

Smart Stepper - flashing the firmware

How to change Vendor / Product ID?

For a better control of the dev rules for Smart Stepper the Vendor IDs and product IDs can be changed! This omits to connect to static / fixed ports.

https://github.com/Misfittech/nano_stepper/issues/47#issuecomment-583914737

```
vim %appdata%\..\Local\Arduino15\packages\misfittech\hardware\samd\1.0.0\boards.txt

nano_zero.vid.0=0x1209
nano_zero.pid.0=0x8087
nano_zero.vid.1=0x1209
nano_zero.pid.1=0x8086
nano_zero.build.vid=0x1209
nano_zero.build.pid=0x8087
```

Trikarus custom firmware fork modifications

Trikarus uses custom firmware which is a mix of hangprinter smart stepper fork and recent misfit tech repo (fw 0.40) - ci

https://github.com/Misfittech/nano_stepper/commit/ddaf3ad388c0788647d27a625718b9728841248b

1. <https://gitlab.com/tobben/Smart-Stepper-for-Hangprinter/issues/1>
2. i2c stuff not implemented:
 1. <https://gitlab.com/tobben/Smart-Stepper-for-Hangprinter/commit/47369f7ec7f921d845d138c8990ac040f617614e>
 2. <https://gitlab.com/tobben/Smart-Stepper-for-Hangprinter/commit/4d296668e11170089cbb9fd477c03788c4c5b3a0>
 3. <https://gitlab.com/tobben/Smart-Stepper-for-Hangprinter/commit/8fecdd1dda00aae269401cd1b4c4951bb27ae762>

4. <https://gitlab.com/tobben/Smart-Stepper-for-Hangprinter/commit/e547967287961c84273519bf4dc00aaefabdf21f>
5. <https://gitlab.com/tobben/Smart-Stepper-for-Hangprinter/commit/367fc4db3d0e22351c8864890462f9dd021fe2ee>

