



Neonode® Prototyping Board User's Guide

2020-04-07

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2 User's Guide - Neonode Prototyping Board

The Neonode Prototyping Board is an Arduino-compatible microcontroller, based on the SAMD21 MCU. The board allows the user to directly connect a Neonode Touch Sensor Module (previously referred to as zForce AIR) through the onboard sensor port, with all 8 connector pads exposed. The prototyping board is only intended for development and prototyping. Meaning, it is not created to withstand challenging environments or demanding use-cases.

The prototyping board can also be configured using an Arduino development environment, for example the Arduino IDE. For easier configuration and implementation, include our [zForce Arduino Library](#)¹ to your project.

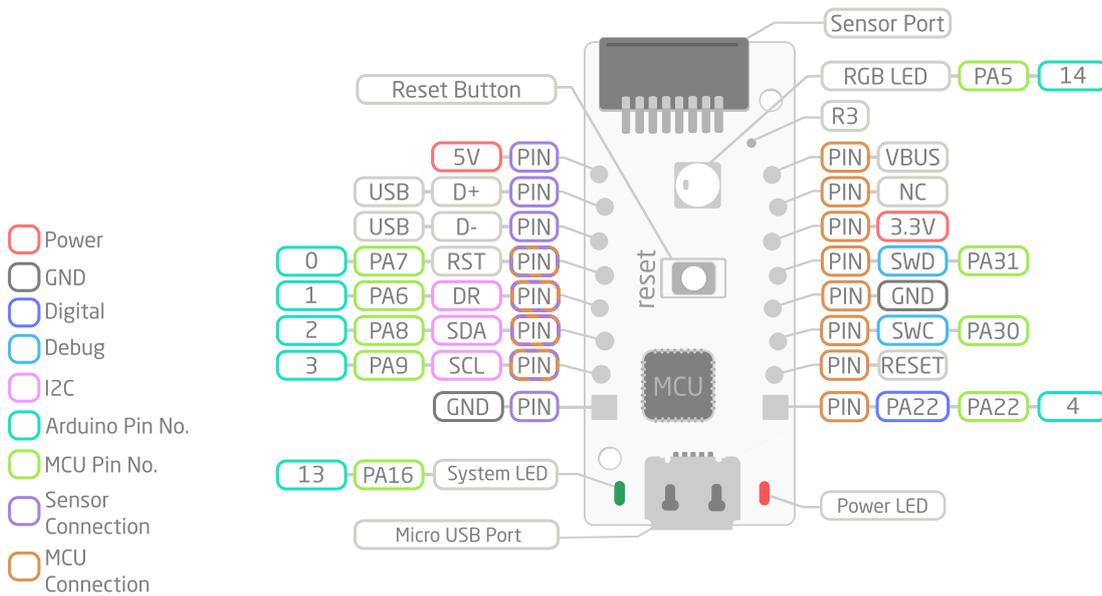


Figure 1 - Pinout Diagram of Neonode Prototyping Board

2.1 Overview

2.1.1 Compatible Development Environment

- **Arduino IDE**
- [zForce Arduino Library](#)²

¹ <https://github.com/neonode-inc/zforce-arduino>

² <https://github.com/neonode-inc/zforce-arduino>

2.1.2 Board Components

Pinouts

- USB D+
- USB D-
- Reset (RST)
- Power supplies,
 - 2x Ground (GND)
 - 5V
 - 3.3V
 - USB VBUS
- Data Ready (DR)
- I2C SCL
- I2C SDA
- Debugging interface,
 - Reset (RESET)
 - SBW clock (SWC)
 - SBW data (SWD)
- Not Connected (NC)
- Digital Pin, GPIO (PA22)

Programmable Components

- Green System LED
- RGB Neopixel LED
- 1x Digital Pin, GPIO (PA22)

MCU Specification

- ATSAM D21E18A 32-bit Cortex M0+ with 256KB Flash and 32 KB RAM
- 3.3V logic, 48 MHz, 32 bit processor

Resistor Bridge

- 0-ohm resistor (R3) that bridges between VBUS and +5V.

2.1.3 Mechanical features

Pin Holes

- 2x M2 mounting holes
- 2 rows of 8x 2.54mm (0.1") pitch pin header holes, with a special design to accept friction fixing for connecting a pin header to a breadboard or other interface boards.

Dimensions

- Width: 16mm
- Length: 37mm
- Height: 4.25mm

Environmental Requirements

- Temperature: 0-40°C
- Non-humid and dry.

2.2 Pinout Description

Please refer to [Electrical integration](#)³ for further information about the sensor module's connector pads.

