

MicroMod Alorium Sno M2 Processor Board Hookup Guide

Introduction

The MicroMod Alorium Sno M2 Processor Board features the Snō System on Module (SoM) from Alorium Technology adapted to the MicroMod M.2 processor form factor. Snō's FPGA provides a reconfigurable hardware platform that hosts an 8-bit AVR instruction set, compatible with the ATmega328, making Snō fully compatible with the Arduino IDE. Snō SoM has a compact footprint, making it ideal for space-constrained applications and an obvious addition to our MicroMod form factor for prototyping.

Alorium Technology provides a library of custom logic called Xcelerator Blocks (XBs) through the Arduino IDE that accelerate specific functionality that is slow, problematic, or even impossible for an 8-bit microcontroller. This library includes XBs such as Servo Control, Quadrature, Floating Point Math, NeoPixel, and Enhanced Analog-to-Digital Converter. Alorium also notes a XB roadmap where future XBs will be implemented based on feedback from early adopters and new potential customers.



SparkFun MicroMod Alorium Sno M2 Processor

● DEV-18030

Product Showcase: SparkFun MicroMod Alorium Sno Processor...



Required Materials

To follow along with this tutorial, you will need the following materials. You may not need everything though depending on what you have. Add it to your cart, read through the guide, and adjust the cart as necessary.



SparkFun MicroMod Alorium Sno M2 Processor
© DEV-18030



SparkFun MicroMod ATP Carrier Board
© DEV-16885



USB 3.1 Cable A to C - 3 Foot
© CAB-14743



SparkFun Mini Screwdriver
© TOL-09146

Suggested Reading

If you aren't familiar with the MicroMod ecosystem, we recommend reading [here](#) for an overview. We recommend reading [here](#) for an overview if you decide to take advantage of the Qwiic connector.

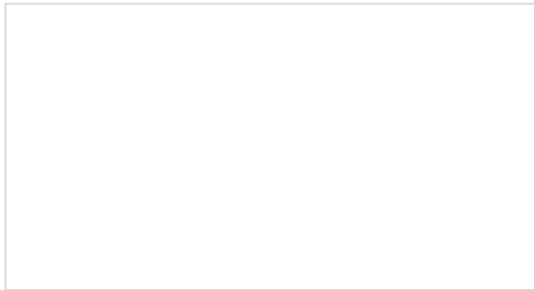
MicroMod

MicroMod Ecosystem



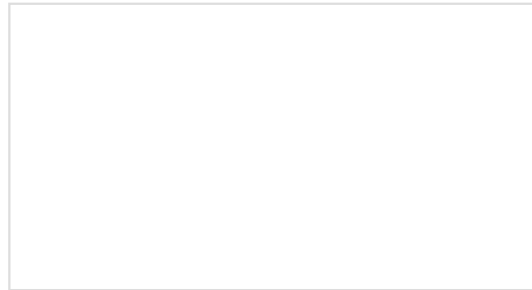
Qwiic Connect System

If you aren't familiar with the following concepts, we also recommend checking out these tutorials before continuing.



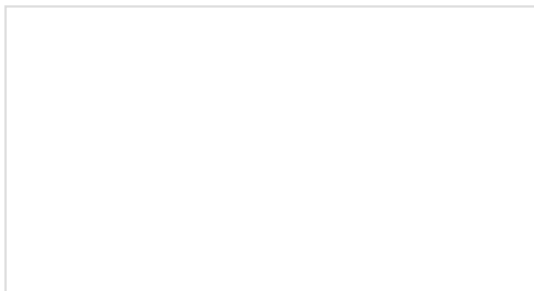
Getting Started with MicroMod

Dive into the world of MicroMod - a compact interface to connect a microcontroller to various peripherals via the M.2 Connector!



How Does an FPGA Work?

The What, How, Why, and When of Field Programmable Gate Arrays, aka FPGAs



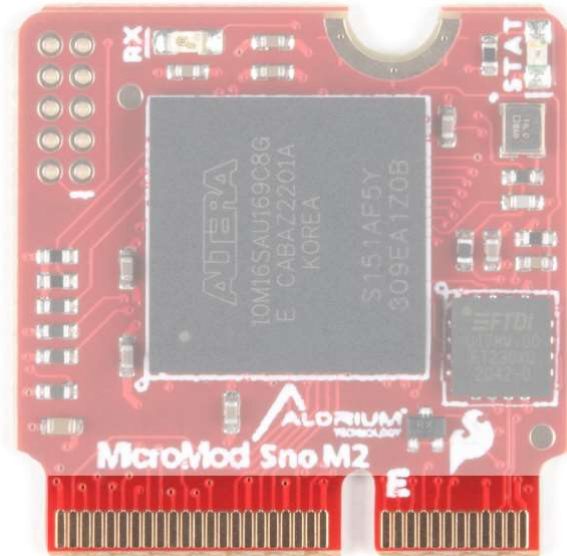
MicroMod All The Pins (ATP) Carrier Board

Access All The Pins (ATP) of the MicroMod Processor Board with the Carrier Board!

