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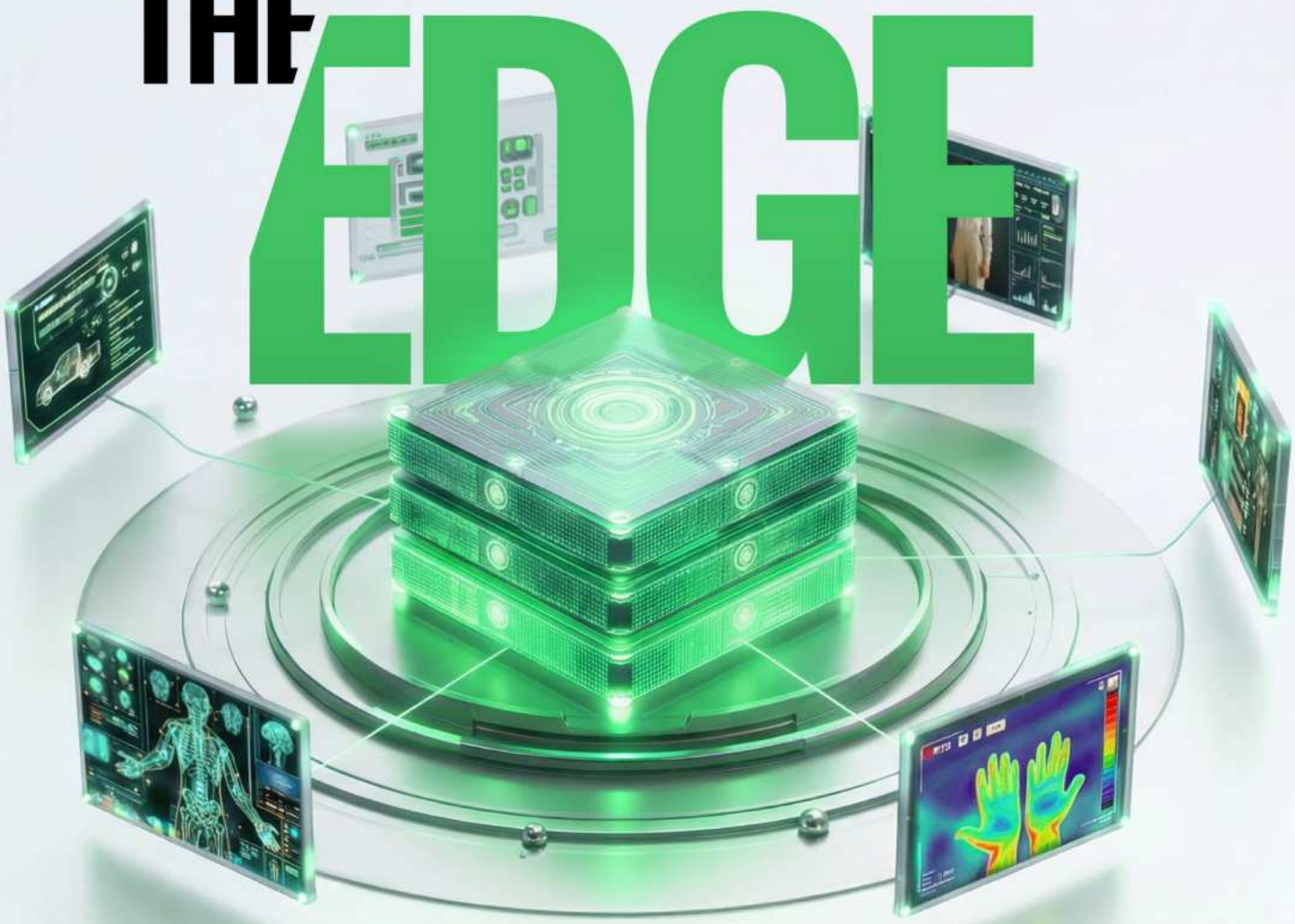
THE EDGE



THE NEWARK EDGE: SENSOR FUSION & INTELLIGENT INTERFACES

MARKET INSIGHT
LATEST PRODUCTS
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NEWARK UPDATES

ACCELERATE INTELLIGENT SENSING

THE EDGE

ACCELERATE INTELLIGENT SENSING

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THE NEWARK EDGE: ADVANCING YOUR SENSING JOURNEY

The competitive edge is shifting from compute to perception. As sensors evolve from standalone components to intelligent, fused subsystems, they are enabling faster decisions, higher asset uptime, safer mobility, and measurable sustainability gains across every sector. With the global sensor market on track to reach **USD 323.3 billion by 2030,** and strong momentum across automotive, industrial automation, healthcare, consumer technology, and smart infrastructure, sensors have clearly moved from simple data capture to strategic value creation.

CLIFF ORTMEYER
HEAD OF SOLUTIONS DEVELOPMENT TECHNICAL MARKETING, NEWARK

This value is now migrating up the stack. Organisations are no longer asking whether to invest in sensing technologies, they are asking how quickly they can deploy them. Sensors are empowering safer vehicles, more efficient factories, healthier indoor environments, and more personalised user experiences. And with the rise of sensor fusion, businesses can gain clearer insight, faster decision-making, and stronger operational resilience by combining diverse sensing modalities into a unified, context-aware view.

At Newark, we see this transformation every day. Our leadership in development kits, evaluation platforms, and rapid-prototyping tools, powered by our **Devkits HQ** initiative, has become a critical accelerator for customers racing to bring new sensing innovations to market. By offering one of the industry's largest and most diverse portfolios of ready-to-use boards, sensors, connectivity, power, passives, and test solutions, we help engineering teams reduce uncertainty, shorten design cycles, and move confidently from prototype to production.

This edition of The Newark EDGE highlights sensing technologies shaping business impact today: pressure sensing supporting the transition to electrified mobility; wireless vibration platforms enabling predictive maintenance; environmental and air-quality solutions that help organisations achieve ESG goals; biosensing unlocking new health and wellness applications; and an expanding ecosystem of development kits driving rapid learning and vproduct iteration.

Our commitment goes beyond components. Through strong global supplier partnerships, technical expertise, and Devkits-driven enablement, we provide a seamless, reliable pathway from concept to commercial deployment, empowering leaders to build smarter, safer, and more sustainable solutions.

At the edge of innovation, it's not only what your sensors measure – it's the enterprise value their intelligence creates.

SENSOR FUSION: MARKET INSIGHTS

Standalone sensors are no longer enough. As electronic systems are pushed to interpret complex, real-world environments, sensor fusion is emerging as the critical layer that turns raw signals into actionable intelligence. By combining data from multiple sensor modalities, systems gain resilience, context awareness, and confidence that no single sensor can deliver on its own.

THE MARKET AT A GLANCE

The global sensor market is entering a strong expansion phase, driven by rising adoption across automotive, industrial automation, consumer electronics, healthcare, and smart infrastructure. The market is projected to grow from USD 212.5 billion in 2025 to USD 323.3 billion by 2030, registering a CAGR of 8.7%. While core sensor categories continue to scale, value creation is increasingly shifting toward multi-sensor integration and sensor fusion architectures that enable contextual awareness and intelligent decision-making.

MARKET VALUE 2025
$212.5bn

8.7% CAGR [1]

FORECAST 2030
$323.3bn

Dominant Sensor Categories

IMAGE · PRESSURE · RADAR · CHEMICAL · BIOSENSORS

60% MARKET VALUE

Sensor Ecosystem Scale

15,000 COMPANIES WORLDWIDE [2]

900+ STARTUPS [2]

2.53% ANNUAL INDUSTRY GROWTH [2]

Industry footprint

590,000+ EMPLOYEES GLOBALLY

2million+ SUPPORTING PATENTS

STRATEGIC FORESIGHT

2026 marks a pivotal shift as real-time intelligence moves decisively to the edge. With autonomous systems, ADAS and industrial automation accelerating, sensing, processing, connectivity and power must operate as tightly integrated, multi-sensor platforms. For engineers, sensor fusion is now a core design parameter alongside performance, cost and reliability, with success defined by accurate perception, deterministic latency and energy-efficient decision-making at the point of data generation.

