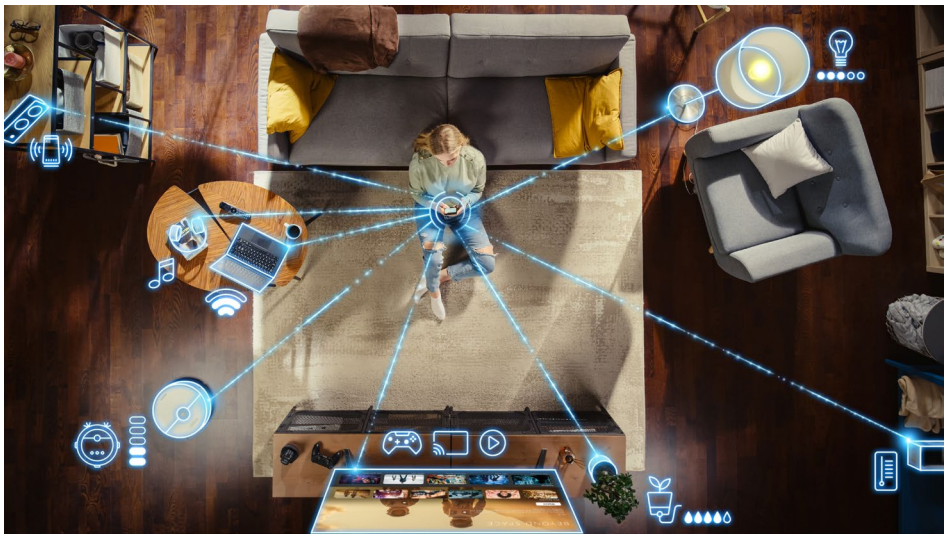
Technology of the connected home and building delivers on safety, comfort and convenience

David Renno, Renesas Electronics



Devices for the home and office are increasingly differentiated by their intelligence and connectivity. Products that can sense their environment, detect users and other people, understand behavior, and respond in a way that humans find intuitive, provide higher value in the form of greater comfort, convenience and safety.

This new generation of equipment for the smart home and building is made possible by the broad availability, high performance and low cost of standard connectivity technologies such as Wi-Fi, Bluetooth and NFC. It is also enabled by the introduction of protocols such as Matter technology, which enables devices from different manufacturers to interoperate.

Renesas Connectivity provide a perfect fit for this new generation of devices for the smart home and building, offering Wi-Fi, Bluetooth and NFC chips and modules that are known for their performance leadership, mature ecosystem and seamless integration.

Here, we explore the market trends that are driving demand for connectivity in the smart home and building, the features required in connectivity components, the products that OEMs can use to build devices for the smart home and building, and the resources available from Renesas to help them, including a broad ecosystem of microcontrollers, software and tools, and Winning Combinations reference designs.

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Always on, always available: smart home and building devices respond to new user expectations

The introduction of new technologies can cast unexpected light on human desires and preferences. It was only with the creation of streaming services that consumers realized that they wanted to be able to listen to any track anytime, anywhere. The daily commute to the workplace was an unquestioned routine for billions of people, until reliable high-bandwidth connectivity and easy-to-use video calling made working from home convenient for everyone with a PC.

In homes and offices, new technology is now transforming the way people live and work. And at the heart of the new technology are advanced wireless communications capabilities.

Always-on monitoring and control

Previously, if users wanted to control the operation of home or building devices in their absence, they had to predict their requirement and set a timer or program to run systems such as heating and ventilation automatically.

Now, users expect to be able to monitor and control home and building systems 24/7 via a convenient user interface on a smartphone or personal computer. This continuous remote control capability is applied today to systems such as heating, ventilation and air-conditioning (HVAC), which might previously have been regulated by a timer program. But the call for 24/7 monitoring and control is being extended to more and more device types: for instance, smart door locks enable a resident, whether they are home or away, to see, speak to and grant access to anyone at their front door.

