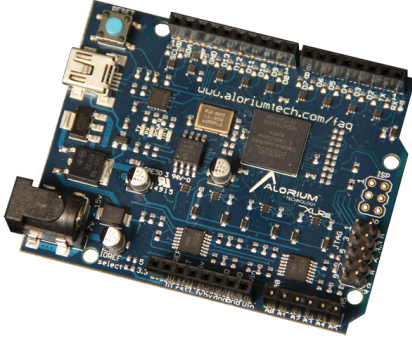


# XLR8™

## ARDUINO-COMPATIBLE FPGA APPLICATION ACCELERATOR & 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 performance.

#### High-Performance

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

This effectively improves overall computational performance.

#### 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

#### XB Roadmap

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

Additional XBs on our roadmap:

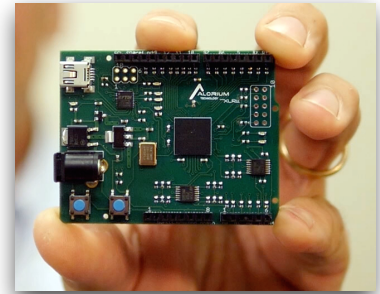
- Proportional-Integral-Derivative (PID) control
- Event Counters and Timers
- Quadrature Encoders/Decoders
- Pulse Width Modulation (PWM)
- Multiple UARTS
- Enhanced Analog-to-Digital Functionality

### 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.

In the near future, we plan to provide access to enough source code and documentation to make it possible for someone proficient with Verilog or VHDL and Altera’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.



*The Rev 1 XLR8 Prototype*

## 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 inputs
- 3.3V outputs

### Analog Inputs

- 5V tolerant
- 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
- Performance: 1 MHz
- Resolution: 12-bit sustained
- Sample Rate: 154k samples/second

### Specification Table

Microcontroller	ATmega328- Compatible
Operating Voltage	3.3V with 5V I/O
Input Voltage	7-12V
Digital I/O Pins	14
PWM Digital I/O Pins	6
Analog Input Pins	6
Flash Memory	32 KB
SRAM	2 KB
Clock Speed	16/32 MHz

### Contact

Alorium Technology  
715.575.3150  
[www.aloriumtech.com](http://www.aloriumtech.com)



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### Наши контакты:

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331