

The background of the cover is a high-angle, close-up photograph of a military pilot in the cockpit of a helicopter. The pilot is wearing a helmet with a display, sunglasses, and a communication system. The helicopter's rotor blades are visible at the top. Below the cockpit, the blue ocean stretches to the horizon, with a white wake from the helicopter. In the lower-left corner, the deck of a ship is visible, featuring various equipment and structures.

**COTS**  
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The Journal of Military Electronics & Computing

Taking eFPGA Security to the Next Level

Green Engineering IT to Accelerate Decarbonization

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Carrier Strike Group

Navy Petty Officer 2nd Class John Kainoa IV prepares to land a helicopter aboard the USS Ronald Reagan during Carrier Strike Group Exercise 2022, a bilateral training event with the South Korean navy, in the Philippine Sea, June 4, 2022.

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**EDITORIAL**

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# ***PUBLISHER'S NOTE***

John Reardon, Publisher

## ***The cost of data breaches in the United States is estimated to exceed \$4 billion in 2022***

Throughout the United States systems are targeted with everything from pranks to highly costly data breaches. From the individual to the hospital, the frequency of these crimes seems to be increasing with each passing day. The defense industry is not immune to these breaches and as security solutions employed come mainly from the commercial sector, the breaches will continue.

In today's defense sector the federal systems employed are like those used throughout the medical and financial industries and it should not be a surprise that they are being attacked constantly by foreign governments in the hopes of finding their vulnerabilities. Although the following numbers are gleaned from the FBI's

Internet Crime Complaint Center and do not break out of the defense sector, they should open our eyes to just how vulnerable we are. These numbers don't address the porous connected battlefield, but they show how our advisories might use similar skills to learn how to penetrate or spoof our defenses.

It is no surprise that California is the State with the greatest financial losses from these breaches. The losses between 2017 and 2021 exceed \$3.5 billion and were comprised of over 325,000 victims. The most expensive type of data breach is having your email compromised with financial losses in this area exceeding \$7.5 billion. Denial of services or ransomware although the most feared, the costliest to Americans are phishing scams.

*This type of crime takes advantage of the human as the weakest link in the chain.*

These have become very sophisticated in recent years by reaching out to a broad array of individuals claiming to be an institution that might entice the reader to click on a false hyperlink and either enter confidential information or turn over control of their system to the scam artist.

This type of crime takes advantage of the human as the weakest link in the chain. It is very difficult to employ technologies when it is human nature to trust that the bank or the hospital logos are legitimate. But employing multiple authentication methods continues to challenge even the most creative criminals. This type of human exposure to data breaches is based on an error in judgment. And can happen to anyone at any time.

The following list indicates the 10 most affected States by data breaches.

1.	California	\$3,738,488,140
2.	Texas	\$1,820,823,734
3.	New York	\$1,775,479,307
4.	Florida	\$1,723,041,371
5.	Ohio	\$776,895,836
6.	Illinois	\$676,683,650
7.	New Jersey	\$670,049,038
8.	Pennsylvania	\$617,680,596
9.	Virginia	\$535,893,196
10.	Massachusetts	\$526,212,719

The frequency and impact of the different types of data breaches convey a menu to the criminal element. The costliest according to the Forbes Advisor is attacks on your email and according to the same report, the most frequent is non-payment/non-delivery. Confidence and Romance Fraud has resulted in over \$2.3 billion of losses and targets people mostly by adopting a false identity to gain the trust of the victim. This ranks number two as the costliest to its victims.

When we hear victims' stories where they sent cash through the mail or acted on a false email to send out gift certificates to the entire company, we tend to believe that we would never fall prey to a scam that is so obvious. The perpetrators of this type of theft have tapped into your life, they may know that your home is for sale or that your primary bank is Bank of America. They may know that you recently experienced a loss of some type that makes you more vulnerable. The ability to exploit these types of real-world needs might catch you when you least expect it during what would otherwise be a routine transaction.

Federal Systems across this country are controlled by fallible humans. They contain and are connected to sensitive data that represents Billions of dollars worth of IP as well as defense strategies. Although not operational systems on the battlefield, the havoc that breaches can cause is far and wide. So be careful out there and make sure that you take all the precautions you can to stay safe.

Data supplied by: [www.forbes.com](http://www.forbes.com)



# The INSIDE TRACK

## NVIDIA Jetson AGX Orin 32GB Production Modules Now Available; Partner Ecosystem Appliances and Servers Arrive

Nearly three dozen partners are offering feature-packed systems based on the new Jetson Orin module to help customers accelerate AI and robotics deployments. Bringing new AI and robotics applications and products to market, or supporting existing ones, can be challenging for developers and enterprises.

Nearly three dozen technology providers in the NVIDIA Partner Network worldwide are offering commercially available products powered by the new module, which provides up to a 6x performance leap over the previous generation. With a wide range of offerings from Jetson partners, developers can build and deploy feature-packed Orin-powered systems sporting cameras, sensors, software, and connectivity suited for edge AI, robotics, AIoT, and embedded applications.

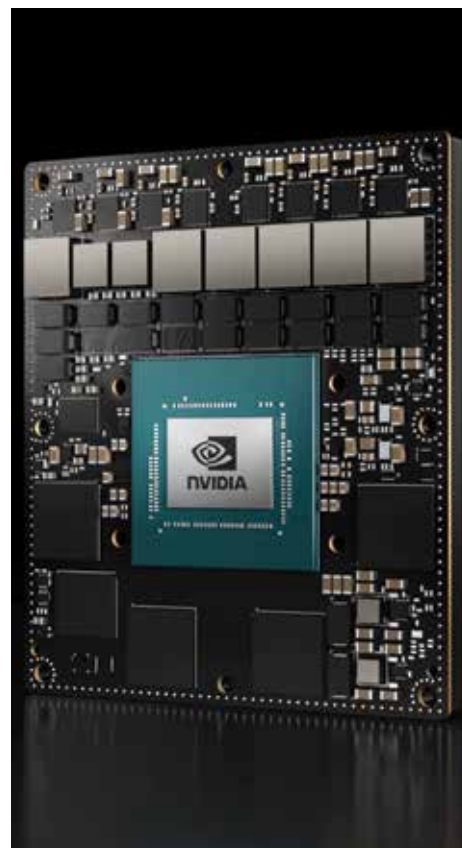
Production-ready systems with options for peripherals enable customers to tackle challenges in industries from manufacturing, retail, and construction to agriculture, logistics, healthcare, smart cities, last-mile delivery, and more. Traditionally, developers and engineers have been limited in their ability to handle multiple concurrent data streams for complex application environments. They've faced strict latency requirements, energy-efficiency constraints, and issues with high-bandwidth wireless connectivity. And they need to be able to easily manage over-the-air software updates. They've also been forced to include multiple chips in their designs to harness the compute resources needed to process diverse, ever-growing amounts of data. NVIDIA Jetson AGX Orin overcomes all of these challenges.

The Jetson AGX Orin developer kit, capable of up to 275 trillion operations per second, supports multiple concurrent AI application pipelines with an NVIDIA Ampere architecture GPU, next-generation deep learning and vision accelerators, and high-speed I/O, and fast memory bandwidth. With Jetson AGX Orin, customers can develop solutions using the largest and most complex AI models to solve problems such as natural language understanding, 3D perception, and multi-sensor fusion.

The four Jetson Orin-based production modules, announced at GTC, offer customers a full

range of server-class AI performance. The Jetson AGX Orin 32GB module is available to purchase now, while the 64GB version will be available in November. Two Orin NX production modules are coming later this year. The production systems are supported by the NVIDIA Jetson software stack, which has enabled thousands of enterprises and millions of developers to build and deploy fully accelerated AI solutions on Jetson.

On top of JetPack SDK, which includes the NVIDIA CUDA-X accelerated stack, Jetson Orin supports multiple NVIDIA platforms and frame-



works such as Isaac for robotics, DeepStream for computer vision, Riva for natural language understanding, TAO Toolkit to accelerate model development with pre-trained models, and Metropolis, an application framework, set of developer tools and partner ecosystem that brings visual data and AI together to improve operational efficiency and safety across industries. Customers

are bringing their next-generation edge AI and robotics applications to market much faster by first emulating any Jetson Orin-based production module on the Jetson AGX Orin developer kit.

### *Expanding Developer Community and Jetson Partner Ecosystem*

More than 1 million developers and over 6,000 companies are building commercial products on the NVIDIA Jetson edge AI and robotics computing platform to create and deploy autonomous machines and edge AI applications. With over 150 members, the growing Jetson ecosystem of partners offers a vast range of support, including from companies specialized in AI software, hardware and application design services, cameras, sensors and peripherals, developer tools, and development systems.

Some 30 partners offer commercially available products, powered by the new Jetson AGX Orin module, which are packed with options to help support cutting-edge applications and accelerate time to market. Developers looking for carrier boards and full hardware systems will find a range of options from AAEON, Auvideo, Connect Tech, MiiVii, Plink, Real-time, and TZTEK to serve their needs.

Over 350 camera and sensor options are available from Allied Vision, Appropho, Basler AG, e-Con Systems, Framos, Leopard Imaging, LIPS, Robosense, Shenzhen Sensing, Stereolabs, Thundersoft, Unicorecomm, and Velodyne. These can support challenging indoor/outdoor lighting conditions, as well as capabilities like lidars for mapping, localization, and navigation in robotics and autonomous machines.

For comprehensive software support like device management, operating systems (Yocto & Realtime OS), AI software, and toolkits, developers can look to Allxon, Cogniteam, Concurrent Realtime, Deci.AI, DriveU, Novauto, RidgeRun, and Sequitur Labs. And for connectivity options, including WiFi 6/6E, LTE, and 5G, developers can check out the product offerings from Telit, Quectel, Infineon, and Silex.