Always-on cloud connectivity is equally valuable in the office, where smart lighting settings and smart surveillance can be viewed and actions implemented remotely. Remote control and 24/7 monitoring from anywhere are particularly useful as the business world adapts to hybrid working. Today's workers can spend as much time at work outside the office – at home, with customers, or in transit – as they do inside it. Organizations are learning to adapt to the reduced demand for office space that this entails. Smart building technologies enable operators to optimize the operation of energy consumers such as lighting and HVAC systems depending on occupancy and demand.

Intelligent devices that learn about you and your behavior

The capabilities of machine learning and artificial intelligence (AI) are expanding rapidly. In smart homes and buildings, this is enabling devices to respond to users in new ways. Users interact with some devices today by speaking or gesturing to them, rather than pressing a button or selecting an item on an on-screen menu.

Increasingly, AI-enabled machines learn about their environment and users' behavior, enabling them to optimize operation independently of user controls. Research published in the academic journal *Sustainability* suggests that commercial buildings can make energy savings of more than 10% while improving users' thermal comfort by handing over control of HVAC systems to AI. Drawing on an array of sensor data, for parameters such as room occupancy, temperature, humidity and air quality, and environmental data such as weather forecasts, an AI system can match HVAC system outputs to the needs of occupants in real time.

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Just for you: secure and protected against abuse by non-authorized users

In the smart home and smart building, access for users, and control of the devices inside, are regulated by technology that is connected via in-building networks and, in many cases, via the cloud. All these connections are potential entry points through which cyber-attackers can enter, exposing homes and buildings to virtual intruders and to malware such as viruses.

Legislators around the world are requiring smart devices to maintain secure connections, to be able to authenticate other devices on the network, and repel intrusion by devices or software that lack the proper security certifications. The introduction of measures such as the European Union's Radio Equipment Directive and Cyber Resilience Act, and the Cyber Trust Mark in the US, means that OEMs are obliged to build robust security capabilities into smart home and building devices.

User safety also encompasses the physical safety of users who share space indoors, particularly in commercial settings such as offices. Touchless interfaces are a new requirement in shared spaces since the emergence of the Covid-19 pandemic, and can be enabled by wireless technology. The smartphone can also act as a personal interface to a wide array of connected devices, isolating the user from the need to press buttons or interact directly in other ways with the devices.

How communications technology is responding to the new customer requirements

As smart home and building technology responds to the new customer demands, the need for more advanced connectivity in devices is set to increase. New connected devices in homes and buildings will need wireless semiconductor chips that can support these key requirements.

Always-on cloud connectivity

The smart doorlock that enables a worker in the office to remotely answer a visitor at the door of their home requires a robust connection to the cloud to carry audio and video streams. Likewise, the office building's AI-enhanced access control and security system could implement face recognition, accessing a cloud computing system to process camera images of the faces of staff and visitors.

So smart home and building devices need strong Wi-Fi connectivity that reliably stretches from the nearest router or gateway – connected systems such as HVAC units are frequently located at the edge of a property. And because devices such as smart doorlocks and smart thermostats are battery-powered, the Wi-Fi/Bluetooth chips that connect them have to use extremely low amounts of power.

As OEMs start to build AI capability into smart home and building products, they will draw on resources such as the Reality AI Tools® solution kit from Renesas. The Reality AI Tools kit enables engineers to simplify the integration of AI functionality into Renesas devices. Its capabilities include generating and building TinyML/Edge AI models based on advanced signal processing implemented on Renesas microcontrollers and microprocessors, and using outputs from Renesas sensors.

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Seamless data transfer

Devices such as wireless occupancy or presence detection sensors might use a Bluetooth Low Energy connection to a host device that can in turn use Wi-Fi signals to pass the sensor data to the cloud. And short-range NFC connections can make provisioning and pairing of Bluetooth and Wi-Fi nodes easy and convenient for the user.

So the smart home and building of the future will be a multi-mode wireless environment that puts the right type of connectivity in the right place, taking advantage of the different characteristics of Wi-Fi, Bluetooth, Thread and NFC connectivity.

