

**FPGA**

DEVELOPMENT ACCELERATOR

Jumpstart development in **automotive and ground vehicle** projects.



TECHNOLOGY ENGINEERING

SO YOU CAN FOCUS

The complexities of configuring an FPGA shouldn't stand in the way of launching your new products and changing lives around the world.

DornerWorks engineers were some of the first to work with the Xilinx RFSoc, and have collaborated with Xilinx and others on its earliest applications and development tools.

We can help you:

- Quickly get your applications up and running on a working prototype
- Identify the FPGA capabilities that support your design goals
- Refine your FPGA configuration to accelerate your algorithms
- Grow your business



FPGA CASE STUDIES

GROUND VEHICLES

Advanced RF systems enabled through miniaturization

Enemies and friendlies in sight with 360-degree awareness

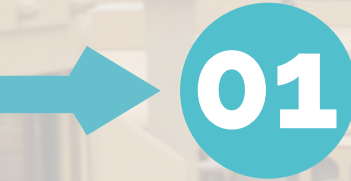
Threat detection sensors connected by AVB networking

Radar algorithm identifies moving targets with concealed explosives

Multi-sensor system platform fuses mission-critical data in real-time

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01

SYNCHRONOUS NETWORKING



WHEN YOU NEED IT

- When you need low latency and high throughput.
- When you need to support diverse traffic inputs over a common network.



WHY YOU NEED IT

IEEE standards-based networking enables high-accuracy time synchronization “behind the scenes,” freeing you to focus on your product design.

REAL-TIME REAL PRECISE

Add time-synchronization and high-speed networking capabilities to legacy devices for everything from vehicle fleets to medical systems, or build a generation of new networked products from the ground up.



Rigorous Standards

- IEEE 802.3 - 1 Gbps full-duplex
- IEEE 802.1AS-REV slave profile
- IEEE 802.1Q-2014 - FQTTSS strict priority or credit-based scheduler for up to 8 QoS



High Accuracy

- Synchronizes to a grandmaster with +/- 8-ns accuracy (double hop)
- Rapid time convergence



Versatile Interfaces

- Xilinx AMBA/AXI4 Lite and Stream interfaces
- MDIO and RGMII or SGMII interfaces to PHY



02 HIGH-SPEED VIDEO PLATFORMS



WHEN YOU NEED IT

When you need a real-time, low-latency video system, but don't have the time or expertise to build it on your own.



WHY YOU NEED IT

Real-time video platforms can enable applications in machine learning and AI, autonomous vehicles, and even distributed medical environments.

STATE-OF-THE-ART PLATFORMS

Frustration-Free Development

Like developers in automotive, aerospace, defense, and rugged industrial markets, you could be using hardware-acceleration and FPGAs to create robust video solutions.

Without them, you're just taking pictures



Multi-Camera Stream Fusion For ADAS

- A pair of Xilinx Zynq UltraScale+ devices was used to process up to seven 12MP 12-bit video streams, and up to three 1MP 8-bit video streams simultaneously.
- All video streams ran at 30 fps and was received via MIPI CSI-2 and parallel interfaces.
- The video was filtered, color corrected, color space converted, and multiplexed over a PCIe 3.0 x8 link to the system for additional video processing.
- The un-processed video was sent via a PCIe 3.0 x4 link to the system for logging.



**Front-End
Filtering**



**Robust
Processing**



**I/O
Versatility**



**System
Design**



03

CUSTOM IP BLOCKS



WHEN YOU NEED IT

- When you don't have the time or experience to develop your own IP.
- When you need to mitigate obsolescence on existing systems.
- When you need to enhance your system by meeting specific standards or requirements.



WHY YOU NEED IT

Custom IP can help you kickstart development on applications for any market, saving you the time and engineering hours involved in developing it alone.