Pinouts - Left Hand Side*					
Pin Name	Pin Description	MCU Pin No.	Arduino Pin No.	Connected to onboard MCU	Connected to Sensor Module
5V	5V Power input for the sensor module				x
D+	USB D+ input connected to sensor module				x
D-	USB D- input connected to sensor module				x
RST	Resets sensor module to initial state. Active low.	PA7	0	x	x
DR	Data Ready - Indicates that there is data available for the host to read	PA6	1	x	x
SDA	Serial Data Line	PA8	2	x	x
SCL	Serial Clock Line	PA9	3	x	x
GND	Ground				x
Pinouts - Right Hand Side*					
Pin Name	Pin Description	MCU Pin No.	Arduino Pin No.	Connected to onboard MCU	Connected to Sensor Module
VBUS	5V - USB bus voltage			x	
NC	Not connected			x	
3.3	Power 3.3V connected to the board's MCU			x	
SWD	Debug Data (of onboard MCU)	PA31		x	

³ <https://support.neonode.com/docs/display/AIRTSUsersGuide/Electrical+Integration>

GND	Ground			x	
SWC	Debug Clock (of onboard MCU)	PA30		x	
RESET	Reset MCU			x	
PA22	GPIO, Digital Pin	PA22	4	x	

**The Prototyping Board is positioned according to Figure 1, with the sensor port at the top of the board, and the Micro USB port at the bottom.*

2.3 Internal Pins

Internal Pin Component	Component Description	MCU Pin No.	Arduino Pin No.
Green System LED	Programmable System LED	PA16	13
RGB LED	RGB Neopixel LED	PA5	14
USB D-	Onboard	PA24	
USB D+	Onboard	PA25	

2.4 Reset Button

Reset Button Action	Action Description
Single Click	Reset, and run the application firmware
Double Click	Reset, and run the bootloader

3 Get Started with Neonode Prototyping Board

3.1 Setup Summary

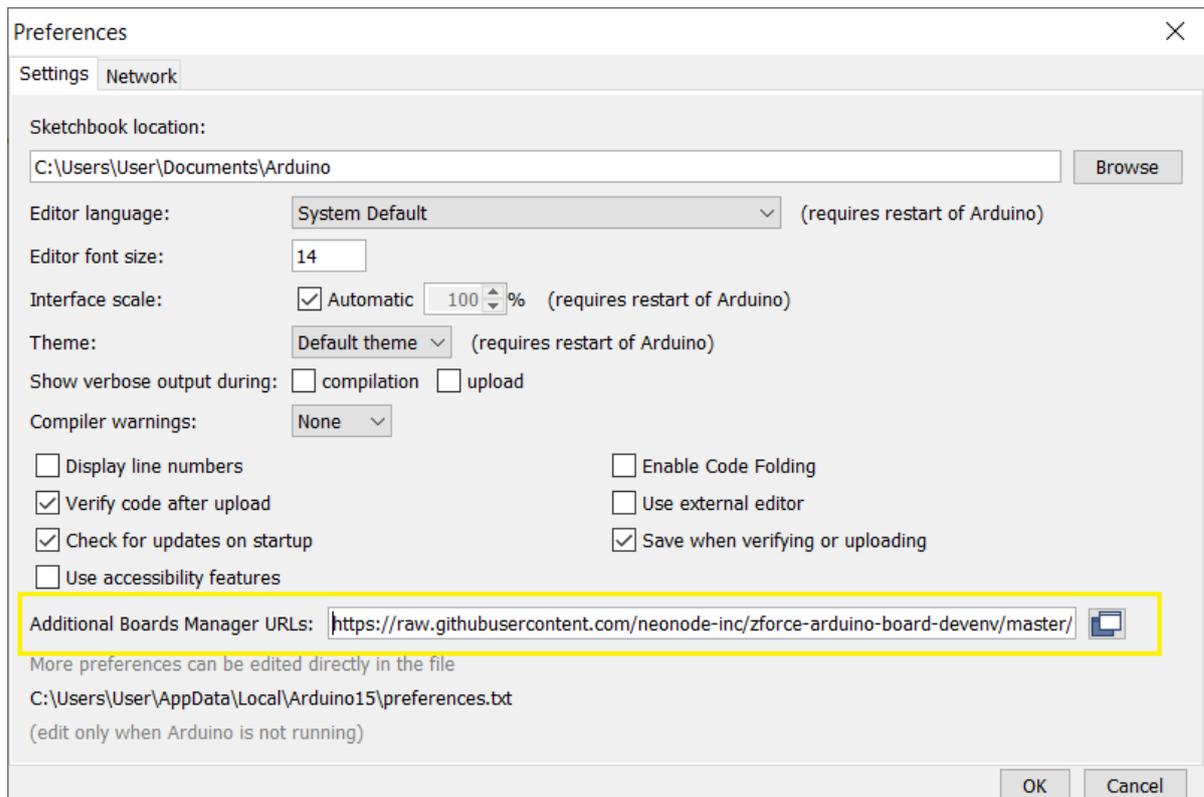
- **Board:** Neonode Prototyping Board
Include URL in Board Manager: https://raw.githubusercontent.com/neonode-inc/zforce-arduino-board-devenv/master/package_neonode_index.json
- **Programmer:** AVRISP mkII (or USBtinyISP)
- **Arduino Library:** [zForce Arduino Library](#)⁴

