languages & low power features like voice activity detection. Get your design going in minutes!



SKILLSET GAP

WE DON'T HAVE/ CAN'T AFFORD DATA SCIENTISTS OR AI EXPERTS! CAN WE TAKE ADVANTAGE OF AI/ ML?



Automate tedious & repetitive ML using the AutoML from Qeexo. Optimized for constrained devices, it supports a variety of ML methods



GT&T provides complete vertical integration for fleet/ asset tracking. They have a Ready to Manufacture solution with support for LTE CATM1/ NB1. Their backend GFleet system is built on Microsoft infrastructure

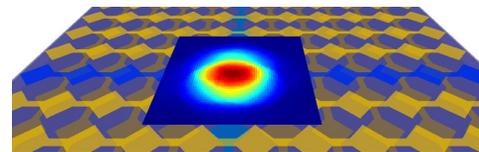


TIME TO MARKET

NEED AN END-TO-END READY TO MANUFACTURE FLEET/ ASSET TRACKER DESIGN + BACKEND



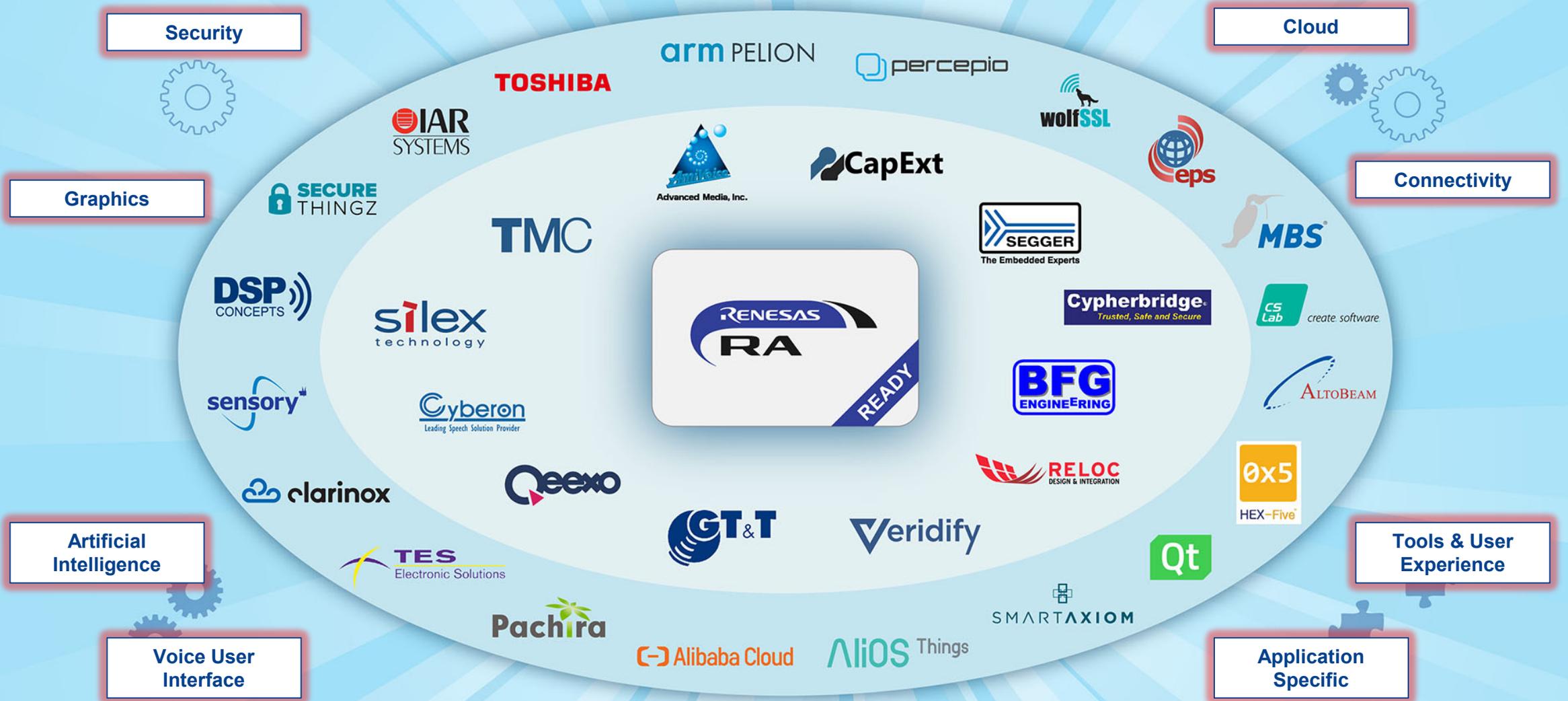
Avoid Expensive PCB Iterations by simulating Capacitance & Resistance using CapExt's toolchain. Fix Noise/ Crosstalk Issues as well as simulate moisture/ water droplets & Finger Sizes



DESIGN PROBLEM

AFTER MULTIPLE PCB ITERATIONS WE STILL CANT GET CONTROL OF NOISE/ CROSSTALK. THIS IS FRUSTRATING!

BROAD PORTFOLIO OF READY TO USE PARTNER SOLUTIONS





SOLUTION PACKS

Solution Brief (Open Access)

- Two page flyer
- Solution value proposition on page 1, partner Information on page 2

Short Solution Video (Open Access)

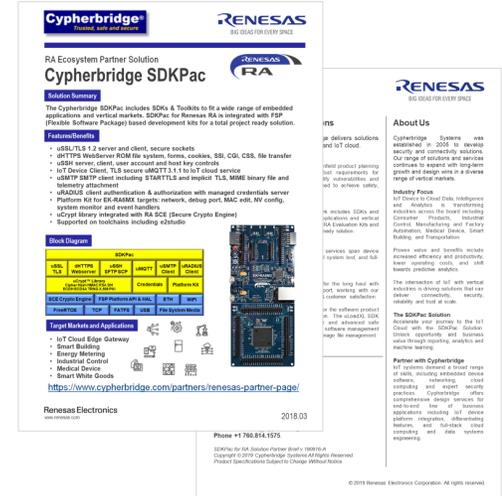
- Short video of solution & value proposition
- Partner could have multiple videos

Gated Demo Document/ Download (Gated Access – My Renesas)

- Next Steps Document/ Evaluation project for customer
- Link to partner website for next steps

On-Demand Webinar (Gated Access)

- Deep-dive on solution
- Available for select partners



SAFETY & SECURITY



	<p>SDKPac™ secure go-to-cloud connectivity and IoT gateway operation, along with the uLoadXL™ secure bootloader</p>
	<p>DOME™ platform provides zero-touch onboarding, authentication, secure firmware update delivery and ownership management for IoT endpoint devices leveraging its quantum resistant Group Theoretic Cryptography (GTC) technology</p>
	<p>MultiZone® Security provides hardware-enforced, software-defined separation of multiple trusted execution environments</p>
	<p>Embedded SSL/TLS library is designed to offer optimal embedded performance and rapid integration into the RA Family of MCUs</p>
	<p>Software manages and secures IoT devices through a patented, lite blockchain technology running among devices at the edge of the Internet and enabling them to defend themselves</p>
	<p>One of the world's largest programming and secure provisioning service providers with a global network of secure programming centers</p>
	<p>Security development tool C-Trust (embedded within IAR Embedded Workbench development toolchain) adds IP protection and production control</p>
	<p>The Security from Inception Suite provides companies with a straightforward way of building the right level of security for their application needs throughout the development, manufacturing, and product management process</p>
	<p>Crypto Quantique's® QuarkLink is an IoT security and device management platform that enables easy and scalable end-to-end security for IoT</p>

CYPHERBRIDGE SDKPAC

IOT TOOLKIT FOR SECURE CONNECTIVITY



Key Features

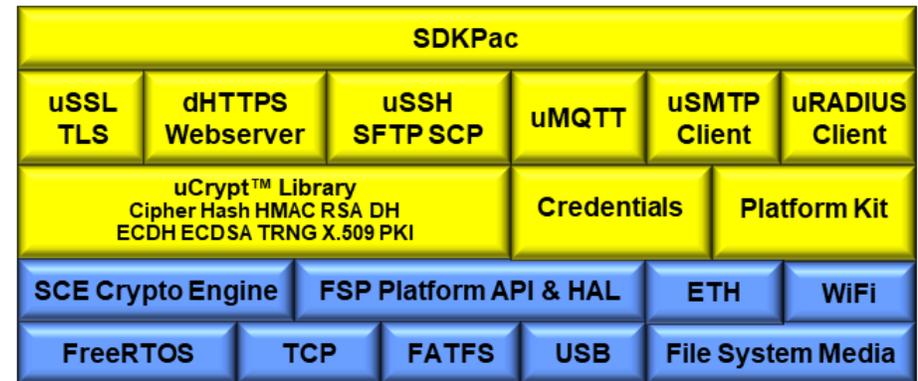
- uSSL/TLS 1.2 server and client, secure sockets
- dHTTPS WebServer ROM file system, forms, cookies, SSI, CGI, CSS, file transfers
- uSSH server, client, user account and host key controls
- IoT Device Client, TLS secure uMQTT 3.1.1 to IoT cloud service
- Works with RA Family devices and Silex Wi-Fi Modules
- uRADIUS client authentication & authorization with managed credentials server

Target Markets and Applications

- IoT Cloud Edge Gateway
- Industrial Control
- Smart Building
- Medical Device
- Energy Metering
- Smart White Goods



Cypherbridge SDKPac includes SDKs & Toolkits to fit a wide range of embedded applications and vertical markets. SDKPac for Renesas RA is integrated with FSP (Flexible Software Package) based development kits for a total project ready solution.



SDKPAC Modular Solution Block Diagram

Learn more at www.renesas.com/ra-partners

CYPHERBRIDGE uLOADXL

SECURE BOOT LOADER



Key Features

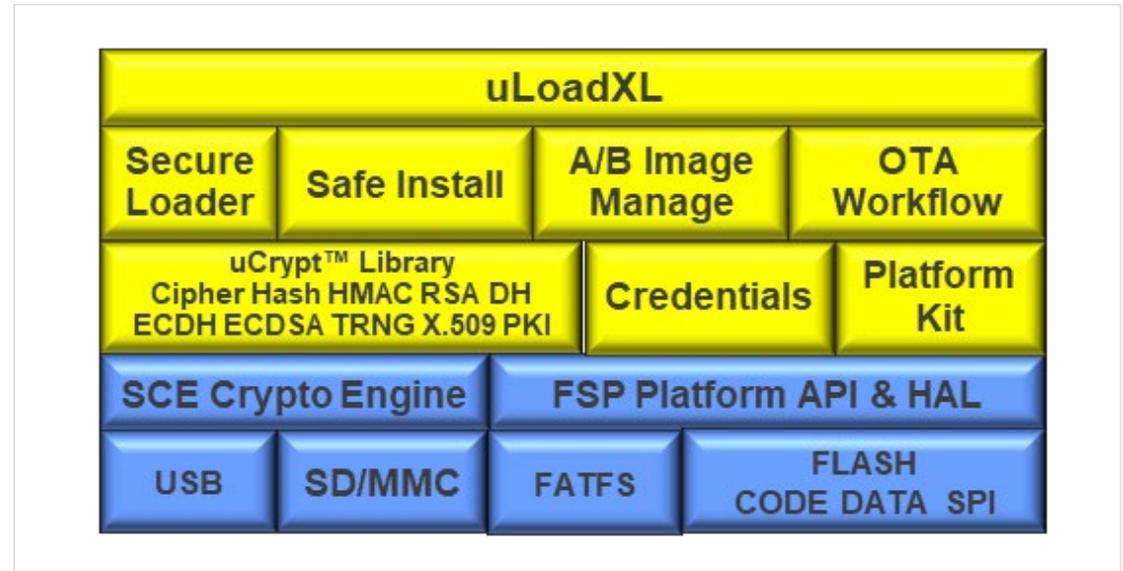
- Secure Boot Loader for Trusted Firmware Updates
- Safe Software update with encrypted and authenticated managed images
- Anti-rollback, anti-cloning, counterfeit and over-production, block malware injection and product tampering
- A/B image manage, install ARM and trigger, failsafe boot,
- GUI progress framework
- Offline WSLAM Software Management Station

Target Markets and Applications

- IoT Cloud Edge Gateway
- Industrial Control
- Smart Building
- Medical Device
- Energy Metering
- Smart White Goods



Cypherbridge uLoadXL secure boot and safe software update software lifecycle solution for Renesas RA is integrated with FSP (Flexible Software Package) based development kits for a total project ready solution.



uLoadXL Modular Solution Block Diagram

Learn more at www.renesas.com/ra-partners



RENESAS RA ECOSYSTEM PARTNER SOLUTION

VERIDIFY DOME™

DEVICE OWNERSHIP MANAGEMENT & ENROLLMENT

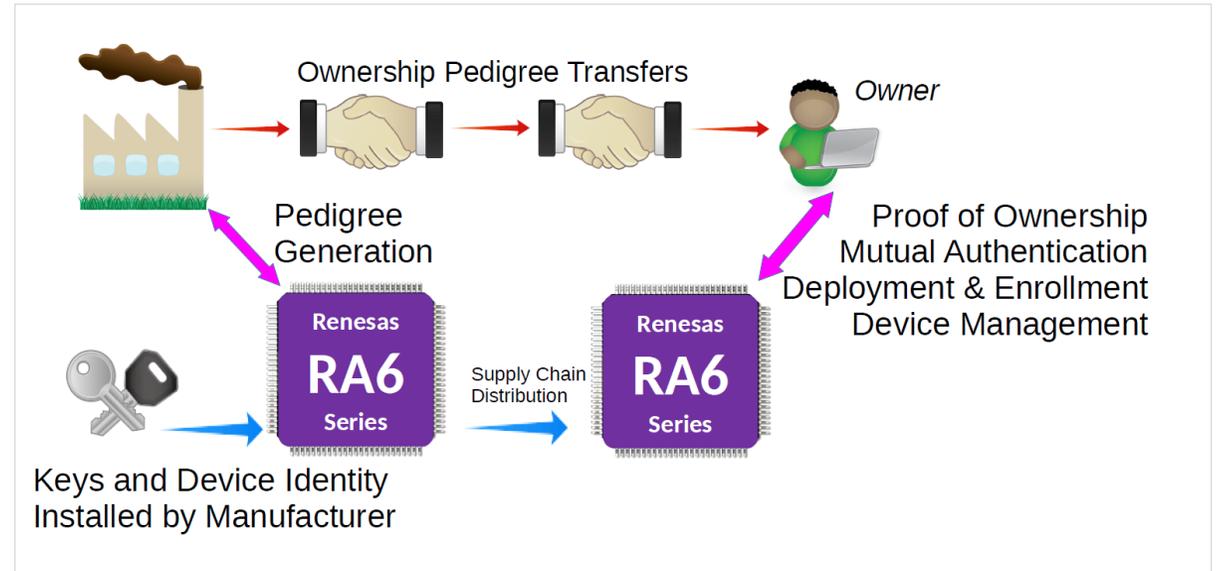
Key Features

- Renesas RA MCU device-level security management
- Blockchain maintains individual processor ownership
- Does not require persistent cloud/network connection
- Quantum-resistant to all known attacks
- Requires less than 8K of ROM for software-only implementation

Target Markets and Applications

- Industrial Process Controls
- Embedded Medical Devices
- Smart Buildings
- IoT
- Utilities and Smart Grid
- Secure supply chain

Veridify's new RA Ready DOME™ solution delivers a flexible onboarding and ownership management blockchain platform for low-resource IoT edge devices like RA series.



