

noa arch1

Scalable FPGA Platform for
Real-Time R&D and Industrial Instrumentation



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Scalable FPGA Platform for Real-Time R&D and Industrial Validation

NOA Arch1 is a flexible FPGA-based real-time platform designed for advanced research laboratories and industrial R&D environments.

It combines deterministic FPGA execution, configurable high-speed analog instrumentation, and scalable networking to support both experimental prototyping and production-grade validation workflows.



FPGA Execution Core

AMD/Xilinx Zynq UltraScale+ MPSoC XCZU5EV
True hardware-level determinism
Sub-microsecond signal loop latency
Integrated ARM subsystem for supervisory tasks

NOA Arch1 provides direct FPGA-level control and full reconfigurability.



Configurable High-Speed Analog Interface

12 × 14-bit 100 MSPS analog channels
Organized in three independent 4-channel blocks
Fully configurable as:
- 12 analog outputs
- 12 analog inputs
- Mixed configuration (e.g., 8 outputs + 4 inputs)

Digital & Synchronization Infrastructure

52 configurable digital I/Os
Deterministic PWM generation
External controller synchronization
High-speed real-time signal exchange

Scalable Networking & Data Logging

Dual 10 Gbps SFP+ ports for distributed real-time systems
1 Gbps Ethernet for industrial integration
256 GB NVMe SSD for high-speed logging

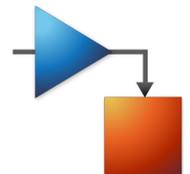
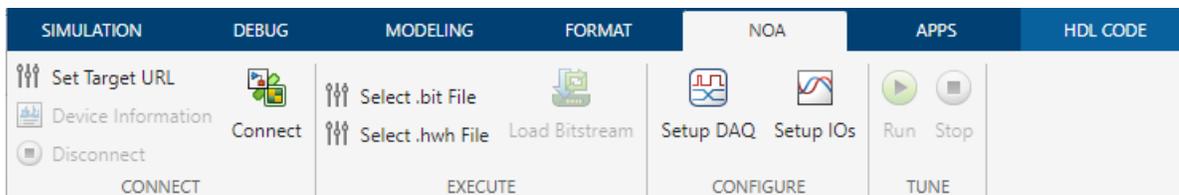
Integrated FPGA IP & Data Acquisition System

NOA Arch1 is delivered with FPGA IP cores and preconfigured software environment:
- High-speed analog interface drivers
- Deterministic data acquisition (DAQ) system
- Pre-installed and configured PYNQ image
- Python API for real-time interaction
- Ready for MATLAB integration (via NOA Toolbox)
- FPGA customization support (VHDL / Verilog)



noa Toolbox

From Simulink Model to Deterministic FPGA Execution



NOA Toolbox is the model-based deployment layer of the NOA platform.

It enables engineering teams to translate Simulink models into deterministic FPGA implementations on NOA Arch1 without low-level HDL development.

Designed for research laboratories and industrial R&D teams, NOA Toolbox bridges algorithm design and hardware level real-time execution.

Model-Based FPGA Deployment

- Seamless Simulink-to-bitstream workflow
- Integrated HDL Coder support
- Automated fixed-point conversion support
- Direct generation of FPGA-ready designs

Runtime Interaction & System Control

- Python-based runtime interaction via PYNQ
- MATLAB-based parameter tuning
- Real-time signal monitoring
- Hardware-level debugging support

Open and Extensible Architecture

- Direct access to FPGA fabric
- Compatible with custom VHDL/Verilog IP
- Modular IP integration
- Scalable to multi-node systems