Today, seamless sharing of data between devices has become easier with the introduction of the Matter protocol. Matter enables different types of devices made by different brands to communicate and transfer data when they run on the same Wi-Fi and/or Thread network. The Matter protocol is a breakthrough in consumer electronics, as it removes the user's concern about whether the devices they own can be controlled via a single interface such as Amazon's Alexa or Google Home: now, all devices that carry a Matter logo can receive and send Matter data and instructions.

Supported by a complete ecosystem of hardware, software and design tools, the Matter protocol is the result of collaboration between a consortium of more than 600 member companies under the aegis of the Connectivity Standards Alliance.

The demand for connectivity inside buildings is reflected in forecasts for device shipments. By 2027, more than half of the world's key smart home devices shipping to end users will be Matter-compliant. By 2030, more than 5.5 billion Matter-compliant smart home devices will have been sold, according to a new report from global technology intelligence firm ABI Research.

The Bluetooth market is also set to continue its strong growth, with annual device shipments rising from 4.9 billion in 2022 to a forecast 7.6 billion in 2027, a 9% compound annual growth rate (source: Bluetooth Special Interest Group).

Ultra-secure authentication

Every connected device is a potential entry point for a cyber-attack. While users are excited about the benefits of remote monitoring and control, which depend on seamless data transfer and robust connections with the cloud, at the same time they expect their devices to be safe and their personal data to be private.

A key element of secure architectures is authentication: proving that a device has the correct credentials to join a network. The latest NFC technology provides a secure way to perform device-to-device authentication, making the onboarding process for smart devices in the home or office both easy and safe. The familiar 'tap to operate' user interface provides for instant, convenient pairing and enrolment into Bluetooth or Wi-Fi networks.

To secure these networks, the broad range of Renesas connectivity solutions combines seamlessly with Renesas microcontrollers and microprocessors, which offer a rich set of hardware security features such as cryptographic coprocessors, and on-chip security logic. These hardware features are backed by software and tools such as a Trusted Execution Environment (TEE), Security Key Management Tool and a Trusted Secure IP Driver.

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Technology redefined: how advanced connectivity is transforming devices in smart homes and buildings

The availability of secure, low-power always-on connections is creating new opportunities in the latest generation of smart devices in homes, offices and other buildings.

Connectivity for smart devices in the home

Even before a resident has entered their home, the next generation of smart technology will get into action to serve their desire for safety, comfort and convenience. In a home with a garage, access control technology scans the airwaves for the car's **Bluetooth signature**, automatically opening the garage door when it is detected.

For the resident arriving on foot, the smart doorlock connects via **Bluetooth Low Energy** to their smartphone. This triggers a signal from the doorlock to the home's smart lighting network and heating/air-conditioning system. Because the doorlock and the lights are all **Matter-compliant**, they can communicate over **Wi-Fi and Thread** via intermediate border routers. So when the doorlock senses the approach of a known user, it automatically switches on a set of interior lights, which are connected via a robust **Thread network** that reaches every room in the home thanks to its mesh topology. The HVAC system also automatically sets the temperature, humidity and ventilation to the user's preferred configuration.

A secure low-power **Wi-Fi connection** between the smart doorlock and the home's **Wi-Fi router**, and from the router to the internet, supports the smart doorlock's face recognition function. Detecting an authorized user's face, the doorlock automatically opens the front door.

Voicing instructions to the home's smart speaker, the resident starts playing a favorite track, and asks for a weather forecast for the next day and an air pollution update – all enabled by the speaker's **secure Wi-Fi connection** to the internet. The smart speaker tells the user that high pollution levels detected by the AI-enhanced air purifier and air quality sensors mean that it has started up automatically. Naturally, the air purifier is **Matter-compliant**, so can communicate with any popular brand of smart speaker, which also carries a Matter logo.

