ENCLUSTRA
FPGA SOLUTIONS

CASE STUDY

Revolutionizing Veterinary FPGA-based Ultrasound with Enclustra's Solution

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Introducing Future-Proof FPGA Solutions

In today's rapidly evolving landscape of veterinary medicine, professionals are increasingly reliant on advanced diagnostic tools that deliver high performance, low latency, and flexibility. The demand for real-time data processing and precise diagnostics—particularly in veterinary ultrasound—has created a need for cutting-edge technology that can adapt to a wide variety of use cases.

From diagnosing livestock on farms to providing high-resolution imaging in small clinics, veterinarians require portable, reliable, and efficient devices capable of performing in challenging environments. Enclustra, a global leader in FPGA (Field-Programmable Gate Array) System-on-Module (SoM) technology, is meeting this demand with its innovative Mercury+ MP1 SoC Module, powered by Microchip's PolarFire® FPGA technology.

This compact, energy-efficient module provides the foundation for developing high-performance veterinary ultrasound devices. By combining unmatched processing capabilities with a robust, adaptable design, the Mercury+ MP1 is transforming how veterinarians diagnose and treat animals, enabling better care across diverse applications.

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The Challenge: Addressing Complex Veterinary Diagnostic Needs

Veterinary professionals face unique challenges when diagnosing animals of various sizes and species, ranging from small household pets to large livestock. Ultrasound technology must provide quick, reliable diagnostic information in real-time, often in unpredictable environments such as barns, farms, or remote clinics.

To meet the demands of modern veterinary care, devices must deliver:

Portability for Field Use: Equipment must operate effectively in diverse environments where durability and ease of transport are critical.

Real-Time, High-Quality Imaging: Clear, real-time imaging is essential for faster diagnosis of complex conditions, rivaling hospital-grade systems.

Extended Battery Life: Devices need to consume minimal power to ensure uninterrupted operation in remote areas.

The Challenge: Addressing Complex Veterinary Diagnostic Needs

Durability in Harsh Conditions: Systems must resist dust, dirt, and moisture to maintain functionality during fieldwork.

Cost-Effectiveness: Advanced diagnostic tools must be accessible to clinics, practices, and rural veterinarians, balancing performance with affordability.

Traditional ultrasound systems have struggled to meet these requirements. Many are bulky, expensive, or energy-intensive, limiting their utility in veterinary settings. These limitations highlight the need for a more flexible, high-performance solution that addresses portability, efficiency, and durability without compromising image quality.

Enclustra's FPGA SoM Solutions Change Animal Care

Recognizing these challenges, Enclustra introduced the Enclustra Mercury+ MP1 Microchip® PolarFire® SoC MPSoC Module, a game-changing technology specifically designed to meet the needs of healthcare industries like veterinary diagnostics. The Enclustra Mercury+ MP1 Microchip® PolarFire® System-on-Module part of Enclustra's suite of FPGA SoM solutions, integrates both FPGA technology and RISC-V® 64-bit processors, delivering powerful computational capabilities with real-time, low-latency performance.

"Operates on half the power of traditional systems"

1. Low Latency Data Processing

Technical Feature	Practical Benefit	Why It Matters
The Enclustra Mercury+ MP1 SoM based ultrasound system can **provide instantaneous data feedback**, ensuring results are delivered with minimal delays.	This enables **precise and timely treatment decisions**, improving diagnostic accuracy and efficiency in medical settings.	**Quick and reliable diagnostics are essential for veterinarians** to assess and treat animals effectively, ensuring better health outcomes and reducing patient stress.

2. Compact Form Factor for Portability

Technical Feature	Practical Benefit	Why It Matters
Dimensions of just 74 × 54 mm make the Mercury+ MP1 **one of the smallest FPGA SoC (system-on-chip) modules available.**	Enables the development of **lightweight, portable** ultrasound devices **suitable for field use.**	Veterinarians can perform **on-site diagnostics without transporting animals, reducing stress and saving time.**

The Solution:
Mercury+ MP1 SoC Module

3. Energy Efficiency for Extended Use

Technical Feature	Practical Benefit	Why It Matters
In low-power applications, **it operates on half the power of traditional systems**, enabling passive cooling solutions and, in many cases, eliminating the need for active fans.	Extended battery life supports **hours of uninterrupted operation, even in remote locations.**	Reliable performance in the field ensures **veterinarians can focus on diagnosing and treating animals without equipment downtime**.