Hardware Overview

M.2 Connector

All of our MicroMod Processor Boards come equipped with the **M.2 MicroMod Connector**, which leverages the M.2 standard and specification to allow you to install your MicroMod Processor Board on your choice of carrier board. Most of the pins use a common pinout to ensure cross platform compatibility.



Alorium Technology Sno M2 Processor

The Alorium Technology Sno 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.



JTAG

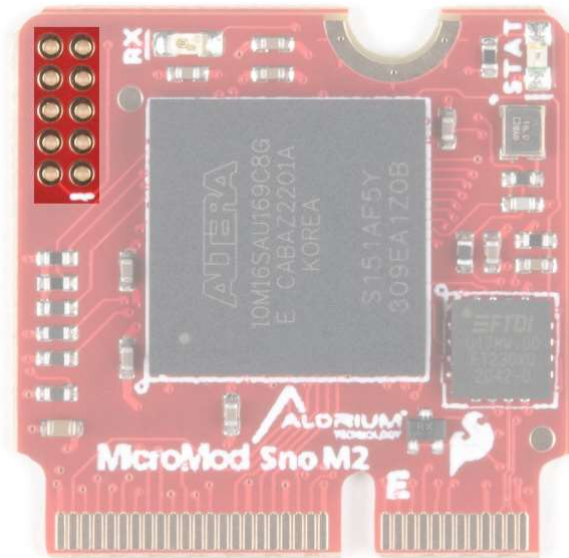
The JTAG interface on Sno M2 is primarily used during manufacturing to load the production FPGA image. For advanced users, JTAG can be used for creating bare-metal FPGA designs and directly flashing a new image to the FPGA.

⚠ Important Note: Using JTAG to load the MAX10 FPGA with a custom image will erase the production Sno M2 functionality, permanently delete the integrated 8-bit microcontroller subsystem, and not allow recovery back to the factory production image.

The Sno M2 FPGA has been designed to be modified and extended by using Alorium's OpenXLR8 Methodology. This flow provides a path to create custom XBs in the FPGA fabric that can easily interface to

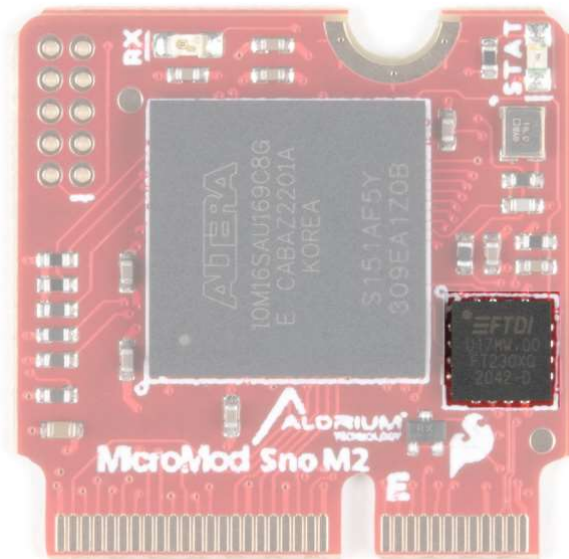
the on-chip microcontroller and preserve full factory functionality.

Learn More about OpenXLR8 here.



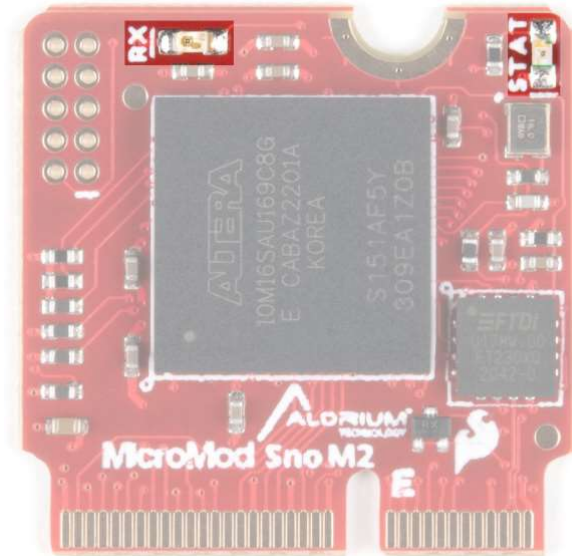
FTDI

The FTDI facilitates USB communication - drivers for the FTDI chip may need to be installed. Please see the How to Install FTDI drivers tutorial if you need help installing these drivers.



