

## 5G and Networking

### 5G Architecture Insights – How 5G Plans to Carry IoT into the Future

5G will support next-generation IoT, industrial, smart building/smart city, and automotive applications from a speed, capacity, and security standpoint. There are a number of key design criteria that must be considered before jumping in to the 5G deep end, however. Join our 5G experts as they provide a 5G architectural overview and looks into each of the various components that a designer must consider to adopt this new technology, including what's needed in the network infrastructure

### Which Wireless Suits You?

We're being besieged by short-range wireless media. There's LoRaWAN, NB-IoT, and a few others, and it seems like there's a new flavor of Bluetooth or Wi-Fi every quarter. One (or more) of these are right for your application. But which one? Obviously, it depends. In this webinar, we'll sift through each of the protocols, highlighting the tradeoffs of each, so you can make an educated decision about which is best for you.

### Wireless Sensor Networks for IoT from LoRa to Cellular Cloud

A number of wireless sensor networks are being trialed in various IoT applications that require low latency and high reliability. There are a number of environmental, range, speed and capacity considerations when exploring these technologies for use in specific IoT applications. Join our experts as they describe the latest in wireless sensor networks and their applications.

### From Cloud to Edge with OpenRAN, a Three-Part 5G Innovation Series:

#### Part I: Cloud to IoT Edge

5G is aggressively being rolled out by all major mobile operators and the race to design and deploy innovative solutions has begun. 5G is enabling new applications and use cases in a variety of industries. Join us as industry experts discuss key features & capabilities 5G brings to these systems, disruptive technologies that can enable new services and extend existing services and example applications that illustrate successful design and deployments.

#### Part II: 5G OpenRAN Overview & Implications

In Part I of our 5G Innovations series experts discussed how 5G is disrupting the smart solutions landscape and how engineers can leverage this disruption to bring innovative solutions to 5G. In Part II we focus on OpenRAN – an open architecture, virtualized radio access network architecture designed for AI/ML applications at the edge. This must-attend event includes covers OpenRAN architecture & interfaces, use cases, and deployment options that enable successful deployment of edge applications.

#### Part III: Design and Deployment Challenges & Solutions

5G Innovations Part III is a tailored webcast that provides a deeper dive on specific technologies, deployment, or example application/use case that builds off the previous two webcasts. The participants will discuss specific implementation challenges and discuss how these challenges can be addressed using available products or services. Examples challenges include security as a service,

embedded device integration, over the air updates, deployment of effective AI/ML at the edge.

*[Part III will be tailored to a specific industry/application/use case to be determined – so the abstract will get more refined based on the sponsors and the information/feedback from Parts I and II.]*

## Artificial Intelligence / Machine Learning

### Applying Machine Learning to Sensor Analytics at the Edge

Machine learning is a hot topic. It lets your industrial platform adapt on the fly. Grabbing the analytics and applying them properly is key to making this technology work for you. In this webinar, we will show the correct method to deploy machine learning hardware and software, and then how to maximize its potential.

### Combine AI with the IoT to Get AIoT

In PC years, the IoT is quite long in the tooth. AI and machine learning, on the other hand, are just pups. When you combine these two complementary technologies, you get AIoT, or Artificial Intelligence of Things. You had better be ready for it, because this is one of those seminal technologies that will dominate the landscape, sort of “get on board or get out of the way.” To make sure you don’t get run over, attend this webinar that will explain what the convergence of these two important technologies means and how it will shape the design landscape for years to come.

### Keys to Developing Real-World AI/ML at the Edge

AI/machine learning can be a boon to the Edge of the IoT if implemented properly. That sounds easy, but it has the potential to be mystifying. With the compute power that’s now available at the Edge, most calculations can be handled locally. While that doesn’t eliminate Cloud interaction completely, it certainly reduces the dependency. This webinar will drill down on gathering requirements for an AI/ML system at the Edge and look at what’s needed to make this technology a reality.

### Machine Learning and AI Systems Testing: How Do You Know It Works?

AI and machine learning systems can be quite complex. Once you get your system up and running, how do you know if it’s operating properly and operating at its full potential. Those may not be simple questions to answer, partly because the technology is changing so rapidly, both on the hardware and software sides. In this webinar, we will look at how you maximize and test your AI and ML systems.

