Xtensor Systems

Next Generation Autonomous Control
Xtensor Dynamic Artificial Intelligence (XDAI™)

Real-time autonomous control for distributed and edge devices using a hybrid of real-time Neural Networks, Inference Engines, and Evolutionary Computational Structures

Abstract

Xtensor Dynamic Artificial Intelligence (XDAI™) is a new Xtensor Systems technology designed to develop and integrate next-generation autonomous systems. XDAI™ enables real-time control of distributed edge devices, remote locations, and distributed equipment without the need for a centralized control system or cloud data sets. XDAI™ creates secure Autonomous applications that respond dynamically to changing local conditions. The system provides Autonomy by switching from one neural net or inference engine configuration to another in real-time.

What is Autonomous Control?

Autonomous control solutions include products, systems, and services that respond autonomously with specific actions without human interaction. In general, they are a combination of automation, control, sensing, and AI technologies. The technology adoption is still early-stage, with initial applications including military vehicles (land/sea/undersea/air) and commercial vertical solutions (automobile, robotics, and more). Autonomy promises to create better, faster, and cheaper commercial solutions.

What is Missing from Current Autonomous Solutions?

Before Autonomous solutions can takeoff commercially, several issues need resolution:

PROBLEM	ISSUE
AI Complexity	Limited industry expertise – complex AI SW/HW upgrades
Performance	Solutions require local real-time responses
Adds, Moves, Changes	Variability requires manual adjustments and reprogramming
Distributed Functionality	Complex integration when distributing functionality
Security	Data, communications, and cybersecurity vulnerabilities
Scalability	AI requires expertise to design and build integrated solutions
Time to Market	Long lead times until solutions are fully functional

What is Dynamic Artificial Intelligence "XDAI™"

Dynamic Artificial Intelligence™ (XDAI™) is Xtensor's patented autonomous control software that powers the next generation of secure, highly intelligent Edge devices, products, systems, and services. It is a complementary technology designed to integrate control solutions with management solutions more quickly. XDAI™ technology brings high-performance and high scalability to distributed applications without producing heavy network traffic. XDAI™ pre-optimizes system processes with minimal human intervention. XDAI™ can be reconfigured, updated, and upgraded remotely for servicing and support. XDAI™ proactively responds to problems and threats in 10 milliseconds. Complex Edge challenges can be resolved automatically in less than one second instead of hours or days using existing solutions.

Why XDAI™?

XDAI™ introduces new Autonomous capabilities into the changing control and management markets. XDAI™ is a flexible platform that can migrate existing solutions into the future. It can help transform existing products, systems, and services into leading-edge, fully Autonomous solutions.
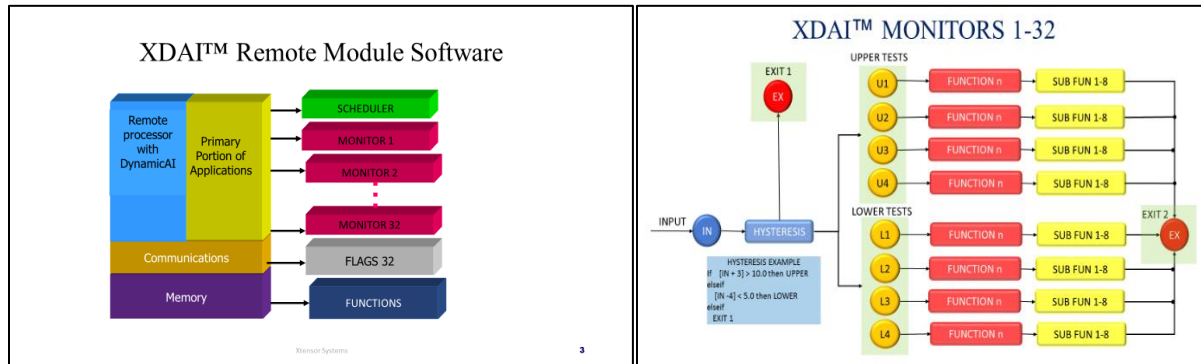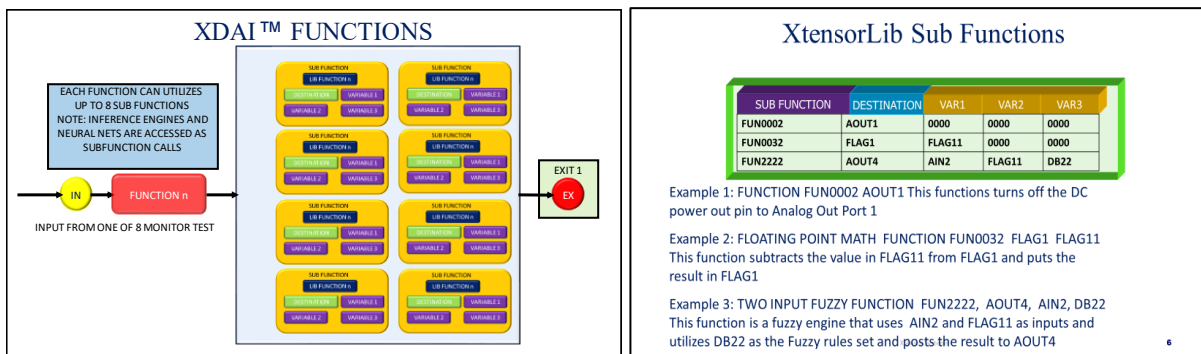
How XDAI™ Functions