# The INSIDE TRACK

## **\$205 Million Investment Accelerates Construction of the Giant Magellan Telescope**

The funding round represents one of the largest in the project's history, with investments from Carnegie Institution for Science, Harvard University, São Paulo Research Foundation (FAPESP), The University of Texas at Austin, University of Arizona, University of Chicago

The Giant Magellan Telescope, the most powerful telescope ever engineered using the world's largest mirrors, today announced it has secured a \$205 million investment from its international consortium to accelerate construction. This investment marks one of the largest funding rounds for the telescope since its founding and includes leading commitments from the Carnegie Institution for Science, Harvard Uni-

"We are honored to receive this investment in our future," said Dr. Robert Shelton, President of Giant Magellan Telescope. "The funding is truly a collaborative effort from our Founders. It will result in the fabrication of the world's largest mirrors, the giant telescope mount that holds and aligns them, and a science instrument that will allow us to study the chemical evolution of stars and planets like never before."

The funding comes after the National Academy of Sciences Astro2020 Decadal Survey evaluated the Giant Magellan Telescope as a core partner of the United States Extremely Large Telescope Program. Astro2020 ranked the program a top priority and "absolutely essential if the United States is to maintain a position as a leader in ground-based astronomy."

"Six like-minded Founders of the Giant Magellan Telescope worked together to close

The Giant Magellan Telescope is under construction at Carnegie's Las Campanas Observatory in Chile and will allow astronomers to see farther into space with more detail than any other optical telescope before. The Giant Magellan Telescope will have 10x the light collecting area and 4x the spatial resolution of the James Webb Space Telescope (JWST) and will be up to 200x more powerful than existing research telescopes.

This unprecedented angular resolution, combined with revolutionary spectrographs and high contrast cameras, will work in direct synergy with JWST to empower new scientific discoveries. The Giant Magellan Telescope will be the next step in studying the physics and chemistry of the faintest light sources in space that JWST will identify. This includes searching the atmospheres of potentially habitable planets for life, studying the first galaxies that formed in the Universe, and finding clues that will unravel the mysteries of dark matter, dark energy, black holes, and the formation of the Universe itself.

"We are working with some of the brightest engineers and scientists at leading research institutions around the globe," said Dr. Walter Massey, Board Chair of Giant Magellan Telescope and former Director of the National Science Foundation and Chairman of Bank of America. "The recent contributions from our investing partners in the Giant Magellan Telescope are collectively pushing the boundaries of astronomy, making the future a reality, and allowing us to answer some key science goals, including 'Are we alone in the Universe.'"

The Giant Magellan Telescope has already achieved significant construction progress over the last few years. Six of seven primary mirror segments have been cast in Tucson, Arizona. The third primary mirror segment has completed its 2-year polishing phase and is undergoing final testing. Construction of a 40,000-square-foot facility in Rockford, Illinois to manufacture the telescope structure is complete. The production of the telescope's first adaptive secondary mirror is well underway in France and Italy, and the site in Chile is primed for the next stage of construction and pouring of the foundation.

This latest \$205 million investment round positions the Giant Magellan Telescope to be one of the first in a new generation of extremely large telescopes to be constructed. First light is anticipated by the end of the decade.

versity, and the São Paulo Research Foundation (FAPESP). The University of Texas at Austin, the University of Arizona, and the University of Chicago. The investment will be used to manufacture the giant 12-story telescope structure at Ingersoll Machine Tools in Illinois, continue progress on the telescope's seven primary mirrors at the University of Arizona's Richard F. Caris Mirror Lab, and build one of the most advanced scientific spectrograph instruments in Texas.

the financial gap between the resources we have attracted to build the telescope and what is required to complete it," said Dr. Eric Isaacs, President of Carnegie Institution for Science. "This investment will bring the telescope closer to first light and provide the world with transformational knowledge of our Universe. Carnegie is proud to have kickstarted the funding effort and to have worked closely with our peers."



# The INSIDE TRACK

## *Datanomix and Flexxbotics Partner to Automate Production Monitoring for Universal Robots*

Datanomix announced support for monitoring Universal Robots for real-time visibility into robot performance. By partnering with Flexxbotics, a leader in robotics process improvement technology, Datanomix extends its automated production intelligence coverage to Universal Robot cells, helping power lights-out and automated operations at precision manufacturers.

As part of the technology partnership with Flexxbotics, Datanomix gains access to real-time operational data for Universal Robots from Flexxbotics via their FlexxConnect™ platform. Advanced utilization and performance data for Universal Robots is collected and displayed in the Datanomix platform, offering insights into both cobot and CNC machine cycle time, part counts, run time, and machine/robot status to allow precision manufacturers to make better-informed decisions around automating their factory. In addition, FlexxConnect™ provides truly centralized and revision-controlled cobot and CNC program management capabili-

ties and guided workflows for both cobot operators and CNC operators.

“Datanomix customers are investing heavily in automation, and robotics are a key success factor in the automation movement,” said Greg McHale, co-founder, and CTO of Datanomix. “Our job is to provide manufacturers with the data and insights they need to help optimize their factory operations. Partnering with Flexxbotics delivers a turnkey integration with Universal Robots that offers deep insights into robot performance, cycle time, utilization, and capacity, satisfying pent-up demand from our customers. And this is just the start of our collaboration to help automate more of our combined customers’ operations.”

With this initial integration, existing Flexxbotics customers can add Datanomix to their deployments, and similarly, Datanomix customers can add the Flexxbotics management platform to Universal Robot installations. Using Flexxbotics’ underlying technology, the Datanomix platform receives performance information directly from Universal Robots and visualizes it alongside the performance data from the CNC machines the robots empower.

“The partnership between Datanomix and Flexxbotics was a natural fit,” remarked Tyler Bouchard, CEO of Flexxbotics. “In addition to sharing several customers, more importantly, we share a common philosophy of delivering advanced functionality through a simple, intuitive user experience that complements manufacturing workflows instead of working against them. Customers who love Flexxbotics love Datanomix and vice versa, and the enthusiasm for the partnership has been overwhelming.”

The Datanomix Platform automates the collection and analysis of manufacturing data and delivers deep insights into production performance, both in real-time and over time. Designed for growth-oriented precision manufacturers, the Datanomix platform delivers industry-leading innovation of manufacturing productivity with no operator input required, and without burdening the end user with cumbersome analysis or data crunching.

The Flexxbotics platform significantly increases Cobot tended CNC utilization and productivity through a suite of robot redeployment, robot monitoring, robot to CNC connectivity, guided workflow, and robot/CNC program management solutions.



# The INSIDE TRACK

## **GRAID Technology Named Most Innovative Flash Memory Startup, Best of Show at Flash Memory Summit 2022**

GRAID Technology SupremeRAID™ recognized for sophisticated software-composed RAID data protection with record-breaking performance speeds and exceptional ROI for demanding workloads.

GRAID Technology SupremeRAID™, the world's first NVMe/NVMeoF RAID card to unlock the full potential of SSD performance, has been named Best of Show winner in the most Innovative Flash Memory Startup category at Flash Memory Summit 2022. Flash Memory Summit recognizes GRAID Technology SupremeRAID™ for cutting-edge innovation in flash memory applications. One SupremeRAID™ card can easily manage 32 direct-attached NVMe SSDs, and because it is NVMe-oF-based, no performance is lost over the network. SupremeRAID™ offloads.

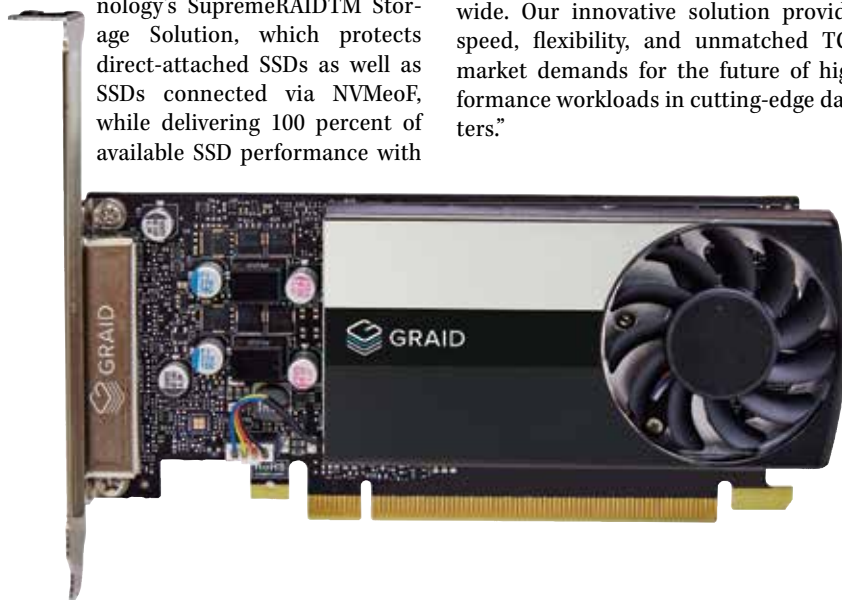
RAID from the CPU to provide performant and robust data protection without the attendant complexity and performance cost of most current solutions. "RAID data protec-

tion is a vital element in protecting valuable information assets, yet until now traditional RAID implementations could not unlock the full potential of enterprise SSD performance," said Jay Kramer, Chairman of the Awards Program and President of Network Storage Advisors Inc.

"We are proud to recognize GRAID Technology's SupremeRAID™ Storage Solution, which protects direct-attached SSDs as well as SSDs connected via NVMeoF, while delivering 100 percent of available SSD performance with

a single SupremeRAID™ card. It can deliver 19M IOPS and 110GB/s throughput."

"We are honored to be named FMS 2022 Best of Show winner," said Leander Yu, CEO of and Founder of GRAID Technology. "GRAID Technology SupremeRAID™ is quickly becoming the data protection solution of choice for Tier One OEMs and data centers worldwide. Our innovative solution provides the speed, flexibility, and unmatched TCO the market demands for the future of high-performance workloads in cutting-edge data centers."



## **Mercury Systems receives a \$12M order for advanced packaging of GPS modules**

Mercury Systems Inc. announced it received a \$12 million order from a leading defense prime contractor to provide advanced trusted and secure manufacturing and packaging for their GPS modules. The GPS modules will enable precision munition capabilities for the U.S. Army. The order was booked in the Company's fiscal 2022 fourth quarter and is expected to be shipped over the next several quarters.

As GPS is heavily utilized throughout high-precision operations, general navigation, and situational awareness, trusted location information is vital.