POWERFUL IP TO PUT YOU AHEAD OF THE CURVE



**Accelerate
Schedule**



**Reduce
Product Risk**



**Defeat
Obsolescence**

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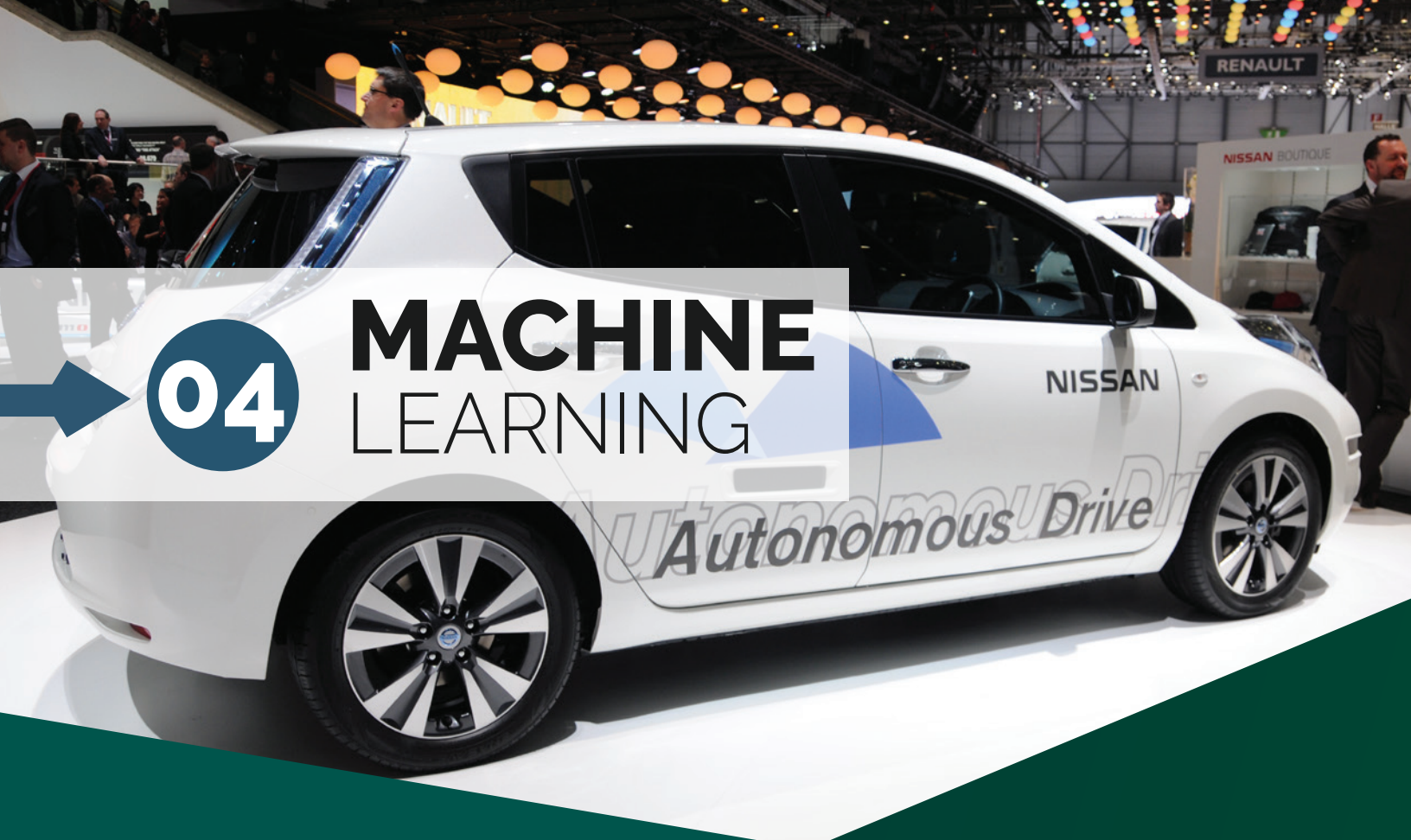
Maintain Momentum with a Custom IP Microprocessor Core

A customer came to DornerWorks looking to replace their obsolete and now-unavailable Intel microprocessor with a VHDL based soft core IP equivalent.

Porting (re-writing) the existing software to a new processor was cost and schedule prohibitive, but a soft core aligned with short term goals of providing needed updates to existing products.

DornerWorks implemented a modern FPGA to host the replacement soft core processor and replace the existing support logic the processor used.

The result was a “plug-and-play” solution that helped the customer maintain momentum on a mature platform.



04

MACHINE LEARNING



WHEN YOU NEED IT

When you want to trigger different processes in your system based on patterns in incoming data, with as little footprint as possible.