WHERE DEMAND IS ACCELERATING

AUTOMOTIVE & MOBILITY
LiDAR, radar and vision systems enabling ADAS and autonomy. [1]

INDUSTRIAL AUTOMATION
Real-time sensing powering predictive maintenance and smart factories. [1]

CONSUMER ELECTRONICS
Image sensors leading innovation in smartphones and wearables.

HEALTHCARE & MEDICAL
Biosensors and medical MEMS driving diagnostics and remote monitoring. [1]

SMART INFRASTRUCTURE
Sensing embedded across energy, buildings and climate systems.

SEGMENTAL & TECHNOLOGY TRENDS

BY TECHNOLOGY: MEMS BACKBONE

Compact, low-power and cost-efficient, MEMS sensors underpin smartphones, automotive and industrial systems, forming the foundation of fused sensing platforms.

BY TYPE: RADAR IN SAFETY

Radar continues to grow in automotive and industrial safety thanks to its reliability in poor visibility, with fusion now standard in ADAS.

BY SOFTWARE: ANALYTICS GROWTH

With 1,100+ companies active in sensor analytics, value is moving from raw data capture toward interpretation, prediction and autonomous decision-making.

BY EMERGING TECHN: QUANTUM POTENTIAL

Though still early-stage, quantum sensing shows strong potential for ultra-precise applications across defence, telecoms and scientific research.

REGIONAL OUTLOOK

Americas
Largest market share, driven by U.S. investment in automotive, industrial automation and IoT, with semiconductor initiatives across Canada and Mexico supporting expansion. [1]

Europe
Key hub for automotive and industrial sensing, with Germany and the UK leading R&D, system integration and safety-focused innovation.

Asia-Pacific
Fastest growth, fuelled by smart manufacturing, robotics and large-scale smart city deployment across China, Japan, South Korea and India. [1] [2]

CITATIONS

[1] BCC Research, Sensors: Technologies and Global Markets, August 2025

[2] StartUs Insights, Sensor Technology Report 2025

eTECH Journal - ISSUE 15

RISE OF THE INTELLIGENT MACHINE

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ENABLING ON-BOARD **SENSOR INTELLIGENCE**

COMPLETE SENSOR SOLUTIONS

ANALOG DEVICES
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Multi-Sensor IoT Development Kit with AI & Wireless Connectivity

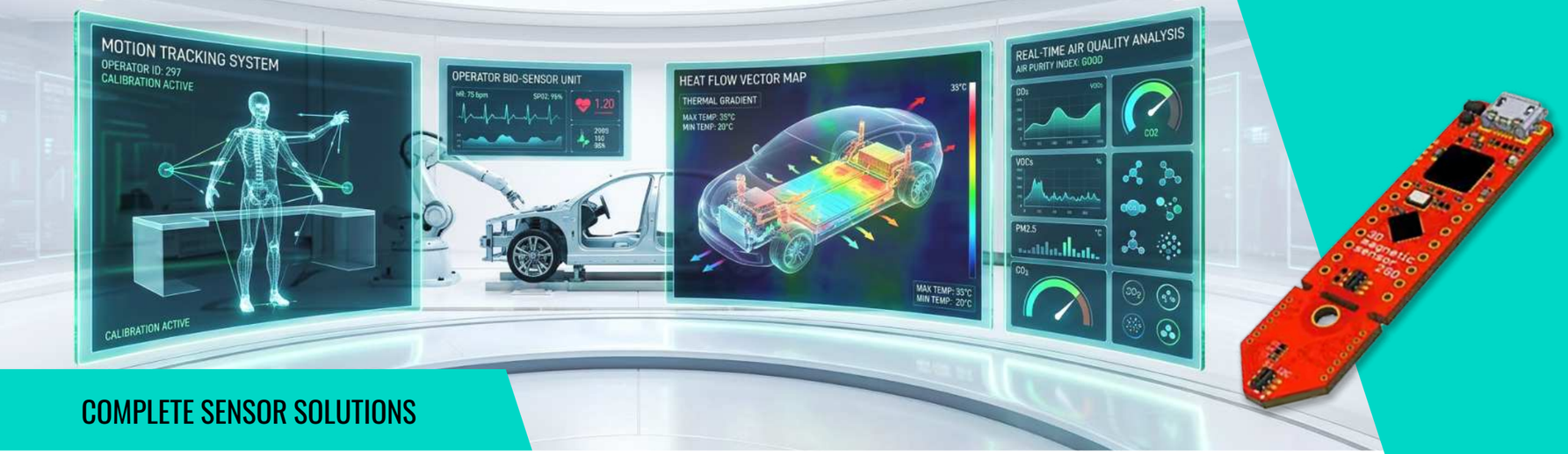
STEVAL-MKBOXPRO

SensorTile.box PRO is a compact, programmable IoT kit designed for rapid development of connected applications. It integrates motion, environmental, audio, and AI-ready sensors with Bluetooth® and NFC connectivity for seamless data collection and interaction. Housed in a rechargeable enclosure with wireless charging and programmable NFC, it supports flexible deployment from prototyping to full-scale solutions. Compatible with the STBLESensor app for real-time data visualization, the platform caters to entry, expert, and professional users, enabling efficient development of smart, data-driven IoT applications.

The MEMS-based Wireless Vibration Monitoring Platform

EV-CBM-VOYAGER4-1Z

Voyager4 uses triaxial digital out MEMS sensors including the ADXL382 and ADXL367. The design also includes the MAX32666 BLE and MAX78000 AI microcontrollers. Flexible and PCB area efficient PMIC power devices have been added as load switches for enhanced wireless sensor power savings. A BLE 5.3 Adapter with Antenna is included in every Voyager4 kit. Voyager4 uses BLE which makes it compatible with any PC with a Bluetooth Radio, but to ensure optimal performance and range, using the adapter when communicating with Voyager4 is recommended



COMPLETE SENSOR SOLUTIONS

Infineon

3D 2go kit featuring TLE493D-P3B6 A0 (I2C) and TLE493D-P3I8 (SPI)

TLE493DP3XXMS2GOTOBO1

Infineon's 3D Magnetic Sensor 2 Go is a compact evaluation kit for TLE493D P3B6 and P3I8 3D Hall sensors. Includes all hardware, free software, GUI for fast setup and measurement, plus example code and Arduino library for rapid development.

Accelerated Edge-AI/ML application to remote sensing

AES-RASYNB-120-SK-G

AES-RASYNB-120-SK-G kit offers low power, edge AI/ML solution, based on a Syntiant NDP120 Neural Decision Processor, a Renesas RA6M4 host MCU plus a power efficient DA16600 Wi-Fi/BT combo module. The NDP120 subsystem achieves highly efficient processing of acoustic- and motion events. Battery and USB-C device connectors facilitate its standalone use, suitable for accelerated Edge-AI and ML applications, battery-powered remote sensor systems, industrial smart sensors, motor predictive maintenance, always-on speech recognition and sensor fusion processing applications.

Sensor ToolBox Development Board for FXLS8971CF 3-Axis IoT Accelerometer

KIT-STBI-A8971

FRDM-STBI-A8971 is a sensor expansion shield for the FXLS8971CF 3-axis accelerometer, designed for applications requiring stable performance across temperature. It connects to NXP FRDM MCU boards through Arduino-compatible expansion connectors. The KIT-STBI-A8971 evaluation kit combines the shield with an FRDM-K22F MCU board, enabling rapid prototyping, evaluation and development using NXP's Sensor Toolbox software tools.

Biosensor Kit

ST1VAFE6AX Biosensor evaluation kit

ST1VAFE6AX biosensor kit with vertical AFE for biopotential signals and 6-axis IMU with AI-driven sensor fusion. Includes STEVAL-MKI249A (full pin-out, decoupling) and STEVAL-MKE005A electrode board.

Environmental Sensor Kit

TVOC and Indoor Air Quality Sensor Pmod™ Board (Renesas QuickConnect IoT)

US082-ZMOD4410EVZ enables rapid prototyping of the ZMOD4410 gas sensor for indoor air quality. Features Pmod Type 6A (Extended I2C) for easy connection to compatible MCU evaluation kits.