## Achieving Real-World AI at the Edge: A Four-Part Machine Learning Engineering Series

### Part I: How to Move AI into Engineering Groups & Endpoint Devices

Advances in sensor technology and widespread IoT connectivity permit us to observe the world around us more deeply and with greater fidelity than ever before. They also present overwhelming amounts of data that is impractical to comprehend by traditional methods. Artificial intelligence has emerged as an option that can help increase our understanding of this data, and by extension optimize our interactions with the physical universe, more efficiently and in real-time.

But maximizing the potential of AI and machine learning means shifting concepts out of the esoteric realm of academia, research, and development to the broader engineering community. It also means migrating these technologies from data center servers to endpoint devices where they can be put to greater use.

In part one of this four-part Embedded AI & Machine Learning webcast series, we set the stage for real-world AI implementations by investigating tools that both shorten the AI development learning curve and prepare algorithms for execution at the edge using techniques such as graph lowering, compression, and sparse modeling.

## **Part II: Enter the Brave New World of Embedded AI Processors & Programming**

Massive economic potential and demand for ubiquitous electronic intelligence are pushing AI and machine learning technologies further and further into resource-constrained embedded edge devices. While these platforms' proximity to data sources and points of action make them ideal targets for executing AI algorithms, their limited computation, memory, I/O, and other resources often prevent them from running sophisticated AI software stacks.

In response, embedded processor vendors have rushed to integrate more DSP capabilities in next-generation compute platforms, either by adding extensions to their traditional offerings (CPUs), retrofitting processors from other markets for use in embedded systems (GPUs), leveraging historically niche technologies (FPGAs), or designing exotic new architectures altogether (Accelerators, VPUs, etc.). Now, embedded systems engineers tasked with integrating AI into their designs are also confronted with a brave new world of hardware targets as well as new, potentially unfamiliar aspects of the development environments needed to program them.

In part two of this four-part series on Embedded AI & Machine Learning, we build on the concepts established in part one to learn how to optimally deploy AI software stacks on a new breed of embedded processors.

## **Part III: Inside the Eye of the Machine. Instructions for Rapid Prototyping of Real-World Computer Vision Systems**

Computer vision is one of AI's first killer apps. Detection and recognition neural networks are already used in systems ranging from smartphones and retail digital signage to advanced driver assistance systems and industrial robots. And with a variety of building blocks already available to the development community, engineers are beginning to innovate and customize their own advanced computer vision AI models.

But as these computer vision technologies becomes more accessible, developers are spending anywhere from weeks to months just evaluating the dizzying number of AI models, development frameworks, vision sensors, compute platforms, and memory configurations needed for an optimized CV application stack. And all that evaluation comes before they can even begin meaningful prototyping.

Part Three of Embedded Computing Design's Machine Learning Engineering webcast series expands on the solutions presented in Parts One and Two by focusing on end-to-end development stacks and kits that enable rapid prototyping of real-world computer vision systems.

## **Part IV: Observe. Process. React. Computer Vision, Co-Bots & Industry 5.0**

The manufacturing industry is undergoing radical change with the introduction of Industry 4.0 technology. But the next automation renaissance is already on the horizon, as organizations prepare for the age of intelligent human-machine interaction: Industry 5.0.

Industry 5.0 introduces collaborative robots (co-bots), cognitive automatons that operate in the same physical space as humans to even further enhance efficiency and productivity. For these platforms to succeed, they must be mobile, untethered, and interactive. Such features are enabled by ultra-low-latency and reliable 5G networks, as well as the advanced perception and navigation capabilities afforded by AI-enabled computer vision.

Unleash your imagination as we consider the possibilities and requirements of deploying complex computer vision systems into the most safety-critical environment of all: side-by-side with humans. Understand the market opportunity and system architecture options, all within the context of tools and technologies introduced throughout this four-part Embedded AI & Machine Learning webcast series.

## **Inside Heterogeneous Systems Engineering, a Three-Part Series**

### **Part I: Effective Use of CPUs and GPUs in Embedded Systems Design**

Graphics Processing Units (GPUs) have been around for a long time and are mainstream components for applications involving a high level of graphics and display capabilities. However, GPUs have found an increasingly larger role in providing engines for edge intelligence, AI, and machine learning functions within larger embedded and IoT systems. Join us as experts discuss the role of CPUs and GPUs for these systems, factors in deciding when to use each, and initiatives that are combining CPU/GPU horsepower for advanced AI and machine learning edge applications.