Flashing directly from Windows client

<http://misfitech.net/blog/arduino-package-install>

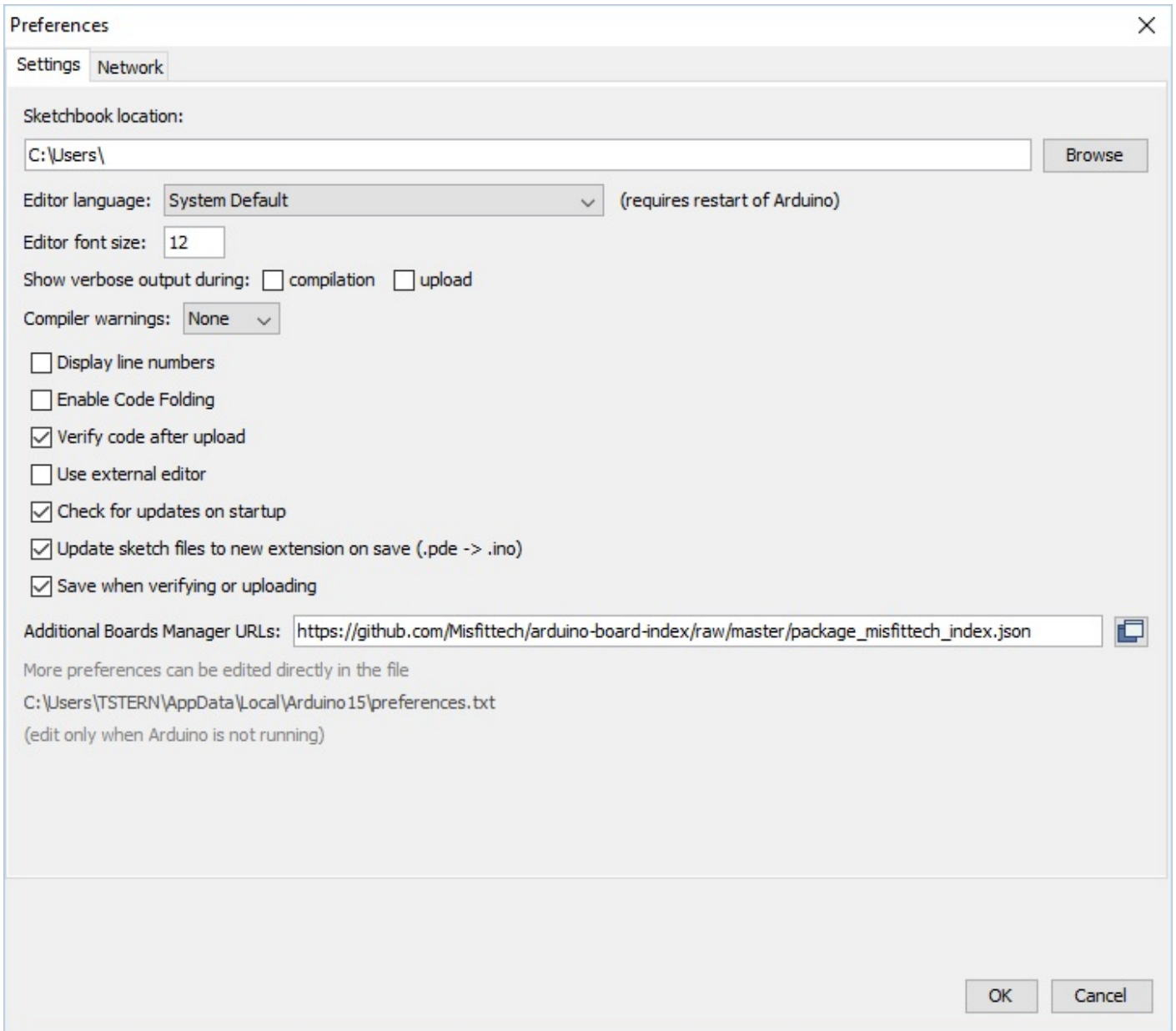
<https://github.com/microsoft/uf2>

Install Arduino IDE

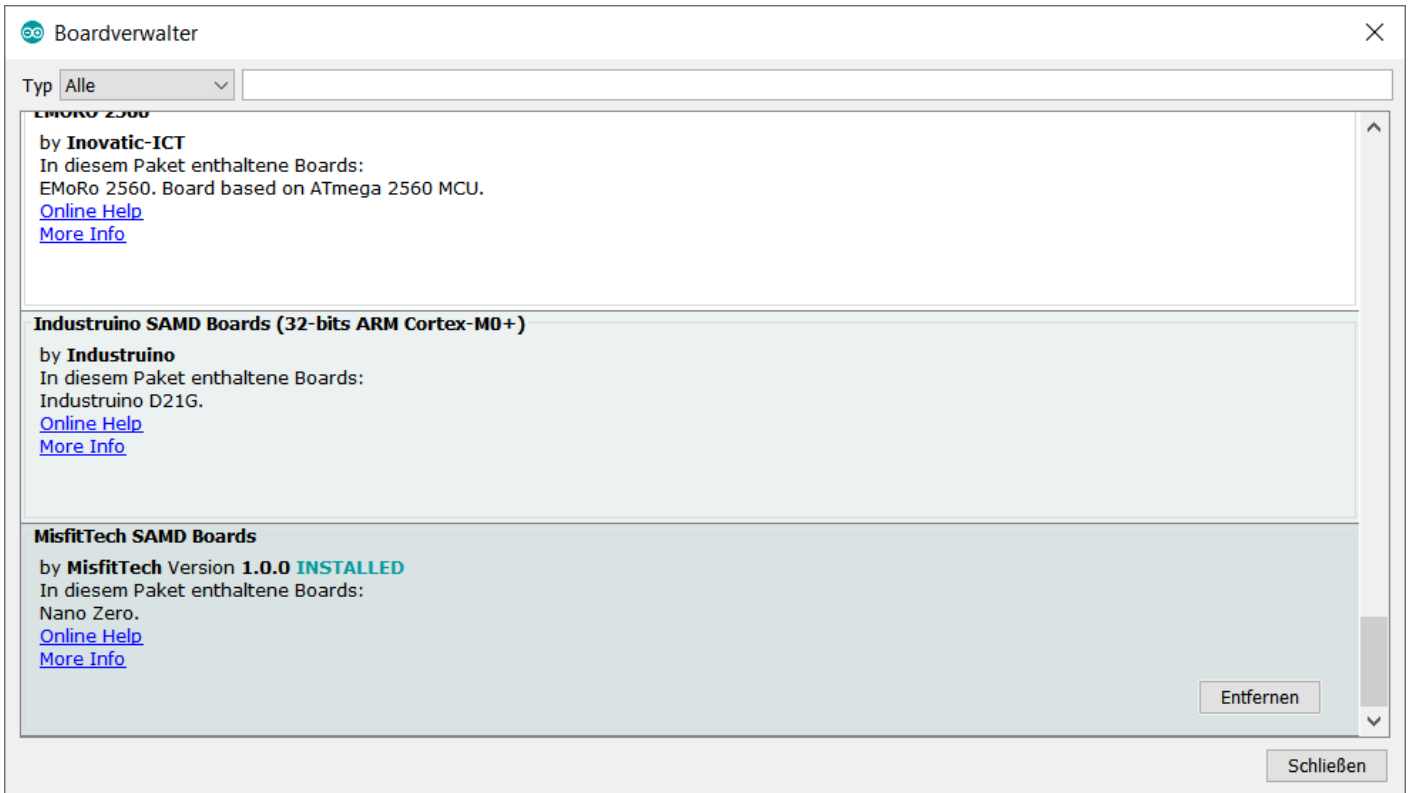
Version 1.6.4 or greater is required → [Download](#)