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Flow Meter kit

Low-Power Heat and Flow Measurement Sensor

EV-FLOWMETER-ARDZ uses ultrasonic time-of-flight with MAX35101 TDC for accurate, long-life flow measurement in utility and industrial systems. Ideal platform for custom heat and flow meter development.

MIKROE

Multifunctional Sensor Boards

MikroE Sensor Click boards for rapid prototyping

MikroE Click boards are plug-and-play add-ons that deliver sensor and peripheral functionality via the mikroBUS socket, enabling rapid prototyping and easy swapping to accelerate development.

LATEST SENSOR ON-BOARD COMPONENTS

SENSIRION

Environmental Sensors

Breaking the size barrier in optical CO2 sensing

SCD4x is Sensirion's 2nd-gen optical CO_2 sensor using photoacoustic NDIR with PASens and CMOSens tech. Compact SMD design, high accuracy, and on-chip compensation via integrated SHT4x temp and humidity sensor.

SGX SENSORTECH
An Amphenol Company

Environmental Sensors

SGX Solid Polymer Electrolyte Gas Sensors

SGX PS1 electrochemical gas sensors use solid polymer electrolyte tech for stable, cost-effective sensing. Compact, highly sensitive, power-free operation with low cross-sensitivity and current output proportional to gas levels.

BROADCOM
connecting everything

Proximity Sensors

HSDL-9100, Miniature Surface-Mount Proximity Sensor

HSDL-9100 is a compact SMD reflective proximity sensor with integrated IR emitter and photodiode. Metal shielding ensures strong optical isolation and low cross-talk with reliable analog output.

VISHAY
The DNA of tech.

Proximity Sensors

Proximity Sensor With Interrupt, VCSEL, and I2C Interface

VCNL36826S combines proximity sensor and VCSEL in a compact CMOS package with integrated photodiodes, amplifiers and ADC. Programmable high and low interrupt thresholds optimise MCU power and resource use.

ams OSRAM

Image Sensors

ams Mira050 CMOS Image Sensor

Mira050 is a compact 0.5MP NIR-enhanced global shutter sensor for 2D/3D vision. 2.79µm BSI pixels, MIPI CSI-2 interface, high NIR sensitivity for stereo, structured light and AR/VR with lower system power use.

Image Sensors

VD16GZ evaluation camera module

CAM-16GZ promodules are compact, ready-to-use camera modules for evaluating and integrating the 1.5MP VD16GZ RGB-IR sensor, with lens, holder and plug-and-play flex in a 6.5mm square format.

infineon

Motion Sensors

XENSIV™ inductive position sensors

TLE4801 is an inductive sensor IC for automotive angular position sensing, ideal for steering torque and steering angle sensor applications.

Biosensors

Biosensor with vAFE (vertical analog front-end) for biopotential signals and 6-axis IMU (inertial measurement unit) w

ST1VAFE6AX combines a vAFE biopotential channel with a 6-axis IMU for synchronous motion and analog signal capture. Compact, low-power design enables context-aware edge analysis with minimal latency.

muRata
INNOVATOR IN ELECTRONICS

Sensor Interface & Processing ICs

SCA3100-D04 3-AXIS High Performance Accelerometer With Digital SPI Interface

SCA3100-D04 is a high-performance 3-axis accelerometer using Murata 3D-MEMS tech. Delivers accurate sensing with flexible SPI interface in robust DFL housing for long-term reliability.

TDK

Motion Sensors

High Performance Automotive 6-Axis MotionTracking Device

IAM-20680 is a 6-axis automotive MotionTracking device with 3-axis gyro and accelerometer in a 3x3x0.75mm LGA. 4KB FIFO reduces bus traffic and power, simplifying integration and optimising motion performance.

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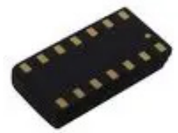

Biosensors

High-Sensitivity Pulse Oximeter and Heart-Rate Sensor for Wearable Health

MAX30101 is an integrated pulse oximeter and heart-rate module with LEDs, photodetectors and low-noise electronics. Ambient light rejection enables a complete, compact solution for mobile and wearable devices.

ANALOG DEVICES
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Sensor Interface & Processing ICs

ADIS16203CCCZ Programmable 360° Inclinometer

ADIS16203 delivers factory-calibrated digital incline data via SPI. Measures 360° and ±180° angles, temperature, supply and aux input, reducing development time, cost and risk.

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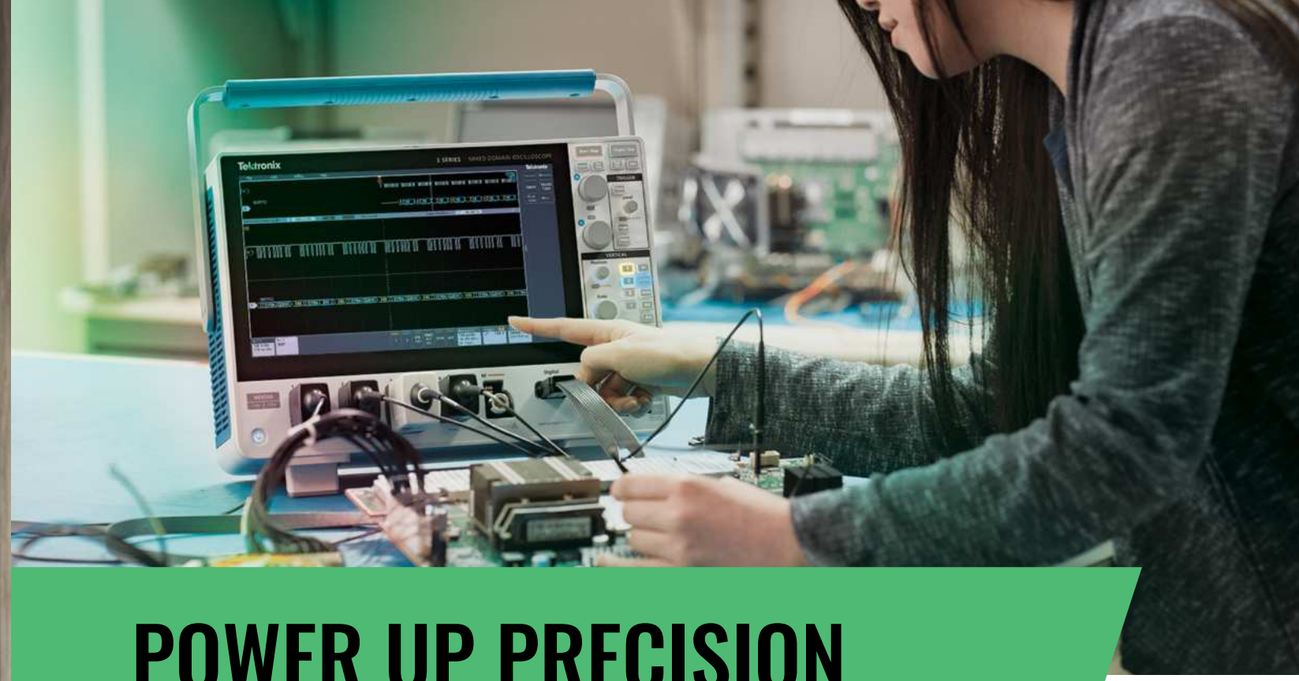
From prototype to production,
we've got you covered.



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SENSOR FUSION:

HOW MULTI-SENSOR INTELLIGENCE IS

TRANSFORMING AUTOMOTIVE, INDUSTRIAL, AND WEARABLES

Author: Piyush Ojha, Senior Content Development Engineer, Newark

The inexorable progress of digitalization has transformed the concept of sensor fusion from academic research papers to product-grade deployments. From multi-camera ADAS and radar-camera fusion in vehicles to predictive maintenance on factory floors and sensor-embedded wearables, sensor fusion creates a single, reliable environment where millisecond latency, safety certification, and milliwatt budgets matter.

"Fusion is not magic — it's orchestration: time-aligned sensing, intelligent pre-processing, and the right silicon to run the model where latency and safety demand it."