LEDs

There are two LEDs on the Sno Processor Board. An RX LED and a STAT LED.



- **RX LED** - The RX LED indicates activity on the USB serial port.
- **STAT LED** - A STAT LED is added to the top side of the board. This is useful debugging or as a status indicator.

MicroMod Alorium Sno M2 Processor Pin Functionality

The complete pin map is shown here or you can refer to the schematic. You can also download the PDF version of the pin map here.

MicroMod Sno M2 Processor Board											
Pin Map											
Last Updated: March 8, 2022											
FPGA PINS/SIGNALS			BOARD PINS/SIGNALS						FPGA PINS/SIGNALS		
MicroMod Pin	Signal	FPGA Pin	Board Pin	Board Pin	Board Pin	Board Pin	Board Pin	FPGA Pin	Signal	MicroMod Pin	
Not connected to FPGA			3.3V	74	73	3V3/IO3		64	01	PORT_D31	
Not connected to FPGA			RST_B1	72	71	RST_B1		63	00	PORT_D30	
PORT_H0	042	F12	SPI_CS/SIO0_DATA3	70	69	STRB/ST		61	03	PORT_D28	
PORT_H01	043	D13	SIO0_DATA2	68	67	SB		011	04	PORT_D26	
PORT_H02	044	R12	SIO0_DATA1	66	65	ANALOG_VREF/ANAL_VREFC		A13	05	PORT_D25	
PORT_H03	045	A11	SPI_SCK/SIO0_DATA0	64	63	ANALOG_VREFCAM_VREFC		A10	06	PORT_D24	
PORT_H04	046	A9	SPI_SIO0/SIO0_CMD	62	61	SPI_SIO		A8	011/MISO	PORT_R11	
PORT_H05	047	C8	SPI_SCK1/SIO0_CLK	60	59	SPI_SIO0		A7	012/MOSI	PORT_R04	
PORT_H06	048	A6	AUD_MCLK	58	57	SPI_CS		A2	013/CS	PORT_R03	
PORT_H07	049	A3	AUD_OUT/CAM_MCLK	56	55	SPI_CS		A4	014/SS	PORT_R02	
PORT_A00	020	B6	AUD_IN/CAM_RCLK	54	53	IO3_SEL1		A2	06	PORT_R01	
PORT_A01	021	B1	AUD_OUT1X	52	51	IO3_SEL1		A8	09	PORT_R00	
PORT_A02	022	B0	AUD_IN1X	50	49	BATT_VIN		Not connected to FPGA			
PORT_A03	023	B5	AUD_IN2X	48	47	PRM1		K2	025	PORT_A01	
PORT_C00	A5	E10B	IO3_SEL0	46	45	GND		Not connected to FPGA			
PORT_C01	A4	D10A	IO3_SEL0	44	43	IO3_SEL0		Not connected to FPGA			
PORT_C02	A3	E4.66	IO3_SEL0	42	41	IO3_SEL0		07	017	PORT_A00	
PORT_C03	A2	E10B	IO3_SEL0	40	39	GND		Not connected to FPGA			
PORT_C04	A1	E1	IO3_SEL0	38	37	IO3_SEL0		11	014	PORT_C00	
Not connected to FPGA			GND	36	35	IO3_SEL0		K2	025	PORT_G01	
PORT_C05	A0	F1	IO3_SEL0	34	33	GND		Not connected to FPGA			
PORT_C06	A0	F1	IO3_SEL0	32	31	Module Key		Not connected to FPGA			
Not connected to FPGA			Module Key	30	29	Module Key		Not connected to FPGA			
Not connected to FPGA			Module Key	28	27	Module Key		Not connected to FPGA			
Not connected to FPGA			Module Key	26	25	Module Key		Not connected to FPGA			
Not connected to FPGA			Module Key	24	23	SWDIO		M5	016	PORT_G02	
PORT_G00	000	K0	IO3_SEL0	22	21	SWOCLK		K2	027	PORT_G00	
PORT_G01	001	K1	IO3_SEL0	20	19	IO3_SEL0		M6	028	PORT_G04	
PORT_G02	002	K2	IO3_SEL0	18	17	IO3_SEL0		M8	029	PORT_G05	
PORT_G03	003	K3	IO3_SEL0	16	15	IO3_SEL0		M9	040	PORT_G06	
PORT_G04	004	K4	IO3_SEL0	14	13	IO3_SEL0		M10	041	PORT_G07	
PORT_G05	005	K5	IO3_SEL0	12	11	BOOT_0 (Open Drain)		Not connected to FPGA			
PORT_G06	006	K6	IO3_SEL0	10	9	USB_VIN		Not connected to FPGA			
PORT_G07	007	M13	IO3_SEL0	8	7	GND		Not connected to FPGA			
PORT_G08	008	M12	IO3_SEL0	6	5	USB_D-		Not connected to FPGA			
Not connected to FPGA			3.3V	4	3	USB_D+		Not connected to FPGA			
Not connected to FPGA			3.3V	2	1	GND		Not connected to FPGA			