4. Long-Term Reliability

Technical Feature	Practical Benefit	Why It Matters
Offers a 20+ year lifecycle, surpassing competitors' typical 15–16 years.	**Reduced need for replacements** and recertifications, **lowering long-term costs.**	Clinics and veterinary tech companies can **confidently invest in devices built to last.**

"hours of uninterrupted operation, even in remote locations"

5. Scalable Design with High I/O Bandwidth

Technical Feature	Practical Benefit	Why It Matters
Supports up to 19.2 GByte/sec memory bandwidth and PCIe Gen2 x4 for **high-speed data transfer.**	The module's modular design **allows for easy upgrades and scalability**, as well as integration of additional updates or functionalities as diagnostic needs grow.	With this, veterinary ultrasound devices can **adapt to future technological advancements** without requiring a full system overhaul.

Meeting the Needs: Animal Healthcare Applications

Livestock Diagnostics

Use Case: Diagnose cattle, sheep, and pigs on-site, reducing transport stress and enabling immediate treatment.

Example: A veterinarian uses a portable ultrasound device to identify a serious condition in a livestock, providing life-saving care on the farm.

Reproductive Health and Breeding

Use Case: High-resolution imaging supports precise assessments of reproductive health.

Example: Breeders monitor fetal development in dogs, horses, or livestock, ensuring optimal breeding outcomes.

Emergency Field Care

Use Case: Portable devices deliver critical diagnostics in urgent situations.

Example: During a foaling emergency, a veterinarian uses a portable ultrasound to assess the position of the foal and guide the delivery process.

Small Clinics

Use Case: Affordable, advanced diagnostics bring high-quality imaging to rural practices.

Example: A small clinic expands its services by offering ultrasound imaging for pets, increasing client trust and satisfaction.

Enclustra's Role: Accelerating Innovation

Enclustra's comprehensive Engineering Design Services simplify the integration of Mercury+ MP1 solution into veterinary diagnostic tools, enabling faster development, reduced risks, and accelerated deployment. With expertise in FPGA-based system development and a customer-first approach, Enclustra provides veterinary tech companies with the tools and guidance to create cutting-edge diagnostic devices tailored to their needs.

Key Advantages of Partnering with Enclustra

Expert Guidance

Enclustra's engineering team offers hands-on support throughout the entire development process, from hardware and firmware design to embedded software and prototype production. This ensures veterinary tech companies can navigate and overcome complex design challenges with confidence.

Cutting-Edge Expertise

Enclustra's close partnerships with industry leaders like Microchip enable access to the latest advancements in FPGA technology. This forward-thinking approach ensures customers benefit from the most innovative and efficient solutions available.

Custom Solutions

Every solution is tailored to meet the specific requirements of veterinary applications, ensuring that the resulting diagnostic devices align with the unique needs of veterinarians and their patients.

Pre-Manufactured Modules

By providing pre-validated modules like the Mercury+ MP1, Enclustra eliminates the need for hardware design from scratch, saving time and resources while ensuring reliability and performance.

Comprehensive Services

From consulting and tailored training to verification and troubleshooting, Enclustra supports every aspect of development. Their mastery of all major FPGA architectures ensures seamless integration and top-tier performance.

By partnering with Enclustra, veterinary tech companies gain access to a proven development partner committed to driving innovation, reducing time-to-market, mitigating risks, and delivering diagnostic tools that set new standards in animal healthcare.