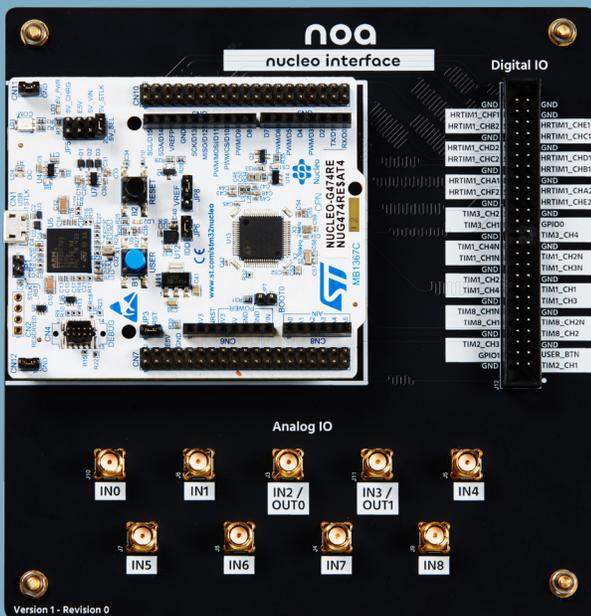
Engineering Impact

- Reduced FPGA development complexity
- Faster validation cycles
- Scalable from lab prototypes to industrial deployment
- Hardware-level performance without black-box constraints

noa nucleo



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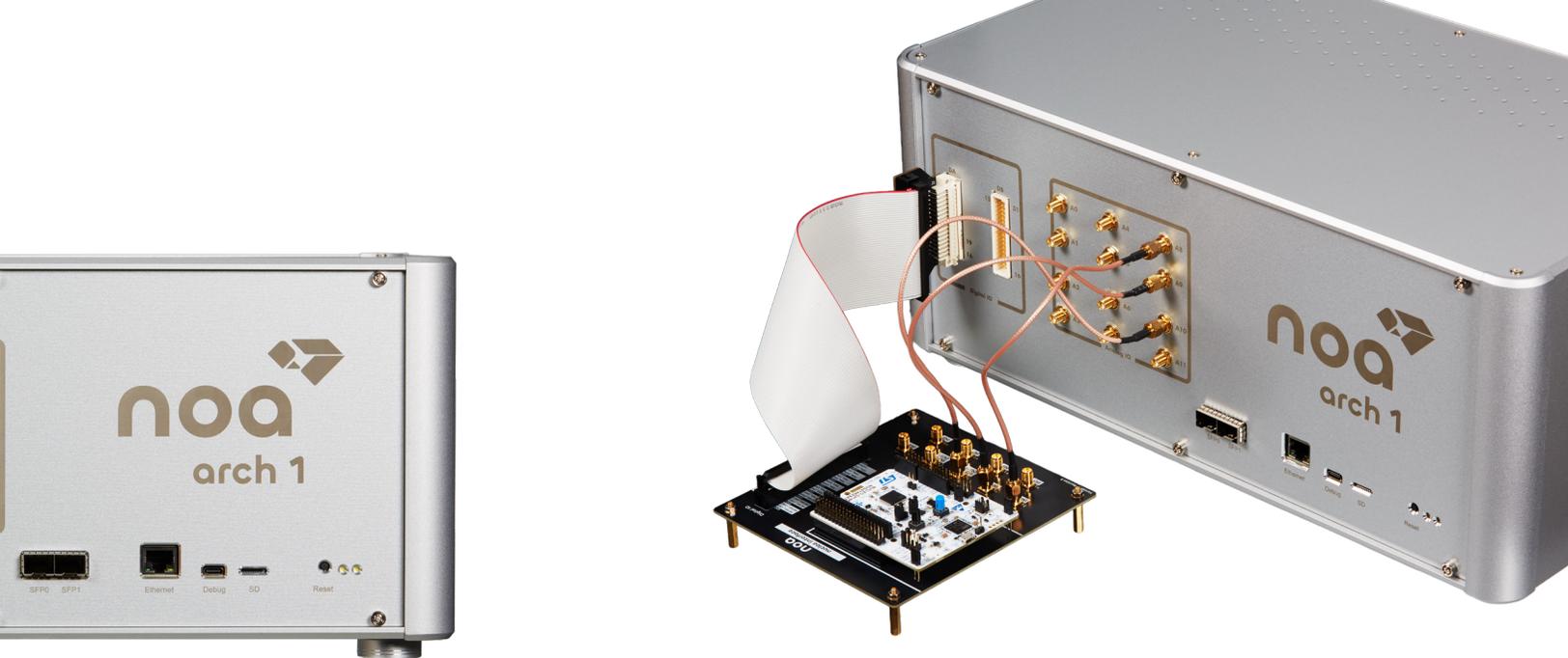