"We are honored to provide our customers with ultra-small, ultra-light packaging technology ruggedized for extreme environments," said Tom Smelker, vice president and general manager, of Mercury Microsystems. "Receiving this prominent order is a com-

PELLING demonstration of how the exponential power of Mercury makes trusted, secure manufacturing profoundly more accessible to aerospace and defense."

The Company has successfully developed and commercialized an entire portfolio of microelectronics solutions ruggedized for modern defense applications without sacrificing size, weight, or power. This comprehensive portfolio includes ultra-compact memory devices, military-grade secure solid-state drives (SSD), GPS solutions, and BuiltSECURE™ System in Package (SiP) devices integrating advanced security algorithms. All of Mercury's digital microelectronics solutions are designed and manufactured in a Defense Microelectronics Activity (DMEA)-accredited facility for design, packaging, test, and broker services.

**Tom Smelker,**  
Vice President and General Manager, Mercury Microsystems



# The INSIDE TRACK

## *Lone Star Analysis Introduces: Advanced R&D Unit, Cipher Alchemy TM*

Lone Star Analysis, a trusted provider of leading-edge predictive and prescriptive analytics, and guided artificial intelligence solutions is introducing Cipher Alchemy (CA), an advanced research and development (R&D) unit designed to enable more powerful solutions by challenging the status quo in mainstream analytics and mainstream AI methods (MAIM).

“When we rolled out Cipher Alchemy, we said it was going to do things that ‘every-one knows to be impossible,” said Eric Haney, chief technology officer, Lone Star Analysis. “Lone Star has a history of significant R&D investments, and we established this department to sustain that commitment and create a technological advantage in areas which matter to our customers.”

Cipher Alchemy’s roots date back to the start of the company. Since its founding, Lone



Star has operated in the spirit of innovation, deep research, and tackling challenging problems. Cipher Alchemy executes this mission on a larger scale, allowing its members to pursue areas of interest with independence and intellectual curiosity.

Within data science, core approaches that have become orthodoxy in the mainstream aren’t questioned but taken as is by practitioners. Cipher Alchemy rejects this paradigm, instead, seeking to use common approaches as starting points of which to innovate. Unconstrained by assumptions and data limitations, Cipher Alchemy proposes new, cutting-edge, and high-accuracy solu-

tions to common problems.

Cipher Alchemy’s work focuses on several key industries in which Lone Star’s customers operate, such as the intelligence community, aerospace, and defense. The unit itself is made up of mathematicians, computer scientists, engineers, and physicists. The team’s varied expertise allows it to take technical concepts common to each field and apply them to others in novel ways.

The organization’s official launch coincides with the company’s renewed effort to focus on research, development, innovation, and intellectual property.

## *Marvin Test Solutions Welcomes New Director of Military and Aerospace Business Development*

Marvin Test Solutions, Inc., a trusted provider of globally-deployed innovative test solutions for military, aerospace, and manufacturing organizations, is pleased to announce it has selected Cesar “Rico” Rodriguez, CEO of SPLASH 3 LLC, as its Director of Military & Aerospace Business Development.

A graduate of The Citadel and the U.S. Naval War College, Rico is a USAF veteran who retired after a storied 25-year career of service in the USAF as a colonel, commander, and fighter pilot. His private sector experience spans 16 years and includes business strategy and business development roles with various business units of Raytheon and Raytheon Technologies. He currently serves on the board of the 390th Memorial Museum in Tucson, AZ, honoring the service of the 390th Bombardment Group in WWII.

“We are thrilled to have Rico join the Marvin Test Solutions team,” said Major General Stephen T. Sargeant, USAF (Ret.), CEO of Mar-

vin Test Solutions. “His depth of knowledge of military and aerospace organizations and technologies, coupled with his passion for delivering customer-centric solutions, makes him invaluable to both MTS and our customers.”

**Cesar “Rico” Rodriguez,**  
CEO of SPLASH 3 LLC, as its  
Director of Military  
& Aerospace Business  
Development



# The INSIDE TRACK

## **Aptima Awarded U.S. Air Force Contract for Evaluating Pilot Training for Electric Vertical Takeoff and Landing (eVTOL) Aircraft**

They're not airplanes. They're not helicopters. What skills will pilots need to fly eVTOLs?

Electric Vertical Takeoff and Landing (eVTOL) aircraft will soon transform the skies above. But who will fly these new and novel vehicles, what skills will they need, and how will they be trained to operate platforms that feature new levels of automation?

To help answer those questions, Aptima, Inc., has been awarded a contract by the US Air Force to assist the Air Education and Training Command's Detachment 62 (Det 62) to determine the pilot proficiencies and training needed for eVTOL operators. Det 62 supports the AFWERX Agility Prime program and is charged with developing the curriculum for eVTOL pilots and driving certification standards for an emerging market that is

expected to transform civil air mobility and select military missions.

Using simulators of various eVTOL prototypes, Aptima will assess and identify the pilot competencies needed for proficient flight, including how pilots learn and perform on eVTOL platforms that have varying levels of automation. "The learnability study will help us not only understand the baseline pilot skills and competencies needed for proficient eVTOL flight, but also the impact of automation on pilot performance," said Samantha Emerson, Training, Learning & Readiness Scientist at Aptima, and project manager for the contract. "Both experienced and novice pilots will bring unique sets of skills and capacities based on their experiences and abilities. We'll assess how these differences affect performance in aircraft with various levels of automation".

EVTOL prototypes range from having moderate levels of automation, that still fly like typical aircraft, to higher orders of automation, thus raising questions about the skills and training required to fly them.

In more heavily automated platforms, where pilots mostly control flight settings rather than the aircraft itself, preliminary research suggests experienced pilots tend to have more difficulty adjusting to automation than novice pilots. This is why we will look to see if experienced pilots tend to "overcontrol" the aircraft.

"Even though a more experienced pilot may possess greater ability in controlling aircraft, not all those skills may be useful or even desired in platforms with more automation and augmentation. It may require an 'unlearning' and re-training of behaviors to prevent interference or conflict with automated operations," Emerson added.

Aptima, a leader in human-machine teaming and training, will help evaluate how automation affects pilots in different eVTOLs, which existing skills will be transferable, and what new skills will require training.



# The INSIDE TRACK

## Interconnect Technology Leaders to Debut Tech Sector Alliance at Flash Memory Summit

Symbiosys Alliance Hits the Ground Running with Eight Members and enable remote software updates

The Symbiosys Alliance, a collaborative interconnect technologies group chartered to foster synergetic solutions between its members, today announced that it will participate in its first public event at Flash Memory Summit (FMS) in Santa Clara, CA. The alliance includes eight technology companies covering a range of markets, including semiconductors, data storage, IoT, cloud computing, consumer electronics, automotive, aerospace, and medical. All eight inaugural member companies were represented at the event.

"In the quickly evolving world of tech, establishing and developing key strategic partnerships can mean the difference between get-

ting out in front of market demand or chasing it from behind," said Mario Pasquali, president, and CEO of Ellisys, a leading provider IoT test solutions. "While

industry collaborations are generally created independently, our approach is to provide the framework needed to augment and accelerate that process by opening the right technical, marketing, and executive channels among Symbiosys membership."

"The Symbiosys Alliance is structured to open channels of communications between member companies that address similar markets with complementary products and technologies," said Paul Mutschler, CEO of SerialTek, a provider of data storage test and analysis solutions. "Under the Symbiosys framework, we've begun to integrate our Kodiak PCIe 5.0 Analysis System with SBExpress NVMe test systems pro-

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# The INSIDE TRACK

## Rigetti Awarded DARPA Contract for Quantum Application Benchmarking

Rigetti will lead a team that includes the University of Technology Sydney, Aalto University, and the University of Southern California

A subsidiary of Rigetti Computing, Inc. a pioneer in full-stack quantum computing, has been selected by the Defense Advanced Research Projects Agency (DARPA) to develop benchmarks for quantum application performance on large-scale quantum computers. The program is worth up to \$2.9 million over three years based on the achievement of certain milestones. Joining Rigetti on this project are the University of Technology Sydney, Aalto University, and the University of Southern California.

A key challenge of planning fault-tolerant quantum computers is the ability to predict their performance on target applications. Establishing rigorous and universal benchmarks could allow for more precise estimates of how fault-tolerant quantum computers could perform in the future. This program aims to pro-

duce a more detailed understanding of how errors occur at the qubit level, how those errors impact performance on target applications, and to provide an accurate estimation of how quantum hardware and software need to evolve to meet critical performance thresholds.