To create such an ecosystem, the design engineer must solve not only algorithmic problems but also hardware-level challenges, such as sensor synchronization, time-stamping, pre-processing, and deterministic pipelines. These solutions enable machines to run on constrained MCUs, domain processors, or heterogeneous SoCs. Silicon vendors have responded with platforms that pair automotive grade compute, industrial software kits, and wearable class power with ready to use fusion libraries.

Why sensor fusion is mission-critical?

Sensor fusion reduces uncertainties, extends robustness across various physical parameters, and enables functionality beyond the reach of any single sensor. For example, applications include precise vehicle localization, predictive maintenance, and health monitoring. These benefits are accelerated by three current market shifts:

AUTOMOTIVE SYSTEMS are transitioning toward domain/zonal architectures and Level 2+ ADAS, and beyond, where raw feeds from cameras, radars, lidar, and inertial sensors must be combined to perceive the environment around the vehicle accurately and reliably, enabling better and safer decisions.

INDUSTRIAL ENVIRONMENTS or popularly known as Industry 4.0, rely on resilient condition monitoring

and mobile robots. Fusing vibration, acoustic, magnetic, time-of-flight (ToF), and radar sensors increases anomaly-detection fidelity and reduces false alarms, even in noisy environments.

WEARABLES must have accurate motion, context, and vitals with long battery life. Fusing an accelerometer, a gyroscope, and a magnetometer/e-compass, stand-alone 6- or 9-axis motion sensor in a single package refines activity recognition, indoor navigation, and health features while keeping computation local for privacy and latency.

"Multi-sensor fusion has moved from luxury to necessity. Reliable ADAS, collision-avoiding robots, and year-long battery life in wearables are no longer aspirations; they are table stakes."

Across these domains, the outcome remains the same: improved decision-making from better data, with lower latency and greater robustness

The Technology Stack: From sensors to software

Modern fusion stacks typically blend:

HETEROGENEOUS SENSORS: MEMS motion sensors (accelerometers, gyros, magnetometers), barometric pressure sensors, microphones, image sensors, and mmWave radar that create complementary views, while IMUs provide instantaneous motion context.

FEATURED PRODUCTS

Accelerate Automotive Innovation with Y-ASK-RH850F1K-V3

Power Your IoT Innovation with NXP FRDM-K64F

Unlock Smart Sensing Power with STM STEVAL-MKBOXPRO

Empower High-Performance Design with Microchip M2S150-ADV-DEV-KIT

Unlock precision sensing with Infineon's DEMOBGT60UTR11AIP TOBO1

EDGE COMPUTE WITH SAFETY/ SECURITY: Automotive MCUs/SoCs offer ASIL-grade safety, virtualization, and high-bandwidth I/O, while industrial/ wearable MCUs incorporate DSP/NPU blocks for always-on inference and filtering, operating at microwatt-to-milliwatt power.

ALGORITHMS AND LIBRARIES: From Kalman and complementary filters to proprietary libraries (e.g., ST's MotionFX on STM32, NXP's Sensor Fusion for MCUs), vendors ship calibrated, production-ready stacks that handle bias correction, coordinate transforms, and quaternion/pose estimation, so engineers can focus on application logic.

Automotive: From ADAS to in-cabin awareness

Automotive perception has evolved from isolated, single-sensor pipelines to distributed fusion architectures that combine radar, camera, and IMU data, which are then executed across scalable processors. NXP's portfolio spans fully integrated 77 GHz RFCMOS transceivers, high-performance processors, and small-form-factor one-chip SoCs, that support the full application spectrum for various types of automotive radar sensors, including corner radar and long-range detection to advanced 4D imaging radar. Combined with NXP's comprehensive solutions for PMIC, CAN, Ethernet, and FlexRay products, NXP streamlines the development process for engineers, enabling them to create scalable solutions that meet next-generation safety requirements and applications.

On the MCU side, Renesas RH850 families target zonal/ADAS controllers that must safely process multiple sensor streams. The RH850/U2A is equipped with up to four 400 MHz CPU cores in a dual-core lock-step structure. Each CPU core integrates a hardware-based virtualization-assisted function, allowing multiple software systems to operate independently without interference during high-performance operations. It also reduces the virtualization overhead required for maintaining real-time execution.

Industrial automation: Higher fidelity condition monitoring and robotics

Renesas provides portable FSP/RDP software and multi-sensor sample code across RA/RX/RZ families, including a Sensor Software Combination Manual for sharing I²C busses and coordinating timing. These make up practical building blocks for integrating multiple sensors on a single node. For industrial applications requiring vision AI, the RZ/V series offers mid-range vision MPUs optimized for efficient edge inference, enabling multi-sensor gateways that fuse vision, IMU, and time-series data.

Wearables: Context, motion, and health sans the battery sacrifice

In wearables, sensor fusion translates to trustworthy context and a smoother user experience with minimal energy consumption. STMicroelectronics' MotionFX library (part of X-CUBE-MEMS1) performs real-time 6/9-axis fusion with gyro bias and magnetometer hard-iron calibration on STM32 devices. It also comes with a broad set of motion libraries (activity recognition, pedometer, pose estimation) and reference projects for SensorTile platforms. This reduces the time-to-market for orientation, gesture, and navigation features.

The Future of Perception is at the Intersection of Sensor, Silicon, and Software

Sensor fusion is no longer limited to academic research papers. With on-sensor ISPU, dedicated Fusion DSPs, Parallel Processing Units, and drag-and-drop toolchains, multi-sensor intelligence is now within practical reach for every automotive zone controller, industrial cobot, and battery-powered wearable. The modern design challenge is system deployment: select the right mix of sensors, choose silicon that supports deterministic processing or secure offload, and utilize vendor toolchains to integrate validated models into firmware.

These kits mark the first step toward innovation. With automotive-grade compute, industrial software kits, and wearable-class power now widely available, it is possible to move beyond single-sensor limits and build systems that are safer, more responsive, and more power-efficient. With the right distribution partner, the burden on engineers shifts from low-level integration to system design and verification, where product differentiation occurs.

EXPERT Q&A

SENSOR FUSION & INTELLIGENT INTERFACES:

WHERE PERCEPTION, MEETS DECISION-MAKING

CLIFF ORTMEYER

HEAD OF SOLUTIONS DEVELOPMENT TECHNICAL MARKETING, NEWARK

Embedded systems are entering a new phase where sensing alone is not enough. Intelligence now depends on how effectively devices combine data, interpret context, and respond in real time. But what does that look like in practical design terms? How are sensor fusion, edge AI, and advanced semiconductors transforming automotive, industrial, and smart infrastructure applications?

In this exclusive interview, Cliff Ortmeyer, Global Head of Technical Marketing at Newark, shares insight into how multi-sensor intelligence and adaptive interfaces are reshaping embedded system architecture and accelerating the shift from raw measurement to real-time decision-making at the edge.

Q: Let's start with the fundamentals. Why is sensor fusion becoming such a critical design priority now?

A: Here's the thing. A single sensor only tells part of the story. Real-world environments are noisy, unpredictable, and full of edge cases. **Sensor fusion brings context. By combining data from vision, radar, LiDAR, IMUs, audio, and environmental sensors, systems move from raw measurement to situational awareness.**

What this really means is better decisions, fewer false positives, and systems that behave more like humans sensing the world through multiple inputs at once.

Q: Which applications are driving adoption fastest?

A: Automotive and industrial automation are leading, but they're not alone. ADAS and autonomous systems rely heavily on sensor fusion for safety and redundancy. In factories, fusion enables precise robotics, machine health monitoring, and adaptive control.

We're also seeing growth in medical devices, smart infrastructure, and consumer wearables where accuracy, reliability, and real-time response matter more than ever.

Q: How does sensor fusion change the way engineers design systems?

A: It shifts design thinking from components to systems. Engineers now have to think about synchronization, latency, data alignment, and confidence scoring.

Instead of asking, "Is this sensor accurate?", the better question becomes, "How do these sensors validate and complement each other?"

This drives tighter integration between hardware, firmware, and algorithms right from the concept stage.

Q: Where does edge intelligence fit into this picture?