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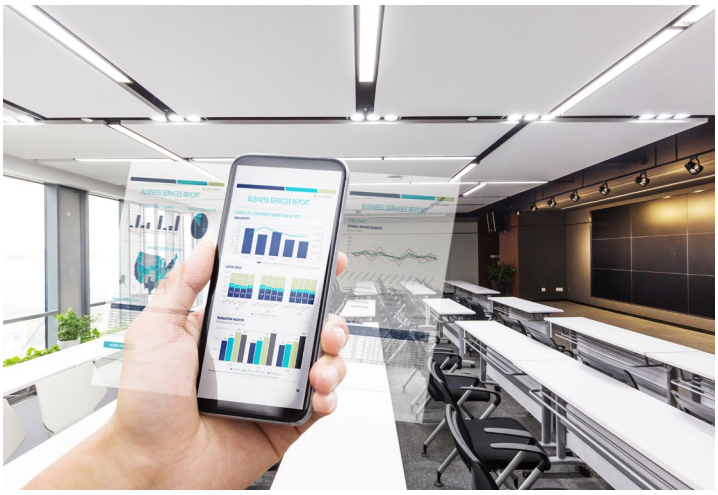
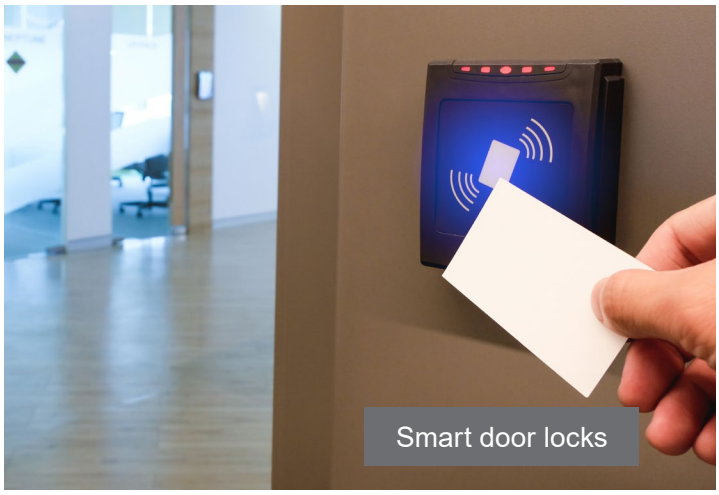
The resident knows that a package arrived during the day, because they spoke to the courier via the **Wi-Fi-enabled** smart doorlock. The resident now opens the package to discover a new table lamp that has a smart **Matter-compliant** LED bulb. After plugging in the lamp, they tap their smartphone on the LED bulb: the phone reads the bulb's **NFC tag**, and home hub software on the phone securely enrols the bulb in the home **Wi-Fi or Thread network**.

Through a combination of the latest **Wi-Fi, Bluetooth and NFC connectivity technologies**, smart home devices make life simpler, safer and more comfortable – and the technology is all natural and intuitive for the resident to use.

…or in the office





Just like a home, a commercial building that deploys smart technology can give employees and other users the benefits of security, convenience and comfort from the moment they step on to the premises.

At the front desk, an access control system connected to the cloud via the office **Wi-Fi network** recognizes an authorized user's face and admits them through a secure entrance. The building automation system now knows that this person has entered the building, and automatically alerts the HVAC system and smart lighting network – connected to a gateway via a **Bluetooth Low Energy network** – to adjust the temperature at their workstation to a comfortable level, and to turn on task lights at their desk.

When this worker arrives at their desk, they lift the smart stylus with which they write on their computer's touchscreen from its **NFC wireless charging dock** – the battery has fully charged overnight ready for a day's usage. An **NFC reader** in the printer also provides for contactless authentication via the worker's identity tag.

As the day progresses, smart wireless sensors connected via a **Bluetooth network** to the building automation system continuously monitor the environment around the workstation. Measurements of carbon dioxide and other measures of indoor air quality, as well as temperature and humidity, are fed to the HVAC system, which adjusts air flow and heating or cooling inputs accordingly.