Integrated Hardware Package

- NOA interface board
- STMicroelectronics NUCLEO-G474RE development board
- NOA digital interface cable (flat ribbon connector)
- 4 SMA-to-SMA high-speed signal cables

Designed for

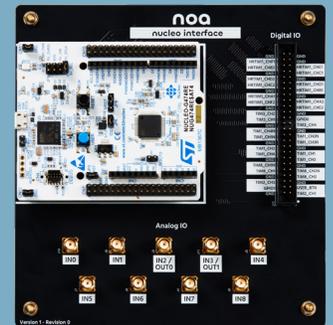
- Power electronics controller development
- Inverter and motor drive firmware validation
- Closed-loop embedded control testing
- Real-time fault injection and validation
- Rapid control prototyping



noa nucleo

Engineering Workflow

- Real-time plant model runs on NOA Arch1 (FPGA)
- Embedded firmware runs on ST NUCLEO-G474RE
- Analog and digital interface for signal exchange
- Analog and digital signals can be monitored and logged via NOA Arch1.



Digital Interface

- Direct digital signal exchange with NOA Arch1
- High-speed PWM signal synchronization
- Deterministic feedback loop coupling
- Real-time controller-to-plant interaction

Typical users

- Research laboratories developing advanced control algorithms
- Industrial R&D teams validating digital power controllers
- Universities teaching real-time embedded control validation
- OEM teams accelerating product development cycles