WHY YOU NEED IT

Autonomous solutions reduce long-term costs, optimize response time, and provide a seamless experience for users in ADAS applications, object detection, and more.



SMARTER, FASTER, BETTER **HARDWARE ACCELERATED MACHINE LEARNING**

FPGA parallelization can accelerate neural network computations for machine learning platforms, and help companies build next-gen autonomous machines.

The problem is, FPGA development with neural networks can be extremely complex.

But that doesn't have to slow you down.

Shorten your time to market and leave your competition behind with FPGA engineering services for **Machine Learning** from DornerWorks.



Development & Acceleration



Niche Products



Wide Platform Expertise

- Microblaze
- Picoblaze
- ARM Cortex-A9/A53
- Xilinx
- Microchip
- NXP



05

DIGITAL SIGNAL PROCESSING



WHEN YOU NEED IT

When you have various forms of data streaming in, and want to be sure it gets translated and filtered before going stale.



WHY YOU NEED IT

Next-gen communication systems rely on complex digital signal processing (DSP) systems that transform and filter signals so other applications can respond.

MULTIPLY THE VALUE OF YOUR DATA STREAMS



Advanced RF Systems RFSoc Engineering

A defense contractor wanted to miniaturize the SWaP-C and improve response time of their advanced radar systems that detected and mitigated oncoming airborne threats.

The design DornerWorks delivered was based on one of the first three Xilinx Zynq UltraScale+ RFSoc boards ever available.

The RFSoc system helped the client receive and process data almost instantaneously.



Signal Translation

- Transformation
- Filtering
- Windowing
- Radar Signal Processing



System Miniaturization

- Reduce the size, weight, and power (SWaP) of your advanced radar systems
- Direct signal conversion with RFSoc technology



Speed & Timing

Interface with different devices knowing your data will be processed and fused as needed, when needed.



