

SparkFun RedBoard Turbo

We use the [SparkFun RedBoard Turbo Development Board](#), which at its heart is an **Arduino Zero** with an ATSAM21G18 32-bit/48MHz ARM Cortex-M0+microcontroller.

SparkFun provides a [Hookup Guide for the RedBoard Turbo](#).

Arduino provides documentation about the [Arduino Zero](#).

Arduino IDE

We use the [Arduino IDE](#) on the [NVIDIA Jetson Xavier NX](#) for the **Arduino software development** on the SparkFun Redboard Turbo.

Download Arduino IDE 1.8.13

Firefox: <https://www.arduino.cc/en/software>

> Click on **Linux ARM 64 bits**

> Click Download

~/Downloads/arduino-1.8.13-**linuxaarch64**.tar.xz

> Right-click Extract to ...

> Browse to sw/SparkFun_RedBoard_Turbo/ArduinoIDE

Create a **portable version**

```
$: mkdir sw/SparkFun_RedBoard_Turbo/ArduinoIDE/arduino-1.8.13-linuxaarch64/arduino-1.8.13 /portable
```

An already downloaded and modified copy can be found here:

sw/SparkFun_RedBoard_Turbo/ArduinoIDE/**arduino-1.8.13-linuxaarch64**

Install Arduino IDE

```
$: sudo apt install libcansberra-gtk0 libcansberra-gtk-module libgtk-3-dev
```

```
$: sudo mkdir -p /opt/SparkFun_RedBoard_Turbo
```

```
$: sudo chmod 777 /opt/SparkFun_RedBoard_Turbo
```

```
$: sudo cp -r sw/SparkFun_RedBoard_Turbo/ArduinoIDE/arduino-1.8.13-linuxaarch64/arduino-1.8.13 /opt/SparkFun_RedBoard_Turbo/
```

```
$: cd /opt/SparkFun_RedBoard_Turbo/arduino-1.8.13
```

```
/opt/SparkFun_RedBoard_Turbo/arduino-1.8.13$: sudo bash install.sh
```

```
/opt/SparkFun_RedBoard_Turbo/arduino-1.8.13$: bash arduino-linux-setup.sh $USER
```

```
$: sudo mkdir -p /opt/SparkFun_RedBoard_Turbo/Arduino
```

```
$: sudo chmod -R +666 /opt/SparkFun_RedBoard_Turbo
```

Arduino IDE

\$: sudo arduino

> Select File>Preferences

> Enter Sketchbook location: /opt/SparkFun_RedBoard_Turbo/Arduino

Install Arduino's SAMD Board Add-Ons

Arduino IDE

\$: sudo arduino

> Select Tools> Board: "Arduino Uno"> Board Manager...

> Select **Arduino SAMD Boards (32-bits ARM Cortex-M0+)**

> Click **1.8.11** Install

Install SparkFun's SAMD Board Add-Ons

The SparkFun SAMD Boards library won't just work on the NVIDIA Jetson Xavier NX, because the versions of arm-none-eabi-gcc and BOSSAC used in the package index are not compiled for ARM 64. As suggested in the post [Installing Arduino SAM boards on Arduino IDE for Arm64](#) in the Arduino Forum, we downloaded and modified the package_sparkfun_index.json file to use the same versions in the toolsDependencies for the SparkFun SAMD Boards version 1.8.3 as found in the portable/package_index.json for the Arduino SAMD Boards (32-bits ARM Cortex-M0+).

We use an already downloaded copy of the sparkfun-samd-1.8.3 package from

https://github.com/sparkfun/Arduino_Boards/raw/master/IDE_Board_Manager/sparkfun-samd-1.8.3.tar.bz2, which can be found here:

sw/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/**sparkfun-samd-1.8.3.tar.bz2**

...

"name": "SparkFun SAMD Boards (dependency: Arduino SAMD Boards 1.8.1) **modified with ARM64 support by aiWerkstatt**",

"version": "1.8.3",

"url": "file:///opt/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/sparkfun-samd-1.8.3.tar.bz2",

"boards": [

{ "name": "Sparkfun RedBoard Turbo" },...