Add custom boards manager URL

Now we add the Misfit Tech package by URL. To do this open the preferences page on the IDE by going to File → Preferences. Add "https://github.com/Misfitech/arduino-board-index/raw/master/package_misfitech_index.json"



Install Board Manager "MisfitTech SAMD Boards"



Flash

stepper_nano_zero | Arduino 1.8.12

Datei Bearbeiten Sketch Werkzeuge Hilfe



Flashing directly from Raspberry Pi (where the motors are connected to by USB serial)

Install Arduino IDE

```
#install arduino  
apt install arduino
```

Please note that arduino command requires X11 forward to work because it's a windowed application.

Check if arduino-cli is existent

if not: install it using the following command. It will be installed into **/usr/bin/arduino-cl**

```
cd /usr  
curl -fsSL https://raw.githubusercontent.com/arduino/arduino-cli/master/install.sh | sh
```

Initialize and configure

```
arduino-cli config init  
  
#edit the newly generated config file  
vim ~/.arduino15/arduino-cli.yaml
```

```
board_manager:  
  additional_urls:  
    - "https://github.com/Misfittech/arduino-board-  
index/raw/master/package_misfittech_index.json"  
daemon:  
  port: "50051"  
directories:  
  data: /root/.arduino15  
  downloads: /root/.arduino15/staging  
  user: /root/Arduino  
logging:
```

```
file: ""
format: text
level: info
telemetry:
  addr: :9090
  enabled: true
```

Update Index

```
arduino-cli core update-index
```

```
Downloading missing tool builtin:ctags@5.8-arduino11...
builtin:ctags@5.8-arduino11 downloaded
Installing builtin:ctags@5.8-arduino11...
builtin:ctags@5.8-arduino11 installed
Downloading missing tool builtin:serial-discovery@1.0.0...
builtin:serial-discovery@1.0.0 downloaded
Installing builtin:serial-discovery@1.0.0...
builtin:serial-discovery@1.0.0 installed
Updating index: library_index.json downloaded
Updating index: package_index.json downloaded
Updating index: package_misfittech_index.json downloaded
```

Install Smart Stepper Board Support

```
#this may take up to 5 minutes
arduino-cli core install misfittech:samd
```

```
Downloading packages...
arduino:arm-none-eabi-gcc@4.8.3-2014q1 downloaded
arduino:bossac@1.6.1-arduino downloaded
arduino:openocd@0.9.0-arduino downloaded
arduino:CMSIS@4.0.0-atmel downloaded
misfittech:samd@1.0.0 downloaded
Installing arduino:arm-none-eabi-gcc@4.8.3-2014q1...
arduino:arm-none-eabi-gcc@4.8.3-2014q1 installed
Installing arduino:bossac@1.6.1-arduino...
arduino:bossac@1.6.1-arduino installed
```

```
Installing arduino:openocd@0.9.0-arduino...
arduino:openocd@0.9.0-arduino installed
Installing arduino:CMSIS@4.0.0-atmel...
arduino:CMSIS@4.0.0-atmel installed
Installing misfittech:samd@1.0.0...
Error during install: extracting archive: open /home/hangprintermanage/.arduino15/tmp/package-880721797: is a directory
```