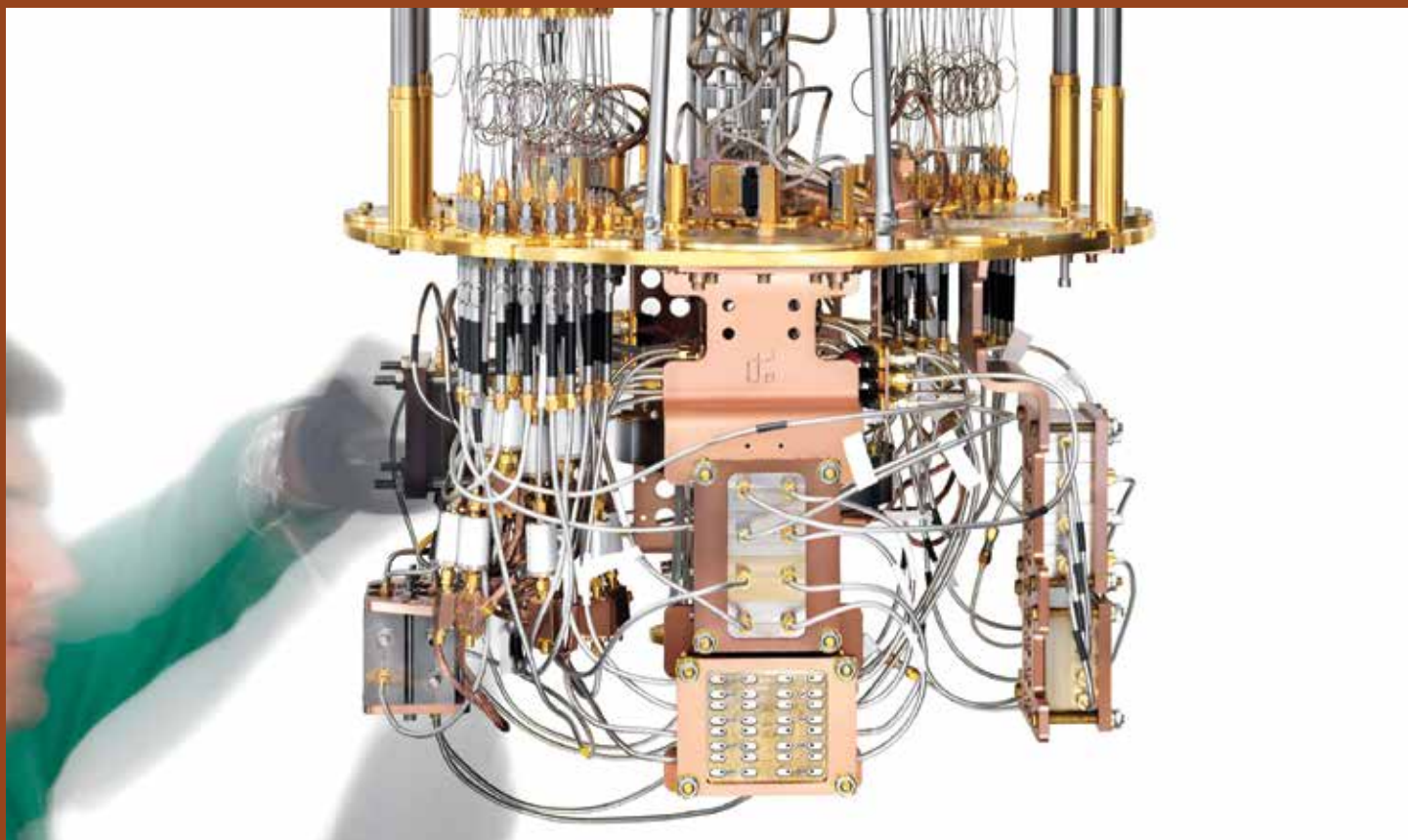
“We are proud to have been selected to deliver this critical program to advance quantum computing capabilities and benchmarks,” said Chad Rigetti, founder and CEO of Rigetti Computing. “Rigetti continues to pioneer advances not only in quantum processor technology but also in applications and benchmarks. This award is a testament to our full-stack R&D capabilities and rigorous focus on delivering application performance. We believe having a set of industry-accepted application benchmarks will help mature the quantum computing ecosystem and inform our technology roadmap.”

“I’m looking forward to assessing the impact of detailed models of superconducting qubits on the overall resources needed to create logical qubits,” said Daniel Lidar, Viterbi Professor of Engineering at the University of Southern California. “Most of the existing work deals with

somewhat simplified assumptions about qubit errors, and here we hope to improve the state of the art by building more faithful models of the qubits and their environment.”

“This is an extraordinary level of collaboration in the quantum software field,” said Yuval Sanders, a researcher at the Center for Quantum Software and Information at the University of Technology Sydney. “We will be developing some of the first automated software tools for quantum performance analytics that have ever existed. This will undoubtedly accelerate the field even further.”

This award is part of DARPA’s Quantum Benchmarking Program. The goal of the program is to re-invent key quantum computing metrics, make those metrics testable, and estimate the required quantum and classical resources needed to reach critical performance thresholds. The three-year project comprises two phases. Rigetti was awarded Phase 1, and the program includes an option for DARPA to award a second phase, concluding in February 2024.



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# The INSIDE TRACK

## Boeing Takes New Role to Help Cut Aviation Emissions Faster

Boeing will represent the aviation sector in a global alliance, jointly established by the US Government and World Economic Forum to accelerate clean technologies and reduce carbon emissions.

The First Movers Coalition (FMC) was created in late 2021 to leverage the purchasing power of major companies to speed up the pace of decarbonizing industrial sectors such as shipping, chemicals, and trucking. Boeing, a founding member of the coalition, will serve as the 'champion' for the aviation sector.

As part of its new role, Boeing commits to supporting the greater commercialization of sustainable aviation fuels and advancing other low-carbon technologies. Scaling up sustainable solutions is critical to the aviation sector's target of net-zero emissions by 2050 and the broader goal of holding global temperatures to 1.5°C above preindustrial levels, the so-called '1.5°C pathway'.

"We can only maintain the critical climate pathway of 1.5°C if we jumpstart the market for disruptive zero-carbon technologies and make them as economically competitive as existing carbon-intensive solutions," said Nancy Gillis, Head of the First Movers Coalition. "I congratulate Boeing for its new championship role and look forward to working together on driving the need for and accelerating the use of these

emerging technologies."

Boeing said it will leverage current technologies and increase industry partnerships in expanding sustainable aviation fuel supplies while shaping strategies for developing new solutions.

"We are honored to serve as 'champion' for our sector and committed to partnering with FMC members and others on scaling SAF and accelerating low-carbon technologies to decarbonize aviation," said Brian Moran, Boeing Vice President of Global Sustainability Policy & Partnerships.

Boeing has recruited one of the leading experts in sustainable aviation fuels (SAF) to work with the more than 50 companies in the First Movers Coalition and other industry partners. Robert Boyd will join Boeing from the International Air Transport Association (IATA), where he led decarbonization efforts, including advancing the commercial deployment of SAF and addressing policy, economic, sustainability, and logistic challenges. Boyd also served as a member of the United Nations International Civil Aviation Organization (ICAO) Fuels Task Group. Additionally, he served for four years on the Board of Directors for the Roundtable on Sustainable Biomaterials (RSB).

"Boeing has been a pioneer in making SAF a reality and having Robert join our team is further proof that we are 100% committed to working together to meet the industry's net-zero emissions commitment by 2050," said Moran.



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# Taking eFPGA Security to the Next Level

By Ralph Grundler, Flex Logix Technologies, Inc. and Vincent van der Leest, Intrinsic ID B.V.

Many markets – 5G, networking, cloud storage, defense, smart home, automotive, and others – are looking to embedded FPGAs (eFPGA) to save power and reduce cost. By removing the high-speed SERDES and other unnecessary I/Os or unused peripherals, port the design to a smaller process node, move fixed parts of the design to the SOC, the customer can save power and reduce latency. With FPGA embedded, the end product can take advantage of these benefits and still be reconfigurable in the field, saving time and money.

eFPGA vendor because of strong adoption based on several patented technologies that reduce the size of the eFPGA. One of these technologies is the Boundless Radix Interconnect technology, which can reduce the interconnect area by forty-five percent (Fig 1). This results in an area efficient solution, similar in density as custom designed FPGA chips while offering higher utilization and using just the lower layers in a metal stack making it compatible with most metal stacks.

question of security is being raised, and it's an important one.

### Bitstream Encryption to Protect eFPGAs

Security is an important topic for every SOC, but it's especially salient in the context of high-risk assets included in the eFPGA for obfuscation. Whether the device is used in defense systems or in cars driving around town, encryption is important so the device remains secure and can't be modified maliciously, whether through physical attacks or remote hacking.

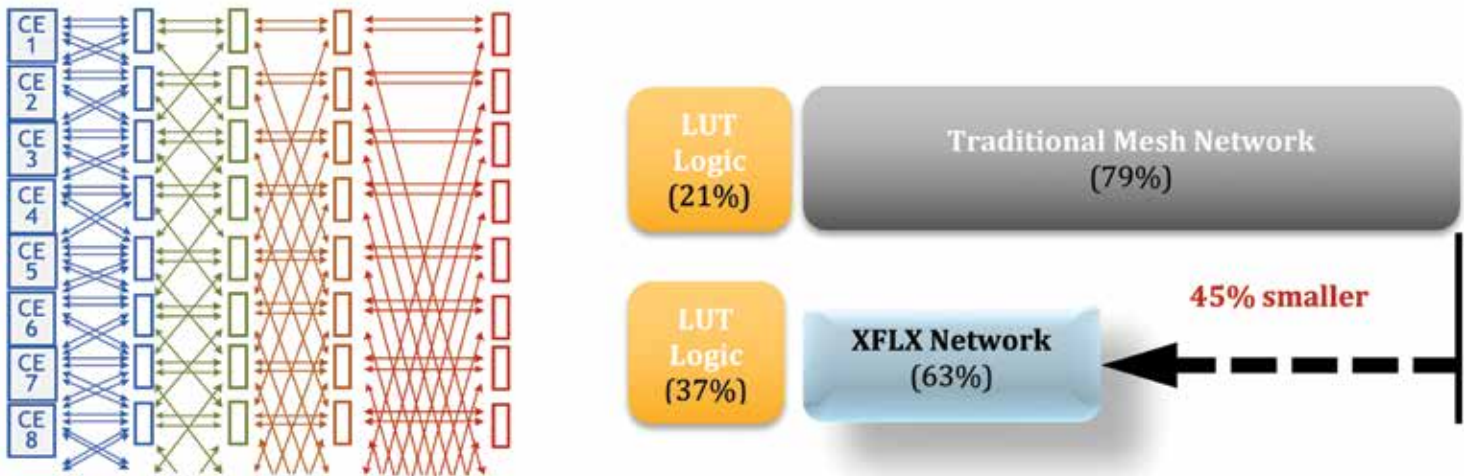


Figure 1: Although LUT logic is slightly larger the Boundless Radix Interconnect (XFLX® Network) is 45% smaller and results in higher utilization

Reconfigurability has many uses, but in the past, this meant greater area and came at an additional cost that was difficult to justify except where it was a requirement. Smaller technology nodes and the increasing cost of taping out (or retaping out), have made FPGA technology from Flex Logix, EFLX® eFPGA, both simple to integrate using less area than ever before and easy to justify from a cost perspective.

eFPGA adoption has been strong in several markets. Like many new technologies, the adoption started out in defense and aeronautical applications by AFRL, Boeing and DARPA. Next came technologies that require reconfigurability but needed to save power: 5G, Vehicle to Vehicle communication, software defined radio, smartNICs and computational storage and the final adopters are consumer products who require a much lower power and cost. As more and more SOCs are integrating FPGAs, the