A: Sensor fusion only works if decisions happen fast. That's why edge processing is essential. Shipping raw sensor data to the cloud introduces latency and reliability risks.

By processing fused data locally, systems can react in milliseconds. A robot avoids collision. A machine shuts down before damage occurs. A vehicle responds instantly to changing road conditions.

Edge intelligence turns sensor fusion from theory into something operational.

Q: Intelligent interfaces are evolving alongside sensor fusion. What's changing?

A: Interfaces are moving beyond screens and buttons. They're becoming contextual and adaptive.

When systems understand their environment through fused sensor data, interfaces can respond intelligently. Voice commands adapt to ambient noise. HMIs adjust based on operator proximity. Gesture, touch, and visual feedback work together instead of in isolation.

The interface stops being a control panel and becomes a collaborator.

Q: What role do semiconductors play in enabling this shift?

A: They're central. Modern SoCs, MCUs, and sensor hubs now include dedicated accelerators for signal processing and AI workloads.

We're seeing tighter coupling between sensors and processing blocks, along with improved power efficiency. That's critical because sensor fusion increases data volume and compute demand.

The silicon roadmap is clearly aligned with multimodal processing and low-latency decision-making at the edge.

Q: What are the biggest technical challenges engineers face with sensor fusion?

A: Three stand out. First, data synchronization. Aligning inputs from sensors with different sampling rates and latencies is non-trivial.

Second, power management. More sensors and compute mean tighter energy budgets, especially in battery-powered designs.

Third, complexity. Fusion algorithms, calibration, and validation require new skill sets and better development tools.

The good news is that suppliers are increasingly providing reference designs, middleware, and software frameworks to reduce friction.

Q: How does AI enhance sensor fusion?

A: AI turns fusion into perception. Traditional fusion relies on deterministic rules. AI-based fusion learns patterns, adapts to changing conditions, and improves over time.

For example, combining vision and radar using AI improves object classification in poor lighting or weather. In industrial systems, AI can correlate vibration, acoustic, and thermal data to detect failures earlier than any single sensor could.

AI doesn't replace physics-based sensing. It amplifies it.

Q: How should engineers approach sensor fusion in new designs?

A: Start with the use case, not the algorithm. Identify what decision the system needs to make and under what conditions. Then select sensors that provide complementary data.

Prototype early using development kits and simulation tools. Validate assumptions with real-world data, not just lab conditions.

Most importantly, design with scalability in mind. Today's fusion solution may need to support additional sensors or interfaces tomorrow.

Q: Looking ahead, what trends should engineers watch?

A: Three trends stand out. **First, tighter sensor-to-processor** integration, including smart sensors with onboard intelligence.

Second, multimodal AI systems that process vision, audio, motion, and environmental data together.

Third, more natural human-machine interfaces driven by context-aware fusion.

The direction is clear. Systems are learning to see, hear, feel, and respond as unified entities, not disconnected parts.

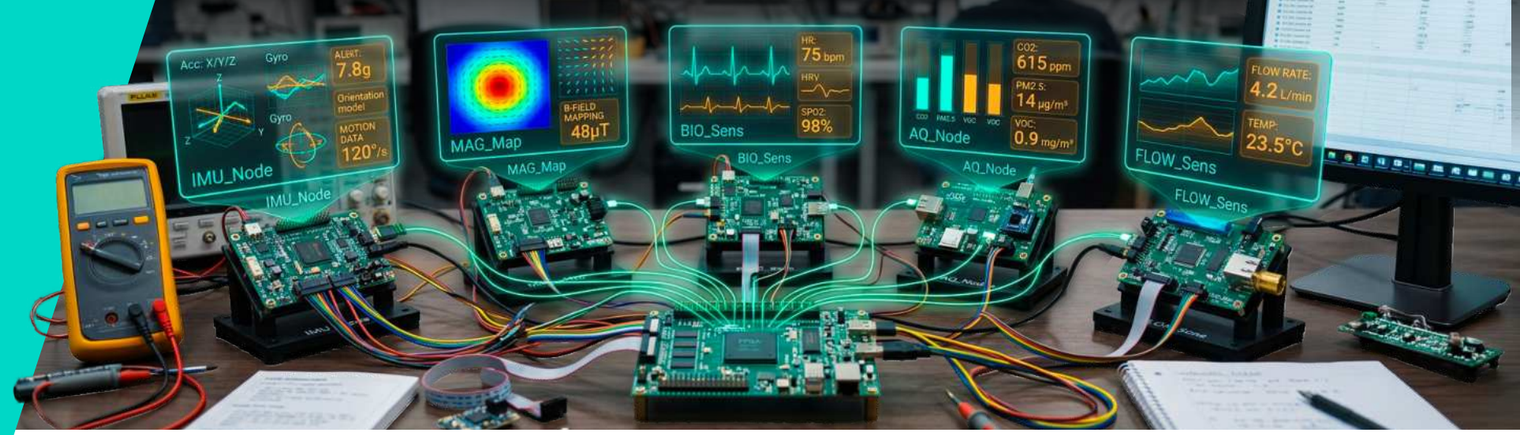
Q: Final takeaway for engineering teams?

A: Sensor fusion and intelligent interfaces aren't future concepts. They're design requirements today.

The teams that succeed will be the ones who think holistically, invest in the right tools, and collaborate closely with suppliers early in the design cycle.

This isn't about adding more sensors. It's about building systems that understand their environment and act with intent.

SENSOR DEVKITS & DESIGN SOLUTIONS



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Precision Health Monitoring with MAX30208EVSYS Sensor Kit

Ideal for healthcare patches, medical thermometers, sports watches, wearable thermometers, and IoT-based health monitoring sensors.

The MAX30208EVSYS evaluation system enables precise health monitoring with the highly accurate MAX30208 temperature sensor, delivering ±0.1°C measurement accuracy for medical and wearable applications. Designed for rapid prototyping, the platform integrates the MAX32630FTHR Arm Cortex-M4 microcontroller with a dedicated MAX30208 interface board connected through a flexible low-thermal-mass PCB. This design ensures fast response times and reliable readings even when the sensor is positioned away from surrounding circuitry. Engineers gain a complete development environment with supporting firmware, hardware, and PC GUI tools to accelerate design, testing, and validation of next-generation wearable health devices. The compact architecture and flexible sensor integration make it well suited for building advanced temperature-sensing solutions across connected medical and IoT platforms.

Infineon

Multi-Sense Innovation with the CY8CPROTO-040T-MS Platform

Designed for touch interfaces, capacitive keypads, trackpads, proximity wake-up, wear detection, hover touch sensing, liquid level monitoring, and inductive sensing for smart consumer and industrial devices.

The CY8CPROTO-040T-MS PSoC™ 4 Development Kit enables rapid development of advanced sensing interfaces for IoT and embedded applications. Powered by the Infineon PSoC 4000T MCU with 5th-generation CAPSENSE™ and Multi-Sense Converter Low-Power (MSCLP) technology, it supports capacitive, inductive, liquid-level, and hover touch sensing in a single platform. Built around an Arm Cortex-M0+ core, the kit delivers ultra-low power operation suited for battery-powered devices. Its modular hardware includes a control board, touch-over-metal boards, a liquid-level sensing FPC with container, and a hover-touch board, allowing developers to explore multiple sensing methods quickly. Pre-programmed firmware, an onboard KitProg programmer, and ModusToolbox™ development support make setup fast while providing full access to I/O for custom designs. This development kit accelerates prototyping for next-generation sensing interfaces in consumer, industrial, and smart home applications.

MICROCHIP

Building Responsive Touch Interfaces with Microchip DM160223

Perfect for capacitive touch and proximity sensing in desktop and notebook PCs, LCD monitors, consumer electronics, and smart appliances.

The Microchip DM160223 Evaluation Kit simplifies the development of capacitive touch and proximity applications using the CAP1298 controller. Designed for fast prototyping, it integrates a PIC microcontroller and an intuitive graphical user interface that allows engineers to analyze sensor data and configure parameters with ease. A secondary connector enables developers to link their own CAP1XXX-based boards directly to the GUI, offering greater flexibility during testing and evaluation. By streamlining configuration, monitoring, and performance tuning, the kit helps engineers quickly validate touch-sensing designs. With its practical development environment and adaptable hardware setup, the DM160223 supports efficient exploration of Microchip's CAP12XX family for responsive touch and proximity interfaces across a range of embedded applications.