TURNKEY SOLUTIONS TO ACCELERATE DEVELOPMENT



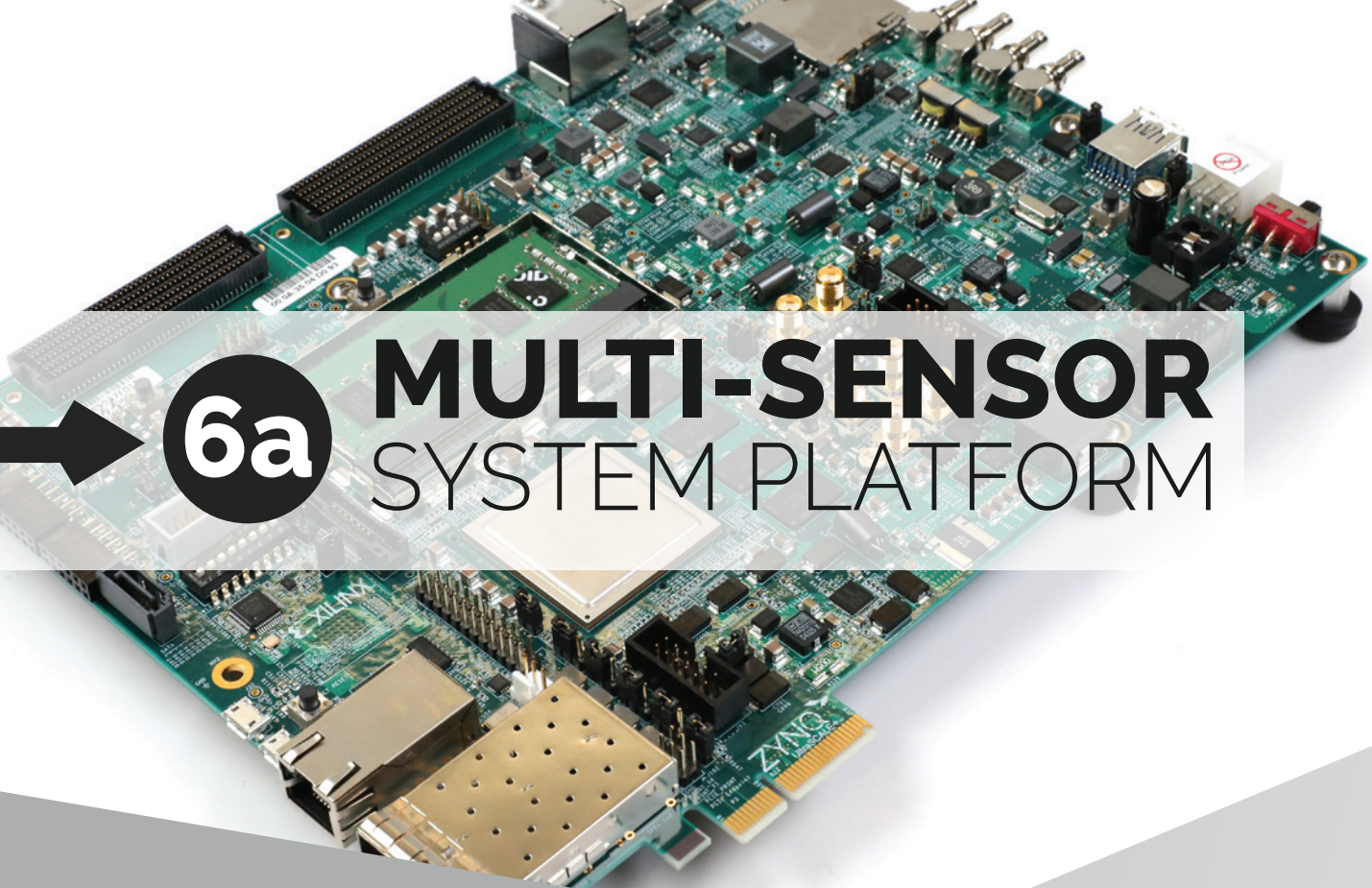
Multi-Sensor System Platform

Software-controllable FPGA-based networked video systems streaming through a Xilinx Zynq UltraScale+ MPSoC ZCU102 enabled by Xilinx IP.



Space-Qualified Multi-Layer Ethernet Switch

Whether for a nuclear submarine fathoms deep or a space station miles above, DornerWorks multi-layer Ethernet switch keeps devices connected to safety-critical communication standards in nearly any environment imaginable.



6a

MULTI-SENSOR SYSTEM PLATFORM



WHEN YOU NEED IT

When you have a distributed sensor system and need to mix and transform the data from those sensors and stream it to a single display at minimal SWaP.



WHY YOU NEED IT

This time-synchronous platform accelerates designs for video conferencing, surveillance, Advanced Driver Assisted Systems (ADAS), streaming and encoding applications, and more.

FUSE DISTRIBUTED SENSOR INPUTS INTO **DECISION-INFORMING, REAL-TIME OUTPUTS**

The Xilinx Zynq UltraScale+ MPSoC ZCU102 accelerates designs for video conferencing, surveillance, Advanced Driver Assisted Systems (ADAS), and streaming and encoding applications.

With a time-synchronous video streaming solution, you can lead the market by delivering the real-time results your customers deserve.