But before eFPGA fabric can be used for security purposes, you first need to make sure that whatever is loaded onto this fabric can be trusted. That is why the most important security measure that needs to be implemented for eFPGAs is bitstream encryption. The bitstream, which determines the functionality of the programmable fabric, is typically stored persistently in non-volatile memory (NVM) somewhere internal or external to the SOC. When the device is powered, this bitstream is

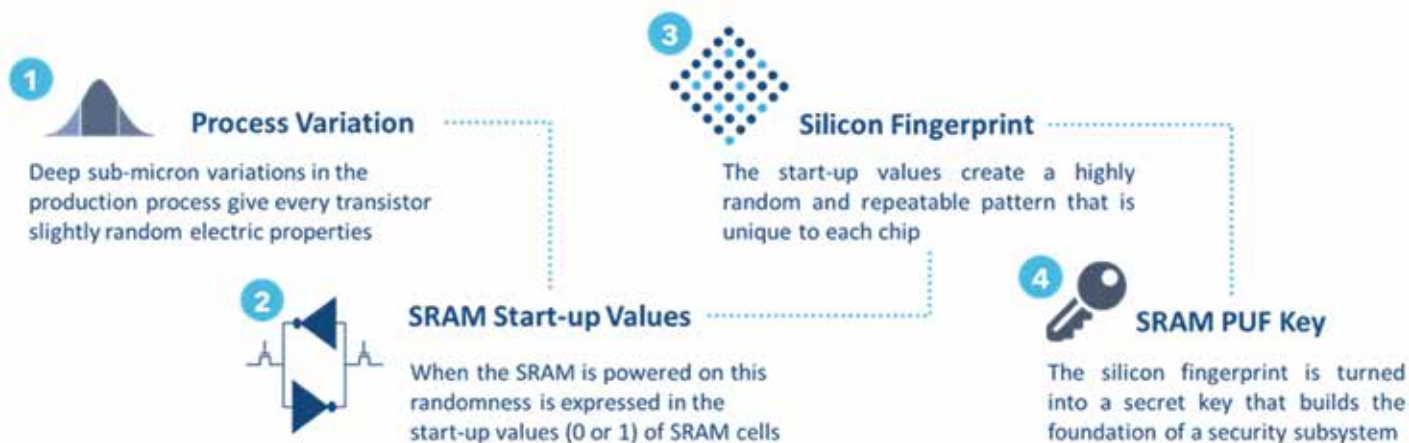


Figure 2: SRAM fingerprint turned into a strong cryptographic key

loaded from the NVM onto the programmable fabric for the eFPGA to become operational. The bitstream contains all the user configuration data and any user data, which should clearly never be altered or stolen. This means that eFPGAs present a unique security challenge, because the bitstream is vulnerable to attack, both when residing in NVM and during transfer. It should never be possible to copy this data to another device to make counterfeit products or make malicious alterations to influence operations of the device.

But what if you could encrypt this eFPGA

configuration data with a device-unique key that is never stored on the device, that cannot be copied from one device to the next, and that is not known to anyone (not even you)? Now you can, by using the secure and patented SRAM PUF (or Physical Unclonable Function) technology from Intrinsic ID.

#### SRAM PUF Technology

A PUF is a physical entity embodied in a physical structure. PUFs utilize deep submicron variations that occur naturally during semiconductor production, and which give each transistor slightly random electric properties –

and therefore a unique identity.

Intrinsic ID created SRAM PUF technology, based on the behavior of standard SRAM memory that is available in any digital chip. Every SRAM cell has its own preferred state every time the SRAM is powered, resulting from random differences in the threshold voltages. This randomness is expressed in the startup values of ‘uninitialized’ SRAM memory. Hence an SRAM response yields a unique and random pattern of 0’s and 1’s. This pattern is like a chip’s fingerprint since it is unique to a particular SRAM and hence a particular chip.



*From the SOC hardware engineering point of view, the process for encryption with SRAM PUF-based keys is no different than with any other type of encryption.*

Proprietary algorithms turn the device-unique fingerprint into a cryptographic root key for the chip (Fig 2 on previous page). A key that is created using an SRAM PUF is never stored 'on the chip' but rather it is extracted 'from the chip', only when it is needed. In that way the key is only present in the chip during a very short time window. When the SRAM is not powered there is no key present on the chip making the solution very secure.

This device-unique root key should never be used directly for cryptographic purposes to prevent the risk of exposing this key through use. That is why good cryptographic hygiene prescribes the derivations of additional keys from the root key. This is standard practice for any root key and not specific to SRAM PUFs, so standard algorithms are available for this purpose. What is specific to SRAM PUF technology is that even these derived keys do not require storage in any form of memory. Like the root key, they can simply be regenerated every time they are needed.

Once additional keys have been derived the bitstream of the eFPGA can be encrypted and authenticated. Now if the device is attacked or found in the field, the bitstream of the eFPGA cannot be altered, read, or copied to another device, because it is protected by a key that is never stored and therefore is invisible and unclonable for the attacker.

The main benefits of using the Intrinsic ID SRAM PUF technology over storing a key in NVM are:

- **High Security:** No key material programmed into device and no key present when it is not in use.
- **High Flexibility:** Key generation at any time and place in the supply chain without external provisioning.
- **Low Cost:** No dedicated security hard-

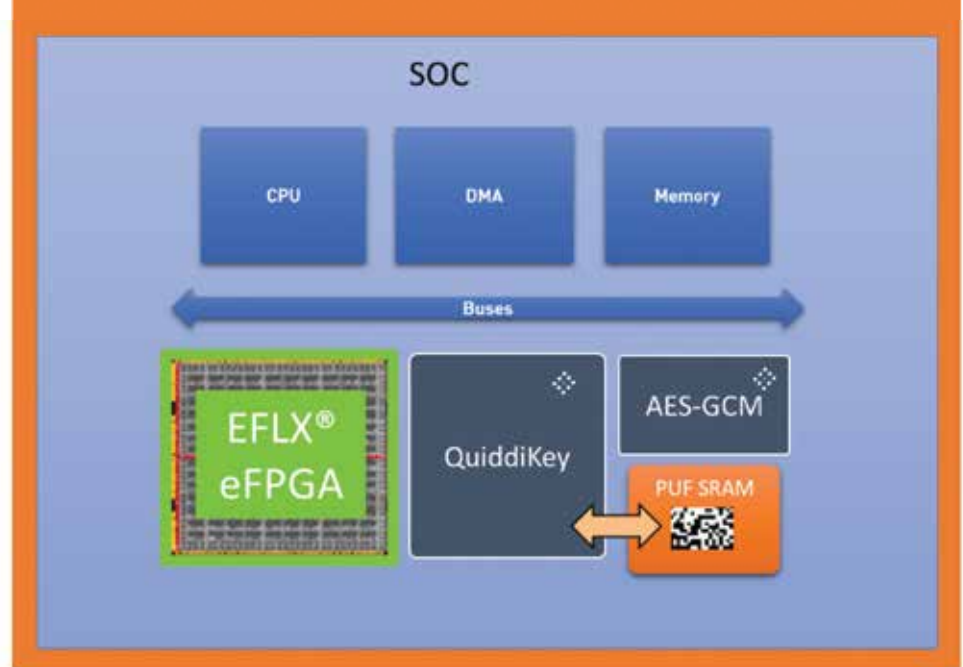


Figure 3: Diagram of QuiddiKey with PUF SRAM implemented in a system with EFLX eFPGA.

ware required to protect the key, as it is never stored.

- **Highly Scalable:** It employs only standard logic, scaling effortlessly with shrinking technology nodes.

#### Using SRAM PUF Technology with EFLX

From the SOC hardware engineering point of view, the process for encryption with SRAM PUF-based keys is no different than with any other type of encryption. It only requires instantiating the SRAM PUF through the Intrinsic ID hardware IP called QuiddiKey®, which takes care of creating the device-unique root key as well as deriving the additional keys needed to encrypt and authenticate the bitstream. The standard implementation looks like the diagram below (Fig 3).

The system will power up just like any other eFPGA, but the AES-GCM will fetch the key from QuiddiKey and decrypt the eFPGA configuration data before programming the eFPGA in the SOC.

The configuration data can be stored in any unprotected NVM since it is protected by the key from the SRAM PUF.

The use of SRAM PUF technology guarantees that the data used to program the eFPGA can be trusted and that it cannot be reused on malicious or counterfeit devices. This way eFPGA technology can be deployed securely in high-risk assets and in security sensitive markets, such as defense, automotive, and critical infrastructures. This is why the collaboration between Flex Logix and Intrinsic ID offers you everything you need to take your device security to the next level. Contact us now to find out how we can help you by combining eFPGA and SRAM PUF technology.

Learn more about the Flex Logix eFPGA solutions at: <https://flex-logix.com/efpga/>

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# *Green Engineering IT to Accelerate Decarbonization*

By Carl Coken, Vice President, Atrius Engineering, Acuity Brands

This year's Earth Day commemoration called for global investment in lowering energy use as we work together for a sustainable future. The Information Technology (IT) sector has a major role in this effort, with the potential to effect a 20% reduction of total CO2 emissions by 2030, according to a Global e-Sustainability Initiative report. Technology that deploys solutions requiring fewer physical resources and less energy will have a transformational impact on meeting climate change mitigation goals.

Facilities managers who manage the built environment will reap benefits from implementing cutting-edge solutions such as cloud computing, digital twins, and machine learning along

with embedded sensor networks. The software underpinning these solutions, created with sustainability in mind, will build the next generation of smart, innovative facilities management solutions. Here is an overview of how intelligent digital solutions will help create a more energy-wise future.

## **Greener Software Design Drives Smart Power Allocation**

Cleaner, greener computing starts with designing software that is mindful of how its projected use is tied to carbon consumption. Applications that are hardware efficient and that minimize the amount of data traveling across networks reduce energy requirements throughout the program

lifecycle. Reducing the network load through compression and decompression is preferred, as it takes less energy than transmitting uncompressed data.

This network-optimized software also applies to cloud computing -- how software is architected, designed, and deployed dictates overall efficiency. Moving from on-premise data centers to the cloud is an important first step. Today's hyper-scale cloud service vendors have made massive strides in making their data centers energy efficient.