Color Key for Board	Signal	MicroMod Pin	Comments
POWER	3.3V	74	3V3/IO3
SDIO	RST_B1	72	RST_B1
AUDIO	SPI_CS/SIO0_DATA3	70	STRB/ST
IO3	SIO0_DATA2	68	SB
UNCAT	SIO0_DATA1	66	ANALOG_VREF/ANAL_VREFC
GND	SPI_SCK/SIO0_DATA0	64	ANALOG_VREFCAM_VREFC
UNCAT	SPI_SIO0/SIO0_CMD	62	SPI_SIO
SPDIO	SPI_SCK1/SIO0_CLK	60	SPI_SIO0
UNCAT	AUD_MCLK	58	SPI_CS
UNCAT	AUD_OUT/CAM_MCLK	56	SPI_CS
UNCAT	AUD_IN/CAM_RCLK	54	IO3_SEL1
UNCAT	AUD_OUT1X	52	IO3_SEL1
UNCAT	AUD_IN1X	50	BATT_VIN
UNCAT	AUD_IN2X	48	PRM1
UNCAT	IO3_SEL0	46	GND
UNCAT	IO3_SEL0	44	IO3_SEL0
UNCAT	IO3_SEL0	42	IO3_SEL0
UNCAT	IO3_SEL0	40	GND
UNCAT	IO3_SEL0	38	IO3_SEL0
UNCAT	GND	36	IO3_SEL0
UNCAT	IO3_SEL0	34	GND
UNCAT	IO3_SEL0	32	Module Key
UNCAT	Module Key	30	Module Key
UNCAT	Module Key	28	Module Key
UNCAT	Module Key	26	Module Key
UNCAT	Module Key	24	SWDIO
UNCAT	IO3_SEL0	22	SWOCLK
UNCAT	IO3_SEL0	20	IO3_SEL0
UNCAT	IO3_SEL0	18	IO3_SEL0
UNCAT	IO3_SEL0	16	IO3_SEL0
UNCAT	IO3_SEL0	14	IO3_SEL0
UNCAT	IO3_SEL0	12	BOOT_0 (Open Drain)
UNCAT	IO3_SEL0	10	USB_VIN
UNCAT	IO3_SEL0	8	GND
UNCAT	IO3_SEL0	6	USB_D-
UNCAT	IO3_SEL0	4	USB_D+
UNCAT	IO3_SEL0	2	GND

Color Key for FPGA	Signal	MicroMod Pin	Comments
PORT_C10	A5-A0	E10B-E1	
PORT_D00	D00-D03	K0-K3	
PORT_D01	D11-D08	M5-M8	
PORT_D02	D09-D02	M9-M2	
PORT_D03	D03-D09	M3-M9	
PORT_D05	D04-D01	M10-M7	
PORT_H00	H00-H07	A0-A7	

Click on image for a closer view of the pin map.
Pin Map courtesy of Alorium Technology

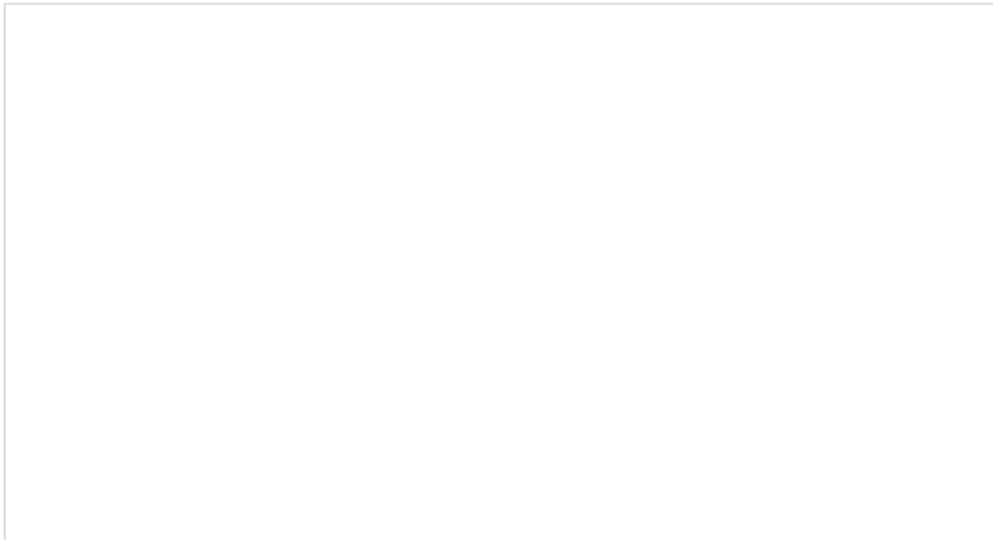
Board Dimensions

The board takes advantage of the standard MicroMod form factor.