Multizone Time-of-Flight Sensing with P-NUCLEO-53L8A1

Ideal for robotics navigation and SLAM, gesture and hand-posture recognition, people counting, object and user detection in IoT, liquid level monitoring, and AR/VR sensing.

The P-NUCLEO-53L8A1 development kit brings multizone Time-of-Flight sensing to robotics, IoT, and AI edge applications. Built on the STM32 Nucleo platform with VL53L8 sensors, it offers precise distance measurement and spatial awareness using an 8×8 ToF array with up to 400 cm range and a 65° field of view. The kit includes the X-NUCLEO-53L8A1 expansion board and NUCLEO-F401RE board for rapid prototyping. Using ST's FlightSense technology, the sensors capture detailed data with low power and strong ambient-light performance. The VL53L8CH provides Compact Normalized Histogram output across 64 zones, enabling AI-driven object classification, gesture detection, and surface recognition. Arduino® UNO R3 compatible and ModusToolbox™ supported, it accelerates development of intelligent sensing solutions.

CO² SENSOR MONITORING FOR SMART BUILDING APPLICATIONS USING XENSIV™ CONNECTED SENSOR KIT (CSK)

Author: Bheema Rao, Application Engineer, Newark

This project explores the integration of Infineon's PASCO2 CO_2 sensor within the XENSIV™ Connected Sensor Kit for IoT applications. It covers system architecture, cloud connectivity, and real-world use cases such as indoor air quality monitoring, HVAC optimization, and predictive maintenance.

PURPOSE AND APPLICATIONS OF CO² MONITORING

CO_2 monitoring plays a critical role in ensuring indoor air quality, optimizing HVAC systems, and supporting smart building automation. The purpose of this project is to demonstrate how advanced sensing technologies can be integrated into IoT ecosystems for real-time environmental insights. Applications include smart homes, commercial buildings, industrial safety, and healthcare facilities where air quality impacts comfort and health. Real-world implementations range from office spaces and schools to factories and hospitals, enabling predictive maintenance and energy efficiency.

Meta Description: Learn how Infineon's XENSIV™ PASCO2 sensor enables rapid IoT prototyping, CO_2 monitoring, and smart building applications with real-time data visualization.

INTRODUCTION

Developing sensor-based IoT systems typically involves significant hardware bring-up, firmware integration, connectivity provisioning, and cloud setup before meaningful data can even be evaluated. To streamline this process for hardware, software, and embedded engineers, Infineon offers the XENSIV™ Connected Sensor Kit (CSK) a modular IoT sensor platform built for rapid prototyping, real-time sensor evaluation, and accelerated product development.

The CSK platform directly addresses the four foundational pillars of any IoT system Sense, Compute, Connect, and Secure. By integrating high-precision XENSIV™ sensors, application-ready hardware, pre-configured connectivity, and built-in security elements, the kit enables engineers to explore new sensing concepts, validate IoT use cases, and progress from proof-of-concept to functional prototype significantly faster.

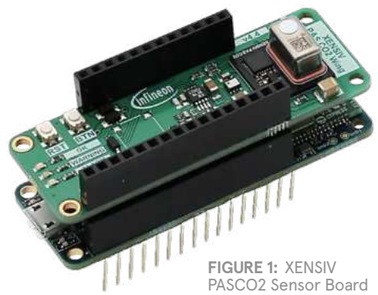

FIGURE 1: XENSIV PASCO2 Sensor Board

The KIT_CSK_PASCO2_5V variant expands the platform with Infineon's advanced XENSIV™ PASCO2V15 CO_2 gas sensor and XENSIV™ DPS368 barometric pressure sensor, allowing engineers to evaluate real-world indoor air quality (IAQ), environmental monitoring, and smart-building applications with accurate, cloud-connected data visualization.

At the core of this kit is the XENSIV™ PASCO2V15 a compact, MEMS-based CO_2 sensor that leverages the photoacoustic spectroscopy (PAS) principle. Infineon's PASCO2 sensor board design offers:

- 4× smaller and 3× lighter footprint than traditional NDIR sensors
- Higher robustness and accuracy than electrochemical CO_2 sensors
- Improved stability through acoustic isolation and low-frequency detector optimization

Compliant with leading IAQ standards such as WELL, LEED, Title 24, and ASHRAE 62.1, the PASCO2V15 is ideal for smart home, HVAC control, and building automation systems. The Wing board also includes the XENSIV™ DPS368 high-resolution pressure sensor. It detects small barometric changes useful for environmental monitoring, door/window state detection, or altitude-based triggers enabling more complex multi-sensor fusion scenarios.

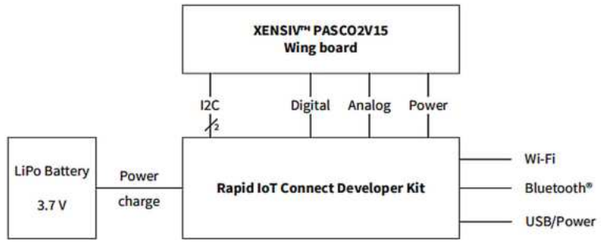

FIGURE 2: CSK System Block Diagram

The KIT_CSK_PASCO2_5V bundle features an integrated rapid development solution for IoT applications, comprising the Rapid IoT Connect Developer Kit (CYSBSYSKIT-DEV-01) and the XENSIV™ PASCO2V15 Wing (EVAL_PASCO2_WING_5V). Central to this setup is the CYSBSYS-RP01 module, which incorporates a dual-core, low-power PSoC™ 62 MCU, and an AIROC™ CYW43012 radio supporting Wi-Fi and Bluetooth® connectivity. This turnkey module includes onboard crystals, oscillators, antenna, and passive components, and supports the ModusToolbox™ development environment, alongside built-in OPTIGA™ security for device authentication and cloud trust.

The hardware features an Adafruit Feather-compatible form factor (22.5 × 63 × 30 mm^3), interchangeable XENSIV™ sensor Wings, a digital CO_2 gas sensor, and a high-precision pressure sensor. The system enables real-time data evaluation with cloud visualization capabilities. Software support includes seamless integration with ModusToolbox™, complete with application examples and templates tailored for various sensor use cases, along with Rapid IoT Connect Cloud for effective onboarding, data visualization, telemetry, and fleet management.

INFINEON RAPID IOT CONNECT CLOUD PLATFORM

Infineon's Rapid IoT Connect cloud platform is designed to simplify the deployment, testing, and lifecycle management of IoT devices built with the XENSIV™ Connected Sensor Kit (CSK). It provides a secure, scalable environment where engineers can stream, visualize, and manage sensor data in real time without needing to build backend infrastructure from scratch.

Key Capabilities

1. **PLUG-AND-PLAY CLOUD CONNECTIVITY:** **The platform integrates natively with the Rapid IoT Connect Developer Kit (CYSBSYSKIT-DEV-01) and the onboard OPTIGA™ security, allowing devices to be provisioned securely and connected within minutes.**
2. **REAL-TIME DATA VISUALIZATION:** **Engineers can monitor live sensor data including CO_2 concentration, barometric pressure, temperature, and environmental metrics—through intuitive dashboards. This accelerates validation of sensor behavior, calibration testing, and algorithm development.**
3. **DEVICE & FLEET MANAGEMENT:** **Rapid IoT Connect allows remote configuration of sensor nodes, firmware updates, and performance monitoring. This makes the platform suitable not only for prototyping but also for conducting customer field trials or early pilot deployments.**
4. **BUILT-IN SECURITY BACKBONE:** **The cloud platform uses Infineon's OPTIGA™ hardware security for device identity, authentication, and encrypted communication. This eliminates one of the most complex parts of IoT development secure onboarding.**
5. **SCALABLE ARCHITECTURE FOR IOT USE CASES:** **Whether testing a single dev kit or scaling to hundreds of nodes, the cloud supports sensor-driven applications such as smart buildings, IAQ monitoring, predictive maintenance, and environmental tracking.**

STEP BY STEP GUIDE:
Working with KITCSKPASCO25VTOBO1 and Rapid IoT Cloud

WALKS YOU THROUGH:

- Creating a cloud account
- Registering your device
- Generating firmware
- Programming the kit
- Viewing live CO_2 telemetry in the cloud

PREREQUISITES:

- KITCSKPASCO25VTOBO1 baseboard + XENSIV™
- PASCO2V15 Wing
- PC/laptop (Windows/macOS/Linux)
- Micro-USB cable
- Wi-Fi network (WPA2)

STEP-BY-STEP PROCEDURE

Step 1: Sign Up and Login to Rapid IoT Connect Cloud

1. Open Rapid IoT Connect Platform in your browser.
2. Click Sign Up and enter your email + required details.
3. Check your email for a temporary password.