],

"toolsDependencies": [

{

"packager": "arduino",

"name": "arm-none-eabi-gcc",

"version": "7-2017q4"

},

{

"packager": "arduino",

"name": "bossac",

"version": "1.7.0-arduino3"

},

{

"packager": "arduino",

```
"name": "openocd",  
"version": "0.10.0-arduino7"  
}
```

...

```
$: sudo mkdir -p /opt/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards  
$: sudo cp  
sw/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/package_sparkfun_index.json  
/opt/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/package_sparkfun_index.json  
$: sudo cp sw/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/sparkfun-samd-1.8.3.tar.bz2  
/opt/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/sparkfun-samd-1.8.3.tar.bz2
```

Arduino IDE

```
$: sudo arduino
```

> Select File>Preferences

> Copy following text into the Additional Board Manager URLs text box:

Instead of https://raw.githubusercontent.com/sparkfun/Arduino_Boards/master/IDE_Board_Manager/package_sparkfun_index.json use:

file:///opt/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/package_sparkfun_index.json

> Click OK

> Select Tools> Board: "Arduino Uno"> Board Manager...

> Select **SparkFun SAMD Boards (dependency: Arduino SAMD Boards 1.8.1) modified with ARM64 support by aiWerkstatt**

> Click **1.8.3** Install

> Select Tools>Board: "Arduino Uno"> SparkFun SAMD (32-bits ARM Cortex M0+)

Boards>**SparkFun Redboard Turbo**

Make sure the SparkFun Redboard Turbo is connected via USB to the NVIDIA Jetson Xavier NX

> Select Tool>Port>/dev/ttyACM0

```
$: sudo usermod -a -G dialout $USER
```

```
$: sudo chmod -R +666 /opt/SparkFun_RedBoard_Turbo
```

The **Arduino IDE** is installed under **/usr/local/bin**.

The **preferences** and **board specific information** are stored under

/opt/SparkFun_RedBoard_Turbo/arduino-1.8.13/portable.

Arduino libraries are stored under **/opt/SparkFun_RedBoard_Turbo/Arduino/libraries**.

When uploading a sketch there may be an indication that something went wrong with opening the TurboBoot folder, nevertheless the upload will be done successfully.

Scan for I2C Addresses

We connected the SparkFun Redboard Turbo to a suite of **SparkFun sensors daisy-chained over an I2C bus** using the [SparkFun Qwiic Connect System](#).

Sensor	I2C addresses
SparkFun TMP102 Temperature Sensor	0x48 (0x49, 0x4A, 0x4B)
2x SparkFun LSM9DS1 IMU	0x6B & 0x6A, 0x1E & 0x1C
SparkFun ICM20948 IMU	0x69 (0x68)
SparkFun LPS25HB Pressure Sensor	0x5D (0x5C)
SparkFun NEO-M9N GPS	0x42
ZIO INA219 Current and Voltage Sensor	0x40 (0x41, 0x44, 0x45)
Not connected, only for configuration: SparkFun USB-C Power Delivery Board	0x28

Test that all sensors are connected properly by scanning for their I2C addresses.

Scan for I2C Addresses

```
$: sudo cp -r sw/SparkFun_RedBoard_Turbo/SparkFun_SAMD_Boards/scan_i2c_addresses
/opt/SparkFun_RedBoard_Turbo/Arduino
$: sudo chmod -R +666 /opt/SparkFun_RedBoard_Turbo
```

Arduino IDE

```
$: arduino
> File>Sketchbook>scan_i2c_addresses
> Click Serial Monitor icon
> Select 115200 baud
> Click Upload icon (until flash is successful)
```

Check I2C address: 0x8

...

Check I2C address: 0x1C found

Check I2C address: 0x1E found

Check I2C address: 0x40 found

Check I2C address: 0x42 found

Check I2C address: 0x48 found

Check I2C address: 0x5D found

Check I2C address: 0x69 found

Check I2C address: 0x6A found

Check I2C address: 0x6B found

...

Script

Run SparkFun RedBoard Turbo installation script

sw/NVIDIA_Jetson_Xavier_NX/Scripts\$ bash **install-6-SparkFun_RedBoard_Turbo.sh**

Dockerfile

SparkFun RedBoard Turbo Dockerfile

sw/NVIDIA_Jetson_Xavier_NX/Docker/**Dockerfile-6-SparkFun_RedBoard_Turbo**