### **Part II: CPU/GPU Design: How to get the most out of your platform**

New combined SoCs and boards involving CPUs and GPUs provide a powerful solution for a wide variety of embedded, graphics, and compute intensive applications such as AI/ML. Join us as CPU & GPU experts discuss important success factors when using these platforms and key design and implementation guidelines for a successful implementation.

### **Part III: CPU/GPU Spotlight: Applying CPU/GPU Platforms to Industry 4.0 Solutions**

The industrial automation market is exploding with opportunity where companies are desperate to deploy solutions that add significant automation, intelligence, and machine learning to achieve higher productivity and make better business decisions. Join us as experts in Industrial Digital Transformation discuss how to leverage CPU/GPU technologies to provide advanced Industrial system solutions.

## Automotive

### ADAS Systems for Today and Tomorrow

Advanced driver-assistance systems (ADAS), electronic systems meant to assist drivers, make vehicles safer. The technologies behind ADAS are evolving very quickly, and it's up to the automakers to keep pace. In this webinar, we will look first at the end systems available, then delve into what makes them work, why, how they should be integrated, and what's coming next.

### Destination: Level 5 Autonomous Drive

Level 5 autonomous is attainable. It may still be a ways down the road, but we are getting closer. In this webinar, we will look at the technologies that have gotten us to Level 4, and what it will take to get to Level 5.

### See Further Down the Road with Advanced Automotive HMIs

The HMIs in current vehicles are quite different than what was used in the relatively recent past. And they continue to evolve, both in terms of touch and sight. In this webinar, we will look at the current state of the art for automotive HMIs, and what's needed to embed them into all types of vehicles.

## Embedded

### COM-HPC: Bringing Data Center Compute into the Fog

The amount of data generated by IoT sensors and AI endpoints means that more processing power is needed closer to the edge. Edge servers minimize networking costs, latency, and security issues associated with transmitting information to a data center or cloud. However, these fog environments host a variety of technology architectures and workloads, and therefore demand flexible infrastructure.

PICMG's COM-HPC was designed to address the requirements of these applications, building on the embedded heritage of the COM Express specification to deliver more interfaces, 10 GbE and PCIe Gen 4 connectivity, support for higher performance CPUs, the ability to accommodate significantly more GPGPU-based accelerator cards, and up to 1 TB of RAM. And, as an open standard, it keeps compatibility consistent and hardware costs low. Join the architects of the PICMG COM-HPC spec for a deep dive into the latest open, industry standard for high-performance computing at the edge, and learn how you can leverage its technology advances in embedded edge servers, AI inferencing, IoT analytics, 5G networking, and beyond.

### Embedded Blockchain: What You Need to Know

You've likely heard the term "embedded blockchain." Do you know what it is and understand it? Should you? If you're worried about your system being hacked, then the answer is yes. This webinar will serve as a primer to explain what the technology is all about and how it can be used to secure your embedded system.

## How Efficient is Enough for Your System?

When you inquire about power efficiency of a circuit, the answer is typically “it depends.” What exactly is efficiency all about and how does it relate to your design? Unfortunately, it depends. This webinar will look at the various scenarios and what options are available to developers.

## Is Free Open Source Worth It?

Should you or shouldn't you is the question that's continually asked when it comes to open source. It's fairly easy to make a credible argument for either side, and typically boils down to the application, the budget, and the experience of the developer. In this webinar, we will show you when, where, and how are the best ways to take advantage of open-source software, and when you should steer clear.

## Quantum Cryptography May be Your Best Defense

Quantum cryptography is a means of exploiting quantum mechanical properties to perform cryptographic tasks. That's a fancy way of saying that you need some advanced techniques to keep your system secure. That includes reducing the ability to clone your system and also the ability to insert keys that only you have access to. In this webinar, we will look at quantum cryptography as well as some other techniques to ensure that the hackers don't gain access to your device and thereby your entire network.

## Thinking Inside/Outside the Box Means Thinking About the Box

Embedded developers spend a lot of time worrying about what goes on their board, including both the hardware and software—and for good reasons which don't need to be detailed here. What they don't spend enough time on is how to deal with the enclosure and the issues that come along with it. For example, will your embedded system be used at high altitudes? In an environment that's subject to lots of shock and vibration? Where “quality” power may not always be available? One that has to deal with excessive high or low temperatures? Or a combination of these issues? That's what we'll deal with in this webinar, the part that has a significant say in whether your system operates as expected when it's deployed in the field.