Figure 1

Figure 2

Figure 3

Figure 4

The XDAI™ software modules in *Figure 1* provide a dynamic mechanism to monitor and interact with system hardware, including both local and remote parameters. Up to 32 monitors may be turned ON and OFF programmatically via the scheduler. Each monitor in *Figure 2* tests for hysteresis (8 tests) and selects one of the functions to call if the test is out of bounds. Each function in *Figure 3* contains up to 8 subfunctions. Each subfunction in *Figure 4* may call up to 8 defined function library procedures.

XDAI™ Features and Benefits

Next-generation Autonomous Control Software provides the following advantages:

FEATURE	BENEFIT
Ease of Use	Easy to design, develop, test, and integrate powerful solutions
High Performance	Real-time AI-enabled Autonomous control
Self-tuning System	Parameters self-adjust for faster response and problem resolution
Integrated Solution	Faster deployment, meet exact needs, maximize uptime

System-wide Security	Encryption provides secure operations and system management
Scalability	Cost-effective solution, fast setup, easy changes
Time to Market	Faster solutions, improved user satisfaction, fast payback

What makes XDAI™ New?

XDAI™ provides 24/7 autonomous solutions, including:

NEW CAPABILITY	NEW SOLUTION
Simple API	Better solutions delivered faster, reduced staffing requirements
Solution Flexibility	Proactive AI-enabled distributed control
Predictive Abilities	Proactive problem detection and resolution
End-to-end Security	Secure encrypted data and end-to-end communications
Scalable Solutions	Cost-effective, manageable global solutions
Cost-effectiveness	Cost-effective heterogeneous environment integration
Distributed Edge Solutions	Proactive edge devices and services
Easy Localization	User interface localized to local requirements

How can you use XDAI™?

For example, XDAI™ can help you develop and integrate the following types of Autonomous solutions:

- Upgrade existing process control solutions to proactive AI-enabled systems
- Integrate secure remote site management
- Implement complex automation to mimic human expertise
- Implement 24/7 global autonomous management solutions
- Integrate control closet equipment management into network management
- Integrate remote equipment management with control solutions
- Integrate physical security into network management
- Autonomous operations without network connections and in intermittent environments
- Integrate control solutions with management solutions
- Integrate heterogeneous equipment management with management solutions
- Integrate edge equipment management with management solutions
- Integrate edge solutions into network management solutions

Conclusion

XDAI™ introduces new Autonomous capabilities into the changing control markets. XDAI™ is a flexible platform that can help migrate existing solutions into the future. Xtensor Systems is looking for partners who want to realize a better future. To succeed, we want to work with you to solve big problems. We are looking for good long-term projects and technical input from industry leaders and visionaries who want to create next-gen Autonomous solutions sooner rather than later. We can help transform existing products, systems, and services into leading-edge, fully Autonomous solutions.

What does Xtensor offer?

Xtensor Systems provides an integrated development, simulation, testing, and deployment platform for next-gen fully autonomous solutions. Our customers include researchers developing Autonomous next-gen technologies, HW/SW developers developing fully Autonomous solutions, vendors trying to integrate Autonomy into their distributed infrastructure solutions, and vendors needing real-time dynamic process control.

Xtensor Systems Info

The principles at Xtensor have over 60 years of experience in architecting, designing, and developing non-classified and classified systems. Our experience includes:

- Systems hardware includes most Microchip and intel processors, Maxim OneWire®, Bit-Slice, SEL-32, DSP's, PGA's, State Machines, and custom designs.

- Systems software, network servers, printer hardware and software, network test equipment using (Tcl\Tk, C\C++, shell scripts, and LabView® for Windows and Unix), assembly language services, barcode printing algorithms, database development (MySQL, PostgreSQL, SQL, DBASE, COBOL), device drivers for over 25 versions of UNIX variants.

- Systems applications, multi-level encryptions in C\C++ & Tcl, multi-port process controllers, smart security systems, and many others.

- Military work includes tactical trainers (F-14, E-2 Hawkeye, Wild Weasel, Space Shuttle, and JA-37), including software and hardware development and maintenance.

- Business experience includes management, marketing, finance, professional services, product development, and business development. Industries include software, hardware, network management, local area network, wide area network, and services. Product expertise includes enhancing existing product lines and finding new market opportunities.

- Our partners include heavy technical experience in autonomous robotics, computer vision, aerial platform navigation, artificial intelligence, embedded systems, software development, and unmanned aircraft integration.

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