DOME Solution Architecture



Learn more at www.renesas.com/ra-partners



VERIFY FUTURE-PROOF SECURITY FOR RA2

GROUP THEORETIC CRYPTOGRAPHY (GTC)

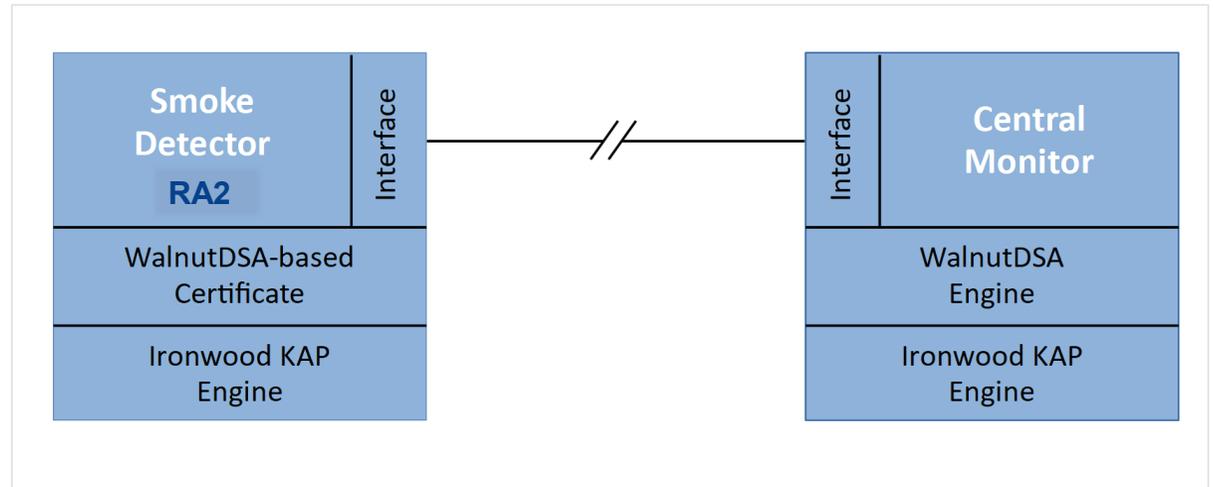
Key Features

- Verify's fast, small and energy efficient security methods are ideal for protecting RA2 devices and the low resource end points they connect to.
- Delivers superior performance, 10X faster than ECC
- Quantum-resistance provides future-proof authentication and data protection
- Software only implementation shortens time to market

Target Markets and Applications

- Secure boot
- Identification
- Secure firmware update
- Data integrity
- Remote authentication
- Data confidentiality

Wireless detectors are at risk for cyber attack. Implementing security enables the central monitoring station to authenticate detectors before acting on their messages, and to ensure that the messages they send have not been altered.



Example Use Case



Learn more at www.renesas.com/ra-partners



RENESAS RA READY SOLUTION

HEX-FIVE MULTIZONE[®] SECURITY

THE QUICK AND SAFE WAY TO ADD SECURITY & SEPARATION TO MCUs

Key Features

- Quick and safe alternative to Arm[®] TrustZone[®] for Cortex[®]-M MCUs
- Retrofits existing hardware: high-security without product redesign
- Hardware-enforced, software-defined, policy-driven RWX
- Multiple, equally secure areas for programs, data, and i/o
- Pre-emptive kernel for safety-critical applications
- Self-contained tool chain extension: no coding required

Target Markets and Applications

- Safety-critical / Industrial
- Medical Devices
- Secure IoT Application
- Aerospace & Defense
- Automotive / Transportation
- Appliances / Smart Home



0x5 HEX-Five Security

MultiZone Security is a software-only TEE (Trusted Execution Environment) that shields multiple trusted functional areas from untrusted 3rd party components within the same chip.

How it works

- 1 Compile, debug, and link each zone into separate binary files
- 2 Define hardware separation policies into a plain text configuration file
- 3 Run the toolchain extension to produce the signed boot firmware

```

multizone.cfg
-rcipise-ctrl-aws/textlive-conf

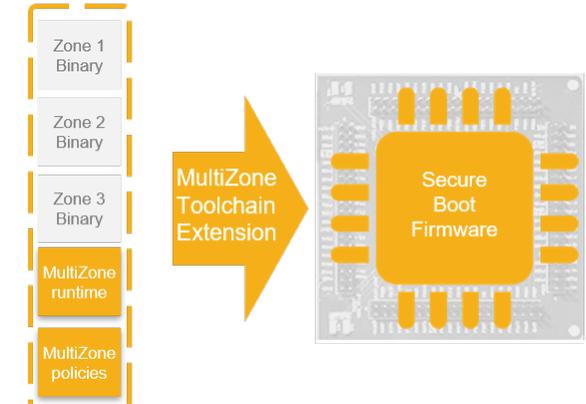
Tick = 10 # ms

Zone = 1 irq = 17
  base = 0x20010000; size = 32K; rwx = rx # FLASH
  base = 0x2001F000; size = 4K; rwx = rw # RAM
  base = 0x40006000; size = 4K; rwx = rw # ICU
  base = 0x40047000; size = 64; rwx = rw # MSTP
  base = 0x400700E0; size = 32; rwx = rw # SCI7
  base = 0x40040980; size = 64; rwx = rw # R_P615_PFS(IO)

Zone = 2 irq = 16
  base = 0x20020000; size = 32K; rwx = rx # FLASH
  base = 0x20027000; size = 4K; rwx = rw # RAM
  base = 0x40006000; size = 4K; rwx = rw # ICU
  base = 0x40040800; size = 512; rwx = rw # R_PFS (IO)

Zone = 3 base = 0x20028000; size = 32K; rwx = rx # FLASH
  base = 0x2002F000; size = 4K; rwx = rw # RAM
  base = 0x40040800; size = 1K; rwx = rw # R_PFS (IO)

```



Learn more at www.renesas.com/ra-partners

wolfSSL

wolfSSL EMBEDDED SSL/TLS LIBRARY



Key Features

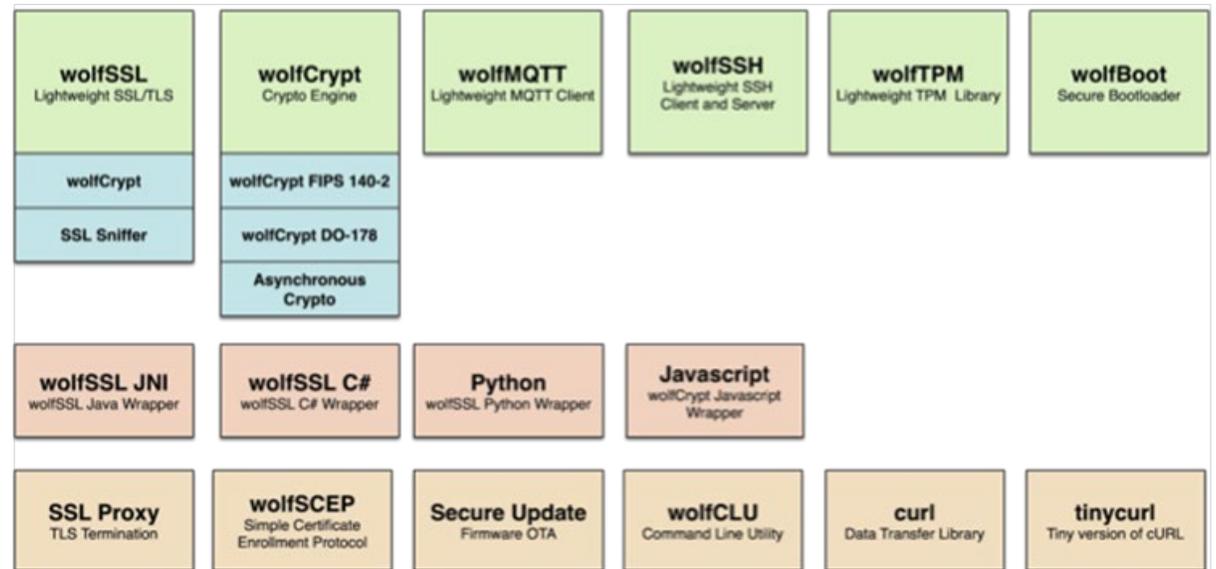
- Support for TLS 1.2, 1.3 and DTLS 1.2
- Small footprint of 20-100 kB
- Runtime memory usage between 1-36 kB
- Modular Design, build up to full TLS 1.3 stack
- Crypto Certifications to FIPS 140-2 Level 1 Certified, DO178 DAL A, and MISRA C
- Lightweight and fully featured MQTT Client with examples for AWS and Azure and support for 20+ operating systems

Target Markets and Applications

- IoT Sensors, Gateways, and Servers
- Embedded Medical Devices
- Smart Home and Buildings
- Industrial Automation: Controllers to Sensors
- Utilities and Smart Grid



wolfSSL's products are designed to offer optimal embedded performance and rapid integration into RA Ready MCU Designs. The integration allows users the ability to leverage hardware crypto solutions, and support for the most current standards with ease-of-use APIs.



wolfSSL Architecture Software Features

Learn more at www.renesas.com/ra-partners

SMARTAXIOM IOT MANAGEMENT & SECURITY

BLOCKCHAIN SECURED FROM END-POINT TO CLOUD



Key Features & Benefits

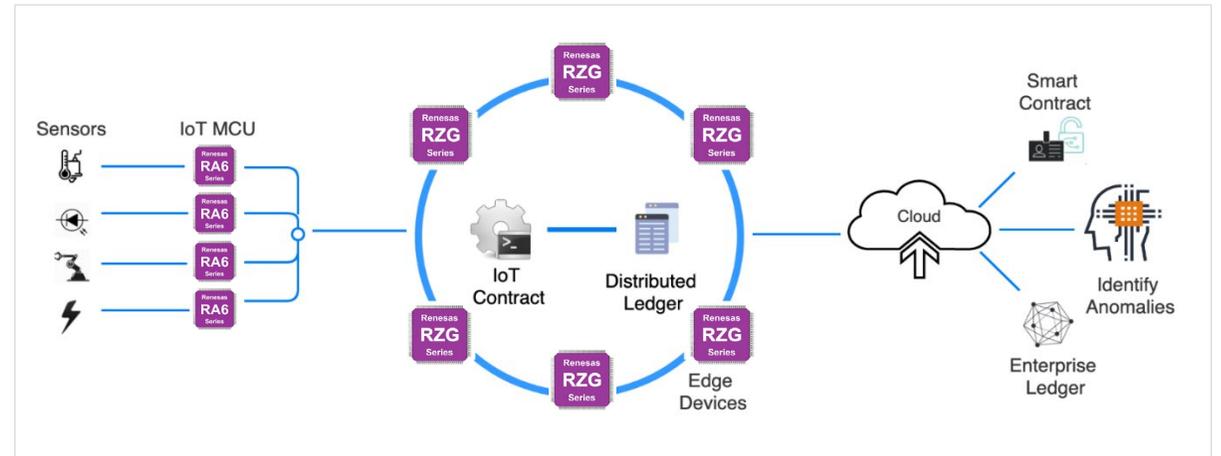
- **Easy evaluation and development:** Proven on Renesas RA MCUs and RZ MPUs.
- **Low latency:** Local response much faster than cloud/server-based security.
- **Redundant and Reliable:** No single point failure at security server or its network connection.
- **Scalable & Flexible:** keyless peer authentication reduces costs and certificate management
- **Secure:** To break the system the majority of the nodes have to be hacked between events

Target Markets and Applications

- Smart Buildings & Cities
- Industrial IoT
- Logistics & Shipping
- Building Security
- In and between vehicles
- EV Charging Transactions



SmartAxiom software manages and secures IoT devices through patented, lite blockchain technology running among those devices at the edge of the Internet - enabling them to defend themselves. Peer-to-peer distributed ledgers improve security, latency, reliability and manageability to create the first true endpoint-to-cloud blockchain solution.