FIGURE 3: Rapid IoT Connect SignUp Screen

4. Log in using your email + temporary password.
5. Create a new permanent password at first login.

You will now enter the main dashboard.

FIGURE 4: Rapid IoT Connect Dashboard

Step 2: Add your device

1. On the dashboard, click Add Device.
2. A step-by-step pop-up wizard will open.
3. Enter:
   - Device Name (any name you prefer)
   - Development Kit Serial Number (printed on the board)
4. Click Next to continue.

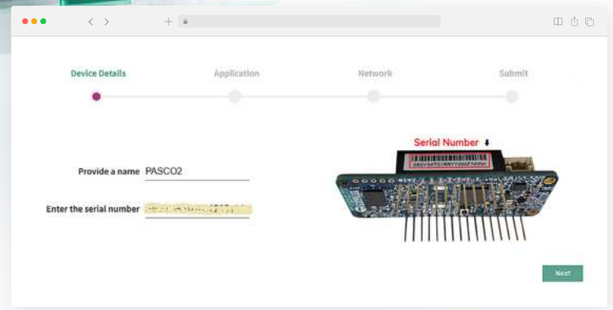

FIGURE 5: Add device wizard

Step 3: Select the applicaiton

1. From the application selection page, choose the Quick IoT Experience V2 sensor application.
2. The wizard will automatically select the default temperature sensor + PASCO2V15 CO_2 sensor profile which gives you a complete IoT sensor experience for the board XENSIV PAS CO2 – Infineon CO2 Sensor, XENSIV DPS 368 – Infineon Pressure Sensor and Thermistor Example
3. Continue to the next step.

This prepares the cloud to configure the firmware for your specific wing board.

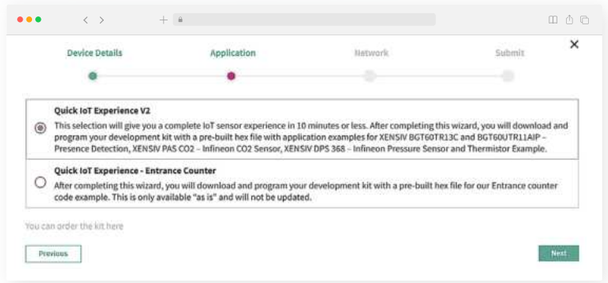

FIGURE 6: Application Selection Screen

Step 4: Configure Wi-Fi

You can either choose to go with:

OPTION A — USE YOUR OWN WI-FI (RECOMMENDED)

- Select Create New Network
- Enter your Wi-Fi SSID and Password (WPA2)

OPTION B — USE BUILT-IN ACCESS POINT (AP MODE)

Use these credentials:
- SSID: IFX_Sensor
- Security: WPA2-PSK
- Password: S66M14022021

Click Next.

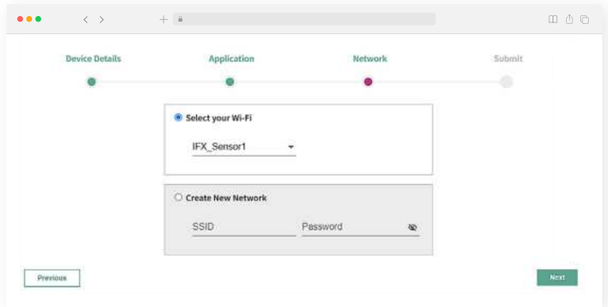

FIGURE 7: WiFi Configuration Screen

Step 5: Review & Submit Configuration

1. Review all details:
   - Device name
   - Serial number
   - Selected application
   - Wi-Fi settings

Click Save.

THE CLOUD WILL NOW:

- Build your customized HEX file
- Generate a ZIP package with programming tools
- Prepare your device bundle

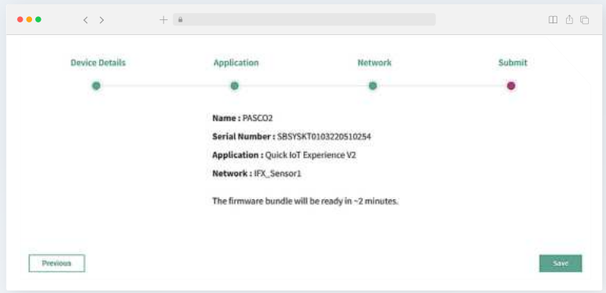

FIGURE 8: Review Submit Configuration

Step 6: Download ZIP Package

1. Wait until the cloud shows Success for firmware build.
2. Click the Download icon next to it.
3. Save the ZIP package (Windows/Linux/macOS versions are auto-generated).

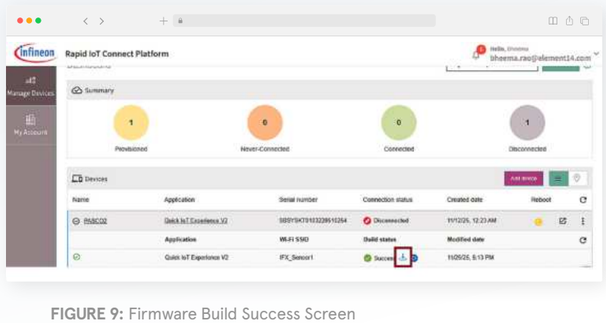

FIGURE 9: Firmware Build Success Screen

INSIDE THE ZIP, YOU WILL FIND:

- Custom HEX firmware
- Programming script (.cmd for Windows, .sh for Linux, .command for macOS)
- README.md

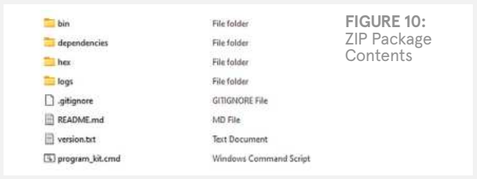

FIGURE 10: ZIP Package Contents

Step 7: Program the KITCSKPASCO25VTOBO1

1. Connect the board to your PC using a Micro-USB cable.
2. Extract the downloaded ZIP package.
3. Run the programming script:
   - Windows: double click on program_kit.cmd
4. Wait for the script to finish flashing the firmware.

You will see a "Programming complete" log in the terminal.

