MFA Control Toolset for NI LabVIEW™

What's New	What's the Big Deal	What's the Benefit
Embedded Model-Free Adaptive (MFA) controllers inside LabVIEW environment.	An integrated control solution that leverages your investment in NI's products and software platforms.	Offers NI users an enhanced control capability delivered as part of the LabVIEW solution.
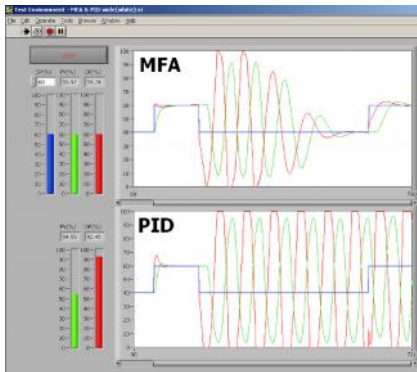
Left: When MFA (top) and PID (bottom) start from the same oscillating control condition, PID will continue to oscillate while MFA will quickly adapt to an excellent control condition. Both MFA and PID are running in a FieldPoint device.

Right: MFA controllers inside NI's PXI, compact FP, and compact RIO.

Model-Free Adaptive Control

MFA controls the processes that are too difficult for PID controllers to handle. MFA is the only "No Model" advanced controller on the market that can control complex systems without the use of first-principle mathematical models or dynamic modeling based models. Once installed, no controller parameter tuning is required.

Better control means improved process stability, higher production efficiency and yield, consistent product quality, and reduced material and energy waste.

NI – MFA Product Options

NI Platform	Application
CompactRIO, VxWorks or Linux	High-speed MFA controls
CompactRIO LabVIEW FPGA	Ultra high-speed MFA at 10 μs
PXI	High-speed MFA controls
FieldPoint or compact FP	For lab and industrial use
PC+RT/DAQ	High-speed PC-based control
PC only	PC-based control

Note: MFA VIs run inside LabVIEW and LabVIEW RT. Special VIs for FPGA.

Embedded MFA in LabVIEW RT

- SISO MFA to replace PID to eliminate manual tuning,
- Nonlinear MFA to control extremely nonlinear processes,
- Anti-delay MFA to control processes with large Tau-T ratio,
- Robust MFA to force PV to stay within defined bounds,
- MFA pH to control pH processes,
- MIMO MFA for multi-variable control systems, and
- Other special MFA controllers….

The Inside of Model-Free Adaptive (MFA) Control

MFA Features	MFA Inside Story	Key Points	Description
Controls complex systems		Adaptive	Adaptive weighting factors are updated in every sample interval to minimize e(t).
Requires no precise process knowledge		Robust	Provides a wider robust range than PID and many other controllers.
Requires no process identification		Speed	No time consuming model training; controls process immediately.
Requires no controller design		Stability	Guarantees closed-loop stability for passive processes.
Requires no complicated manual tuning		Ease of Use	Easy to configure, launch, and maintain.