Beachhead

Trust Endpoint ID & Data

BlockLock

Embedded Edge Blockchain

Tenacious

Cloud Management

Learn more at www.renesas.com/ra-partners

EPS GLOBAL

SECURE PROVISIONING & IC PROGRAMMING



Key Features

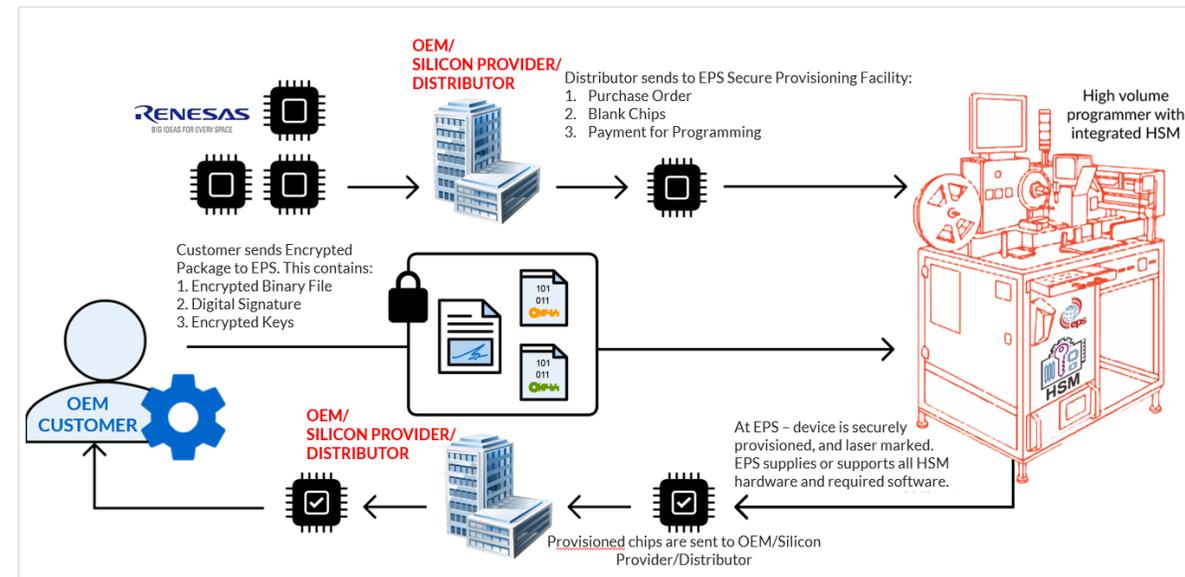
- EPS Global offers secure provisioning services from its 18 programming centres in the Americas, EMEA, India and Asia at a very competitive price point.
- EPS supports Renesas Synergy, RE, RA, RL78 and RX families.
- Other services include IC Programming, Tape & Reeling, Component configuration.
- Flexible business models, the most popular model – free issue devices to your chosen EPS Programming Centre at a per-unit provisioning charge

Target Markets and Applications

- Connected devices in:
- Automotive
 - Mass market Consumer IOT
 - Industrial IOT (IIOT)
 - Smart Cities
 - Medical & Telecommunications



EPS Global is one of the world's largest Programming and Secure Provisioning service providers, allowing customers to seamlessly access a global network of secure programming centres to service low volume prototype quantities through to high volume IC programming requirements.



Secure Provisioning Process

Learn more at www.renesas.com/ra-partners

IAR EMBEDDED WORKBENCH (C-Trust)

COMPLETE C/C++ COMPILER & DEBUGGER TOOLCHAIN



Key Features

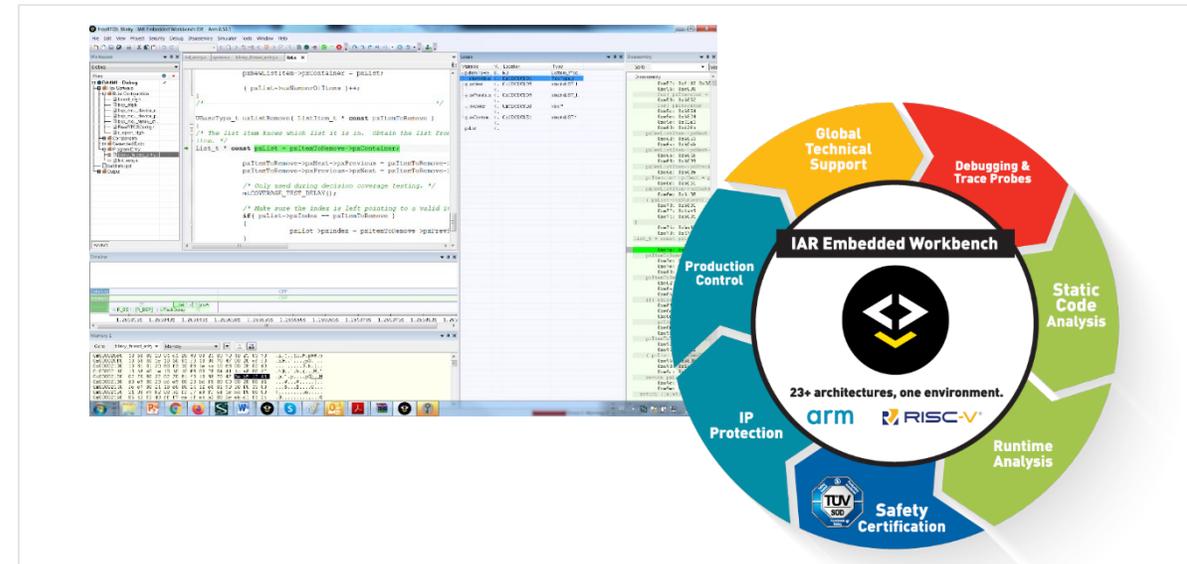
- Outstanding performance through sophisticated optimization technology
- Comprehensive debugger
- User-friendly features and broad ecosystem integration
- Integrated static and runtime code analysis
- Global support services and training
- Functional safety certification: IEC 61508, ISO 26262, IEC 62304, EN 50128, EN 50657

Target Markets and Applications

- Industrial automation
- Automotive
- Consumer electronics
- Medical technology and wearables
- Smart metering



IAR Embedded Workbench is a complete development toolchain providing powerful code optimizations and comprehensive debugging features in an easy-to-use integrated development environment. The security development tool C-Trust adds IP protection and production control.



IAR Toolchain

Learn more at www.renesas.com/ra-partners

SECURITY FROM INCEPTION SUITE

UNIQUE SET OF TOOLS AND SERVICES FOR IMPLEMENTING SECURITY



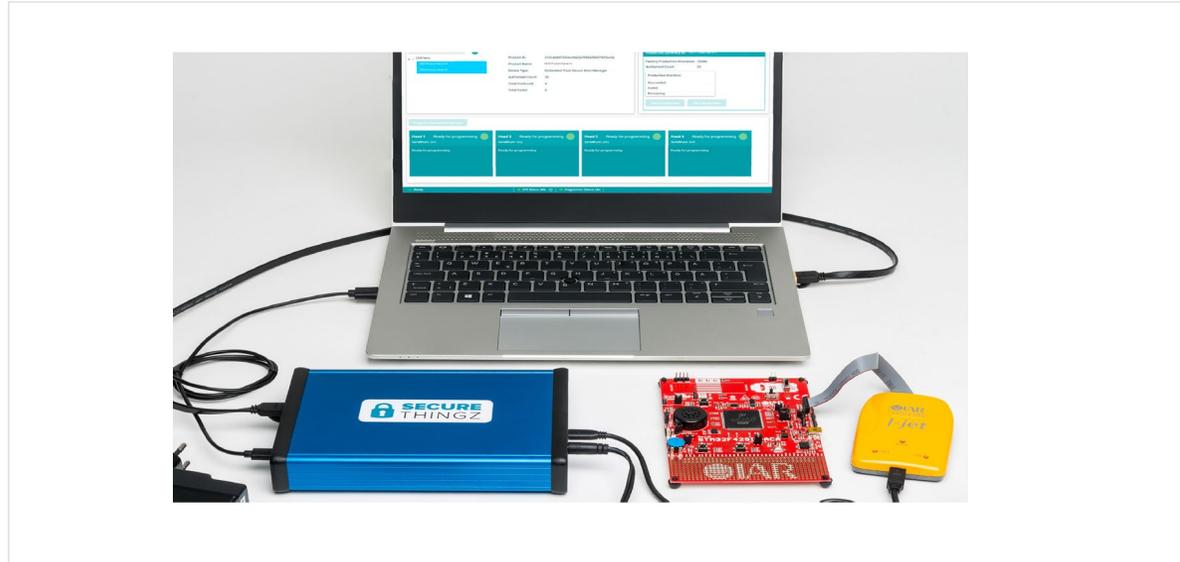
Key Features

- Software and hardware tools
 - Security Development Environment
 - Secure Desktop Provisioner
 - Complete C/C++ compiler and debugger toolchain
 - Static code analysis
- Training resources with topics like:
 - Impact of Legislation & Security on IoT
 - Managing Intellectual Property & Inhibiting Overproduction
- Custom Design Review
 - Identifying potential risks and establishing threat model
 - Creating custom security implementation

Target Markets and Applications

- Industrial automation
- Automotive
- Consumer electronics
- Medical technology and wearables
- Smart metering

The Security from Inception Suite provides companies with a straightforward way of building the right level of security for their application needs throughout the development, manufacturing, and product management process.



System Demo

Learn more at www.renesas.com/ra-partners



RENESAS RA ECOSYSTEM PARTNER SOLUTION

CRYPTO QUANTIQUE®

AUTOMATED DEVICE ONBOARDING & MANAGEMENT



Key Features

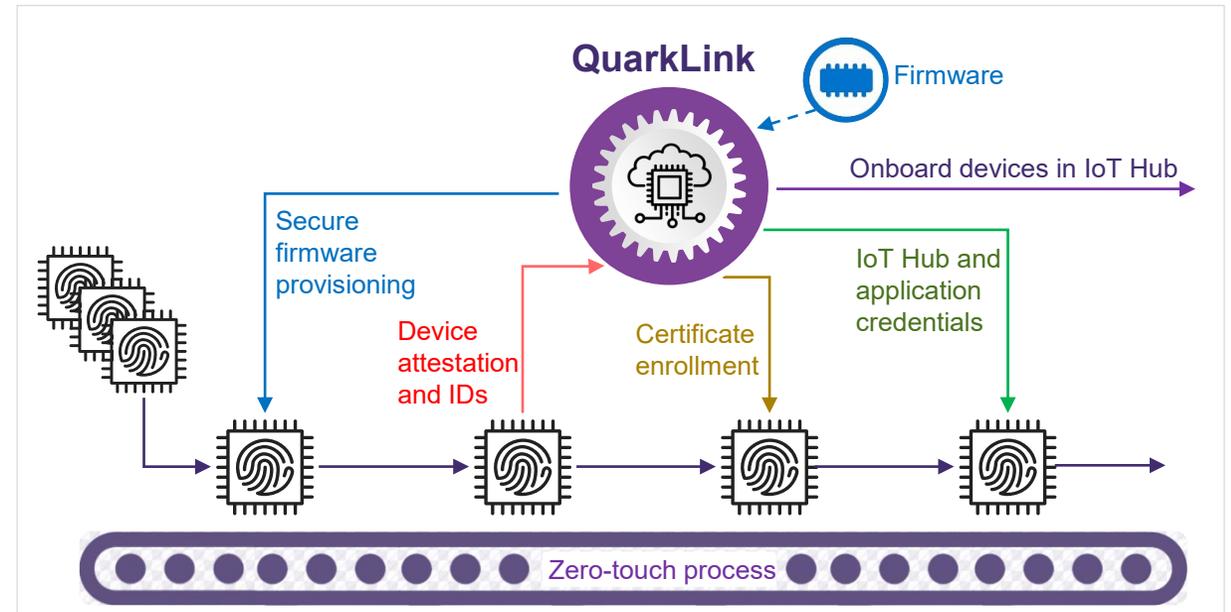
- Zero-touch device attestation, onboarding and enrolment, based on hardware root-of-trust
- Secure provisioning with firmware signing and encryption with no HSMs, key injection, or secure supply-chains required
- Certificate management and revocation with automatic renewals and private PKI, no external CA required
- Platform agnostic and flexible deployment, can be hosted on-prem or in the cloud, providing full control of keys and firmware and a fully functional private PKI
- Data protected from device to application, encrypted at rest

Target Markets and Applications

- Automotive
- Industrial IoT
- Smart Cities
- Smart Homes
- Smart Sensors
- Consumer Electronics



Crypto Quantique's® QuarkLink is an IoT security and device management platform that enables easy and scalable end-to-end security for IoT, automating secure firmware provisioning, device onboarding and enrolment, and certificate management, providing zero-touch security from hardware to application whilst giving customers full control of security assets.



Learn more at www.renesas.com/ra-partners

RENESAS RA ECOSYSTEM PARTNER SOLUTIONS

HUMAN MACHINE INTERFACE



  <p>Algorithm Specialist</p>	<p>Deliver a smart voice solution using algorithms and decoding for human machine interface communication</p>
 <p>Leading Speech Solution Provider</p>	<p>Offers a voice recognition command and control solution for human machine interface communications with easy customization & support for 34 languages</p>
 	<p>DSP Concepts' TalkTo™ audio front end and Sensory's Truly Handsfree™ Speech Recognition solution set is the perfect combination for local voice activation and control</p>
	<p>Provides the RECAIUS voice recognition software solution for user pre-defined trigger work detection suitable for constrained edge devices</p>
	<p>Delivers an offline wake-up command trigger with fast response time and voice playback support. Integrated DSP (Fortemedia) features beamforming, noise immunity, and echo cancelation</p>
	<p>emWin embedded GUI is integrated out-of-box in the RA FSP to enable the creation of highly efficient and high-quality graphical user interfaces</p>
	<p>World's leading independent graphics toolkit and application framework for building GUI applications on embedded devices. Qt helps customers deliver smartphone-like UI/UX with its designer and developer tools, which support collaborative product development</p>
	<p>GUILIANI from TES Electronic Solutions is a powerful, yet easy-to-use modern object-orientated and customizable software to create stylish GUIs quickly, with support from quality design services</p>
	<p>Capacitive touch simulation software reduces prototyping time and delivers optimal touch screen performance</p>

AMI + TMC VOICE RECOGNITION

VOICE RECOGNITION & NOISE SUPPRESSION



Key Features

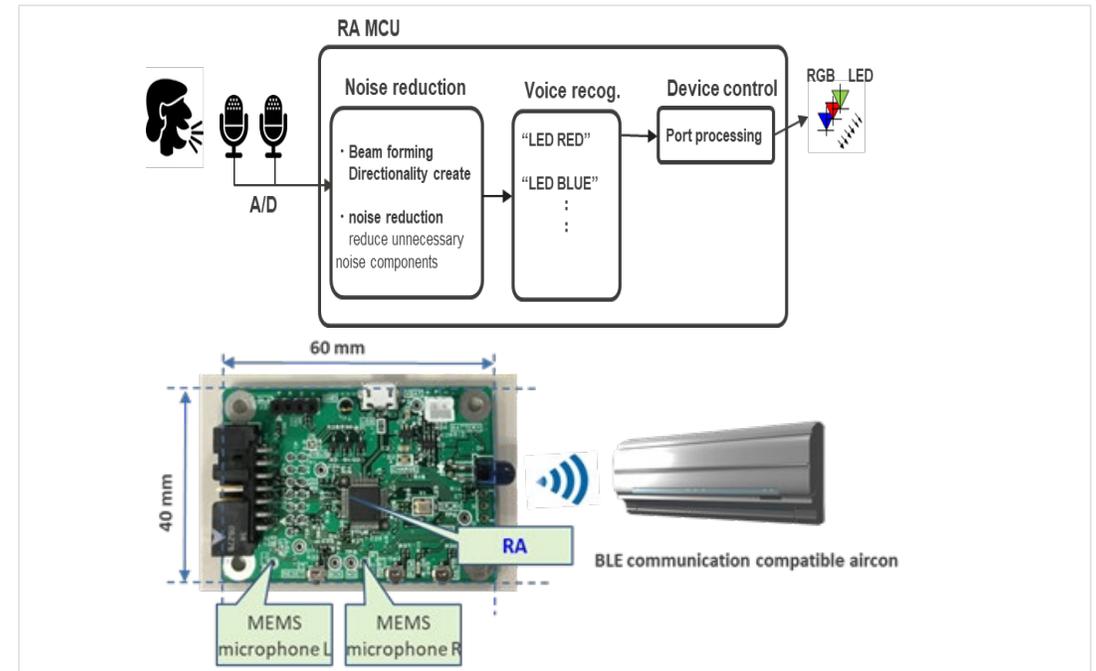
- High recognition rate with optimized middleware for RA MCU
- Realize low (system) cost by voice recognition and device control in one RA MCU
- Low clock and small memory size
- Noise suppressor (noise reduction rate max 30dB (about 1/30))
- Enable to control products which support BLE protocol
- Available to start evaluation and development immediately

Target Markets and Applications

- Smart Home
- Building Automation
- Office Automation
- Other IoT



Combination of “AMIVOICE MICRO” provided by Advanced Media and “ZOOM VOICE” provided by Techno Mathematical on RA can realize the best voice recognition solutions for consumer products and industrial equipment.



