

# New API tools and features

## Preliminary considerations

The tools used for configuring the board are the same as usual, i.e.

- qbadmin
- qbparam

Since the number of parameters has increased and new commands have been created, these tools have been expanded:

- qbadmin handles also new commands: -r, -A, -E, -S, -X
- qbparam parameters list view has been reorganized with new tool nmml\_param
- nmml\_param\_imu has been added to configure connected IMUs

# New API tools and features

## New qbadmin commands

- Specific for SoftHand Pro device
  - **qbadmin -r**: print information about cycles counters and usage of the SoftHand
  - **qbadmin -S**: get the current two open files on the SD card (if configured and enabled) with the list of current parameters and recorded data
  - **qbadmin -X**: store the filesystem of the SD card (if configured and enabled) in a local folder
- Only for Generic FW configurations
  - **qbadmin -A**: raw reading of ADC channels on the board as configured with “*ADC channel []*” parameters
  - **qbadmin -E**: raw reading of connected Encoders as configured with “*Read enc raw line*” parameters

# New API tools and features

## nmmi\_param tool

It works in the same way as qbparam tool, but it is organized in sections.  
It is possible only to access specific sections without viewing all the parameters list.

Usage: *nmmi\_param.exe ID section\_identifier*

| Parameters Section | Identifier           |
|--------------------|----------------------|
| Device             | 'dev' or 'device'    |
| Motor              | 'mot' or 'motor'     |
| Encoder            | 'enc' or 'encoder'   |
| EMG                | 'emg'                |
| IMU                | 'imu'                |
| Expansion port     | 'exp' or 'expansion' |
| User               | 'usr' or 'user'      |
| SoftHand           | 'SH' or 'softhand'   |
| Master             | 'MS' or 'master'     |
| Feedback           | 'FB' or 'feedback'   |
| Wrist              | 'WR' or 'wrist'      |
| Joystick           | 'JOY' or 'joystick'  |
| All parameters     | 'all'                |

```
Device parameters:
1) GENERAL DEVICE PARAMETERS
1 - Device ID: 1
2 - Date of maintenance [D/M/Y]: 24 5 19
3 - Hand side: Right
4 - Reset counters: NO
5 - User ID: GENERIC USER
6 - Use second motor: OFF
7 - Device type: GENERIC 2 MOTORS

2) MOTOR 1 PARAMETERS
1 - Position PID [P, I, D]: 0.016495 0.000000 0.006989
2 - Current PID [P, I, D]: 1.000000 0.000992 0.000000
3 - Startup Activation: YES
4 - Input mode: Usb
5 - Control mode: Position
6 - Pos. limit active: YES
7 - Pos. limits [inf, sup]: 0 19000
8 - Max steps [neg, pos]: 0 0
9 - Current limit: 1500
10 - PWM rescaling: NO
11 - Current lookup: 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
12 - Associated encoder line: 0
13 - Driver type: MC33887 (Standard)
14 - PWM rate limiter: 1
15 - Not reversible: NO

3) MOTOR 2 PARAMETERS
1 - Position PID [P, I, D]: 0.016495 0.000000 0.006989
2 - Current PID [P, I, D]: 1.000000 0.000992 0.000000
3 - Startup Activation: YES
4 - Input mode: Usb
5 - Control mode: Position
6 - Pos. limit active: YES
7 - Pos. limits [inf, sup]: 0 19000
8 - Max steps [neg, pos]: 0 0
9 - Current limit: 1500
10 - PWM rescaling: NO
11 - Current lookup: 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
12 - Associated encoder line: 1
13 - Driver type: MC33887 (Standard)
14 - PWM rate limiter: 3
15 - Not reversible: NO

4) ENCODER 0 (RIGHT SIDE) PARAMETERS
1 - Resolutions: 3 3 3
2 - Measurement Offsets: 0 0 0
3 - Multipliers: 1.000000 1.000000 1.000000
4 - Absolute encoder position: NO
5 - Motor handle ratio: 22
6 - Enc idx used for control: 0 1 2
7 - Gear params[N1, N2, I1]: 15 14 1
8 - Read enc raw line 0:

5) ENCODER 1 (LEFT SIDE) PARAMETERS
1 - Resolutions: 3 3 3
2 - Measurement Offsets: 0 0 0
3 - Multipliers: 1.000000 1.000000 1.000000
4 - Absolute encoder position: NO
5 - Motor handle ratio: 22
6 - Enc idx used for control: 0 1 2
7 - Gear params[N1, N2, I1]: 15 14 1
8 - Read enc raw line 1:

6) EMG PARAMETERS
1 - EMG thresholds: 200 200
2 - EMG calibration on startup: NO
3 - EMG max values: 1024 1024
4 - EMG max speed: 100
5 - EMG inversion: NO

7) IMU PARAMETERS
1 - Read IMUs: OFF
2 - SPI read delay (IMU): Low
3 - On board IMU conf. [a,g,m,q,t]: 1 1 0 0 0

8) EXPANSION PORT PARAMETERS
1 - Read Expansion port: None
2 - Last checked Time [D/M/Y H:M:S]: 1 2 3 4 5 6
3 - Read additional ADC port: OFF
4 - ADC channel [1-6]: 0 0 0 0 0 0
5 - ADC channel [7-12]: 0 0 0 0 0 0

9) USER 0 PARAMETERS
1 - User code: GEN001

10) SOFTHAND SPECIFIC PARAMETERS
1 - Rest position: 7000
2 - Rest position time delay (ms): 10
3 - Rest vel closure (ticks/sec): 10000
4 - Rest position enabled: NO
```