This fails with error. You can fix it manually:

```
mkdir -p ~/.arduino15/packages/misfittech/hardware/samd/
cd ~/.arduino15/packages/misfittech/hardware/samd/
wget https://github.com/Misfittech/arduino-board-index/raw/master/boards/misfittech_samd-1.0.0.tar.bz2
tar jxf misfittech_samd-1.0.0.tar.bz2
rm misfittech_samd-1.0.0.tar.bz2
mv misfittech_samd-1.0.0/ 1.0.0/
```

Check if installed properly

```
arduino-cli core list
```

```
ID Installed Latest Name
misfittech:samd 1.0.0 1.0.0 MisfitTech SAMD Boards
```

For information only: get device list

Get the list of real /dev devices. The ttyUSB-SMART* are only symlinks

```
ls -l /dev/serial/by-id
ls -alF /dev |grep ttyUSB-SMART
python3.7 -m serial.tools.list_ports
arduino-cli board list #get the connected USB device
```

Compile and upload fresh .bin files to Smart Stepper devices

Do the following steps as the user who installed arduino and configured arduino-cli

```
mkdir -p /home/hangprintermanage/firmware_smartstepper_trikarus/stepper_nano_zero
#copy *.ino and sketch files into /home/hangprintermanage/stepper_nano_zero/

#at the top level of the directory
cd /home/hangprintermanage/firmware_smartstepper_trikarus/stepper_nano_zero/

#compile the sketch (get stepper_nano_zero.misfittech.samd.nano_zero.bin file)
arduino-cli compile --fqbn misfittech:samd:nano_zero

#upload the sketch - note that /dev/ttyUSB-SMART* symlinks do not work. You need the real tty
names. You can use readlink to find correct tty behind symlinks
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-A-AXIS) --fqbn misfittech:samd:nano_zero
&& sleep 4 && screen /dev/ttyUSB-SMART-A-AXIS
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-B-AXIS) --fqbn misfittech:samd:nano_zero
&& sleep 4 && screen /dev/ttyUSB-SMART-B-AXIS
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-C-AXIS) --fqbn misfittech:samd:nano_zero
&& sleep 4 && screen /dev/ttyUSB-SMART-C-AXIS
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-D-AXIS) --fqbn misfittech:samd:nano_zero
&& sleep 4 && screen /dev/ttyUSB-SMART-D-AXIS
```

More advanced compilation and upload with known calibration values

In case the Smart Steppers should not be moved it's a good idea to prevent Smart Steppers requiring re-calibration after new firmware upload. In this case you can compile with known values. Using the "getcal" command in Smart Stepper interface you can get the motor specific calibration values. Those values will be put in nonvolatile.cpp file on line 53 which is commented out in default mode.

You can also get the calibration values calling using the Python Serial parser described at [Smart Stepper - calibration and control modes \(sPID mode, pPID mode and torque mode\)](#)

```
python3.7 /opt/smartStepper.py --dev A --getcal
```

Typical calibration errors are around 0.1 degree or better. If your calibration is worse than this make sure your board is tightened down to motor on all four screws and run the calibration and test again. If the error is still high then you might want to check and make

sure magnet is glued to the shaft properly.