## Understand Industry 5.0

You're pretty secure in your understanding of Industry 4.0. In fact, you're ready to deploy a system that's based on this standard. But wait—now we have Industry 5.0! What does that mean, and does it mean that I should wait on my deployment? The answer is....it depends. In this webinar, you'll get an understanding of what Industry 5.0 is and what it might mean to your deployment.

## IoT

### Design, Build, and Manage Your Industrial IoT Network

In the industrial sector, down time is measured in dollars, lots of dollars. So anything that can prevent that dreaded down time is being embraced by the manufacturing, automation, and robotics industries. It's a combination of hardware and software that's needed to manage that industrial IoT network. In this webinar, we will look at what a system integrator's options are, while simultaneously keeping an eye on safety and security.

## **IoT Asset Management Tracking Platforms, Sensors and Software**

Asset tracking has a variety of use cases and applications across a variety of industry. Key features include geo location analysis for route optimization, asset health reporting, anomaly detection, and predictive maintenance. A comprehensive approach involving support for IoT platforms, control systems, sensors, and connectivity is required for effective asset tracking and management. Join us as thought leaders in IoT asset management discuss challenges and opportunities across the IoT architecture for effective asset management.

## **IoT, Interoperability, and the Latest Platforms**

Interoperability has always been a critical part of any system. The same is true with IoT. However, as we move to newer “enhanced” platforms, forward and backward compatibility is essential. In some cases, it’s standards that drive the change, while in other cases, it’s newer technologies, including 5G, the big disruptor. Regardless of the reasons why, hardware and software components that worked fine before must continue without a hitch. Join us as IoT experts across various platform technologies discuss the importance of interoperability, resources, and how the landscape will evolve in the near future.

## **IoT Device Security Virtual Conference (Q4)**

Most end devices are connecting to the Internet in some form, either with a wire or wirelessly, whether the application is in the consumer space, the automotive medical arena, or industrial. Hence, security is a top priority.

In the Fourth Annual IoT Device Security Conference, we will look at the most pressing issue facing technology organizations today. Last year’s conference was attended by over 1000 qualified engineers. So, we invite you to join in that success, teaching IoT Developers, Engineering Managers, and Executives how to protect their connected systems, companies, and reputations with a series of live and pre-recorded in-depth technical sessions.

## **Industrial IoT Device Virtual Conference**

While there is a specific definition of Industry 5.0, many in the industry just assume that it’s simply the next evolution of industrial computing. The actual definition has to do with robots operating in a manufacturing environment amongst people, there are many other factors that must be considered, starting with the safety and security of both the people and the reports. The Industrial IoT Device Virtual Conference will look at what’s needed to build out (or retrofit) a factory to Industry 5.0 standards.

## **Inside Industrial Safety, Security & Regulation for the Automation Era**

Industrial platforms are evolving very quickly. Are you sure you’re taking the time to ensure that the safety and security protocols are being adhere4d to? Do you even know what those protocols are? In this webinar, we will look at the latest industrial hardware and show how to build in proper “safety first” concepts.

## **Predictive Maintenance See the Future So Your Network Runs Efficiently**

Predictive maintenance is not a new concept, and it’s been embraced by the industrial IoT community. However, implementations of this technology have been scarce at best. In this webinar, we will look at what it takes to implement predictive maintenance in an industrial setting, and how to maximize it to minimize capital equipment costs.

## Putting Smarts into the Smart Home

Manufacturers are flooding the shelves with devices aimed at the smart home. That would be a good thing if they all happened to be compatible. Unfortunately, that's not the case. In fact, incompatibility is far more likely. This webinar looks at the solutions available from the semiconductor vendors to ensure that the smart home will live up to its name.

## The Benefits of a Cloud Native Architecture

The Cloud providers are making it easier and easier to operate within their container-based environments. Also known as Cloud Native, this technology is more attractive for industrial applications for a host of reasons, none more important than the security that's offered. The applications with a Cloud-native architecture can be deployed as microservices and managed on using an agile infrastructure. If you're interested in a technology that can scale as your needs grow, Cloud Native may be just what you need. Check out this webinar to understand whether Cloud Native is right for you.