Hardware Assembly

If you have not already, make sure to check out the Getting Started with MicroMod: Hardware Hookup for information on inserting your Processor Board into your Carrier Board.

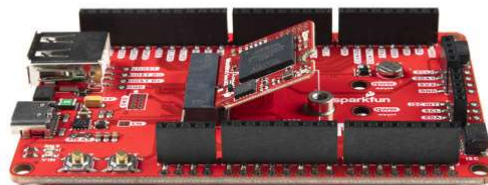


Getting Started with MicroMod

OCTOBER 21, 2020

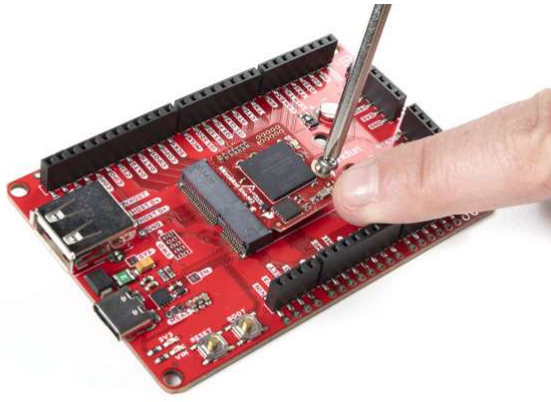
Dive into the world of MicroMod - a compact interface to connect a microcontroller to various peripherals via the M.2 Connector!

After inserting the MicroMod Alorium Sno M2 processor board into a carrier board, your setup may look like the following.



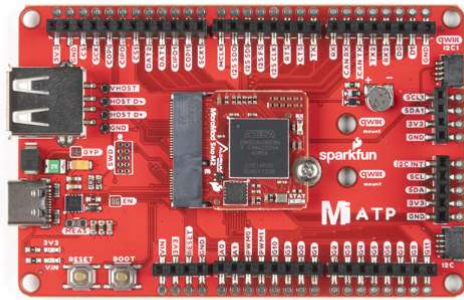
Click on image for a closer view.

Go ahead and secure the Processor Board by gently pressing it down and tightening the screw (not too much though).



Click on image for a closer view.

For simplicity, we'll be using the MicroMod ATP Carrier Board to program the board. At a minimum, your setup should look like the image below with the MicroMod Alorium Sno M2 Processor Board.



Click on image for a closer view.

Software Installation

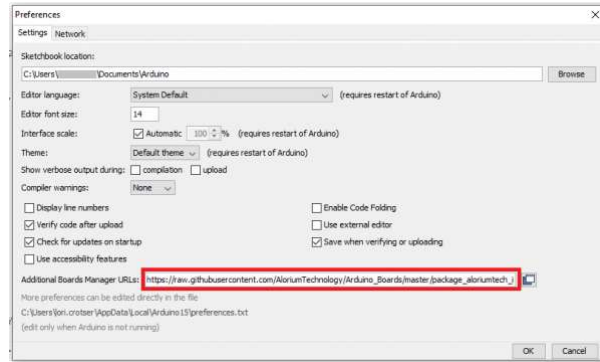
Note: This example assumes you are using the latest version of the Arduino IDE on your desktop. If this is your first time using Arduino, please review our tutorial on installing the Arduino IDE. If you have not previously installed an Arduino library, please check out our installation guide.

Install Arduino Board Definitions

In your Arduino IDE menu bar, go to **File > Preferences** and locate the 'Additional Boards Manager URLs' input field. Paste the following URL into the "Additional Boards Manager URLs" input field:

```
https://raw.githubusercontent.com/AloriumTechnology/Arduino_Boards/master/package_aloriumtech_in  
dex.json
```

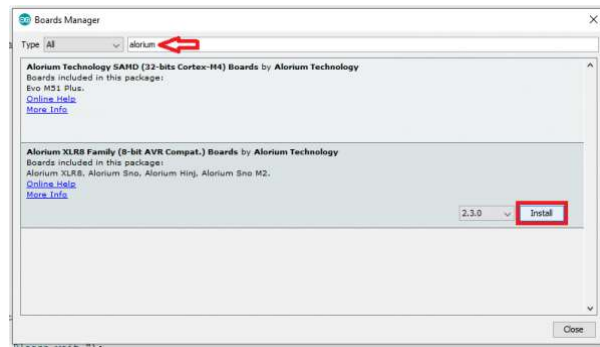
It should look something like the following:



Click on image for a closer view.