Do the following steps as the user who installed arduino and configured arduino-cli

```
cd /home/hangprintermanage/firmware_smartstepper_trikarus/stepper_nano_zero/

# Drive A - getcal: "Max error is 0.043 degrees"
sed -i
'53s/.*/18109,18426,18752,19066,19387,19714,20037,20353,20672,20994,21316,21632,21953,22278,22
600,22919,23239,23567,23892,24209,24532,24865,25188,25509,25839,26167,26496,26820,27151,27485,
27816,28135,28467,28801,29132,29456,29785,30118,30440,30763,31091,31420,31749,32069,32395,3272
8,33050,33368,33694,34024,34347,34669,34991,35320,35641,35959,36287,36615,36943,37263,37587,37
921,38247,38569,38897,39228,39561,39881,40213,40551,40881,41208,41540,41874,42214,42542,42874,
43212,43551,43878,44212,44549,44888,45215,45548,45882,46223,46550,46882,47209,47543,47872,4819
8,48527,48862,49181,49511,49837,50163,50483,50808,51135,51460,51778,52103,52428,52753,53073,53
393,53719,54044,54362,54682,55010,55336,55653,55980,56305,56628,56952,57275,57602,57931,58258,
58582,58911,59238,59567,59892,60221,60556,60878,61207,61541,61873,62201,62529,62861,63189,6351
3,63843,64175,64507,64827,65161,65486,283,603,935,1262,1589,1907,2237,2560,2889,3208,3535,3864
,4189,4510,4839,5166,5495,5821,6146,6480,6811,7134,7463,7801,8130,8461,8792,9129,9462,9795,101
29,10466,10802,11137,11470,11811,12149,12477,12813,13157,13490,13819,14154,14490,14823,15153,1
5479,15814,16145,16470,16794,17124,17452,17771,/' nonvolatile.cpp

arduino-cli compile --fqbn misfittech:samd:nano_zero
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-A-AXIS) --fqbn misfittech:samd:nano_zero
&& sleep 4 && screen /dev/ttyUSB-SMART-A-AXIS

# Drive B - getcal: "Max error is 0.049 degrees"
sed -i
'53s/.*/1007,1325,1650,1976,2315,2644,2973,3297,3630,3960,4289,4615,4947,5277,5610,5933,6264,6
596,6927,7250,7583,7914,8242,8569,8903,9233,9561,9889,10222,10552,10880,11206,11540,11867,1220
1,12525,12857,13190,13516,13841,14173,14502,14829,15151,15485,15812,16142,16466,16793,17122,17
452,17773,18101,18425,18755,19076,19405,19731,20061,20381,20711,21035,21363,21680,22010,22336,
22662,22984,23311,23638,23966,24285,24615,24940,25269,25588,25919,26247,26573,26895,27224,2755
0,27880,28202,28534,28862,29190,29516,29845,30175,30504,30826,31158,31488,31814,32137,32468,32
798,33122,33448,33779,34107,34428,34754,35087,35417,35744,36067,36398,36725,37054,37377,37709,
38036,38368,38687,39018,39345,39676,39998,40328,40659,40988,41313,41643,41974,42303,42625,4295
9,43288,43618,43943,44269,44603,44932,45261,45590,45921,46248,46572,46905,47232,47560,47882,48
213,48544,48873,49194,49523,49852,50178,50500,50825,51152,51481,51801,52130,52457,52780,53104,
53431,53760,54085,54404,54732,55059,55383,55707,56033,56359,56688,57010,57336,57664,57992,5831
6,58644,58969,59299,59624,59952,60280,60612,60934,61264,61595,61922,62248,62578,62906,63238,63
```

```
567,63895,64225,64551,64878,65211,7,340,660,/' nonvolatile.cpp
```

```
arduino-cli compile --fqbn misfittech:samd:nano_zero
```

```
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-B-AXIS) --fqbn misfittech:samd:nano_zero
```

```
&& sleep 4 && screen /dev/ttyUSB-SMART-B-AXIS
```

```
# Drive C - getcal: "Max error is 0.054 degrees"
```

```
sed -i
```

```
'53s/./25926,26245,26573,26897,27228,27554,27881,28211,28540,28873,29203,29526,29862,30191,30521,30849,31183,31513,31843,32169,32503,32832,33162,33486,33816,34143,34467,34789,35120,35444,35767,36091,36424,36753,37082,37408,37748,38078,38409,38735,39074,39405,39733,40056,40387,40713,41033,41351,41679,42002,42322,42641,42970,43296,43617,43939,44277,44605,44929,45255,45596,45925,46257,46582,46918,47246,47575,47898,48230,48557,48886,49203,49532,49860,50182,50505,50833,51157,51480,51801,52133,52458,52782,53100,53430,53751,54070,54383,54706,55023,55339,55651,55972,56291,56608,56918,57242,57560,57877,58192,58521,58843,59169,59487,59816,60140,60464,60785,61120,61442,61771,62095,62428,62758,63086,63417,63753,64082,64413,64742,65077,65407,204,530,866,1196,1524,1851,2185,2515,2840,3163,3496,3822,4150,4471,4807,5133,5460,5785,6120,6446,6780,7106,7443,7776,8106,8431,8769,9097,9429,9749,10087,10417,10746,11077,11409,11741,12073,12399,12740,13070,13402,13728,14067,14399,14732,15059,15398,15734,16067,16397,16734,17068,17401,17729,18069,18395,18726,19048,19385,19716,20045,20371,20705,21032,21361,21685,22016,22345,22673,22994,23329,23654,23980,24301,24632,24954,25281,25601,/' nonvolatile.cpp
```

```
arduino-cli compile --fqbn misfittech:samd:nano_zero
```

```
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-C-AXIS) --fqbn misfittech:samd:nano_zero
```

```
&& sleep 4 && screen /dev/ttyUSB-SMART-C-AXIS
```

```
# Drive D - getcal: "Max error is 0.054 degrees"
```

```
sed -i
```

```
'53s/./2426,2760,3087,3420,3742,4077,4401,4728,5054,5384,5708,6030,6352,6681,6997,7317,7635,7957,8271,8592,8909,9233,9555,9878,10202,10528,10864,11192,11523,11857,12187,12518,12851,13180,13519,13841,14174,14501,14833,15165,15493,15831,16159,16490,16818,17145,17481,17818,18148,18466,18796,19116,19445,19769,20099,20414,20735,21050,21370,21686,21999,22315,22628,22934,23245,23558,23867,24183,24491,24809,25126,25441,25760,26082,26404,26725,27048,27380,27705,28030,28358,28695,29020,29349,29682,30014,30346,30680,31016,31350,31674,32002,32337,32674,33006,33337,33670,34005,34334,34662,35001,35334,35663,35993,36319,36650,36972,37298,37619,37944,38269,38590,38912,39240,39559,39882,40204,40530,40855,41180,41504,41836,42160,42491,42818,43156,43478,43813,44144,44476,44809,45140,45472,45805,46135,46466,46797,47137,47472,47789,48116,48449,48780,49107,49436,49769,50099,50422,50748,51071,51399,51734,52057,52392,52713,53039,53360,53693,54018,54345,54667,55001,55320,55646,55973,56302,56627,56956,57279,57610,57936,58265,58585,58913,59239,59564,59889,60218,60546,60878,61207,61544,61875,62214,62541,62882,63218,63561,63896,64237,6457
```

```
7,64920,65252,65,404,741,1076,1408,1743,2081,/' nonvolatile.cpp
arduino-cli compile --fqbn misfittech:samd:nano_zero
arduino-cli upload -p $(readlink -f /dev/ttyUSB-SMART-D-AXIS) --fqbn misfittech:samd:nano_zero
&& sleep 4 && screen /dev/ttyUSB-SMART-D-AXIS

#reset the original nonvolatile.cpp file to prevent uploading wrong calibration values to some
Smart Stepper at some point
sed -i '53s/.*/ /' nonvolatile.cpp
```