## Time-Sensitive Networks Push the Industrial Sector

Sensor analytics based on distributed processing provide engineers with actionable intelligence from the Edge of the IoT. However, the size, power consumption, and cost of processing solutions capable of executing suitable analytics functions often preclude them from being used on embedded sensor nodes themselves. As a result, sensor analytics processing is typically performed on platforms higher up in IoT hierarchies, which can introduce latencies that are unacceptable for decision making in real-time control systems. It's vital to ensure that your data reaches the end point at the right time, and in time to make the right decision. Join networking, processor, and software professionals as they reveal the possibilities of deterministic networking for sensor data analytics in industrial control applications, as well as how to deal with any delays that are sometimes unavoidable.

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## A Digital Experimentation Approach to IT/OT Convergence, a Four-Part Series

### Part I: Taking a “Digital Experimentation” Approach

IoT design involves a cross-discipline, “system-of-systems” approach involving embedded, network, and cloud components. This makes it difficult for design teams to have all the needed expertise to achieve success. Applying a “fail fast” approach to design can identify issues early on and help the team build needed expertise to achieve a successful result faster. Join us as IoT experts discuss the “fail fast” lifecycle and available platforms to facilitate the approach.

### Part II: Cloud Architecture and Internals for Intelligent Edge Applications

Today’s technology development requires embedded engineers to understand, integrate, and sometimes develop from device to cloud. These new programming and deployment paradigms can be challenging to deal with using online tools and training only. Join us as cloud experts provide a cloud architecture-and-internals overview, cloud native & containers approach to development, and how technical personnel can gain important expertise in order to successfully design and deploy new IoT systems.

### Part III: IT/OT Convergence in Digital Transformation

Designing and deploying smart systems blurs the lines between enterprise IT systems and embedded operational OT systems. This trend has resulted in the need for “hybrid expertise” where development tasks are a combination of embedded, networking, and enterprise system implementation and integration. Join us as experts discuss challenges and opportunities with systems integration in this challenging environment and available tools, platforms, and training can help engineers & systems integrators transition successfully.

### Part IV: Digital Transformation Security: Protection, Detection, & Security Functions

The Digital Transformation is bringing a wide variety of new use cases to personal, commercial, government systems. The digital transformation trend distributes intelligence and information across cloud, edge, and device resulting in increased attack surfaces and vulnerabilities. Join us as security experts discuss key security challenges involving identifying vulnerabilities, how to address them, and Security-as-a-Service for successful, secure systems.

## Medical

### Medical Devices MUST Be Secure

While the need to secure your medical design has not changed, the method with which you secure the device is quite different. There are software techniques, hardware techniques, and other methods as well. In this webinar, we’ll look at the unique requirements associated with medical devices, and what can be done to ensure their security.

## Power

### **Power: It's All About Efficiency**

Power efficiency should be a simple metric to measure. It's essentially the ratio of output power to input power. However, that's the only thing that's simple about. IoT really needs some explanation when you're designing a product, with caveats for product category, power level, operating environment, technology that's employed and so on. As an engineer, how do you do an apples-to-apples comparison? This webinar will go over those issues and help the engineer make an educated determination as to how he chooses the most efficient parts for his design.

### **Make the Most of Wideband Gap Power Semiconductors**

Wideband gap power semiconductors are far from leading edge at this point, but designers are still unsure how to implement them properly to maximize their potential. In this webinar, we will look at the various options available to designers, which applications are most appropriate, and how to maximize the efficiency of these higher power devices.

## Security

### **It's Your IP. Keep it that Way.**

Your company's IP may be more valuable than its physical assets. Security pros must understand that the "bad guys" go to extremes to wrestle that IP from you. There are techniques that will ensure that your IP remains in your control, but those techniques require a constant up-date. This webinar will look at what those techniques consist of, and what you need to do to ensure that your IP stays within your company's control.

### **Making Your System "Secure Enough"**

Are you tired of the discussion about making your systems more secure? Let's hope not, because it's not going away any time soon. In fact, the discussion is likely to heat up as more AI comes along and the hackers get more sophisticated in their attempts to breach. But never fear, solutions are here. And while they may not ever be 100%, the rule of thumb is to make the system secure enough so that the hacker will go away and find another victim. In this webinar, we'll look at what you need to do to ensure that your system is "secure enough."

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