Automatic **Bluetooth-connected** window openers are controlled in the same way to regulate the flow of ventilation to freshen the atmosphere.

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At the end of the day, the stylus is returned to its **NFC charging dock**. After the user leaves, **wireless Bluetooth** presence sensors detect that the workstation is unoccupied, and instruct the building automation system to turn off the lights and deactivate HVAC operation. As the user passes the front desk on their way, they tap their smartphone on an **NFC reader**, so fire safety and other systems know that they are no longer in the building.

This is smart technology at work – keeping staff members safe, secure and comfortable.

Renesas Connectivity Solutions: a partner for success in devices for smart homes and buildings

Communications technologies, whether Wi-Fi, Bluetooth, Thread or NFC, provide the connections that make possible the operation of smart devices for homes and buildings.

Many manufacturers of smart devices today look to Renesas to provide the semiconductors, software, tools and development environment on which their products are based. Their choice of Renesas is built on three foundations:

- Mature ecosystem
- Performance leadership
- Seamless integration

A mature ecosystem that combines control with connectivity

When manufacturers engage with Renesas Connectivity Solutions, they are working with the world's largest manufacturer of microcontrollers, shipping 3.5 billion units per year. Alongside its microcontrollers, Renesas also offers a broad portfolio of Wi-Fi, Bluetooth and NFC products.

These connectivity solutions are partner products to the microcontrollers: for instance, Renesas wireless devices are readily supported in the e^2 studio integrated development environment, which is familiar to users of Renesas microcontrollers. In fact, users of Renesas Connectivity Solutions products and microcontrollers have complete access to the industry's most comprehensive set of design tools and resources, including:

- Flexible Software Package (FSP) of middleware, drivers and operating systems
- Reality AI Tools® solution for development of edge AI applications on connected smart devices such as gateways and endpoints. These systems can be highly resource constrained in terms of power, memory and processing capability: the Reality AI Tools system helps designers to optimize AI performance within these constraints.
- Ready-to-use protocol stacks for Wi-Fi, Bluetooth and NFC connections
- Rich libraries of software code and hundreds of code examples
- Debugging and simulation tools
- Security software, certifications and provisioning capabilities

Renesas has announced its intent to acquire Altium, a premier supplier of electronic design systems. Altium's sophisticated cloud platform capabilities combined with the Renesas' extensive portfolio of embedded solutions promises to deliver users an integrated and open electronics system design and lifecycle management platform.

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The combination will also enable integration with third-party vendors to execute all electronic design steps seamlessly on the cloud.

By partnering with the leading provider of embedded controller products, manufacturers of smart home and building devices gain access to a uniquely rich set of developer and software resources.

Performance leadership to meet demanding requirements for power and throughput

In the smart home and building, devices require robust connections while maintaining always-on operation at ultra-low power. The superior performance of Renesas Connectivity Solutions products ensures manufacturers can gain a competitive design advantage.

Ultra-low power operation – Renesas deploys VirtualZero™ Wi-Fi technology which provides the longest battery run-time for power-constrained Wi-Fi-connected devices such as smart doorlocks and battery-powered detectors. A broad range of Bluetooth Low Energy chips and modules enables OEMs to take advantage of the power-saving capabilities of the latest versions of the Bluetooth specifications.

Feature set optimization – the broad range of products in the Renesas Connectivity Solutions portfolio meets varied requirements. Renesas Connectivity Solutions has a long heritage in the Wi-Fi, Bluetooth and NFC markets thanks to its track record of strategic investment in best-in-class producers.

Over a range from tens of millimeters up to hundreds of kilometers, the Renesas Connectivity Solutions portfolio provides for all connectivity needs.

Technology innovation and superior R&D – Renesas products benefit from the company's advanced silicon process technologies, in-house fabrication capabilities, and long-term investment in research and development into improving circuit and system designs. Examples include Dirac® technology for NFC wireless charging at twice the speed of competing products, and ultra-low power VirtualZero™ technology for always-on Wi-Fi networking.