There are conditions, though, when leveraging hybrid cloud architectures for specialized



workloads is the right decision. When a computer workload can be easily broken into discrete chunks, running tasks on the network edge to take advantage of local processing capabilities which exist on controllers and gateways is often more efficient than sending an entire dataset over a network to run in the cloud. This is true whether you are running a machine learning model on a local TPU or summarizing and aggregating data locally before sending it over the network.

Compute utilization is another area in which green computing principles can be applied. The workload handled by a computer processing unit at any time varies. Most servers are not fully utilized but are still using energy. Reducing the size of virtual machines that have a higher utilization generally uses less power than a larger VM with lower utilization. Also, turning off VMs and containers which are not being utilized can save significant resources.

#### **Digital Twin Framework Maps Real-Time Conditions**

Digital twins, digital models of a physical object, can give extremely detailed views of real-time, changing environmental conditions. Managing a built environment and other assets becomes much easier when you have a complete view of every part of the space and how it is being used.

Because digital twin mapping is continually updated with new data, the model reveals nuanced

and often formerly unrealized detail about energy flow, equipment conditions, air quality, lighting, and other environmental aspects. As conditions change, the digital twin enables us to understand shifts in energy patterns or equipment operations, so issues can be managed quickly and before problems arise. It can also enable buildings to be managed based on how they are being used as opposed to a schedule based upon personal observations.

Operators can run simulations on the digital representation of a physical asset to test new equipment configurations or processes, determine best-use scenarios or improve predictive maintenance. Digital twins are converging with increased IoT and machine learning systems, making this technology an essential tool across many industries.

#### **Embedded Sensors and Machine Learning Bring Unprecedented Benefits**

As sensors become more widely embedded throughout an environment, any built space can have the ability to become smarter, greener, and safer. Not only can IoT networks and artificial intelligence (AI) extract and share data from diverse sources, but these systems can analyze vast reams of information and make decisions that optimize energy use.

In buildings, for example, lighting is a huge energy draw and yet public spaces and businesses

need to keep places lit when people are on-site. But there are times throughout the day when there are few people in a specific area, and less light is needed. An intelligent automated system that can “read” the area, compare historical data and trends, and decide that fewer lights are required can create the right action.

One prominent U.S. retailer, an Atrius customer, was able to save millions of dollars annually in energy costs through an automated dimming program. Scale this across multiple retailers globally and a simple dimming system could save billions in KWh and energy dollars, making huge strides for decarbonization.

Machine learning, embedded IoT systems, and data visualization technology have made information more accessible, but the most important aspect is that it gives people back the time to apply human ingenuity, creativity, and foresight to planning. Cleaner, green computing is a growing discipline that ties together software design, energy, and sustainability and will help propel the climate change mitigation solutions we need now and in the future.

*Carl Coken is Vice President, Atrius Engineering, Acuity Brands. He is responsible for the development of the Atrius suite of products and solutions which control thousands of buildings, interact with millions of people, and manage billions of square feet of real estate around the world every single day. More info at Atrius; email [marketing@atrius.com](mailto:marketing@atrius.com).*

*In buildings, for example, lighting is a huge energy draw and yet public spaces and businesses need to keep places lit when people are on-site. But there are times throughout the day when there are few people in a specific area, and less light is needed.*

# August 2022 COT'S PICKS

## **BittWare Announces PCIe 5.0/CXL FPGA Accelerators Featuring Intel Agilex M-Series and I-Series to Drive Memory and Interconnectivity Improvements while Reducing Risk**

BittWare, a Molex company, a leading supplier of enterprise-class accelerators for edge and cloud-computing applications, today introduced new card and server-level solutions featuring Intel® Agilex™ FPGAs. The new BittWare IA-860m helps customers alleviate memory-bound application workloads by leveraging up to 32GB of HBM2e in-package memory and 16 lanes of PCIe 5.0 (with CXL upgrade option).

BittWare also added new Intel Agilex I-Series FPGA-based products with the introduction of the IA-440i and IA-640i accelerators, which support high-performance interfaces, including 400G Ethernet and PCIe 5.0 (CXL option). These newest models complement BittWare's existing lineup of Intel Agilex F-Series products to comprise one of the broadest portfolios of Intel Agilex FPGA-based offerings on the market. This announcement reinforces BittWare's commitment to addressing ever-increasing demands of high-performance compute, storage, network, and sensor processing applications.

"BittWare is excited to apply Intel's ad-

vanced technology to solve increasingly difficult application problems, quickly and at low risk," said Craig Petrie, vice president, Sales, and Marketing of Bitt-

Ware. "Our longstanding collaboration with Intel, expertise with the latest development tools, including OneAPI, as well as alignment with Molex's global supply chain and manufacturing capabilities enable BittWare to reduce development time by 12-to-18 months while ensuring smooth transitions from proof-of-concept to volume product deployment."

### **Jumpstarting Innovation**

BittWare has been selected to participate in Intel's Agilex M-Series Early Access Program (EAP) to expedite the delivery of FPGA-based solutions featuring Intel's latest technology advancements. To that end, BittWare's world-class engineering team will take advantage of in-package HBM2e (High-Bandwidth Memory) DRAM stacks; on-chip SRAM; and support for external synchronous DRAM (SDRAM) next-generation memory, including DDR5.

"We are pleased to team with BittWare to scale Intel FPGA-based solutions while fueling momentum for our new Intel Agilex M-Series FPGAs," said Deepali Trehan, vice president and general manager of Programmable Solutions,



Intel Corporation. "Over the years, BittWare has been pivotal in supporting our flagship Intel Agilex product roadmap as well as leveraging Intel's OneAPI development toolkit to speed the development and delivery of solutions that empower our customers to achieve high levels of performance and power efficiency across end-markets and applications."

### **Addressing Exponential Data Growth**

BittWare and Intel together are developing solutions to speed the processing of various workloads, ranging from machine learning inference, database acceleration, and nonvolatile memory express (NVMe) computational storage to networking test and measurement, 5G cellular testing, and sensor processing. As a result, both organizations are poised to enable customers to keep pace with ever-increasing demands for high-speed networking, computing, and storage acceleration for the most demanding applications and computational workloads.

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# August 2022 COT'S PICKS

## Acromag's Ethernet Remote I/O Modules Add Conditional Logic Computing

Acromag's new BusWorks® NT series remote I/O modules are now enhanced with conditional logic. The conditional logic increases the functionality with a system of rules that allows extremely complicated decisions based on relatively simple "yes/no" questions. For example, reading an analog or digital input value can trigger an action to happen as a result. This value could be used to control a relay when one or more conditions occur. Another example would be when a discrete input is ON and a temperature threshold is crossed. More complex math computation and logic are also an option.

Conditional logic is configured on the NT's built-in web configuration page. No programming is required. The modules support up to 64 conditions using IF/THEN/ELSE statements. NTE Ethernet I/O models have dual RJ45 ports and a webserver with Modbus TCP/IP and Ethernet/IP communication to monitor or control the internal

I/O channels. An integrated DIN rail bus allows connections of up to three NTX expansion I/O modules. Each I/O module adds up to 16 input or output signals allowing a mix of voltage, current, temperature, TTL, and relay control signals networked on one IP address. The space-saving design requires only 25mm of DIN rail per module. Ethernet I/O modules distribute 9-32V DC power along the DIN rail bus to expansion modules. Hazardous location approvals, high noise immunity, and -40 to 70°C operation make this I/O ideal for use in harsh environments.



"With this new conditional logic capability, users can easily implement rule-based control functions without programming," states Robert Greenfield, Acromag's Business Development Manager.

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# August 2022 COT'S PICKS

## Galleon G1 Rugged Computing Solutions Achieve NIAP Certified Dual Layer Encryption for Data at Rest

The XSR & G1, Galleon's most versatile and sought-after rugged computing solution, has achieved certification through the National Information Association Partnership on its hardware and software full-disk encryption. NIAP oversees the certification of commercial information technology products for national security systems, and after an extensive evaluation through a NIAP-approved Common Criteria Testing Laboratory (CCTL), the XSR & G1 will carry Dual-Layer Encryption Certifications. This certification applies in all Common Criteria partner countries and will allow Galleon's customers to deploy the rugged XSR & G1 computing solutions quickly, effectively, and into harsh environments where classified data protection is required.

Cory Grosklags, President of Galleon Embedded Computing, states "This is an exciting milestone for the XSR & G1 and it demonstrates our commitment to providing best-in-class security features for our customers." Multi-layer protection is the basis on which the US program for commercial Solutions for Classified (CSfC) is based. Software Full Disk Encryption (SWFDE) uses the central processor for authentication, and Hardware Full Disk Encryption (HWFDE) uses a separate processor for authentication and loading the DEKs into inline crypto devices.

### Hardware Encryption Features:

- Multi-channel SATA encryption
- Separated main processor key handling
- Symmetric AES-256 encryption
- Software Encryption Features:
- LUKS (Linux Unified Key Setup) for key exchange/authentication

- Supports up to 8 users per drive
- Independent from hardware encryption layer
- Available system SSD encryption

Galleon Embedded Computing is an innovative leader in the development of extremely rugged, secure storage solutions, data recorder systems, servers, network-attached storage devices & processing systems intended for deployment in the harshest environmental conditions.

Galleon has been part of the Spectra Aerospace & Defense group since August of 2021, a trusted group of defense electronics companies providing innovative solutions in support of national security requirements around the world.

*Galleon Embedded Computing*  
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## Rugged, Customizable Encoder Family from Elma Offers Balance Between Cost and Performance

Versatile configurations provide reliable operation and "Swiss-click" tactile feedback

Elma Electronic now offers the E18 family of price-competitive, robust mechanical incremental encoders. This new range of encoders offers a high-quality alternative to system designers struggling to find a drop-in, rugged encoder for harsh environments with a footprint that matches their current PCB design.

Mark Thorsell, sales manager for Elma Electronic rotary switch products in the Americas noted, "A well-designed user interface is a key to any electronic system for efficient operation. What good is any panel control if it begins to work intermittently and ultimately fails? Elma's E18 encoders ensure that users will experience reliable operation out in the field, at a cost that makes them a logical substitution."

Typical applications include white goods, home automation, two-way radios, power, heat, and water distribution controls as well as industrial controllers and audio or entertainment systems.

