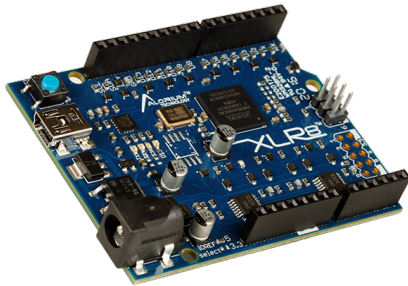


XLR8™

Arduino-Compatible FPGA Application Accelerator and Development Board



Introducing XLR8

XLR8 is a drop-in replacement for an Arduino Uno with an interesting twist. It is an Arduino-compatible board that uses a Field-Programmable Gate Array (FPGA) as the main processing chip.

The FPGA provides a reconfigurable hardware platform that hosts an ATmega328 instruction set compatible microcontroller. The FPGA also provides the ability to implement custom logic that accelerates specific functionality that is slow, problematic or even impossible for an 8-bit microcontroller.

The FPGA-based hardware acceleration and offload provided by XLR8 results in significantly improved performance in the same physical footprint and using the same tool chain as standard Arduino Uno boards.

XLR8 is a great solution for accelerating your Arduino-based applications and projects!

XLR8 Advantages

Faster

Hardware-accelerated functions run in a fraction of the clock cycles required to execute the same function in software.

This results in faster overall application speed.

High-Performance

Shorter times to complete complex tasks in hardware result in more clock cycles available for additional software functions.

Computational performance is significantly improved.

Scalable

The functionality and capabilities accelerated in the FPGA hardware can be expanded and scaled for many different applications.

We are just scratching the surface of what is possible to accelerate!

Xcelerator Blocks

An Xcelerator Block (XB) is an optimized hardware implementation of a unique processor-intensive function. Basically, an XB is a custom piece of hardware, implemented on the same FPGA fabric and tightly integrated with the microcontroller. XBs can access the same register space and even integrate with the instructions of the microcontroller.

Available XBs

XLR8 ships with pre-installed XBs that target application-specific behavior, and the board can be field-updated to change the XBs implemented on the FPGA.

The default XLR8 configuration will include XBs for:

- Floating Point Math
- Servo Control
- NeoPixel Control
- Enhanced Analog-to-Digital Functionality
- Quadrature

XB Roadmap

Future XBs will be implemented based on feedback from early adopters and new potential customers.

Additional XBs on our roadmap:

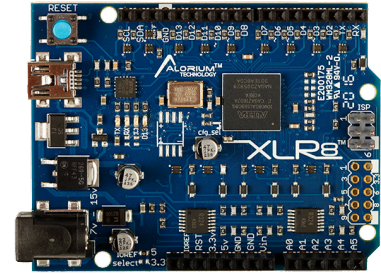
- Proportional-Integral-Derivative (PID) control
- Event Counters and Timers
- Pulse Width Modulation (PWM)
- Multiple UARTS

User-Created Xcelerator Blocks

Out of the gate, the primary goal is to provide an FPGA-based board that is a drop-in replacement for the Arduino Uno. XLR8 supports FPGA image updates via the USB port, and there is also a JTAG footprint on the board so that more advanced FPGA users could use a JTAG programmer to talk to the FPGA directly.

The microcontroller core that we have developed has been designed to be easily extendable, and Alorium Technology is actively developing the support model for users who want to create their own XBs and interface to the on-chip microcontroller.

For those who want to design their own FPGA logic, we offer **OpenXLR8** - a platform for users to create custom Xcelerator Blocks. This allows developers proficient with Verilog or VHDL and Intel's Quartus Prime software to create their own XBs. The sky's the limit on what can be done, and the XBs created this way can be shared with the rest of the XLR8 community.



XLR8 Top View

Technical Specs

Physical Dimensions

- Based on the Arduino Uno
- Matches the Uno's physical footprint - including pin headers for attaching shields
- Mounting brackets or shields that fit Uno will also fit XLR8

Digital I/O

- 5V tolerant inputs
- 5V outputs

Analog Inputs

- 5V
- Op-amp circuit emulates 0-5V behavior of the ADCs on the Arduino Uno
- Correct ADC results regardless of whether it's powered from USB or from the barrel connector
- ADC Performance: 1 MHz
- Resolution: 12-bit sustained
- Sample Rate: 254k samples/second

Specification Table

XLR8 Part Number	XLR8R22M08V5U0DI
FPGA	Intel MAX 10*
Microcontroller	ATmega328 Compatible
Operating Voltage	3.3V with 5V I/O
Input Voltage	7-15V
Digital I/O Pins	14
Logic Elements	8K
Analog Input Pins	6
Program FLASH	32 KB
SRAM	2 KB
Clock Speed	16/32 MHz

*FPGA Part Number: 10M08SAU169C8G

Contact

Alorium Technology
715.575.3150

www.aloriumtech.com