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Creating IoT insights from image data with the RSL10 Smart Shot

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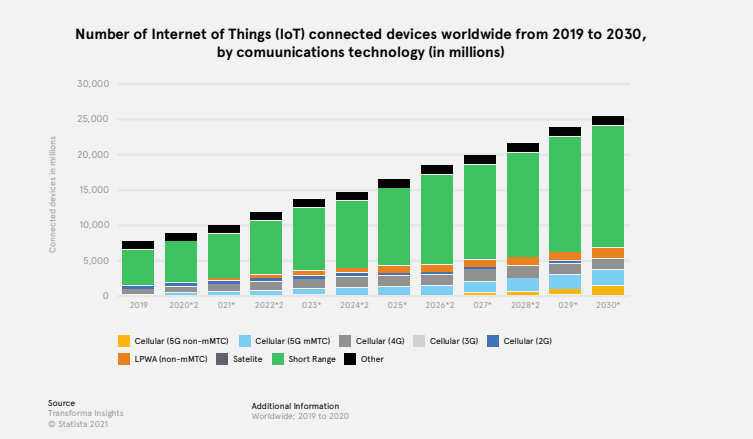
The number of devices using short-range wireless communication technologies, such as Bluetooth, Wi-Fi, Zigbee and others, is predicted to exceed 17 billion by 2030 (source: Statista). This means short-range wireless will dominate the Internet of Things (IoT) for many years to come. While other technologies, including massive machine-type communication (mMTC) using 5G cellular connectivity will see continued growth through 2030, technologies like Bluetooth will be most prevalent.



THE EVOLUTION OF BLUETOOTH

The Bluetooth Special Interest Group (SIG) appeared in 1998 to take over and manage the Bluetooth specification and now has over 35,000 members. The SIG has been adding more features to support the IoT, particularly in the areas of ultra-low power, bandwidth and number of nodes. With Version 5, developers can now balance range with transfer speed in IoT applications without sacrificing low power operation. This enables entirely new opportunities like image data transfer at the network's edge.

COLLECTING DATA AND ADDING CONNECTIVITY

The IoT is about creating data from sensors and sharing that data securely with value-added services. The key elements of this equation are the sensor and the connectivity. As the data shows, most of those smart sensors will connect to the internet using a short-range wireless technology.

With a wide portfolio of both sensor and connectivity products, onsemi is positioned to offer the right combination of technologies to address any IoT application. By bringing these solutions together in systems that are ready to use, onsemi is making it easier for developers and OEMs to get from proof of concept to deployed product faster.

CAPTURE EVERYTHING USING THE RSL10 SMART SHOT CAMERA PLATFORM

Data capture can be achieved in many ways, but perhaps the most versatile is to use an image sensor to monitor a scene. The RSL10 Smart Shot Camera platform has been developed to make image capture and analysis simple. Based on the RSL10 Bluetooth System-in-Package (SiP), the RSL10 Smart Shot Camera platform includes everything needed to develop a low-power smart image sensor.

WHAT MAKES THE RSL10 SIP SO GOOD?

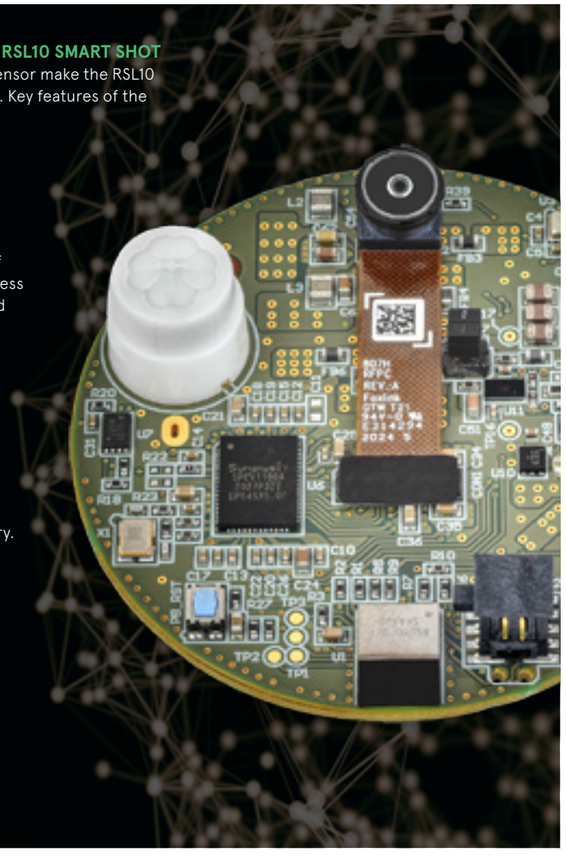
The RSL10 SiP offers a range of market-leading features:

- **Efficiency and flexibility:** The RSL10 SiP integrates the RSL10 radio SoC, antenna and all passive components needed. It can support both Bluetooth 5/Low Energy and proprietary 2.4 GHz protocols and also supports Firmware Over-The-Air (FOTA) updates.
- **Putting power first:** The RSL10 SiP delivers high performance with low-power operation, achieving an EEMBC ULPMark™ score of 1090 at 3 V and 1260 at 2.1 V. In Deep Sleep mode it consumes just 62.5 nW and in receive mode just 7 mW.
- **Versatile solution:** The RSL10 also integrates power management and can operate from a supply of between 1.1 V and 3.3 V. Built-in IP protection ensures that whatever is in the integrated flash memory always stays secure.
- **The full package:** With a range of configurable I/O available, including GPIOs, low-speed A/D converters (LSADs), I2C, SPI and PCM, developers can easily add multiple sensors to their design. The application code is also taken care of thanks to the dual-core architecture.

SEE MUCH MORE WITH THE POWERFUL FEATURES OF THE RSL10 SMART SHOT

The combination of Bluetooth 5 and an advanced CMOS image sensor make the RSL10 Smart Shot Camera platform a complete node-to-cloud solution. Key features of the RSL10 Smart Shot Camera platform are shown below.

- **RSL10 Bluetooth SiP** delivers a simple way to add Bluetooth 5 connectivity to battery-powered applications with the most challenging power budget. That could even include devices running on harvested energy.
- **Image sensor module** is based on the ARX3A0. With a choice of color or mono 68° Diagonal Field of View (DFOV), the Image Access System (IAS) module is compact, ultra-low-power and optimized for intelligent imaging sensors.
- **ARX3A0 image sensor** is ultra-small at just 1/10.3-inch optical format yet delivers 360 FPS at 560 x 560 pixels. With high sensitivity in visible and near-infrared (NIR) wavelengths, it functions like a global shutter sensor with the benefits of being based on a 2.2 µm rolling shutter pixel.
- **FAN53880 PMIC** power management IC provides the intelligent power management needed for a smart IoT sensor design, enabling up to five years operation from a single coin cell battery.
- The RSL10 Smart Shot Camera's **small form factor** can be integrated into almost anything.
- **Multiple image capture trigger modes** include periodic, continuous, proximity detection, acceleration and environmental change.
- **Additional features** include a mobile app (available from GooglePlay™ and the iOS® store), support for FOTA updates and high sensitivity at both visible and NIR wavelengths.



SOFTWARE SUPPORT FOR RAPID DEVELOPMENT

The RSL10 Smart Shot Camera has been designed by onsemi to include everything a development team needs to get to market quickly. To support this, it also has extensive software support in the form of a software development kit (SDK). When coupled with Avnet's IoTConnect® Platform, powered by Microsoft Azure, OEMs can get to market even faster.

Main features of the software support include:

- An industry-leading development environment
- A fully developed Bluetooth protocol stack
- Support for secure FOTA through smartphone apps
- Easy wizard-based configurations for all major firmware features

SMART SHOT WITH SMART POWER

With billions of smart sensors being deployed over the next decade, power efficiency becomes mission critical. Many smart, connected sensors will be battery powered. A large number will be powered from energy harvested from their surroundings. This is only possible through the development of ultra-low-power solutions like the RSL10 SiP.

By coupling the highly efficient and highly integrated RSL10 Bluetooth radio SiP to the ARX3A0 ultra-low-power image sensor, onsemi has achieved the perfect blend of sensing and connectivity. Using Bluetooth 5 for the data transport means manufacturers can afford to exploit the benefits of image sensing without breaking the power budget.

The RSL10 Smart Shot Camera platform uses innovative techniques such as proximity detection and defined areas of interest to reduce power consumption during active detection. By adding on-board JPEG compression to the system solution, the amount of data sent over the Bluetooth connection is also minimized, which keeps the transmit and receive power incredibly low.

By combining the ultra-low-power integrated circuitry of the RSL10 SiP and ARX3A0 image sensor with intelligent triggering and image compression, onsemi enables the use of image sensing in even the smallest IoT node.