Install Alorium's XLR8 Board Package

Start by going to **Tools > Board > Boards Manager**. Type "Alorium," in the search field and you will see an option to install board files for Alorium Arduino compatible boards. Select the "Alorium XLR8 Boards" package and then click "Install".



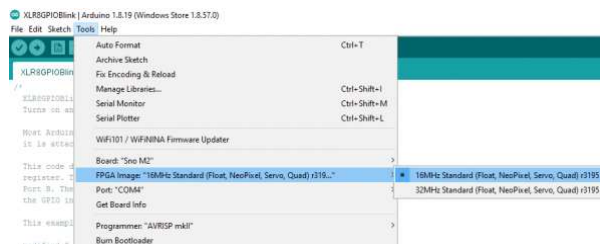
Click on image for a closer view.

Go to **Tools > Board**. You should see that a new section titled "Alorium XLR8 Family" now exists. Under this new heading should be the **Sno M2** board. You can select the "Sno M2" board just like you would normally select the "Arduino/Genuino Uno" board.



Click on image for a closer view.

After selecting the Sno M2, you will find a new menu item at **Tools > FPGA Image**, where you will find a number of FPGA images that provide different operating speeds and different XB configurations.



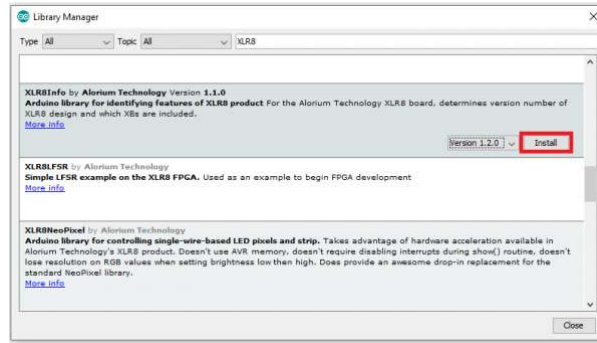
Click on image for a closer view.

XLR8 Libraries

Installing the XLR8 board support will also install a default set of libraries that are needed to take advantage of the extra capabilities of Snō. You can see these libraries listed in the **Sketch > Include Library** menu.

There are additional libraries available that can be installed using the Library Manager. In the Arduino IDE, go to the menu **Sketch > Include Library > Manage Libraries**, which will open the Library Manager in a new window. Enter "Alorium" in the search bar and you will find the entries for the various XLR8 and Snō libraries available.

There are many libraries you can install to support a variety of our board functions and Xcelerator Blocks. For the purposes of this getting started guide, find the "XLR8Info" library and click on it.



Click on image for a closer view.

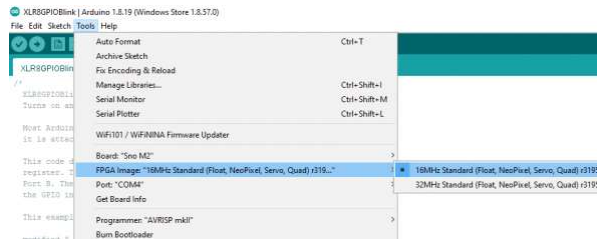
An **Install** button will appear for it. Click on the **Install** button, and when the installation is complete you will see that the library is now tagged as Installed.

After adding the library, you'll find it in the menu **Sketch > Include Library**, under Contributed Libraries (You may need to re-start the IDE if you don't see it).

You'll also find some examples sketches in the **File > Examples** menu, under the library name.

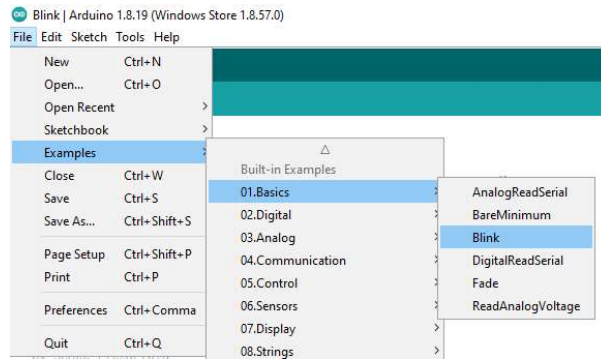
Example 1: Blink

With the Sno Processor Board inserted into the M.2 slot and secured, plug your ATP board to your computer with a USB cable. Make sure you have the correct Board, FPGA Image, Upload Action, and Port as you see below.