Seamless integration of connectivity and control products into high-performance device designs

Across its broad portfolio of products covering multiple wireless networking technologies, Renesas Connectivity Solutions ensures that customers' connectivity designs co-operate seamlessly. For instance, NFC and Bluetooth products can be designed to work together to support simple touch-to-pair functionality. And Renesas Wi-Fi chips fully support the Matter protocol for seamless interoperability of devices in the smart home.

Integration of Renesas connectivity products is eased by the availability of expert technical assistance from a worldwide team of applications engineers, backed by a rich set of development tools, resources and documentation.

And once an OEM has designed in a Renesas Wi-Fi, Bluetooth or NFC chip, they can be confident of its availability for the life of the product: the Renesas longevity program guarantees long-term availability of products and secures customers' investment in product designs and IP.

Finally, Winning Combinations reduce the customer's design effort by offering ready-made reference designs that combine compatible products in a pre-tested architecture, to give OEMs a head-start in implementing designs for smart home and building devices.

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Ideal for the smart home and building: high-performance and low-power connectivity components

Every question that manufacturers of smart home and building devices ask of their connectivity components find answers in the Renesas product range. Low-power operation, robust connectivity and strong security are the watchwords of the Renesas portfolio. Examples of the products from the Renesas Connectivity Solutions range which are ideal for smart home and buildings applications include:

Ultra-low power Wi-Fi SoC

Featuring Renesas' unique VirtualZero™ leading-edge low-power technology, the **DA16200 system-on-chip** is a fully integrated wireless networking device which implements the Wi-Fi 802.11n technology. Matter-ready, it is supplied with a complete Wi-Fi protocol stack for use in stand-alone mode or with an external host controller.

VirtualZero™ technology offers four sleep modes, including an unconnected mode which reduces operating current to nanoamp level. Ultra-fast wake-up gives a fast response to user inputs, and enables a fast return to sleep mode to save battery power. This is especially useful in applications that require long intervals between battery replacements, such as smart doorlocks, smart switches, and security and surveillance equipment.

Based on an Arm® Cortex®-M4F CPU core, the DA16200 supports a wide set of security functions, including hardware cryptography, TLS and WPA3 Wi-Fi security, and over-the-air updates.

The SoC is also available in a module with the part number DA16200MOD.

Ultra-low power Bluetooth SoC

The **DA1453X series of SoC** offers extremely low power consumption to extend battery run-time in always-on applications. It supports the use of alkaline, coin cell, silver oxide and printed batteries without the need for an external boost regulator.

Based on an Arm Cortex-M0+ CPU core operating at 16MHz, the DA1453X also features an on-chip buck/boost DC-DC converter.

Space-saving integrated Bluetooth SoCs

The **DA1469x series of SoCs** integrate multiple functions into a single chip to enable designers to reduce component count and bill-of-materials cost in designs for products such as access control and home automation equipment.

Extremely low-power devices, the DA1469x series' high level of integration including a system power management unit saves as much as $1.28 in bill-of-materials cost when compared to competing Bluetooth wireless MCUs, and up to 38mm² of PCB space.

The SoCs' programmable protocol engine ensures end products are future-proof. Security suitable even for banking systems offers the highest level of protection for the application, data and communication.

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Wi-Fi/Bluetooth combination integrated module simplifies system design

The ultra-low power **DA16600 module** combines a Wi-Fi and a Bluetooth Low Energy radio in a single package, enabling OEMs to simplify their board design and reduce component count.

Ideal for home automation products, smart doorlocks, video doorbells, and other applications that require both Wi-Fi and Bluetooth low-power connectivity, the DA16600 is a fully integrated module which includes an antenna or u.FL connector, a crystal oscillator and external Flash memory.

Pre-certified for use according to RF regulations worldwide, the DA16600 is supplied with ready-made protocol software.