Solution Overview

Learn more at www.renesas.com/ra-partners

CYBERON DSPOTTER

VOICE COMMAND SOLUTION



Key Features

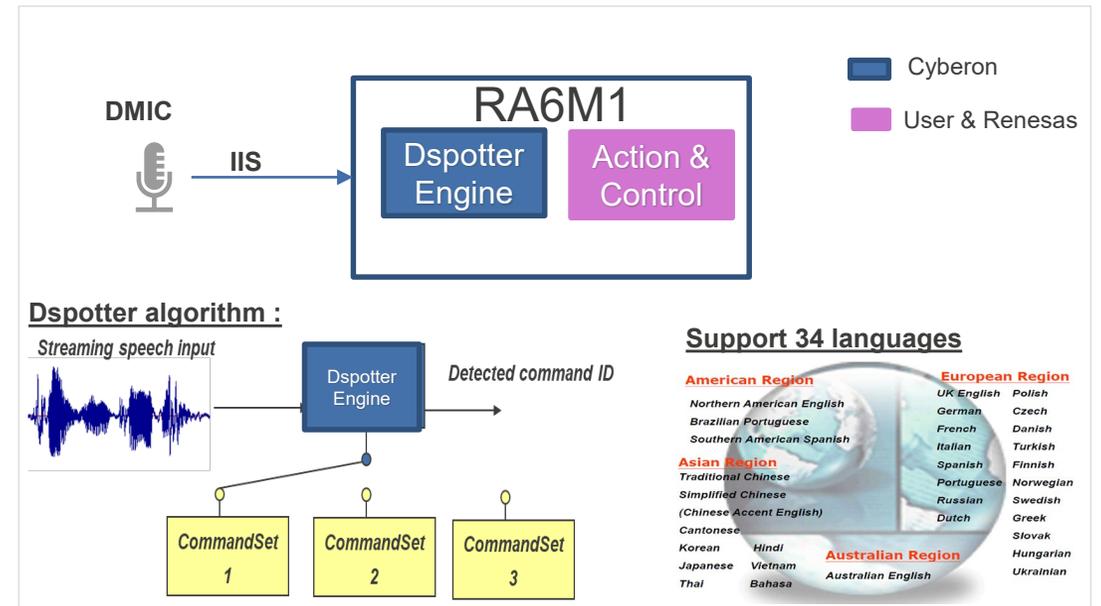
- Local voice recognition algorithm, no network connectivity needed
- Phoneme-based modeling
 - Quick command customization: no advance speech data collection
 - Optimization by model adaptation just with small amount speech data
- Global language support: 40+ languages worldwide
- Small footprint (Flash : 200KB + 28B*Xc, RAM: 50KB+116*Xc) & Cost effective (single DMIC + RA6M1)
- DSMT Tool: command customization, performance tuning, testing
- Separation of recognition engine and command model, switching commands dynamically

Target Markets and Applications

- IoT Devices
- Home Appliances
- Wearable/Hearable Devices



Cyberon DSpotter is a local voice trigger & command recognition solution with robust noise reduction that consumes very low resources and provides high-accuracy performance. It runs on RA MCUs with 120Mhz speed and supports multiple languages as well as H/W crypto engine for security



System Block Diagram

Learn more at www.renesas.com/ra-partners

DSP CONCEPTS & SENSORY

EDGE VOICE USER INTERFACE SOLUTION



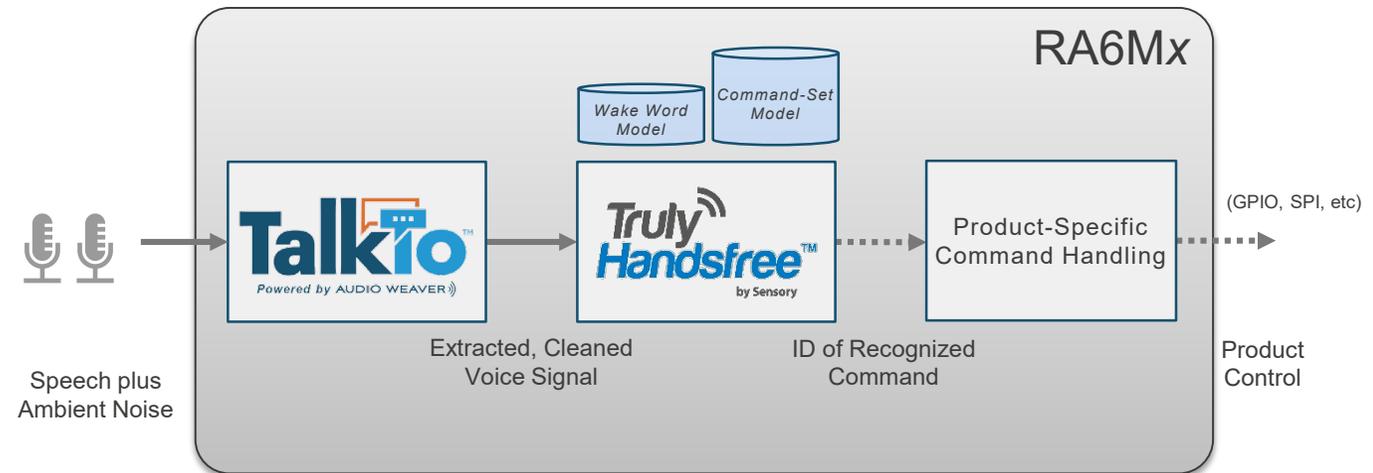
Key Features

- 2-mic, far-field voice-control for endpoint products
- Localized command control; no internet connection needed
- High-performance 2-Mic Audio Front End from DSP-Concepts
- AVS and Google ART certified
- Customizable Wake-Word and Command-set from Sensory
- Best-in-class barge-in and speech-recognition performance
- Enhanced Voice User Experience (VUX)
- Runs on Arm® Cortex™ M4 and Evaluation Kit EK-RA6M3

Target Markets and Applications

- Voice Activated Appliances
- Voice Activated Consumer Electronics
- Voice Activated Controls

DSP Concepts' Audio Front End and Sensory's Speech Recognition solution set is the perfect combination for local voice activation and control. Optimized for the RA6 to ensure low MIPS and Memory consumption while providing best in class FAR & FRR accuracy, DSP Concepts' AVS and Google ART certified AFE combined with Renesas' RA6 platform and Sensory's embedded speech recognition provides a seamless path to developing your voice activated products.



Solution Block Diagram

Learn more at www.renesas.com/ra-partners



TOSHIBA DIGITAL SOLUTIONS “RECAIUS”

VOICE RECOGNITION SOLUTION



Key Features

- SW solution realize talk-switch less and hands-free system detecting pre-defined word (Trigger Word) .
- No Internet connection required.
- Triger word can be defined by customer.
- Suitable for edge device due to small memory size and less CPU performance.
- Partner Beamforming, Noise suppression technology can be used.

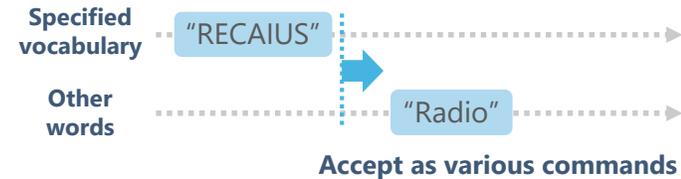
Target Markets and Applications

- Industrial Controls
- Smart Buildings
- Smart Home
- Consumer Electronics
- Home Appliance



1. For command recognition

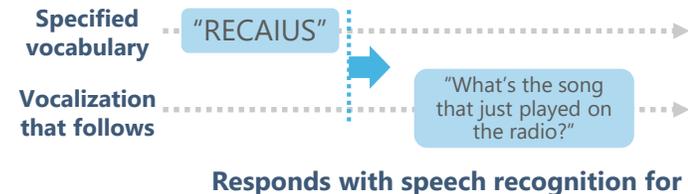
First, limit detection to specific trigger words, then treat other detected trigger words following it as speech commands for various operations.



2. As a switch to initiate listening

Cut out the speech which continues after the trigger word to use as a switch to initiate listening for speech recognition of spontaneous vocalization.

* A switch before speaking is required for speech recognition for spontaneous vocalization.



Use Cases

Learn more at www.renesas.com/ra-ready

PACHIRA INFORMATION TECHNOLOGY

VOICE RECOGNITION SOLUTION



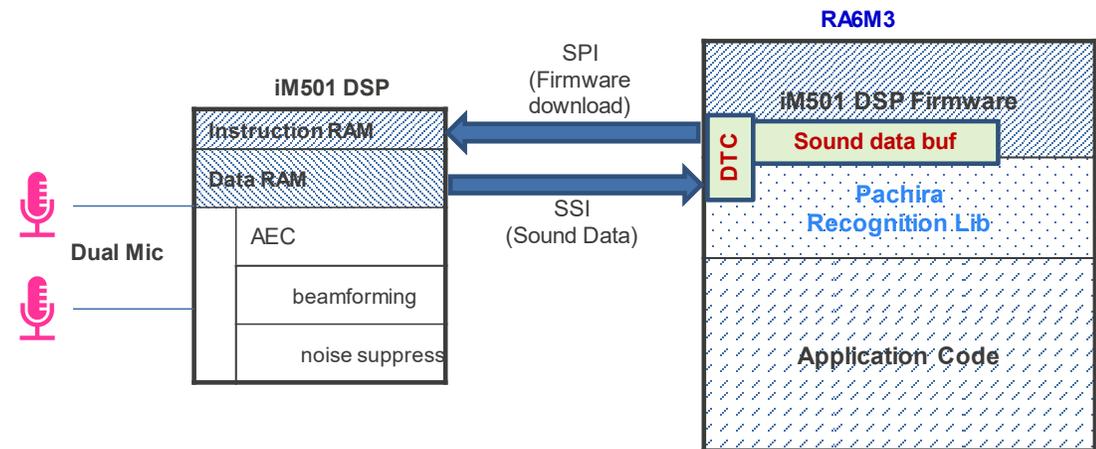
Key Features

- High accuracy voice recognition rate, far-field support of up to 5 meters
- Wake-up command based trigger with fast response time
- Beamforming, noise immunity, echo cancelation
- Voice playback support
- Voice recognition w/o Cloud connection, enabling local voice identification

Target Markets and Applications

- Range Hood / Smart Toilet
- IoT Edge Devices
- Small Home Appliance
- Vehicle

Pachira Voice Recognition solution delivers an offline wake-up command trigger with fast response time with voice playback support. Integrated DSP (Fortemedia) features beamforming, noise immunity and echo cancelation with RA MCU



Voice Recognition Solution Block Diagram

Learn more at www.renesas.com/ra-partners



SEGGER EMWIN

PROFESSIONAL EMBEDDED GRAPHICS LIBRARY



Key Features

- Users of the Renesas RA MCUs receive the full emWin package for their commercial application free of charge as object code library
 - A source code upgrade option is available from SEGGER
- Simple to configure and integrate – part of the FSP for RA
- Utilizes the RA's TFT LCD controller and 2D graphics engine
- Supports all display types: LCD, TFT, LED, EPD
- Visualization and debug tools available FOC

Target Markets and Applications

- Industrial Controls
- Smart Home / IoT
- Home Appliances
- Medical Devices
- Consumer Electronics
- Automotive / Avionics



emWin solution delivers a flexible, professional GUI platform, enabling the creation of highly efficient, high-quality, interactive graphical user interfaces on any display



AppWizard
GUI creation tool
(Q1/2020)

emWin GUI Solution

Learn more at www.renesas.com/ra-partners

Qt for MCUs

ULTIMATE PERFORMANCE. TINY FOOTPRINT.