Elma's E18 encoders are available in a variety of configurations, including with or without

a push button, and with or without a threaded bushing. There is also an option to have the shaft already mounted in the encoder body or to have the shaft supplied separately for tape and reel packing and/or industry-standard reflow soldering processes. And the entire line of E8 encoders includes Elma's renowned "Swiss Click Indexing System" that optimizes encoder life and epitomizes quality turning feel.

Elma's extra-stable, gull-wing SMT terminations or THT pins are standard, and even in smaller quantities, customer-specific customizations may be possible. Packing in the tray (THT) or tape-and-reel (SMD) offers plenty of purchasing options.

*Elma Electronic*  
[www.elma.com](http://www.elma.com)



# August 2022 COT'S PICKS



## RUGGED SOSA-aligned 3U VPX from MEMKOR

New 3U OpenVPX modules with three different deployment options to optimize for customer applications:

- Rugged OpenVPX SSD Module
- Rugged single removable canister
- Rugged double removable canister

Pre-boot Locking and Authentication in a simple UI to add an additional layer of security in protecting SSDs, operating systems, and hypervisor machines. MEMKOR is now offering CipherDrive across all Military-grade SSDs. Support for 2-factor authentication and CAC/PIV/CIV/SIPR-NET cards. Common Criteria certified, NIAP/NSA listed.

In collaboration with a Defense customer and Broadcom, MEMKOR developed new firmware to easily deploy and manage multiple self-encrypting SSDs (SEDs) using Broadcom RAID controller and MegaRAID SafeStore. MEMKOR is an American Engineering firm that designs and builds Secure, High Endurance, and Rugged Military-grade SSDs.

MEMKOR SSDs are currently deployed across many defense sectors, UAVs, jets, helicopters, ground vehicles, ships, submarines, UUVs, weapon control systems, etc - anywhere data collection and usage is crucial in harsh operating environments.

- SECURITY – FIPS140-2, FIPS197, TCG Opal, TCG Enterprise

- PERFORMANCE AT TEMPS – Operating between -55°C to 95°C, performance even when others throttle down, and can be optimized to application requirements
- RUGGED – Up to 100g shock, 30gRMS vibration, and 100,000 insertions
- LOCKED BOM – EOL monitoring, and custom solutions available
- LEAD TIMES – 4-8 weeks

MEMKOR  
<https://memkor.com/>

## AIC Introduces a Mainstream Dual Socket Server Product Family Powered by 3rd Gen. Intel® Xeon® Scalable Processors

AIC Inc. announced its new product family of mainstream dual socket storage servers. Powered by 3rd Gen. Intel® Xeon® Scalable processors, these rackmount storage servers are high-performance and designed with high flexibility to support various storage devices. This new product family provides options ranging from cost-efficiency servers to high-performance all-flash NVMe platforms and can fulfill a wide range of data storage applications from storage tiering, and virtualization to cloud datacenters and high-performance computing (HPC).

This new product family includes three models, SB101-A6, SB202-A6, and SB201-A6. These dual-socket server systems are with an AIC server board (codename: A6) that is based on 3rd Gen. Intel® Xeon® Scalable processors 'great features, including CPU TDP supports up to 270W, DDR4 memory, PCIe Gen4 ready, built-in AI, and enhanced security, the new server systems provide excellent performances and low latency while maintaining the cost-effective benefits. Customers can utilize the enhanced Intel CPU performances, memory capabilities, and doubled PCIe Gen4 I/O bandwidth to tackle the challenges in data storage workloads. Besides, the new server systems are designed with universal (tri-mode) backplanes and can support SAS\*, SATA, and NVMe, providing great flexibility for customers

to load either 3.5" or 2.5" HDDs/SSDs. With tool-less features, the new server systems can save operators a significant amount of maintenance resources, which is crucial for hyper-scaler and cloud environments.

AIC Inc.  
[www.aicipc.com](http://www.aicipc.com)



## Pixus Announces a New Wearable Software Define Radio With Enhanced Ruggedization

Pixus Technologies has announced a new compact implementation of its ruggedized enclosure line utilizing NI's Ettus Research™ brand Software Defined Radio (SDR).

The new RB210 is a ruggedized version of NI's small form factor B210 SDR. It currently comes in an IP67 weather-resistant style with options for full MIL grade implementations. The compact unit is approximately 87mm tall x 156mm wide and 300mm long and weighs under 7 lbs. It can be used in human wearable configura-

tions or other applications requiring low SWaP (Size, Weight, and Power). The modular front and rear faceplates are customizable for various I/O implementations.

The RB210 features continuous frequency coverage from 70 MHz – 6 GHz. It combines the AD9361 RFIC direct-conversion transceiver providing up to 56MHz of real-time bandwidth, an open and reprogrammable Spartan6 FPGA, and fast SuperSpeed USB 3.0 connectivity with convenient bus-power.

Pixus now offers air-cooled, conduction-cooled IP67, and conduction-cooled MIL grade versions of NI's SDRs. The company has also developed ruggedized enclosures for the NI

X310, N310, and X410 styles.

Pixus Technologies  
<https://pixustechnologies.com/>



# August 2022 COT'S PICKS

## **Aitech's New U-C850x Series of 3U VPX Cybersecurity-enabled SOSA Aligned SBCs Ideal for Applications Handling Large Amounts of Sensitive Data**

Three configurations use powerful Intel TigerLake SoC with integrated GPGPU processing to optimize SWaP-C and provide superior interconnectivity as well as design flexibility

Aitech Systems aerospace and space applications now offer the U-C8500, U-C8501, and U-C8502, three new 3U VPX cybersecurity-enabled single board computers (SBCs) aligned to The Open Group Sensor Open Systems Architecture™ (SOSA) Technical Standard.

Unique to the U-C850x Series SBCs is the single board combination of three main pillars of modern data processing acceleration: CPU, iGPU & FPGA. A high-performance CPU SoC featuring a strong internal GPU is combined with optional integrated large FPGA, enabling the new SBC series to be used in a wide range of rugged military and aerospace data-intensive applications, including artificial intelligence and machine learning (AI/ML), all while minimizing SWaP-C and without sacrificing performance.

The U-C850x Series fully supports AiSecure™, Aitech's innovative and proprietary cybersecurity framework that increases survivability and level of confidence by detecting and preventing unexpected attacks. The inherent security features enable both firmware and data protection as well as prevent reverse engineering and tampering with system integrity while allowing secure transmission and storage of sensitive data.

The U-C850x Series of rugged 3U VPX SBCs

features a multi-core Intel Architecture CPU processor, strong GPGPU artificial intelligence (AI) processing, and advanced cybersecurity protection. The high-performance Intel 11th generation TigerLake UP3 (TGL-UP3) SoC with 4 cores/8 threads and an innovative GPU with up to 96 Execution Units enables ground-breaking performance per Watt, with 12W, 15W & 28W TDP options. The boards also feature other advanced I/O options.

The series comes in three different configurations:

- U-C8500: 4x PCIe Gen3/4 Data Plane; XMC slot
- U-C8501: 4x PCIe Gen3 Data Plane; 4xPCIe Gen4 Expansion Plane; XMC slot
- U-C8502: 4x PCIe Gen3 Data Plane; 4xPCIe Gen4 Expansion Plane; integrated Xilinx MPSoC FPGA

Alex Trigoub, Director, Board Level Product Line for Aitech, commented, "The U-C850x Series provides an improved performance-to-cost ratio as well as better performance-per-Watt than existing Intel SBCs. The boards are also aligned with the SOSA Technical Standard, allowing for much faster, easier integration and upgrades, while im-

proving time-to-market and lowering risk. Having advanced Intel application performance and strong video, AI, and ML processing capabilities, as well as a large integrated FPGA on a 3U VPX SBC, without wasting additional SWaP-C on separate GPGPU and FPGA boards, is an impressive combination, one that today's military systems are demanding."

Highly integrated functionality and excellent SWaP-C make the new U-C850x series ideal for several harsh military and aerospace applications that need to reliably process significant amounts of data. These include unmanned aerial vehicles and unmanned ground vehicles (UAV/UGV), mission computers, digital signal and image processing as well as signal intelligence (SIGINT) and electronic warfare (EW).

The boards feature support for up to 64GB LPDDR4X RAM to provide higher performance for graphics and AI/ML applications using the integrated GPGPU as well as PCIe Gen4 support for optimized interconnect to other boards in the system.

Aitech System  
<https://aitechsystems.com/>



## **Avery Announces 800G Ethernet VIP virtual network co-simulation platform, enabling SoC pre-silicon validation in real networked application environments**

Avery Design Systems announced that its fully-tested Verification IP (VIP) for 800Gbps Ethernet can now be used to perform virtual network co-simulation for the full layer Ethernet 2-7 network stack. The combination of the VIP and a virtual co-simulation/co-emulation system enables the running of full hardware/

software system verification on pre-silicon SoC RTL and software integrations. System designers can now perform system-level validation of an SoC design's Ethernet and TCP/IP network interfaces using real network traffic workloads of communication, data center, and storage network protocols running on either host OS or virtual machine (guest OS) platforms.

The virtual network co-simulation solution is the latest extension of Avery's virtual platform co-simulation/co-emulation strategy for next-generation pre-silicon validation of interfaces in system-level environments. With

its approach, virtual platform co-simulation virtualizes host or embedded devices such as PCIe, CXL, AMBA, and now Ethernet interfaces, so verification can be performed under actual operational conditions, including verification of software integration.

This comes on the heels of other news from Avery Design Systems including support for CXL 3.0 and that its NVMe, PCIe, and AXI VIP have been adopted by TenaFe for new solid-state storage controllers.

Avery Design Systems Inc.  
[www.avery-design.com](http://www.avery-design.com)

# August 2022 COT'S PICKS

## Modular high-end Micro-ATX carrier for more sustainable and ultra-scalable COM-HPC-based system designs

congatec enters the high-end industrial workstation and desktop client market by introducing its first modular Micro-ATX compliant carrier board with a COM-HPC interface. The board is designed for embedded long-term availability of at least seven years, which eliminates the design risks, revision requirements, and supply chain uncertainties of standard or semi-industrial-grade motherboards that are usually only deliverable for three to five years. As it is processor socket and vendor-independent, the board can be equipped with any high-end Computer-on-Module available in COM-HPC Client Size A, B, or C, making OEM designs even more flexible and sustainable. Impressive scalability across the entire range of 12th Generation Intel Core processor-based COM-HPC modules, which congatec offers in 14 different high-end performance flavors, is just the start of possibilities. Performance options for the new conga-HPC/uATX carrier board range from the conga-HPC/cALS COM-HPC Client Size C modules, offering the currently highest embedded client performance with a 16-core Intel Core i9 processor, to the masters of price/performance optimization – the conga-HPC/cALP COM-HPC Client Size A modules with Intel Celeron 7305E processor.