IMAGE SENSING: A NEW IOT FRONTIER

The edge of the IoT is vast and growing. Smart endpoints are used to sense and communicate important information to the network's core. Breakthroughs in low power design and image sensor capabilities pioneered by onsemi now make it possible to create vision systems that can autonomously capture, analyze and transfer actionable data directly to the cloud.

Bluetooth is fundamental to making this possible. It offers an optimal combination of low power, high bandwidth and secure connectivity. Using Bluetooth 5 at the edge enables vision data to reach the core faster, while consuming the lowest possible power.

SIX REASONS TO USE IMAGE SENSING IN THE IOT

1. The size and cost of advanced image sensors is coming down, thanks to the efforts of onsemi and its leadership position in developing CMOS pixel technology.
2. The low-light and near-infrared (NIR) performance of image sensors is improving, making them more useful in applications with wide variations in lighting conditions.
3. Cloud-based AI software can analyze an image in fractions of a second and determine exactly what is happening in the image with a high degree of accuracy.
4. Image sensors can capture an entire scene with a wide field of view at hundreds of frames per second so they never miss an event.
5. The cost of using image sensor data can be far lower than retrofitting or hard-wiring other types of sensors into an application to bring them into the IoT.
6. Data from an image sensor can be used in a variety of applications, enabling users to implement several types of solutions with one technology.

IMAGE RECOGNITION HAS UNLIMITED APPLICATIONS

Adding image sensors to your IoT infrastructure brings a new dimension to automation. Through advanced AI-driven image recognition provided by the cloud platform, it is now easy to automatically identify events, objects or hazards in various scenes. This can trigger subsequent actions through APIs that enable your cloud platform to interact with other connected systems. The RSL10 Smart Shot Camera is the key to bringing this capability to many applications, such as:

- Stock monitoring in warehouses, by detecting the presence or absence of stock on shelves
- Gauge monitoring to identify when a parameter reaches or exceeds its set limits
- Hazard warning by identifying objects in doorways, passageways or other access points
- Patient monitoring to automatically alert a care provider if a patient leaves their bed, chair or room
- Asset monitoring, by alerting an operative if an asset is moved or tampered with
- Traffic monitoring using image sensing to count vehicles or pedestrians
- Security systems using AI to reduce false positives or false negatives

GETTING THE MOST FROM CONNECTED IMAGE SENSORS

The RSL10 Smart Shot Camera platform has been designed by onsemi to form part of a larger solution. IoT is, by definition, a collective of smart devices and software. Using a cloud-based platform to provision, secure and control your connected devices makes it simple to achieve the best return on your IoT investment. This is why partnering with the right providers makes so much sense. There is no point in trying to build the entire infrastructure needed to make the IoT work for you when you can leverage the proven platforms already available.

ACCELERATE YOUR TIME TO ACTION WITH AVNET AND onsemi

Access to short-range radio protocols is defining the IoT. While the backhaul still needs an IP-ready protocol, the high volume of smart connected devices being deployed demands a protocol like Bluetooth 5 to make it feasible. This is where solutions like Avnet's powerful IoTConnect® Platform, enabled by Microsoft Azure, make the IoT a commercial reality.

The combination of the RSL10 Smart Shot Camera and the wide onsemi ecosystem (including the RSL10 Multi-Sensor Platform), and Avnet's IoTConnect® Platform delivers actionable insights with a streamlined onboarding process and an intuitive web-based interface.