Key Features

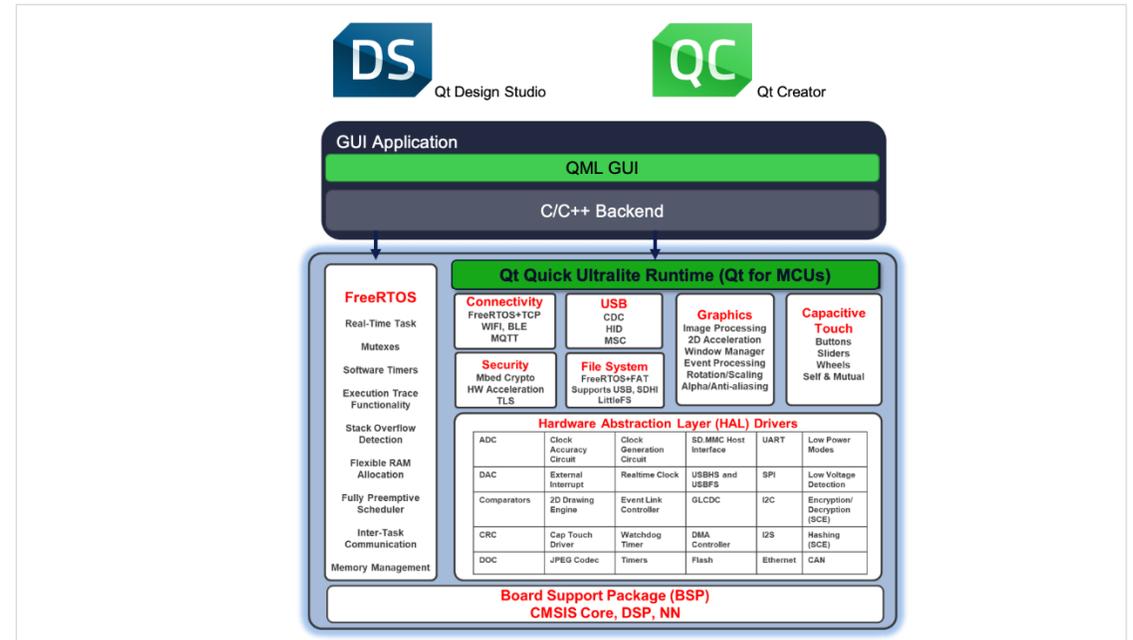
- Leverages hardware capabilities to provide best-in-class graphics performance,
- Small RAM footprint of graphics engine,
- Supports dynamic, scalable fonts with RAM footprint as low as 20kB and Internationalization,
- Graphic assets management and conditioning for reducing memory footprint,
- Includes WYSIWYG Studio and IDE to support Design-Develop iterative cycle.

Target Markets and Applications

- HMI on control panels in industrial / building automation,
- HMI for metering devices,
- HMI for white good appliances.



Qt for MCUs is a complete graphics framework and toolkit with everything you need to design, develop, and deploy GUIs on RA MCUs. Create smartphone-like UI/UX on microcontrollers with industry leading design and development tools, ultimate performance and a tiny footprint.



Solution Block Diagram

Learn more at www.renesas.com/ra-partners



RENESAS RA ECOSYSTEM PARTNER SOLUTION

TES ELECTRONIC SOLUTIONS

GUILIANI GRAPHICAL UI SOLUTION

Key Features

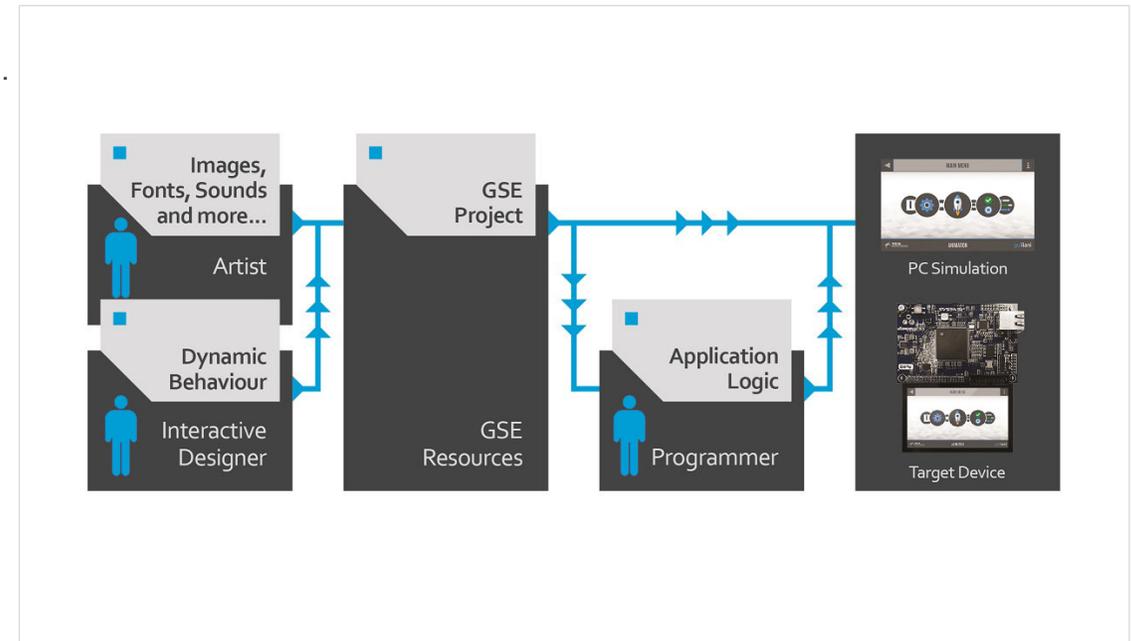
- Highly dynamic run-time-engine concept = fast time-to-market
- Modern object-orientated approach = intuitive workflow
- Innovative Data-Pool concept = easily link your data & events to the GUI
- Vast range of graphics assets such as widgets, skins, fonts, languages, charts, etc...
- Powerful WYSIWYG PC Streaming Editor including simulator
- Flexible business models to meet your requirements
- Best-in-class utilization of the D/AVE graphics accelerators = TES IP
- NEW! Bidirectional text, e.g. Arabic, output as well as input. Grow your market!

Target Markets and Applications

- White Goods, Appliances, HVAC
- Industrial, Test & Measurement
- Consumer Electronics
- Medical & Fitness
- Automotive & Transportation



GUILIANI is a powerful, yet easy to use, modern, object-orientated and customizable software to create stylish Graphical User Interfaces (GUI) quickly. Also supported by quality design services



GUI Development Workflow

Learn more at www.renesas.com/ra-partners

CAPEXT SIMULATION

SIMULATING CAPACITIVE TOUCH DESIGNS



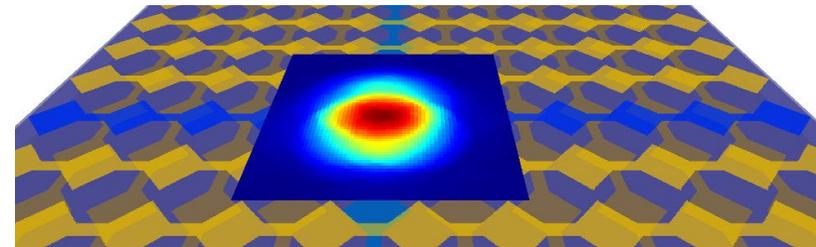
Key Features

- Save money by avoid PCB iterations during design
- Ready to go, validate your touch design in less than 5 minute
 - Import standard design files such as Gerbers or DXF files
 - From Gerber to simulation results in under 5 minutes
- Find and fix noise/crosstalk issues
- Simulate capacitance and resistance
- Simulate the effect moisture/water on your touch design
- Reduce development time and hit the market faster!

Target Markets and Applications

- Implementing capacitive touch
 - Touch surfaces on PCBs
 - Touch surfaces on ITO for screens/mobile phones
- Need capacitance simulations for sensitive analog designs

CapExt is a software package for simulating capacitive touch, designed from the ground up to be as easy to use as possible, while returning accurate results. With CapExt you can ensure optimal touch performance before the first prototype.



Sensitivity of a mutual capacitance touch surface as simulated in CapExt



Solution Design Flow

Learn more at www.renesas.com/ra-partners



RENESAS RA ECOSYSTEM PARTNER SOLUTIONS

CONNECTIVITY & CLOUD



	<p>The Renesas RA Ali Cloud Solution uses the RA6M3 microcontroller and connects via Wi-Fi to Ali Cloud Web Services. It provides an ideal evaluation environment for developers and serves as a strong foundation for IoT device development</p>
	<p>Pelion IoT Platform is a flexible, secure, and efficient foundation for connectivity, device, and data management. It accelerates time to value of IoT deployments helping to easily connect trusted IoT devices on global networks, seamlessly manage them, and extract real-time data to drive competitive advantage</p>
	<p>SX-ULPGN is an ultra-low-power Wi-Fi IoT module. This low power Wi-Fi IoT module is based on QCA4010 radio from Qualcomm. It is an excellent choice for IOT Wi-Fi connected devices</p>
	<p>RELOC Wi-Fi FSP Driver adds ATWINC15x0 Wi-Fi module support to the RA MCU to simplify the development of wireless connected products. Driver package includes a comprehensive IoT example application based on Amazon FreeRTOS & AWS IoT Cloud services</p>
	<p>The Clarinox Wi-Fi/BT/BLE protocol stacks are a robust, reliable connectivity suite, which includes advanced tools for debugging and protocol analysis. Based on 19+ years domain expertise in connectivity, Clarinox stacks ensure reliable product development, with fast time to market</p>
	<p>Altobeam is a Wi-Fi chip & module vendor. The Wi-Fi module features a highly integrated 802.11b/g/n WLAN SoC with SDIO interface (SDIO2.0 compliant) to enable easy cloud connectivity for IoT edge devices</p>

RENESAS RA ECOSYSTEM PARTNER SOLUTION

ALIBABA – ALI CLOUD

RA ALI CLOUD SOLUTION



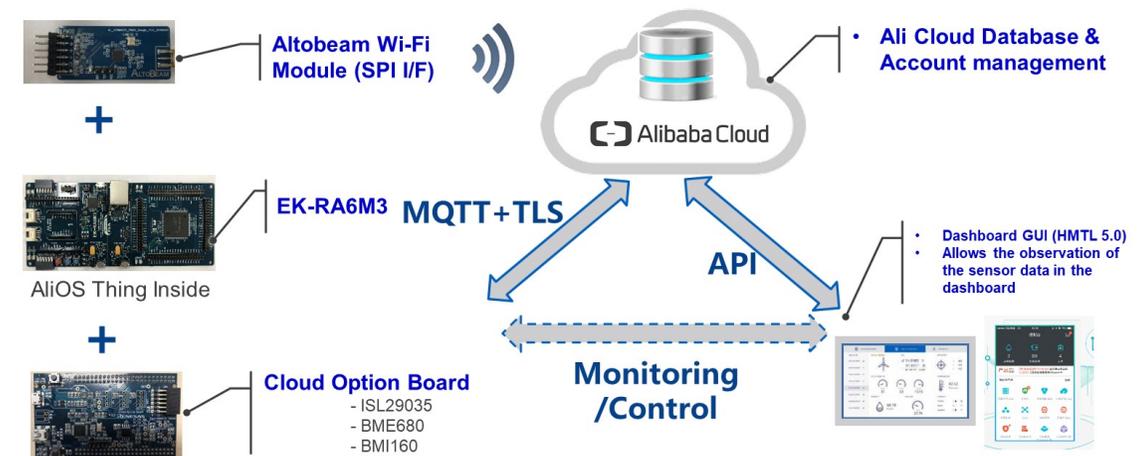
Key Features

- Enables developers to easily get started and connect their designs to Ali cloud
- Accelerates IoT device development and prototyping
- Reduces product development cost by delivering a comprehensive software foundation
- Fully compliant with AliOS Things certification
- Leverages MQTT/TLS endpoint security of RA
- Allows monitoring & control of sensor data through a dashboard

Target Markets and Applications

- Smart Home/ Factory/ Agriculture
- Gateway
- Small Home Appliance
- IoT Edge Devices
- Intelligent Vending Machine
- Entertainment

The Renesas RA Ali Cloud Solution uses the RA6M3 microcontroller and connects via Wi-Fi to Ali Cloud Web Services. It provides an ideal evaluation environment for developers and serves as a strong foundation for IoT device development



RA Ali Cloud Solution

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ARM PELION™

DEVICE & CONNECTIVITY MANAGEMENT SERVICES



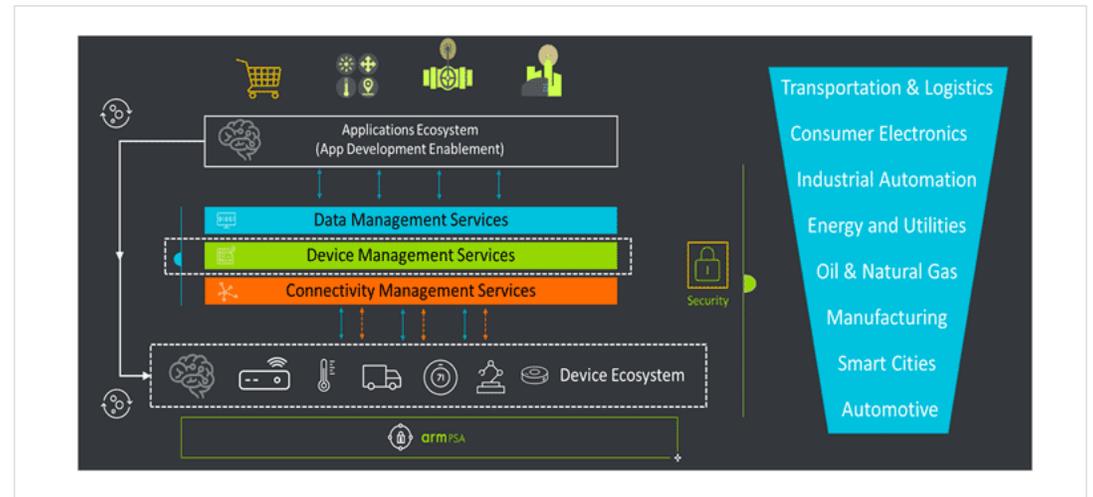
Key Features

- Support for Device Mgmt. services across entire Renesas RA family of devices & out-of-the-box with FSP (Flexible Software Package)
- Leverages RA enhanced security through secure crypto engine and PSATM certification – "chip-to-cloud security"
- Comprehensive and Turnkey service for faster IoT deployments
- Faster Time-To-Market for device development and deployments
- Easily scalable to support any use case across any verticals
- Unified view of devices, networks, and data
- Choice of deployment options, device types, communication protocols

Target Markets and Applications

- Transportation & Logistics
- Consumer Electronics
- Industrial Automation
- Energy & Utilities
- Oil & Natural Gas
- Manufacturing
- Smart Cities
- Automotive

The RA processor family supports the Pelion IoT Platform which is a flexible, secure, and efficient foundation for connectivity, device, and data management. It accelerates time to value of IoT deployments helping to easily connect trusted IoT devices on global networks, seamlessly manage them, and extract real-time data to drive competitive advantage.