NFC reader IC for reliable authentication

The PTX105R NFC reader IC features a unique sine-wave architecture that produces best-in-class RF performance for a longer reading distance and ultra-reliable connectivity even in demanding and noisy environments. This makes it ideal for use in smart locks, smart toothbrushes, air purifiers and access control equipment.

Renesas DiRAC® technology enables the PTX105R to operate via a small antenna, helping the OEM to reduce system size and simplify the design of the antenna matching network. Supplied with ready-to-use NFC protocol software, the PTX105R is easy to integrate into any terminal or device host.

High-speed wireless battery charging

The PTX130W and PTX30W provide a complete solution for the poller (charger side) and listener (charged device side) of an NFC wireless charging system. NFC wireless charging is a lower-cost and smaller solution than other wireless charging technologies such as Qi, making it ideal for smart devices in a small form factor, such as smart toothbrushes, or the battery module of a smart lock.

Both the PTX130W and PTX30W are highly integrated products: this simplifies charger designs and reduces bill-of-materials cost. Excellent RF performance eases compliance with EMC requirements.

Renesas Connectivity Solutions products in market-leading customer products

The advanced products described here and others in the Renesas Connectivity Solutions portfolio are helping customers worldwide to succeed in the smart home and building markets. Performance leadership, a complete ecosystem and seamless integration enable OEMs to get to market early with attractive and competitive products. Examples include:

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Smart door lock

A world leading brand in the consumer electronics sector has developed an innovative design for a smart doorlock that uses Wi-Fi technology to connect directly to a router or internet access point. Previously, smart doorlocks used a Bluetooth Low Energy or Zigbee network, which required the separate procurement and installation of a gateway or bridge to the router or access point.

This breakthrough was enabled by the use of a **DA16200 Wi-Fi SoC**, which offers best-in-class battery run-time thanks to its Renesas VirtualZero™ technology. By building ultra-low power Wi-Fi into the smart doorlock, this technology brand also gained superior security protection because of the product's support for direct over-the-air updates and the security functions provided in the Wi-Fi standard protocol.

Cloud-connected light switch

A global original design manufacturer (ODM) has created a Wi-Fi connected light switch that offers ready-made integration with the Amazon Web Services cloud computing service.

This is possible thanks to the switch's **DA16200 Wi-Fi- SoC**. Smart light switches require long intervals between battery replacements: the DA16200 provides the solution thanks to its ultra-low power VirtualZero™ technology, which draws just microamps of power when in sleep mode and connected to AWS, but wakes up quickly when user interaction is detected.

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KAIFA: Small, high performance solution for automated meter reading

KAIFA, a global leader in smart meters and Advanced Metering Infrastructure (AMI), was looking for a Bluetooth module that would be compatible with its smart electricity, water and gas meters, and handheld terminals.

It chose the Renesas DA14531 SmartBond™ ultra-low power Bluetooth 5.1 SoC which, despite its small size and low power consumption, offers excellent performance thanks to its powerful 32-bit Arm Cortex-M0+ processor.

Blueprint for success: winning combinations integrate compatible products

Users of Renesas Connectivity Solutions can simplify the product development process and accelerate time-to-market by starting projects with one a Winning Combination: this is a pre-tested reference design architecture for specific applications and use cases. Various Winning Combinations are suitable for smart home and building applications.