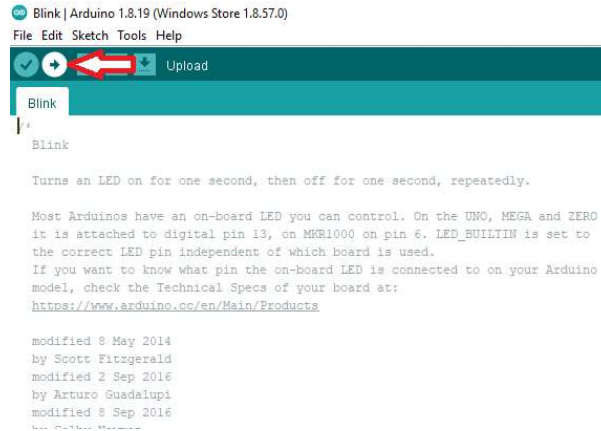
Click on image for a closer view.

Go to **Tools > Board** and select the Sno M.2. Then go to **File > Examples > 01. Basics** and select **Blink**.



Click on image for a closer view.

Upload the sketch as you see here:



Click on image for a closer view.

If all goes well, you should see something like the gif below:

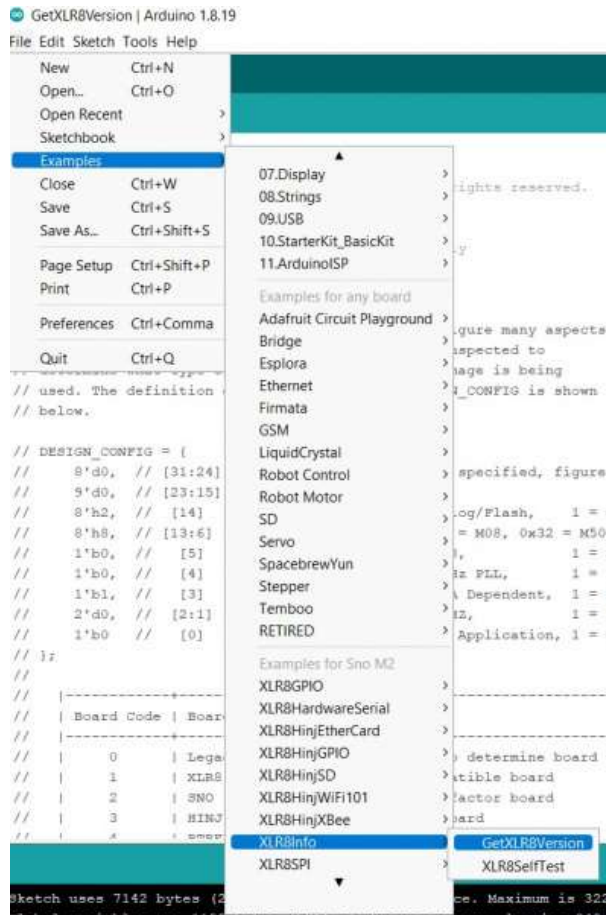


Example 2: Running with an Xcelerator Block (XB)

To run with the XLR8Info XB and library, do the following:

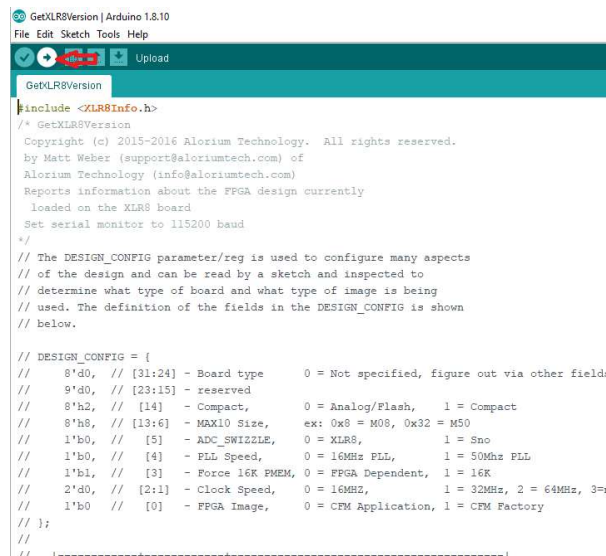
Connect Snō to your computer with a USB cable, and set up the Port and Serial Monitor as you normally would. Go to **Tools > Port** and verify that Arduino IDE is connected to the XLR8 USB serial port.

Go to **Tools > Board** and select the XLR8 board. Then go to **File > Examples > XLR8Info** and select "GetXLR8Version".



Click on image for a closer view.

In the GetXLR8Version sketch window, click on the Upload button



Click on image for a closer view.