Pelion Architecture

Learn more at www.renesas.com/ra-partners



SILEX WI-FI MODULE

LOW POWER WI-FI IOT MODULE



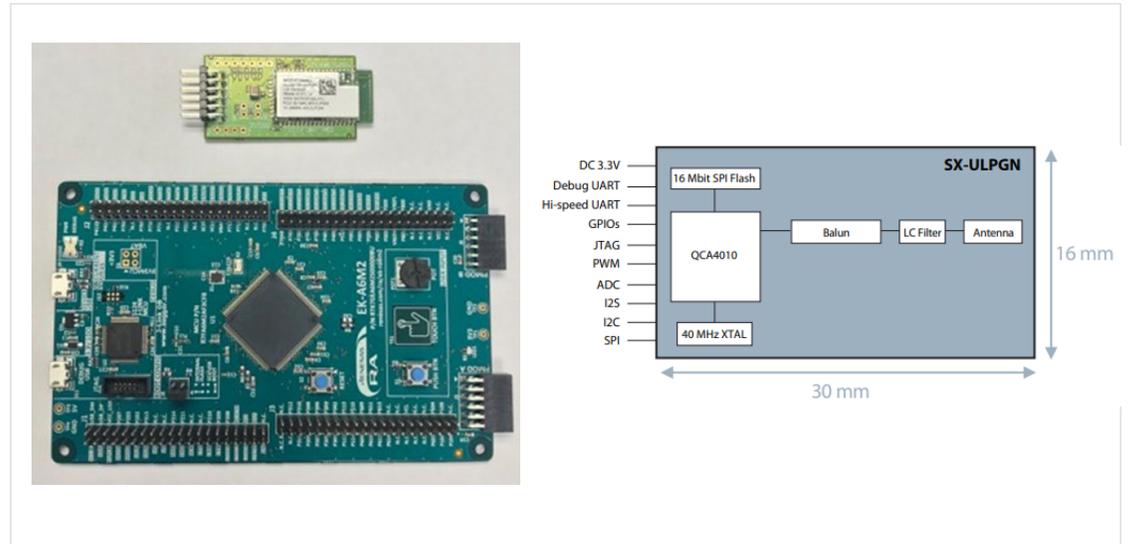
Key Features

- IEEE 802.11b/g/n-compliant (2.4 GHz)
- Support for SX-ULPGN Wi-Fi Module based on QCA4010 Radio
- Single Stream System (1x1)
- 20 MHz Integrated RF front end
- PCB trace antenna
- Host-less or hosted stack Software driver options

Target Markets and Applications

- Smart Building, Lighting
- Appliances and Remote Controls
- Automation, Smart City
- IoT Cloud Connectivity

SX-ULPGN is an ultra-low-power Wi-Fi IoT module. This low power Wi-Fi IoT module is based on QCA4010 radio from Qualcomm. It is an excellent choice for IOT Wi-Fi connected devices



Block Diagram & Hardware

Learn more at www.renesas.com/ra-partners



RELOC WI-FI MODULE

WI-FI DRIVER & MODULE SOLUTION



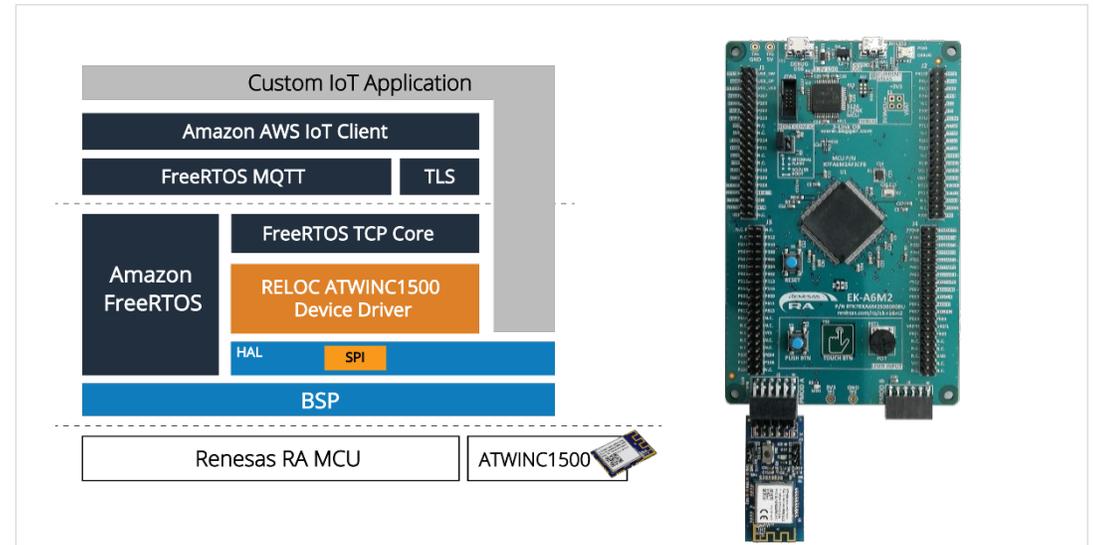
Key Features

- Support for ATWINC15x0 Wi-Fi module with Renesas RA FSP, supporting both Wi-Fi station & AP modes
- Rapid development of RA IoT projects relying on comprehensive Amazon FreeRTOS connectivity bundle, including MQTTs 3.1.1, HTTPs, TLS1.2, firmware over-the-air (OTA) secure updates
- ATWINC1500 PMOD board for connection to RA EK-RA6Mx kits
- Supported toolchains: e2studio and Keil
- Example project with AWS IoT cloud services integration
- Full customization service offered

Target Markets and Applications

- Smart Appliance
- Industrial Control
- Smart Home and Buildings
- IoT Cloud Gateway
- Energy Metering

RELOC Wi-Fi FSP Driver adds ATWINC15x0 Wi-Fi module support to the RA MCU to simplify the development of wireless connected products. Driver package includes a comprehensive IoT example application based on Amazon FreeRTOS & AWS IoT Cloud services



Block Diagram & Hardware

Learn more at www.renesas.com/ra-partners



CLARINOX

BT/BLE/WiFi PROTOCOL STACKS



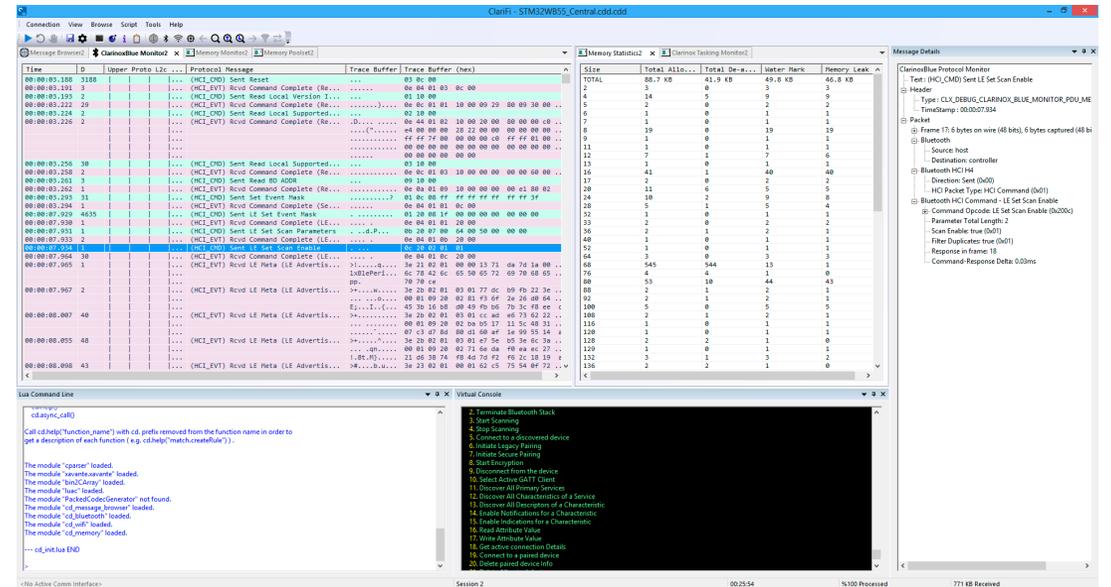
Key Features

- RTOS agnostic (Bare Metal, FreeRTOS, ThreadX & more)
- Smaller, simpler application code
- Powerful debugger Clarifi, inbuilt for Bluetooth Classic, BLE, WiFi & script based automated testing
- Handles complex use cases with all profiles/roles available; simultaneous running of multiple profiles/roles
- Robust, modern, and object oriented code base
- Quality/Standards; MISRA, ASPICE, ISO9001

Target Markets and Applications

- Industrial
- IoT
- Smart Building
- Appliance (Home/Office)
- Wearables
- Healthcare
- Automotive, Transportation
- Smart Metering

The Clarinox Wi-Fi/BT/BLE protocol stacks are a robust, reliable connectivity suite, which includes advanced tools for debugging and protocol analysis. Based on 19+ years domain expertise in connectivity, Clarinox stacks ensure reliable product development, with fast time to market.



ClariFi Protocol Analyzer

Learn more at www.renesas.com/ra-partners



ALTOBEAM (CHINA) INC

HIGH-SPEED Wi-Fi CLOUD CONNECTIVITY SOLUTION



Key Features

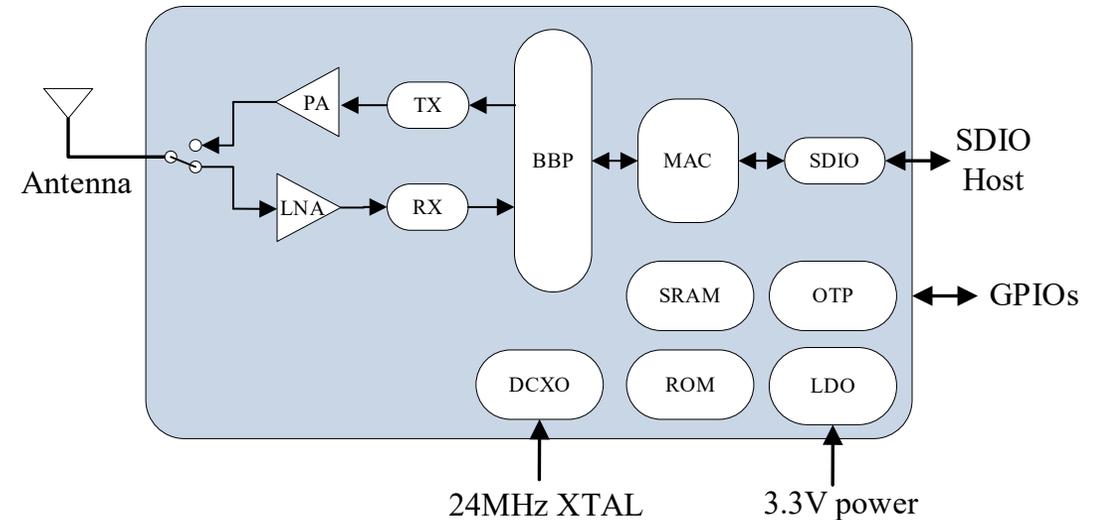
- WLAN MAC, 1T1R capable WLAN baseband and WLAN RF in a single chip
- Integrated PA, LNA, Balun, and T/R switch to minimize BOM
- Integrated LDO to simplify power source, requiring only 3.3V
- Compatible 802.11b/g/n/i/e/w specifications
- Support both 20MHz and 40MHz bandwidth transmission
- 4x4 mm², 28pin QFN package with on-chip 32.768 crystal

Target Markets and Applications

- Smart Home
- Smart Health
- Smart Lighting
- Intelligent Lock/ Doorbell
- Industrial Equipment
- IP Camera



Altobeam is a Wi-Fi chip & module vendor. The Wi-Fi module features a highly integrated 802.11b/g/n WLAN SoC with SDIO interface (SDIO2.0 compliant) to enable easy cloud connectivity for IoT edge devices



Altobeam Wi-Fi Chip/Module Block Diagram

Learn more at www.renesas.com/ra-partners

RENESAS RA ECOSYSTEM PARTNER SOLUTIONS

SENSING & CONTROL



BFG's RA Ready Motor Control solution delivers a flexible, professional platform, enabling the creation of highly efficient, high-quality, flexible and adaptable solution for motor driven applications

BFG MOTOR CONTROL

SENSORLESS FIELD ORIENTED (FO) CONTROL



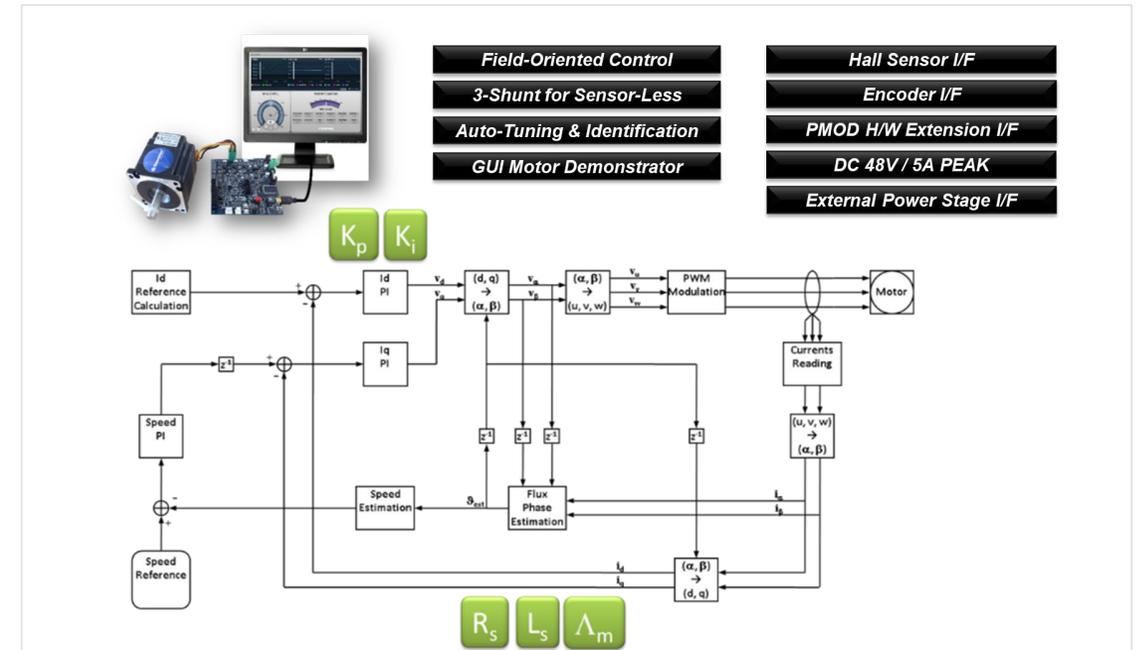
Key Features

- State of the Art 3-Phase BLDC / PMSM Field Oriented Control
- Sensor-less 3-Shunt Method
- Sensor based capabilities supported (HALL & Encoder I/F's)
- Auto Tuning capabilities including Motor parameter identification
- System Parameter enabled to be optimized during system run
- Supports low voltage and external high voltage Inverters
- Supported on toolchains including e2studio

