SilF4ware

- RCGroups thread
- Github Repository

Hardware

Receiver

NRF24

The mini module is the lightest option (~0.5g) and is recommended for micro quads. The module with PA+LNA (GT-24) provides a bigger range, but weight (~1.1g) and power consumption is higher.

Mini

It can be found using “nrf24l01 mini” as search term (Banggood). For adding a wire antenna, see this post.

Pin	Function
1	VCC (needs to be bridged with CE)
2	GND
3	CE (needs to be bridged with VCC)
4	CSN
5	SCK
6	MOSI
7	MISO
8	IRQ (not used)

PA LNA (GT-24)

It can be found with “GT-24” as search term (Banggood). For adding an U.FL antenna, see this post.

XN297

- Can be harvested from toy transmitters like H101, H8, ...
- DIY PCB
- There is a XN297L module commercially available (Banggood), but no one has tested it yet.

Flight Controller

Omnibus

It lacks a BOOT button, but the LRD gesture can be used to switch it into DFU mode.

See SilF4ware/STM32F405 Omnibus/board_pinout.jpg

Omnibus	**NRF24 Mini**
3.3V	VCC (bridge with CE)
GND	GND
	CE (bridge with VCC)
SBUS_PPM	CSN
LED_STRIP	SCK
TX1	MOSI
RX1 (DSM)	MISO
	IRQ

NOX

See SilF4ware/STM32F411 NOXE/board_pinout.jpg

NOX	**NRF24 Mini**
3.3V	VCC (bridge with CE)
GND	GND
	CE (bridge with VCC)
NSS A15	CSN
CLK B03	SCK
MOSI B05	MOSI
MISO B04	MISO
	IRQ

NOX v1

Basic Configuration

Main configuration is done in SilF4ware/config.h.

Receiver

The default configuration is setup for NRF24 modules. If using a NRF24 module with PA LNA, it is recommended to adjust TX_POWER in SilF4ware/config.h:

```
#define TX_POWER 1 // 0 .. 3 (use 1 when using an nRF24L01 PA LNA module)
```

If using a XN297 module, see radio_config.txt file for configuration notes.

Battery Cell Count

Default setup is configured for 4S batteries. Make sure to adjust CELL_COUNT_UNSCALED in SilF4ware/battery.c if needed. As an example, for a 2S setup:

```
#define CELL_COUNT_UNSCALED 2 // Voltage divider, idle_offset, and PID
values tuned for 4S.
```

Dshot

Default setup is configured for using Dshot 300+RPM Filter. If using RPM Filter, the number of magnets on the motor bell needs to be configured correctly in SilF4ware/drv_dshot_bidir.c:

```
#define MOTOR_POLE_COUNT 14 // usually on 22xx motors and above
// #define MOTOR_POLE_COUNT 12 // usually on 18xx motors and below
```

If using conventional D-Shot, adjust SilF4ware/hardware.h:

```
#define DSHOT_DMA_BIDIR // needed for RPM_FILTER, 4k loop frequency max
// #define DSHOT_DMA_DRIVER // conventional Dshot, consumes less cycles,
works for 8k loop frequency
// #define DSHOT_DRIVER // delay version
```

2D/3D Flying

3D flying is enabled by default. If using a 2D setup, following changes are needed:

In the main config file (config.h):

```
//#define INVERTED_ENABLE
#define FN_INVERTED CH_OFF
//#define LEVEL_MODE_INVERTED_ENABLE // be careful when enabling this
```

In the dshot configuration file (when using RPM Filter: drv_dshot_bidir.c):

```
// Enable this for 3D. The 'Motor Direction' setting in BLHeliSuite must be
set to 'Bidirectional' (or 'Bidirectional Rev.') accordingly:
//#define BIDIRECTIONAL
```

Misc

- Props out configuration is enabled by default (comment INVERT_YAW_PID to disable it)
- Default rates are very high, adjust them if needed
- PID configuration for acro mode is done in SilF4ware/pid.c and for level mode in SilF4ware/angle_pid.c

Advanced Features

Analog Aux Channels

The variables aux_analog[0] and aux_analog[1] hold a value between 0.0 and 2.0 which can be used in various places in the code. Per default they are used to tweak Kp and Kd respectively. This is done in SilF4ware/pid.c:

```
#define AA_pidkp ( x <2 ? pdScaleValue * aux_analog[ 0 ] : 1.0f ) // Scale
Kp and Kd only for roll and pitch.
#define AA_pidki 1.0f
#define AA_pidkd ( x <2 ? pdScaleValue * aux_analog[ 1 ] : 1.0f ) // Scale
Kp and Kd only for roll and pitch.
```

If you want to use them for something else, change the define for AA_pidkp and AA_pidkd to look similar to the one for AA_pidki:

```
#define AA_pidkp 1.0f
#define AA_pidki 1.0f
#define AA_pidkd 1.0f
```

Now you could use aux_analog[0] and aux_analog[1] for example to tune the filter frequency by adding it to config.h like this:

```
#define GYRO_LPF_2ND_HZ_BASE 400 * aux_analog[ 0 ]
#define GYRO_LPF_2ND_HZ_MAX 400 * aux_analog[ 1 ]
```

(Original post)

Blackbox Logging

Blackbox logging is possible with an external logging device. See details here

Using

Gestures

- PID Tuning: some gestures have been swapped in comparison to other silverware branches: UDD switches to the next column and UDU to the next row
- LRU: reboot flight controller (nice when otherwise one would unplug and replug the battery)
- LRD: switch to DFU mode (nice if the BOOT button is mechanically hard to reach after installing the FC into a quad)

Motors test mode

With default setup, when using LLU stick gesture (Left, Left, Up) SilF4ware switches into motor test mode (MOTORS_TO_THROTTLE). It can be used to verify that the configured motor order is correct, but also to check for bad/noisy props.

In motor test mode, push the stick in the corresponding direction, e.g. left up will make the motor spin which is configured as front left.

LLD stick gesture (Left, Left, Down) turns this mode off again.

If you are used to other silverware branches, please note that with SilF4ware it is not needed to adjust the idle offset to make sure that only one motor spins.

Devo TX

A Devo 7E build and model file which is able to display PID values can be found in this post. Note that it will only display PIDs set via gestures, not when set via analog aux channels.

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