Working with the smart steppers over a long time it's possible that you need to recalibrate at a later point to reduce the error. A higher error can be caused by different physical triggers like temperature / climate change at the place where the components are installed to.

Re-apply your custom motor settings

After flashing previous values get lost like maxcurrent and holdcurrent.

Run **/opt/sms_modes/sms_preconfigure.sh** to set them again. Please see [Smart Stepper - calibration and control modes \(sPID mode, pPID mode and torque mode\)](#)

Or upload pre-compiled *.bin files to Smart Stepper devices

this requires the bossac command. This command comes from misfittech package! no need to install the package "bossa".

```
#set the Smart Steppers into boot loader mode by sending "boot" command. Therefore open some
screen terminal for each smart stepper
screen /dev/ttyACM1
screen /dev/ttyACM2
screen /dev/ttyACM3
screen /dev/ttyACM4

cd /home/hangprintermanage/firmware_smartstepper_trikarus/stepper_nano_zero/
~/arduino15/packages/arduino/tools/bossac/1.6.1-arduino/bossac -i -d --port=ttyACM1 -U true -
i -e -w -v ./stepper_nano_zero.misfittech.samd.nano_zero.bin -R
~/arduino15/packages/arduino/tools/bossac/1.6.1-arduino/bossac -i -d --port=ttyACM2 -U true -
```

```
i -e -w -v ./stepper_nano_zero.misfittech.samd.nano_zero.bin -R
~/arduino15/packages/arduino/tools/bossac/1.6.1-arduino/bossac -i -d --port=ttyACM3 -U true -
i -e -w -v ./stepper_nano_zero.misfittech.samd.nano_zero.bin -R
~/arduino15/packages/arduino/tools/bossac/1.6.1-arduino/bossac -i -d --port=ttyACM4 -U true -
i -e -w -v ./stepper_nano_zero.misfittech.samd.nano_zero.bin -R
```

Version #2

Erstellt: 2026-06-08 15:43:36 CEST von Mario Voigt

Zuletzt aktualisiert: 2026-06-08 15:47:32 CEST von Mario Voigt