Competitive Advantages

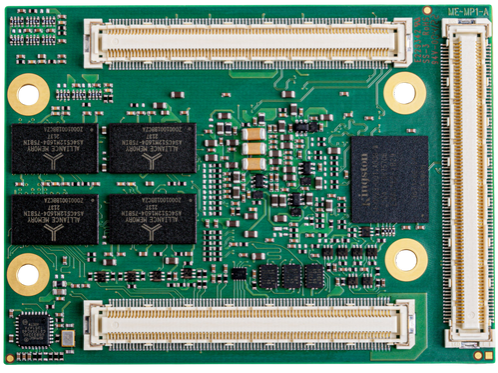
Devices built on the Mercury+ MP1 module can offer:

- Unmatched Portability: Lightweight and enclosed systems are easy to carry and resistant to environmental damage.

- Energy Efficiency: Lower power consumption extends battery life and reduces cooling requirements.

- Advanced Imaging: Deterministic processing delivers precise, real-time diagnostics.

- Long-Term Value: A lifespan exceeding 20 years lowers maintenance and replacement expenses, resulting in a higher return on investment.



Future Vision: Leading Veterinary Innovation

The Mercury+ MP1 module represents more than just a solution—it's a platform for continuous innovation. By enabling portable, high-performance diagnostic tools, Enclustra and Microchip are shaping the future of veterinary healthcare.

As demand grows for advanced, accessible diagnostic technology, the Mercury+ MP1 provides the foundation for devices that save animal, improve outcomes, and enhance the veterinarian experience.

Impact of Low-Latency Data Processing in Healthcare

The impact of Enclustra's FPGA SoM solutions extends far beyond a single veterinary practice. As the demand for advanced diagnostic tools in animal care continues to grow, the Enclustra Mercury+ MP1 Microchip® PolarFire® SoC MPSoC Module provides a reliable and scalable solution for the future of veterinary devices and beyond.

Whether it's diagnosing farm animals in remote locations or conducting medical check-ups in urban clinics, Enclustra's FPGA SoM based solution empowers healthcare professionals to deliver more accurate diagnoses and tailored treatments.

Conclusion: Empowering Veterinary Care

With the introduction of the Mercury+ MP1 SoC Module, powered by Microchip's PolarFire® FPGA technology, there is a new standard for high-performance, low-latency data processing in animal healthcare. Whether used in a field setting, a clinic, or a breeding program, this technology empowers veterinarians to deliver better care, faster. By offering scalable and future-proof FPGA SoM Solutions, it is not only addressing the needs of today's healthcare industry but is also paving the way for future advancements. Veterinary tech companies looking to create the next generation of diagnostic tools can trust Enclustra and Microchip to provide the expertise and technology to make their vision a reality.

Be Great. Em-bed With Us. Explore how Enclustra's FPGA SoM solutions can revolutionize your veterinary diagnostic tools at Enclustra.com.

Offer your customers the technological upper hand by partnering with Enclustra

Let your customers tap into the benefits of FPGA technology by outsourcing FPGA development to a trusted partner. Learn more about Enclustra at www.enclustra.com, download our catalog to explore our vast product portfolio, or reach out to discuss your FPGA design project via our design service enquiry form. Be the first to gain hands-on experience with new products by signing up to our early access program.

Design Service Enquiry Form

Mercury+ MP1 Order Now!

About the Author

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Sarah Han is a Product Manager at Enclustra GmbH, overseeing the FPGA-based System-on-Module standard product portfolio. With a Master's degree in Electrical and Electronics Engineering and a decade of experience in product management, product marketing, project management, and business development, she aligns technical innovation with evolving industry needs. Her work emphasizes practical solutions, collaborative partnerships, and steady growth, strengthening Enclustra's relationships with its partners and customers.

About us

Enclustra is an innovative, dynamic, and growing company for FPGA design with headquarters in Zurich, Switzerland, with subsidiaries in Germany, France, USA, and China.

As a leader in FPGA design and development, Enclustra offers a product portfolio of FPGA-based electronic modules and FPGA-optimized IP solutions for industrial customers and R&D organizations. In parallel, Enclustra provides leading engineering services in FPGA system design, covering the entire spectrum of FPGA-based system development: from high-speed hardware or HDL firmware to embedded software, from system design, specification, and implementation to prototyping.

Leveraging our expertise in cutting-edge FPGA technology and diverse application knowledge, Enclustra delivers high-performance solutions across various industries, minimizing development effort and accelerating your time-to-market.

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