3.2 Setup Guide for Arduino IDE

Install and Select Neonode Prototyping Board

1. Go to **File >> Preferences**.
2. in **Preferences**, navigate to **Additional Boards Manager URLs** and include the following URL: https://raw.githubusercontent.com/neonode-inc/zforce-arduino-board-devenv/master/package_neonode_index.json

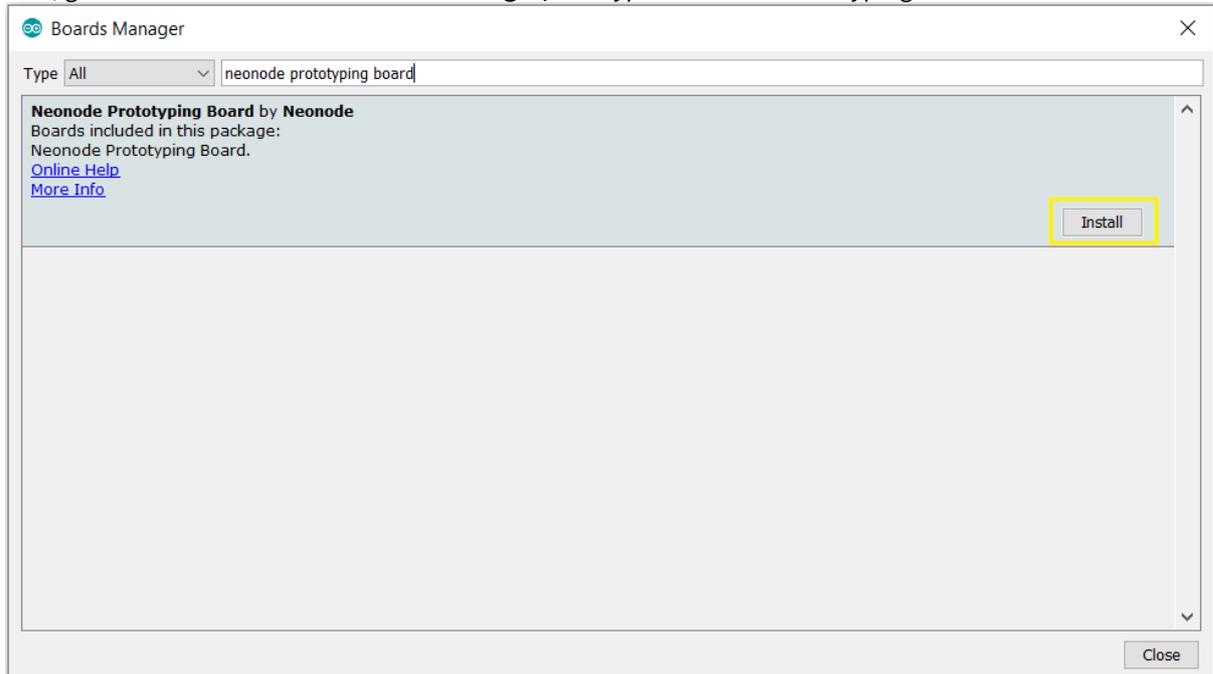
 If you have multiple URLs in your Board Manager, you can separate each link with a comma (,) or press the pop-up icon and paste the URL on a new row.



1. Press **OK**.

⁴ <https://github.com/neonode-inc/zforce-arduino>

2. Now, go to **Tools >> Boards >> Boards Manager**, and type "Neonode Prototyping Board" in the search field.



3. Press **Install** to install the board preset.
4. When the installation is complete, Select the new board by going to **Tools >> Board >> Neonode Prototyping Board**.

Select AVRISP mkII as Programmer

1. Go to **Tools >> Programmer >> AVRISP mkII**.
 - a. Alternatively, you can set *USBtinyISP* as your programmer.

Include zForce Arduino Library

Please refer to our [zForce Arduino Library](#)⁵ for easier implementation and communication with the sensor module.

⁵ <https://github.com/neonode-inc/zforce-arduino>