noa launchpad



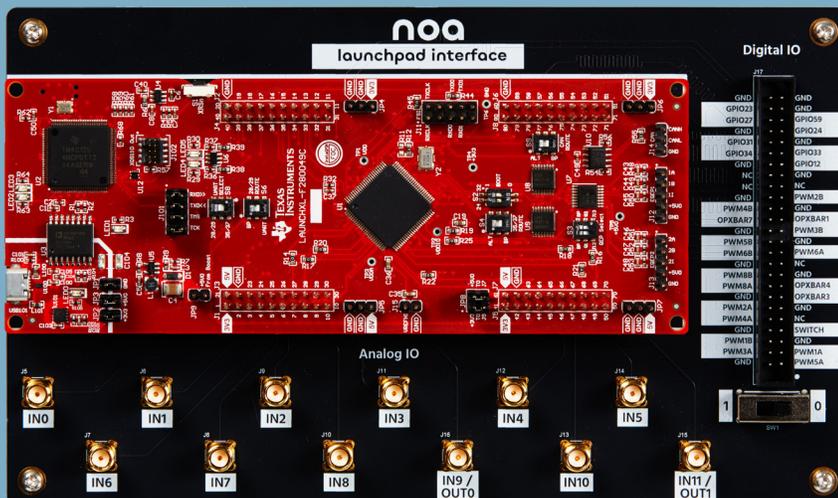
noa launchpad

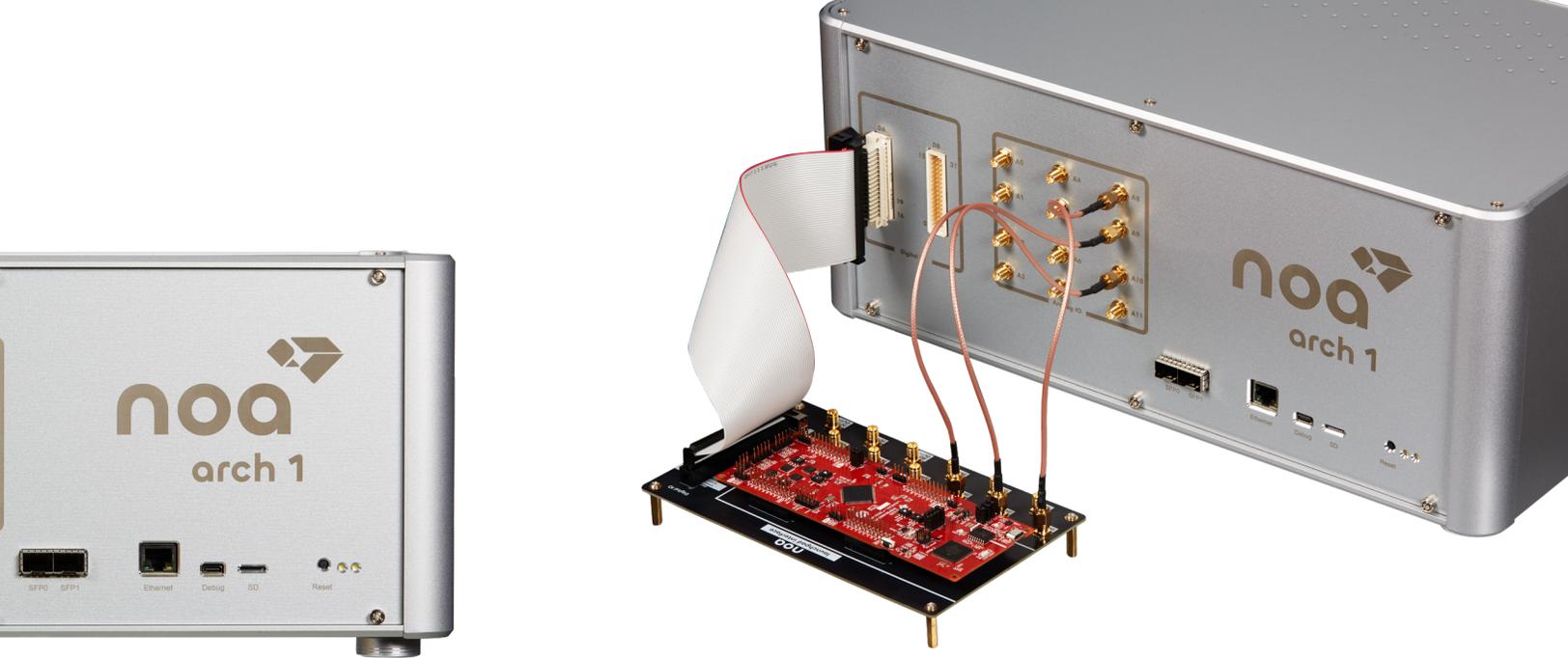
Designed for

- Power electronics controller development
- Inverter and motor drive firmware validation
- Closed-loop embedded control testing
- Real-time fault injection and validation
- Rapid control prototyping

Integrated Hardware Package

- NOA interface board
- Texas Instruments LAUNCHXL-F280049C development board
- NOA digital interface cable (flat ribbon connector)
- 4 SMA-to-SMA high-speed signal cables

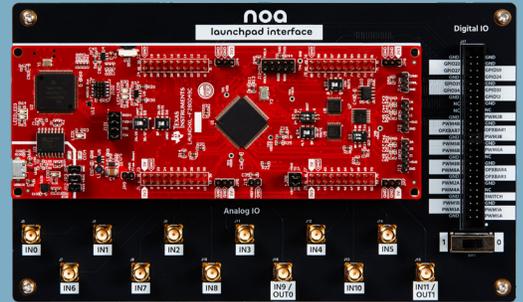




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Engineering Workflow

- Real-time plant model runs on NOA Arch1 (FPGA)
- Embedded firmware runs on TI LAUNCHXL-F280049C
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NOA Real-Time Platform Ecosystem

NOA Arch1, NOA Toolbox, NOA Nucleo and NOA Launchpad form a unified FPGA-based infrastructure for:

- Real-time instrumentation
- Rapid control prototyping
- Deterministic closed-loop validation
- Scalable industrial systems
- Embedded controller verification
- Hardware-in-the-loop simulation

Open, Flexible, Scalable

Built on an open FPGA architecture with:

- Preconfigured PYNQ environment
- Python and MATLAB integration
- Deterministic analog and digital interfaces
- Modular hardware and software building blocks



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