Target Markets and Applications

- Industrial Controls
- Smart Buildings
- Smart Home
- Medical Devices
- Home Appliances
- Consumer Electronics

BFG's RA Ready Motor Control solution delivers a flexible, professional platform, enabling the creation of highly efficient, high-quality, flexible and adaptable solution for motor driven applications



Solutions Overview

Learn more at www.renesas.com/ra-partners



ARTIFICIAL INTELLIGENCE/ MACHINE LEARNING



	<p>Qeexo AutoML is a fully-automated machine learning platform – rapidly builds models & embedded AI solutions for low-resource IoT Edge devices like the RA series</p>
	<p>MicroAI™ Atom brings big infrastructure intelligence down into a single piece of equipment or device.</p>

QEEEXO AUTOML FOR EMBEDDED AI

MACHINE LEARNING PLATFORM FOR BUILDING ENDPOINT APPLICATIONS



Key Features

- Supports Arm® Cortex™- M4 class MCUs like S5D9 and RA6M3
- Enables multiple machine learning methods (e.g. GBM, XGBoost, Random Forest, & Logistic Regression), not just deep learning (e.g. CNN, ANN)
- Optimized for constrained Edge environments: low latency, low power consumption, small footprint
- Automates tedious and repetitive machine learning processes – saves time & cost to production and eliminates room for error
- End-to-end Demo optimized for Renesas RA6M3 ML Sensor Module

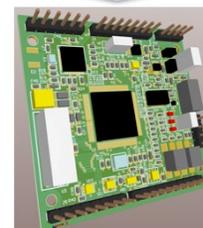
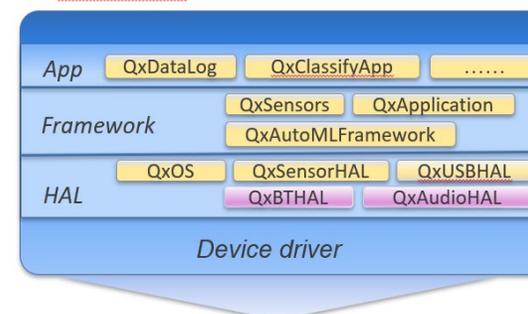
Target Markets and Applications

- Industrial/Predictive Maintenance
- Wearables
- IoT
- Mobile
- Automotive
- Appliances/Smart Home



Qeeexo AutoML is a fully-automated machine learning platform – rapidly builds models & embedded AI solutions for low-resource IoT Edge devices like the RA series.

AutoML Architecture



RA6M3 Sensor Module*

RA6M3 Sensor Module*

Device	Function
RA6M3	120MHz MCU
RA4W1	BLE 5.0
HS3001	Humidity Sensor
ISL29035	Light sensor
Bosch BM160	6 Axis Accelerometer/Gyro
SPM0687LR5H	MEMS Microphone
ZMOD4410	Environmental sensor

*Not for Sale

AutoML Solution for RA MCUs

Learn more at www.renesas.com/ra-partners

ONE TECH MicroAI™ ATOM

A SELF-LEARNING AI PLATFORM THAT LIVES & TRAINS ON THE SMART ASSET



Key Features

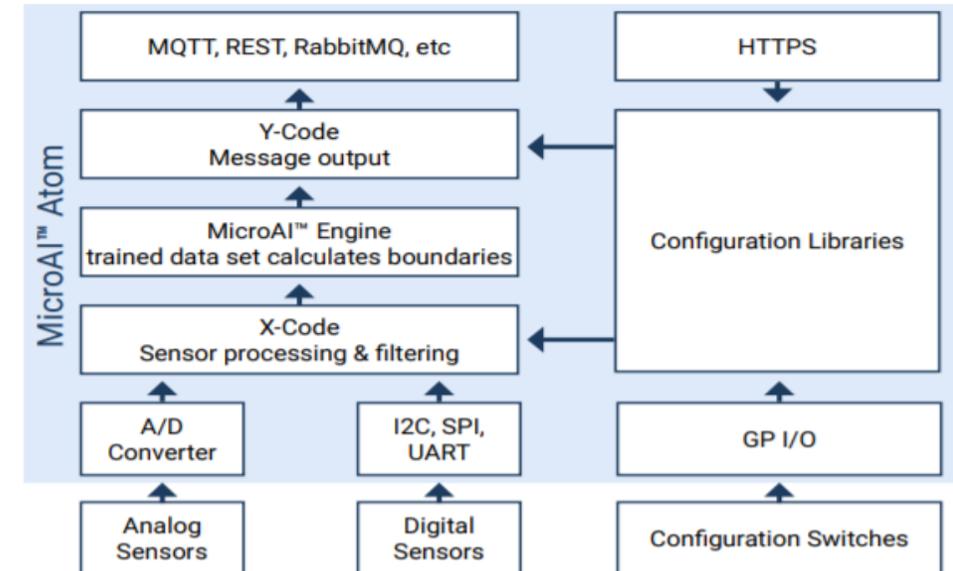
- Can be applied on a single device or scaled to an entire device ecosystem
- More cost effective than traditional microcontroller-based solutions that live on the edge
- Lives and trains on smart assets at the MCU level – RA6M3
- Increases visibility into the health and performance of your devices, with real-time behavior analysis and response
- Performs cycle time optimization for increased productivity, longer asset life cycles, and optimized asset performance

Target Markets and Applications

- IoT/IIoT, Smart Factory, Embedded AI
- Asset Management/Connectivity, Asset Performance Optimization, Predictive Maintenance
- Security, Endpoint Threat Detection, Workflow Automation



MicroAI™ Atom brings big infrastructure intelligence down into a single piece of equipment or device. Operating within the small environment of the device itself, MicroAI™ Atom provides a more efficient method for capturing data, performing asset analytics, and generating real-time alerts.



Your products run MicroAI™ directly by pulling data from embedded sensors connected to a microcontroller unit or microprocessor inside the asset.

Learn more at www.renesas.com/ra-ready

APPLICATION SPECIFIC/ EMERGING



	<p>GT&T Fleet Tracker is a small and reliable GPS, Cat-M1/NB-IoT fleet tracking unit. Based on GT&T's proven design, with years of domain expertise in transportation, telematics and telemetry</p>
	<p>Pelion IoT Platform is a flexible, secure, and efficient foundation for connectivity, device, and data management. It accelerates time to value of IoT deployments helping to easily connect trusted IoT devices on global networks, seamlessly manage them, and extract real-time data to drive competitive advantage</p>
	<p>Proven BACnet stack conforming to ISO16484-5 standard. BACnet is the world's leading building automation protocol with countless installations around the world for HVAC (heating, ventilation and air conditioning), lighting and access control applications</p>
	<p>The MBS DALI stack simplifies the development process for DALI 2.0 while significantly reducing development times and costs.</p>

GT&T FLEET TRACKER

RELIABLE FLEET & ASSET TRACKING



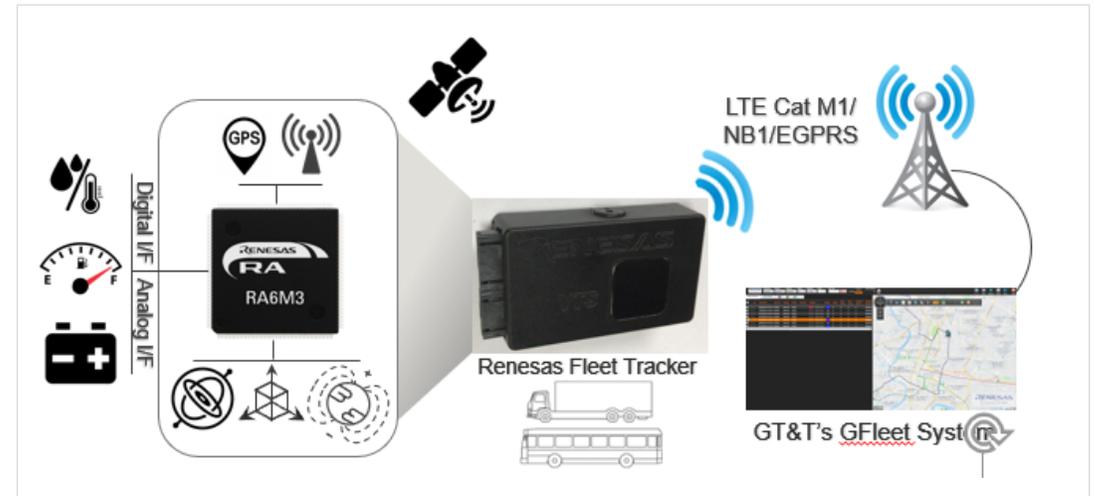
Key Features

- Ready-To-Manufacture Tracker solution & Ready-To-Go when coupled with GT&T backend software
- Designed to resist vehicle's power fluctuations with under-voltage cut-off to avoid battery drain
- Logs locations while out of communications coverage
- Isolated interface to external analog & digital I/O
- Firmware Over-The-Air (FOTA) upgrade to extend product life
- Great ROI, as tracker outlives the assets it tracks

Target Markets and Applications

- Fleet & Asset Tracking for Telematics, Transportation, Logistics
- Asset monitoring for Industrial IoT (generators, pumps, etc.)
- WAN communications device

GT&T Fleet Tracker is a small and reliable GPS, Cat-M1/NB-IoT fleet tracking unit. Based on GT&T's proven design, with years of domain expertise in transportation, telematics and telemetry.



Fleet Tracker Solution Overview



Learn more at www.renesas.com/ra-partners

ARM PELION™

DEVICE & CONNECTIVITY MANAGEMENT SERVICES



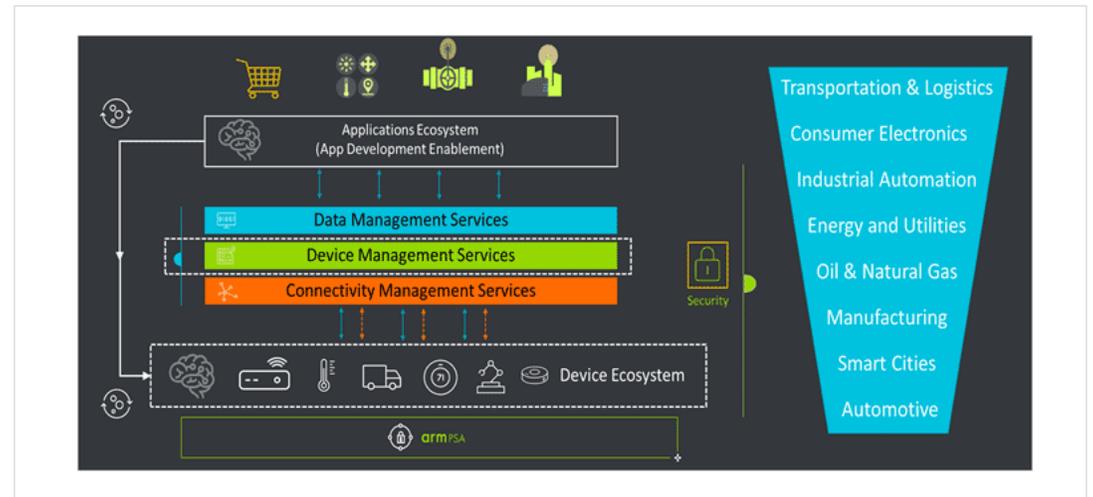
Key Features

- Support for Device Mgmt. services across entire Renesas RA family of devices & out-of-the-box with FSP (Flexible Software Package)
- Leverages RA enhanced security through secure crypto engine and PSATM certification – "chip-to-cloud security"
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- Faster Time-To-Market for device development and deployments
- Easily scalable to support any use case across any verticals
- Unified view of devices, networks, and data
- Choice of deployment options, device types, communication protocols

Target Markets and Applications

- Transportation & Logistics
- Consumer Electronics
- Industrial Automation
- Energy & Utilities
- Oil & Natural Gas
- Manufacturing
- Smart Cities
- Automotive

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Pelion Architecture

Learn more at www.renesas.com/ra-partners



CS-LAB

BACnet STACK FOR RA MCUs



Key Features

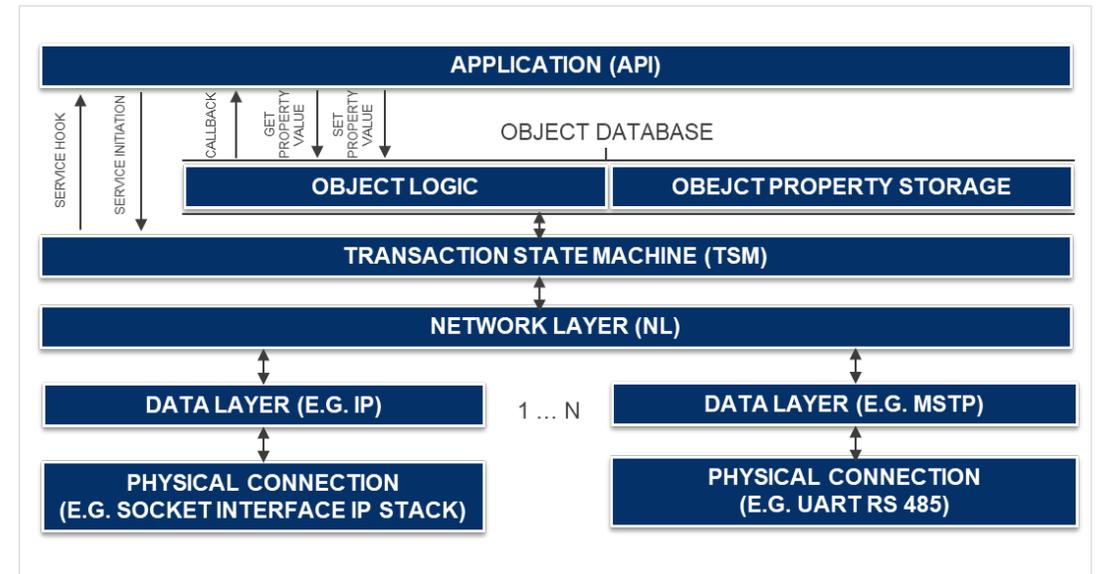
- User-friendly, flexible, reliable
 - Convenience: The development of standard-compliant applications is simplified tremendously.
 - Flexibility: Large I&C systems can be programmed in the same way as automation stations or small devices (such as heat meters).
 - Bandwidth: Implementations for a wide range of operating systems are available, from older Windows systems to various Linux variants.
 - Reliability: As part of the BTF, accredited test laboratories use the stack to test the standard conformity of BACnet products.
- Many details are processed automatically so that users no longer have to worry about them. Thus, the functionality of the BACnet objects is implemented as an object database. In addition, various mechanisms and fallbacks for the value acquisition of field devices have been built into the code.