Values: - SOFTHAND PRO  
- GENERIC 2 MOTORS

(FUTURE IMPLEMENTATION)  
CUFF, STRETCHPRO, MASTER,  
HANDLINO, etc..

```

1) GENERAL DEVICE PARAMETERS
1 - Device ID: 1
2 - Date of maintenance [D/M/Y]: 24 5 19
3 - Hand side: Left
4 - Reset counters: NO
5 - User ID: GENERIC USER

2) MOTOR 1 PARAMETERS
1 - Position PID [P, I, D]: 0.016495 0.000000 0.006989
2 - Current PID [P, I, D]: 1.000000 0.000992 0.000000
3 - Startup Activation: YES
4 - Input mode: Usb
5 - Control mode: Position
6 - Pos. limit active: YES
7 - Pos. limits [inf, sup]: 0 16000
8 - Max steps [neg, pos]: 0 0
9 - Current limit: 1500
10 - PWM rescaling: NO
11 - Current lookup: 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000

3) ENCODER 1 (LEFT SIDE) PARAMETERS
1 - Resolutions: 3 3 3
2 - Measurement Offsets: 0 0 0
3 - Multipliers: 1.000000 1.000000 1.000000
4 - Absolute encoder position: YES
5 - Motor handle ratio: 22

4) EMG PARAMETERS
1 - EMG thresholds: 200 200
2 - EMG calibration on startup: NO
3 - EMG max values: 1024 1024
4 - EMG max speed: 100
5 - EMG inversion: NO

5) IMU PARAMETERS
1 - Read IMUs: OFF
2 - SPI read delay (IMU): None
3 - On board IMU conf. [a,g,m,q,t]: 1 1 0 0 0

6) EXPANSION PORT PARAMETERS
1 - Read Expansion port: None
2 - Last checked Time [D/M/Y H:M:S]: 1 2 3 4 5 6

7) USER 0 PARAMETERS
1 - User code: USR001

8) SOFTHAND SPECIFIC PARAMETERS
1 - Rest position: 7000
2 - Rest position time delay (ms): 10
3 - Rest vel closure (ticks/sec): 10000
4 - Rest position enabled: NO

```

# nmimi\_param tool for SoftHand Pro device

New PSoC5 FW parameters:

Hand side: [ Right / Left ]

User ID: (when changed, retrieve previously stored EMG parameters and User code)

- Generic User
- Other known users



Read IMUs: enables on board IMU reading

Read Expansion port: enables SD card saving

Last checked Time: used to configure date of RTC

User code: 6 characters string to identify SD folder where to save user usage data

Note: some parameters change need a board reset (reported in related menu, it occurs automatically)

# New API tools and features

nmmi\_param\_imu tool

It can be used for both PSoC5 or STM32 boards firmware.

It gives information on IMUs connected to the board and can get or set parameters on all the connected IMU.

e.g. IMU 3 configuration: 1 1 0 0 0

it means you want to read

- accelerometers [1]
- gyroscopes [1]

but you are not interested to

- magnetometers [0]
- quaternions [0]
- temperature [0]

```
Device parameters:
Number of connected IMUs: 3
Port 0 ID: - - -
Port 1 ID: 3 - -
Port 2 ID: 6 - -
Port 3 ID: - - -
Port 4 ID: - - -
Port 5 ID: - - -
Port 6 ID: 18 - -
Mag cal parameters: 176 176 165 181 182 170
Mag cal parameters: 185 186 175
11 - Device ID: 2
12 - IMU 3 configuration: 1 1 0 0 0
13 - IMU 6 configuration: 1 1 0 0 0
14 - IMU 18 configuration: 1 1 0 0 0
15 - SPI read delay: None
```