USING AVNET'S IOTCONNECT® PLATFORM TO MAKE VISION WORK FOR YOU

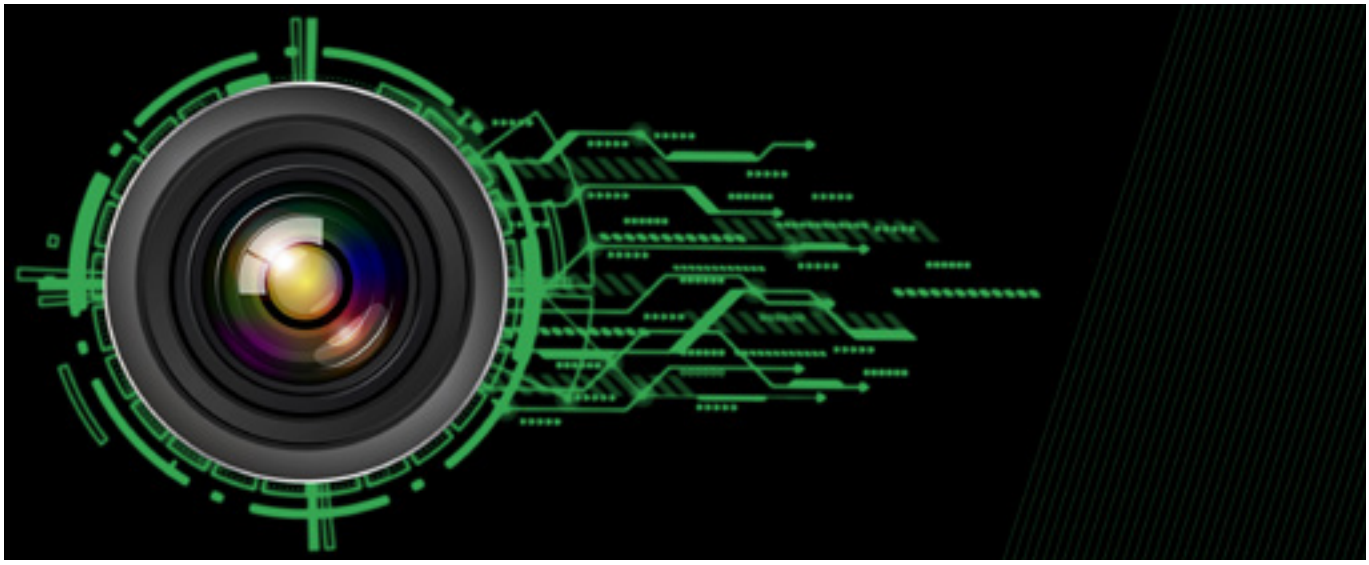
Independent market research shows that over half of all IoT projects fail at the proof-of-concept (PoC) stage. While this may be alarming, it is exactly what PoC is intended to do; failing early reduces losses later and ensures resources are focused on success. Even so, around one-third of projects that go on to deployment still miss their ROI targets.

This is not because the PoC stage was flawed, but more likely because the execution stage was not robust. Choosing what to do in house and when to partner with an expert provider is key to IoT success. Developing an IoT ecosystem is complex, it needs to bring together the Information Technology and Operational Technology domains. Few companies have the resources to do all of this on their own.

Avnet recognizes that success requires capability and experience and brings these factors together to deliver the IoTConnect® Platform. This scalable platform is focused on making asset management simple for customers, accelerating deployment and supporting innovation.
Through IoTConnect®, organizations are better equipped to deploy real IoT systems that deliver the big data needed to uncover actionable insights.

Because the IoT comprises a multitude of protocols, your cloud platform needs to speak many languages. The IoTConnect® Platform understands all leading protocols, making it easier to connect your enterprise to the IoT. Turning data into value involves using the best data engineering techniques to generate accurate notifications and alerts. IoTConnect® comes with a SDK optimized for making it easier to access your data. This is complemented with a suite of standard functions and the ability to quickly create your own.

These powerful features and capabilities mean developers can use the IoTConnect® Platform to focus on adding high-level value, rather than low-level data manipulation. The process of onboarding and configuring smart endpoints is made simple using IoTConnect®, making it faster to scale up operations.



TAKEAWAYS

Working with global leaders like Avnet and onsemi will help ensure your IoT project is a success. By leveraging the features of the RSL10 Smart Shot Camera platform coupled with the IoTConnect® Platform, you can reduce the complexity of developing, deploying, provisioning and accessing your IoT image sensor endpoints. Avnet and onsemi are here to provide the support, advice and expertise needed to make your IoT project a success.

ABOUT AVNET

As a leading global technology distributor and solutions provider, Avnet has served customers' evolving needs for an entire century. We support customers at each stage of a product's life cycle, from idea to design and from prototype to production. Our unique position at the center of the technology value chain enables us to accelerate the design and supply stages of product development so customers can realize revenue faster. Decade after decade, Avnet helps its customers and suppliers around the world realize the transformative possibilities of technology.

ABOUT onsemi

onsemi is driving disruptive innovations to build a better future. With a focus on automotive and industrial end-markets, the company is accelerating change in megatrends such as vehicle electrification and safety, sustainable energy grids, industrial automation, and 5G and cloud infrastructure. With a highly differentiated and innovative product portfolio, onsemi creates intelligent power and sensing technologies that solve the world's most complex challenges and leads the way in creating a safer, cleaner, and smarter world.

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