Target Markets and Applications

- Building Automation



The CS-Lab BACnet stack for RA MCUs helps developers save time and effort in the implementation of BACnet-compatible applications. CS-Lab has compiled a library that supports programmers in the use of BACnet for a particular task (automation station). Routines of the BACnet stack take over the standard-compliant operation of the BACnet protocol, allowing the programmer to focus on the actual application.



Block Diagram

Learn more at www.renesas.com/ra-partners

MBS

DALI STACK FOR RA MCUs



Key Features

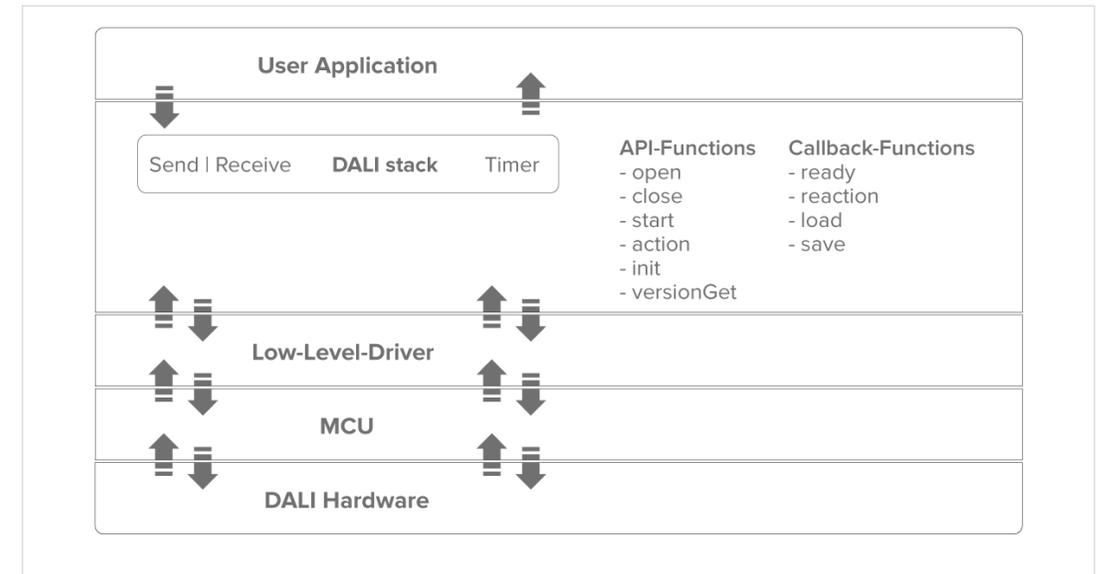
- Simplifies and speed up the development of compatible devices according to DALI 2
- Significantly reduces development costs
- Provides the core functions and software components needed for the development of control and operating devices compatible with DALI 2.0
- The application program communicates with other DALI control and operating devices via the stack API function
- Users require no DALI knowledge for this, they can concentrate fully on the actual application.

Target Markets and Applications

- Lighting Management
- Lighting control in large buildings
- Building solutions



The MBS DALI stack helps developers develop DALI-compatible operating devices such as push buttons or lights and control devices such as light sensors or motion sensors with one or more DALI control units in a very short time. It simplifies the development process for DALI 2.0 while significantly reducing development times and costs.



Solution Architecture

Learn more at www.renesas.com/ra-partners

TOOLS & USER EXPERIENCE



	IAR Embedded Workbench is a complete development toolchain providing powerful code optimizations and comprehensive debugging features in an easy-to-use integrated development environment. The security development tool C-Trust adds IP protection and production control
	The Security from Inception Suite provides companies with a straightforward way of building the right level of security for their application needs throughout the development, manufacturing, and product management process
	Capacitive touch simulation software reduces prototyping time and delivers optimal touch screen performance
	Tracealyzer is the premier solution for visual trace diagnostics for developers of RTOS- or Linux-based embedded software systems. State-of-the-art software tracing and trace visualization, developed since 2004, is designed to make it easier to spot & understand bugs, find solutions & verify them

IAR EMBEDDED WORKBENCH

COMPLETE C/C++ COMPILER & DEBUGGER TOOLCHAIN



Key Features

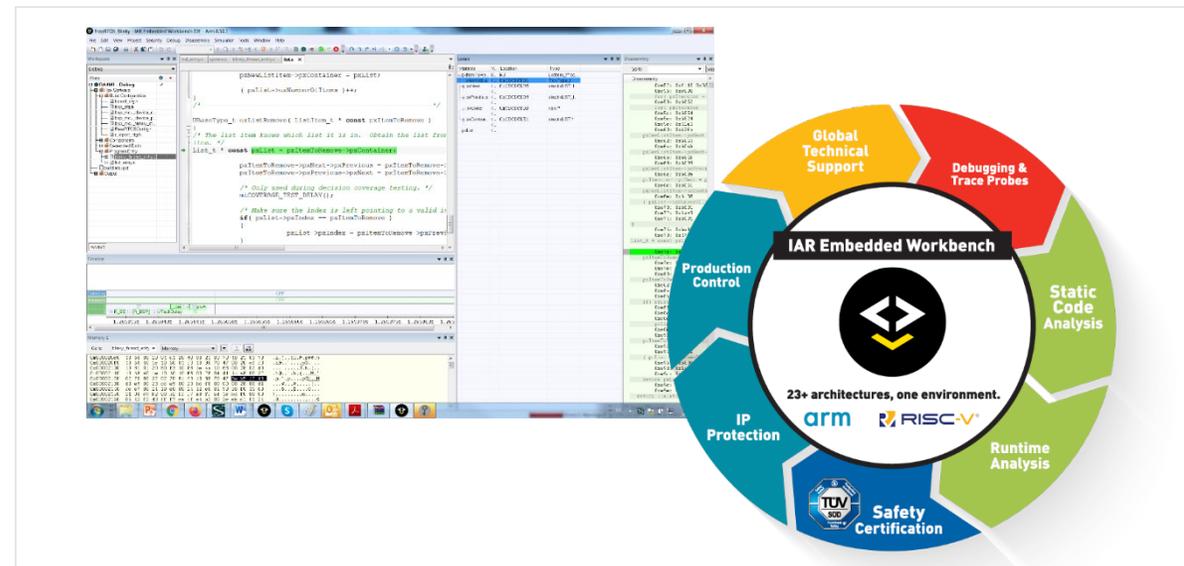
- Outstanding performance through sophisticated optimization technology
- Comprehensive debugger
- User-friendly features and broad ecosystem integration
- Integrated static and runtime code analysis
- Global support services and training
- Functional safety certification: IEC 61508, ISO 26262, IEC 62304, EN 50128, EN 50657

Target Markets and Applications

- Industrial automation
- Automotive
- Consumer electronics
- Medical technology and wearables
- Smart metering



IAR Embedded Workbench is a complete development toolchain providing powerful code optimizations and comprehensive debugging features in an easy-to-use integrated development environment. The security development tool C-Trust adds IP protection and production control.



IAR Toolchain

Learn more at www.renesas.com/ra-partners

SECURITY FROM INCEPTION SUITE

UNIQUE SET OF TOOLS AND SERVICES FOR IMPLEMENTING SECURITY



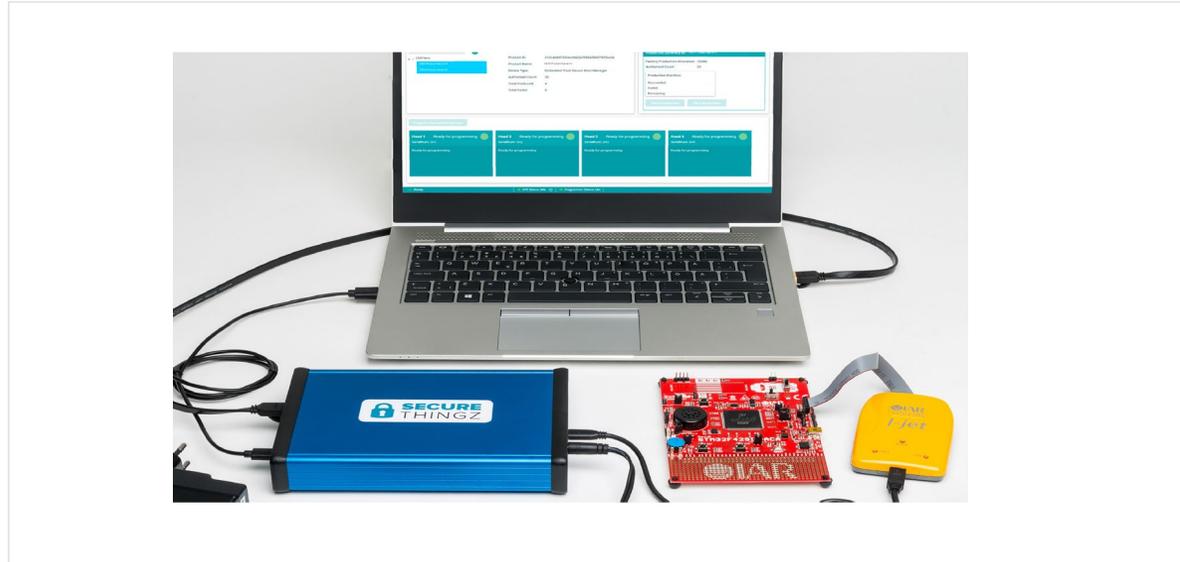
Key Features

- Software and hardware tools
 - Security Development Environment
 - Secure Desktop Provisioner
 - Complete C/C++ compiler and debugger toolchain
 - Static code analysis
- Training resources with topics like:
 - Impact of Legislation & Security on IoT
 - Managing Intellectual Property & Inhibiting Overproduction
- Custom Design Review
 - Identifying potential risks and establishing threat model
 - Creating custom security implementation

Target Markets and Applications

- Industrial automation
- Automotive
- Consumer electronics
- Medical technology and wearables
- Smart metering

The Security from Inception Suite provides companies with a straightforward way of building the right level of security for their application needs throughout the development, manufacturing, and product management process.



System Demo

Learn more at www.renesas.com/ra-partners



CAPEXT SIMULATION

SIMULATING CAPACITIVE TOUCH DESIGNS



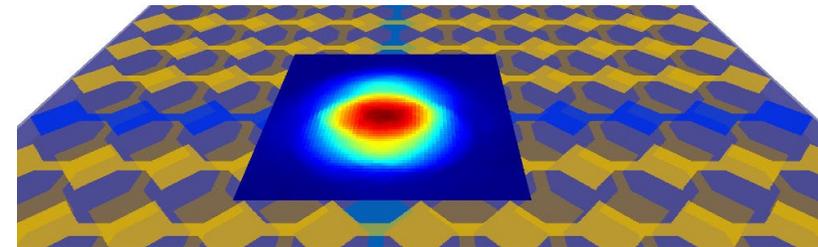
Key Features

- Save money by avoid PCB iterations during design
- Ready to go, validate your touch design in less than 5 minute
 - Import standard design files such as Gerbers or DXF files
 - From Gerber to simulation results in under 5 minutes
- Find and fix noise/crosstalk issues
- Simulate capacitance and resistance
- Simulate the effect moisture/water on your touch design
- Reduce development time and hit the market faster!

Target Markets and Applications

- Implementing capacitive touch
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 - Touch surfaces on ITO for screens/mobile phones
- Need capacitance simulations for sensitive analog designs

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Sensitivity of a mutual capacitance touch surface as simulated in CapExt



Solution Design Flow

Learn more at www.renesas.com/ra-partners



PERCEPIO

TRACEALYZER



Key Features

- Over 30 views of the run-time behavior
- Custom logging of “User Events” to see states and variables over time
- Profiling views to show you what parts of the system that uses most resources
- No special trace hardware is required. Tracealyzer relies on efficient software instrumentation with minimal overhead.
- Multiple RTOS and Linux platforms are supported, including FreeRTOS, Amazon FreeRTOS, SafeRTOS, Micrium μC/OS, ThreadX, Keil RTX5 and VxWorks

Tracealyzer is the premier solution for visual trace diagnostics for developers of RTOS- or Linux-based embedded software systems. State-of-the-art software tracing and trace visualization, developed since 2004, is designed to make it easier to spot and understand bugs, find solutions and verify them.



All views are interconnected in clever ways, so you can click on a data point in one view and see the corresponding location in another related view. Moreover, all timeline views can be synchronized, so you can scroll and zoom them side-by-side. This way, you can benefit from multiple perspectives at the same time and better understand the trace.



Percepio Toolchain

Learn more at www.renesas.com/ra-partners

THANK YOU