Check the Serial Monitor window for the output, which should look like the output below. **Note that you will need to set the baud rate for the Serial Monitor to 115200 for this sketch to display output correctly.**

```
=====
Board Type: Snō M2
FPGA Image: 16 MHz Float Servo NeoPixel Quadrature r3000
=====
XLR8 Hardware Version = 3000
XLR8 CID           = 0x8430861C
=====
Design Configuration = 0x408
Image              = 1
Clock              = 16MHz
PLL Speed         = 16MHz
FPGA Size         = M16
=====
Builtin XB ENABLE  = 0xF
Has Floating Point Add, Subtract, and Multiply
Has Floating Point Divide
Has Servo XB
Has NeoPixel XB
Has Quadrature XB
=====
OpenXLR8 Info Regs = 3
Info Reg 1 = 0x11
Info Reg 2 = 0x12
Info Reg 3 = 0x13
=====
Int Osc = 90.07 MHz
=====

To help improve our products, please paste the following URL into a web browser, add any n
https://docs.google.com/forms/d/1djbu8L3VNO3RdnVh2VbPkj0YFG3BeW8nmDxYzvVHM9jc/viewform?en

GetXLRVersion Complete

Autoscroll  Show timestamp      Newline 115200 baud Clear output
```

Click on image for a closer view.

Troubleshooting

General Troubleshooting Help & Technical Support

❓ Not working as expected and need help?

If you need technical assistance or more information regarding this or another SparkFun product that is not working as you expected, we recommend heading on over to the SparkFun Technical Assistance page for some initial troubleshooting.

SPARKFUN TECHNICAL ASSISTANCE PAGE

If you don't find what you need there, the SparkFun Forums: MicroMod are a great place to find and ask for help. If this is your first visit, you'll need to create a Forum Account to search product forums and post questions.

SPARKFUN FORUMS: MICROMOD

Resources and Going Further

For more information, check out the resources below:

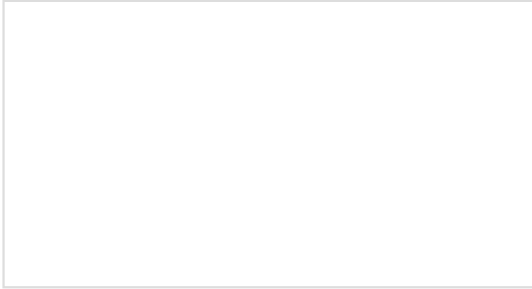
- Schematic
- Eagle Files
- Board Outline
- Alorium Technology OEM Module page
- Snō Product Brief

- [GitHub Repo](#)

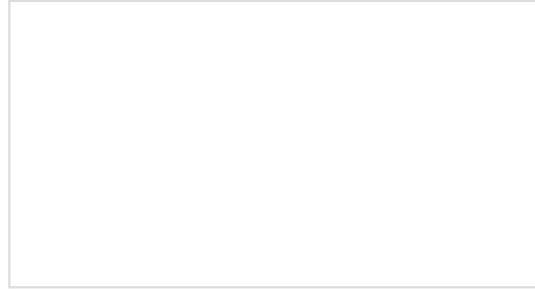
For more information about the SparkFun MicroMod Ecosystem, take a look at the links below:

- [Getting Started with MicroMod](#)
- [Designing with MicroMod](#)
- [MicroMod Info Page](#)
- [MicroMod Forums](#)

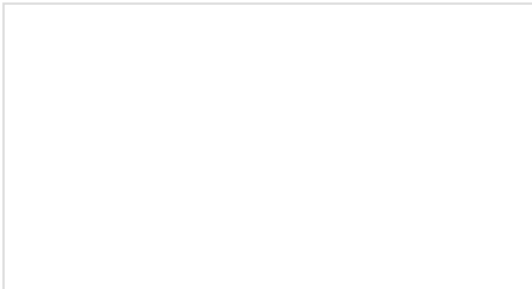
Need some inspiration for a project using your Alorium Sno Processor? The tutorials below may help you get started!



MicroMod Machine Learning Carrier Board Hookup Guide
Get hacking with this tutorial on our Machine Learning Carrier Board!



MicroMod STM32 Processor Hookup Guide
Get started with the MicroMod Ecosystem and the STM32 Processor Board!



MicroMod WiFi Function Board - ESP32 Hookup Guide
The MicroMod ESP32 Function Board adds additional wireless options to MicroMod Processor Boards that do not have that capability. This special function board acts as a coprocessor that takes advantage of Espressif's ESP32 WROOM to add WiFi and Bluetooth® to your applications.



MicroMod Alorium Sno M2 Processor Board Hookup Guide
Get started with the MicroMod Alorium Sno M2 Processor Board!