The combination of application-ready industrial-grade COMs & carrier boards with tailored cooling solutions and comprehensive BSPs

for all leading RTOSes and the real-time hypervisor from Real-Time Systems is perfect for the fastest time-to-market, produces the lowest non-recurring engineering costs, enables customers to react very quickly to changing market requirements and reduces the effort to scale the performance of Micro-ATX based systems to a minimum. It allows customers to create a full product portfolio based on one single carrier concept.

Future upgrade and update options of Micro-ATX-based platforms are design-inherent, which delivers maximum performance flexibility, system design security, and sustainable long-term availability for application-specifically customized carrier board and system designs. In times of supply chain uncertainties, the option to pick any available COM-HPC module is a particular advantage. OEMs benefit from not being tied to one specific BGA or LGA processor from a single silicon or Computer-on-Modules vendor, which reduces the supply shortage risk significantly. At the same time, the mechanics and application-specific peripherals can stay as they are without needing any hardware changes.

“The new industrial-grade COM-HPC carrier board in Micro-ATX form factor ports all benefits of Computer-on-Modules to the high-end industrial and semi-industrial motherboard market. It will progress conventional motherboard-based system designs, which are tailored to a certain processor generation, too far more flexibly and sustainably scalable motherboard layouts that utilize Computer-on-Modules. Industrial applications need longer life cycles than three to five years to reduce the NRE costs and to maximize the return on investment of dedicated systems. Being able to switch the processor performance to any future option without the need to rebuild the entire system is thus a huge advantage for many industries,” explains Martin Danzer, Director of Product Management at congatec.

The new conga-HPC/uATX carrier board for COM-HPC Computer-on-Modules in Micro-ATX form factor enables engineers to instantly prototype the next generation of their high-performance embedded and edge computing systems for the fastest time to market.

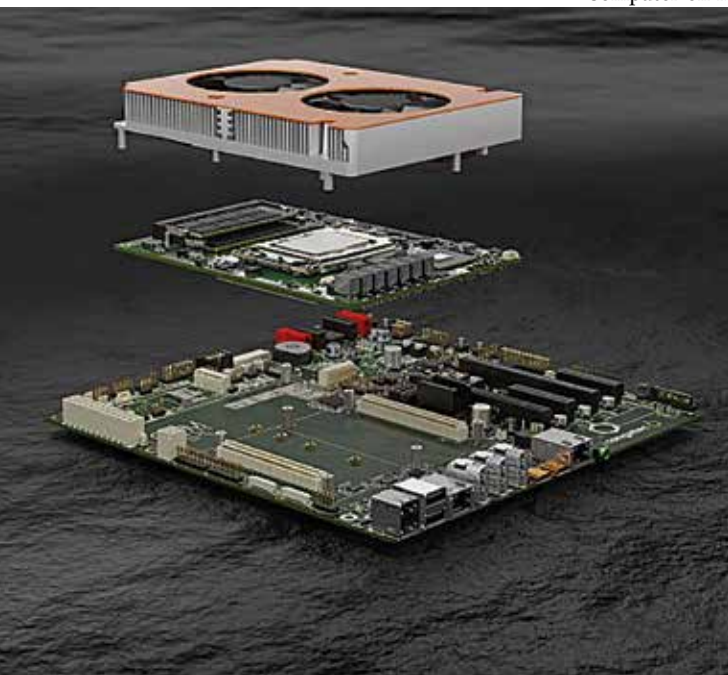
Application areas of Micro-ATX system designs are system solutions that support multiple displays and can be found in various markets. Typical applications range from industrial and medical HMIs, real-time edge controllers, industrial PCs, and control room systems to infotainment and digital signage applications up to professional casino gaming systems.

The carrier board offers the latest interface enhancements such as PCIe Gen4 and USB 4 and is a perfect fit for system designs with congatec's latest high-end COM-HPC Client modules based on the 12th generation Intel Core i9/7/5/3 desktop processors (formerly code-named Alder Lake-S). Most impressive is the fact that engineers can now leverage Intel's innovative performance hybrid architecture. An offering of up to 16 cores/24 threads, 12th Gen Intel Core processors provide a quantum leap in multitasking and scalability levels.

Next-gen IoT and edge applications benefit from up to 8 optimized Performance-cores (P-cores) plus up to 8 low-power Efficient-cores (E-cores) and DDR5 memory support to accelerate multithreaded applications and execute background tasks more efficiently. Optimized for the highest embedded client performance, the graphics of the LGA processor-based modules deliver now up to 94% faster performance and its image classification inference performance has nearly tripled with up to 181% higher throughput. In addition, the modules offer massive bandwidth to connect discrete GPUs for maximum graphics and GPGPU-based AI performance.

Besides the highest bandwidth and performance, the new flagship COM-HPC Client modules impress with dedicated AI engines supporting Windows ML, Intel Distribution of OpenVINO toolkit, and Chrome Cross ML. The different AI workloads can seamlessly be delegated to the P-cores, E-cores, as well as GPU execution units, to process even the most intensive edge AI workloads. The built-in Intel Deep Learning boost technology leverages different cores via Vector Neural Network Instructions (VNNI), and the integrated graphics support AI accelerated DP4a GPU instructions that can even be scaled to dedicated GPUs. Furthermore, Intel's lowest power built-in AI accelerator, the Intel Gaussian & Neural Accelerator 3.0 (Intel GNA 3.0), enables dynamic noise suppression and speech recognition and can even run while the processor is in low power states for wake-up voice commands.

congatec  
[www.congatec.com](http://www.congatec.com)



# August 2022 COT'S PICKS

## Anritsu Launches World's First Single Sweep VNA-Spectrum Analyzer Solution Supporting 70 kHz to 220 GHz

Anritsu Company enhances its VectorStar™ vector network analyzer (VNA) family with comprehensive spectrum analysis capability to create the world's first single sweep VNA-spectrum analyzer solution that supports 70 kHz to 220 GHz. With the spectrum analyzer option installed, VectorStar can conduct single connection VNA and spectrum-based measurements to create a more efficient and accurate testing environment to verify active and passive devices during the design, troubleshooting, or characterization stages.

The spectrum analyzer option is compatible with all baseband VectorStar models – broadband and banded system configurations. Integrating VNA/spectrum analyzer capability provides engineers with an innovative method to quickly transfer a challenging VNA measurement to the spectrum analyzer – without changing the test setup or using multiple instruments. It is particularly beneficial for applications involving mixers and

amplifiers, including those with multiple outputs or input-output comparisons.

Simultaneous, sequential S-parameter and spectrum analysis are possible with the VNA-spectrum analyzer instrument. Spectral-domain measurements of harmonics, spurious, other distortion products, and general frequency content can be made effectively with the single-instrument solution. It allows engineers to analyze the VNA-like and spectrum-analyzer-like response of a device under test (DUT).

The VNA-spectrum analyzer solution is ideal for on-wafer measurements, as it leverages VectorStar's inherent advantages of making a direct connection to an on-wafer device. Mounting and demounting of on-wafer devices, which can cause major errors in measurement, are eliminated with the solution. Power calibration can be conducted at the probe tip for greater accuracy and repeatability.



Engineers can also use the VNA source as a stimulus and any port as a receiver for scalar measurements. Using the multiple test ports on the VNA delivers multi-channel spectrum analysis that is synchronized with the internal swept signal generators. Spectrum analysis for broadband and banded is also available with Anritsu or other millimeters (mmWave) modules.

Two configurations are available in the spectrum analyzer option. The standard VNA mode supports point-based spectrum analysis for faster measurements, making it well suited for known signal analysis. For unknown signal analysis, the solution can be configured with a traditional sweep-based spectrum analyzer.

Anritsu  
[www.anritsu.com](http://www.anritsu.com)

## Abaco Announces New Rugged COTS Secure Router Featuring Juniper Networks® Junos® vSRX Virtual Firewall

AMETEK Abaco Systems introduced the VSR8000, a fully rugged secure router featuring Juniper Networks® Junos® vSRX Virtual Firewall. This provides a commercial off-the-shelf (COTS) line replaceable unit (LRU) version of the recently launched 3U VPX VSR347D. This fully ruggedized secure router is a clear indicator of Abaco's commitment to offering a full networking solution. The VSR8000 utilizes vSRX from Juniper Network in a fully rugged and SWaP optimized package to offer the only fully rugged solution on the market.

Abaco has taken its proven SBC347D single board computer (SBC), added an efficient, high-performance software environment, and integrated it into a fully rugged package that meets a wide range of MIL-STD qualifications including MIL-STD-810H for rain, sand, and salt fog. The VSR8000 combines Abaco's knowledge and expertise with SBCs, networking, and rugged LRU systems into a market-leading rugged secure router. Designed to ease the transition from the RTR8GE, the VSR8000 saves on both time and cost for customers.



Acting as a drop-in replacement for the RTR8GE, this router's combination of updated software, identical interfaces, and mechanical mounting points provides flexibility by offering the right options for legacy architectures. The software architecture provides a plan to overcome obsolescence and provides for the next generation of SBCs and other form factors using an x86 architecture processor.

With eight ports of 1000BASE-T, users can connect to multiple networks and devices while maintaining a high level of security for each one. The VSR8000 acts as an essential gateway between

the outside world and local networks to keep intruders out and data secured. It is ideal for both new and existing users looking for a secure router system. With high levels of environmental qualifications, it meets extreme demands presented by altitude, decompression, overpressure, sand, salt fog, rain, shock, and vibration. This secure router can be utilized on a wide range of applications, including edge of network security; command and control; electronic warfare; radar; surveillance; situational.

Abaco Systems Inc.  
[www.abaco.com](http://www.abaco.com)

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