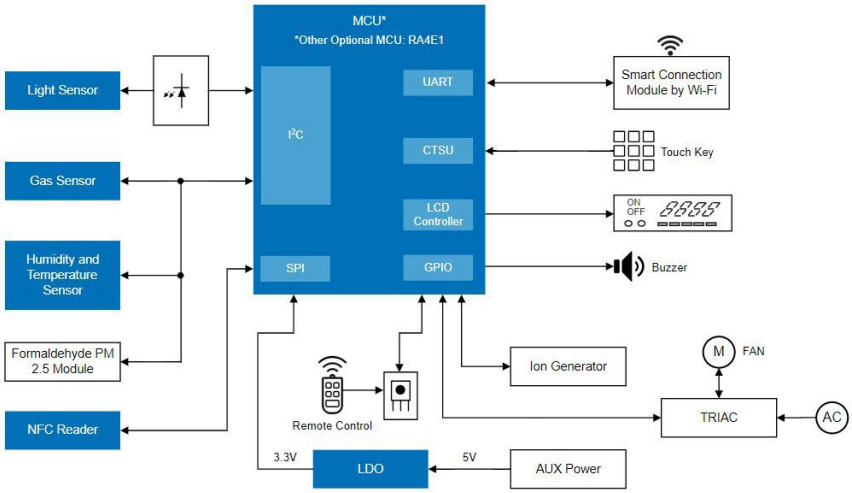
Smart lock

The smart doorlock solution features fingerprint control and Wi-Fi networking provided by an ultra-low power Wi-Fi SoC. The design supports fingerprint recognition, as well as on-site and remote lock open/close. The solution uses the Amazon Web Services (AWS) IoT cloud service to operate a door and monitor the door's status, such as opened or closed. Users can control these operations using a mobile app.

Building on this solution, a US-based manufacturer of smart locks has developed a product using a Renesas combined Wi-Fi, BLE, and NFC solution for seamless keyless entry. This innovative approach, featuring integrated technologies from Renesas, includes Homekey functionality, and promises enhanced security and convenience.

Smart IoT air purifier

The design based on an RA4M1 microcontroller incorporates temperature, humidity and air quality sensors. A light sensor automatically detects when the filter needs replacing. NFC technology provided by a PTX105 NFC reader guarantees the device's compatibility with authorized filters only.



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Flammable IoT gas leakage detector

This battery-operated stand-alone system, which detects the leakage of flammable gas, uses low power Wi-Fi communication provided by the DA16200MOD Wi-Fi module to communicate with the nearest router. It sends updates via push notifications to a dedicated smartphone app.

Smart heating and ventilation sensor

The HVAC Environment Monitor Module measures air quality and other environmental parameters in public buildings. It transmits the sensor data through multiple communication devices, including LTE, Wi-Fi, and Bluetooth Low Energy connections.

Long battery life is assured thanks to the use of the ultra-low power DA14531MOD SmartBond TINY™ Bluetooth Low Energy module.

Smart thermostat

The Renesas thermostat design enables users to connect to the cloud and provide a large color touchscreen for ease of use. An RA6M3 32-bit microcontroller maintains a connection to the cloud via a DA16200 ultra-low power Wi-Fi SoC.

Smart printer

As a security measure against unauthorized users and information leaks, authentication for shared printers in offices can be performed by linking them with entry/exit cards. This winning combination implements a printer control panel unit with card authentication via NFC. NFC connectivity is provided by the PTX100R, a high-performance, high-power NFC reader IC, which can also be used to contactlessly authenticate replacement ink cartridges.

Conclusion

SoCs and modules for Wi-Fi, Bluetooth and NFC connectivity from Renesas Connectivity offer best-in-class performance in smart home and building applications, while enabling fast time-to-market and simpler development thanks to the mature Renesas ecosystem and seamless integration of hardware and software elements. Low-power connectivity provided by the Renesas portfolio of products enables the next generation of devices such as smart home sensors, locks and controllers to operate on battery power for longer before replacement or recharging.

Renesas is the world's largest manufacturer of microcontrollers. Alongside its connectivity components it supplies a broad range of microcontrollers and microprocessors, all supported by a comprehensive set of firmware, middleware and application software and development tools.

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Increasingly, devices in the home and office are adding connectivity and artificial intelligence to provide greater value through increased convenience, comfort and safety. Wi-Fi, Bluetooth and NFC connections are the enablers of smart connectivity, and the Renesas Connectivity product range provides a complete set of chips, SoCs, modules and associated software and tools to enable customers to succeed with their next generation of smart home and building products.

Resources

- Renesas Wireless Connectivity page

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