After programming click the refresh button, you can see the device as connected

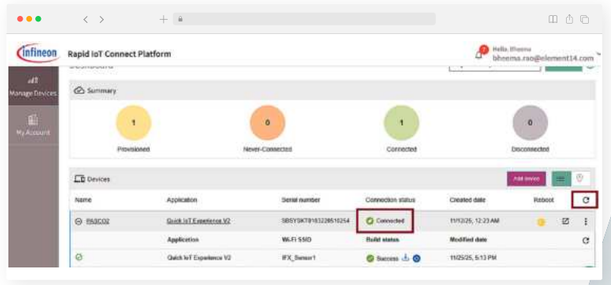

FIGURE 11: Programming KITCSKPASCO25VTOBO1

Step 8: Manage Your Device

1. Go to Device Management.
2. Expand your device entry to verify:
   - Device is connected
   - CO_2 application is selected
   - Latest attributes have been pushed

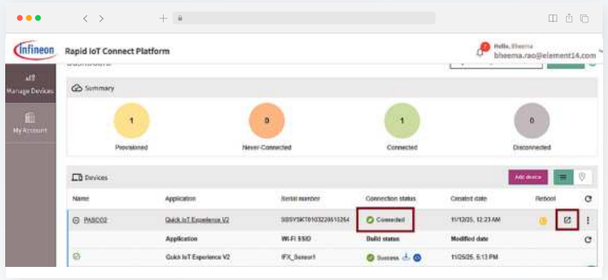

FIGURE 12: Device Management Dashboard

Step 9: Select or Modify Application Attributes

1. Go to Device Management.
2. Expand your device entry to verify:
   - Device is connected
   - CO_2 application is selected
   - Latest attributes have been pushed

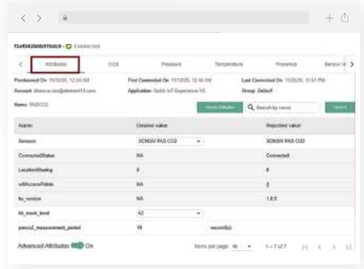

FIGURE 13: Application Attributes Screen

Step 10: View Live CO^2 Sensor Data

1. In the device details window, click the CO_2 tab.
2. View real-time graphs of:
   - CO_2 concentration
   - Temperature
   - Diagnostic indicators
3. To export raw data:
   - Click Download > CSV

FIGURE 14: Live CO2 Sensor Data Visualization

CONCLUSION:
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By utilizing this guide, engineers can efficiently execute the following tasks: establishing a connection between the KITCSKPASCO25VTOBO1 device and the cloud, deploying ready-made sensor applications, measuring CO_2 telemetry in real-time, and assessing various applications such as indoor air quality monitoring. This optimized workflow significantly accelerates the development of Internet of Things (IoT) prototypes, enabling a genuine IoT experience within just ten minutes.

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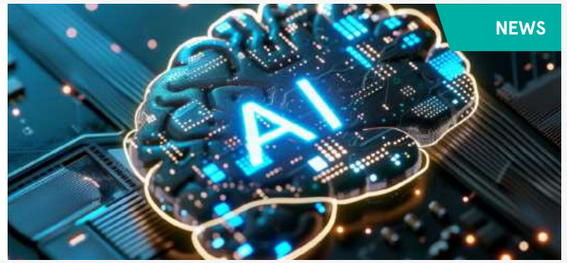

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To build on the momentum from APEC 2026, engineers were encouraged to visit newark.com/devkit hq.

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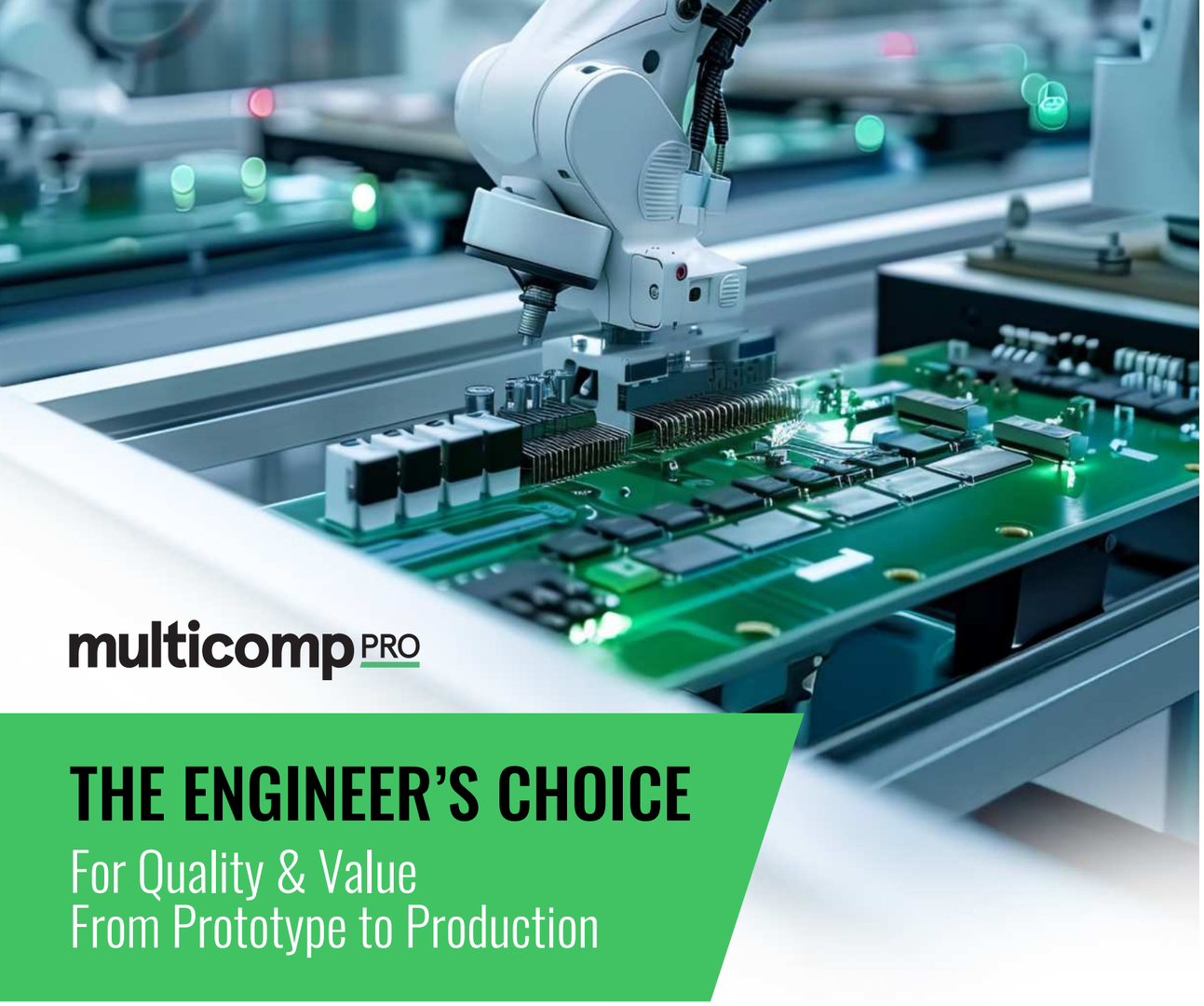

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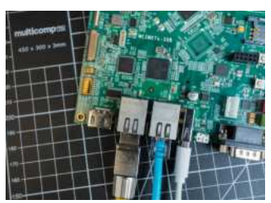

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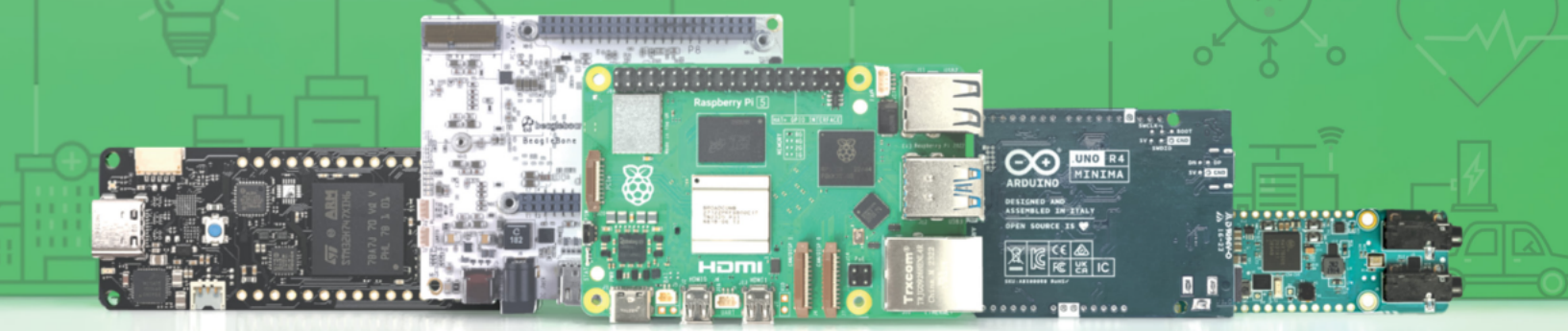

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