**Multi-stream capable
DisplayPort input**



**Software defined
video overlay**



**Alpha-blended
mixing**

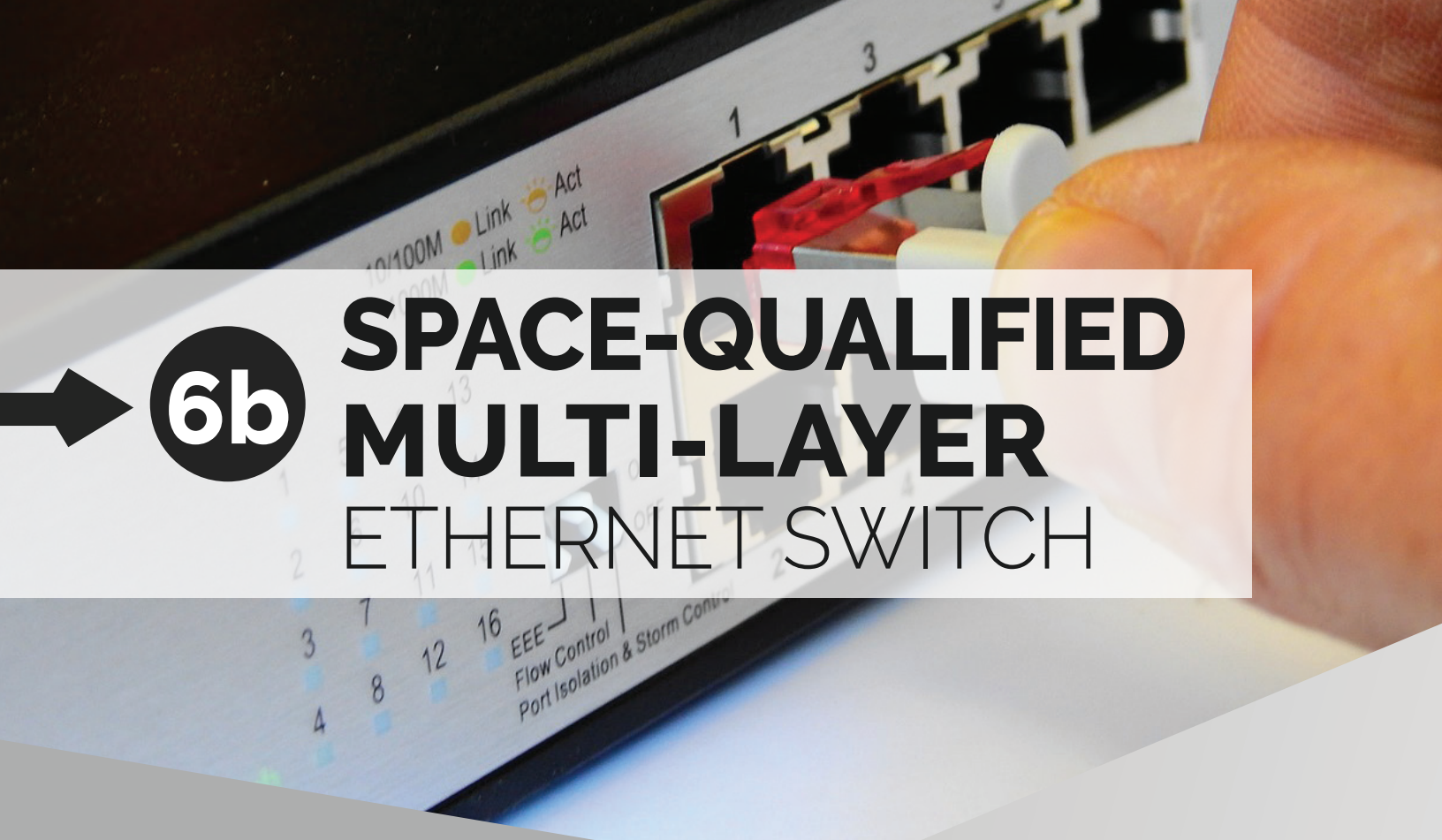


**Mixed video
output**



**Mixed video
encoding**



**6b**

SPACE-QUALIFIED MULTI-LAYER ETHERNET SWITCH



WHEN YOU NEED IT

- When you need a networking solution for safety-critical applications, and don't have the time or expertise to develop the platform on your own.
- When you need a networking solution that stands up to radioactivity and the harsh environments of space.



WHY YOU NEED IT

- Based on radiation-hardened technology, so it can be used in any environment.
- Compatible with many commercial devices, so it fits seamlessly into users' lives.
- Based on RISC-V technology, so it can overcome obsolescence.

FOR LOW POWER FOR HARSH ENVIRONMENTS FOR ANY PLATFORM

If you need a networking solution for safety-critical applications, COTS devices could put stress on your system and leave you open to hardware vulnerabilities.

DornerWorks can help your business develop a customized networking solution for land, sea, air, or space, made portable with RISC-V architecture.



Safety-Critical Certification Artifacts

- NASA Standards
- ISO 9001 and AS9100
- ISO 13485

Minimal Footprint for Limited Resources

- Just 10% of the wattage of most COTS options
- IP routing handled in hardware logic
- RISC-V softcore is portable to any platform

Multi-Layer Enhanced Capability

- Limited IP routing
- VLAN tagging



TECHNOLOGY ENGINEERING

SO YOU CAN FOCUS



We can help you accelerate product development at any stage in your timeline.

Get started with an **FPGA Service Package** that will help you overcome development challenges and grow your business. Contact DornerWorks today!

DornerWorks.com