Application of TF series Lidar in F4

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Content

1 Document Instruction

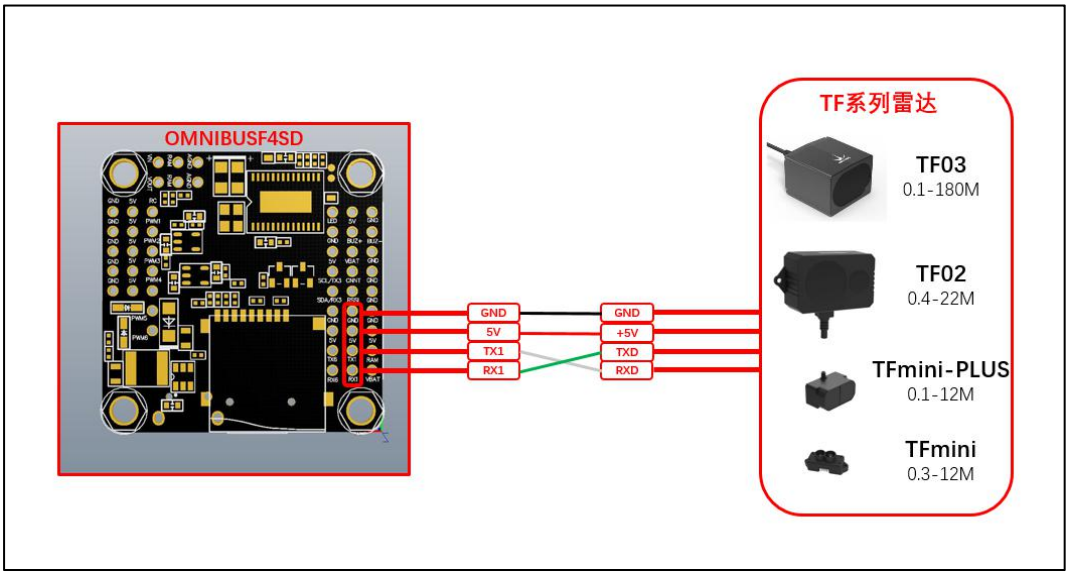
Barometer as the main sensor components height measurement of flight control, although meet the fixed high need of most of the time, but the accuracy is poor, especially in the top flight, such as automatic take-off and landing, it is difficult to ensure the accuracy of pressure data in order to realize high precision range fixed high (terrain model), auxiliary automatic land and take off (especially the fixed wing aircraft), And functions such as obstacle avoidance, which can be used with TF Lidar connected to F4.

This document describes how to establish communication with F4 using TF Lidar. The TF Lidar will act as a rangefinder and will be displayed in the SONAR sensor options of the F4.

2 Device and Wiring

TF series Lidar include TF03, TF02, TFMini-Plus and TFmini-S. They all have the UART interface mode, which can be directly welded to F4 and need to occupy a UART interface of F4. When connecting cables, note that the sequence corresponds to TX-Rx and RX-TX.

Taking OMNIBUSF4 SD as an example, it occupies the UART1 interface. The following figure shows the wiring sequence of the device.



3 Ground Station and F4 firmware

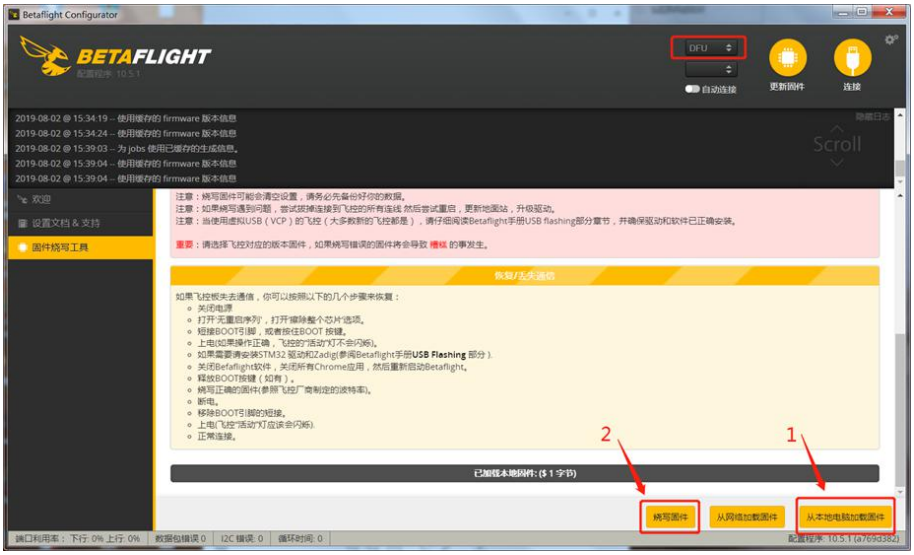
The communication between TF Lidar and F4 needs to be configured by ground station, and the corresponding F4 firmware version that can support communication needs to be fired. Next, the Betaflight and INAV ground station will be introduced for demonstration.

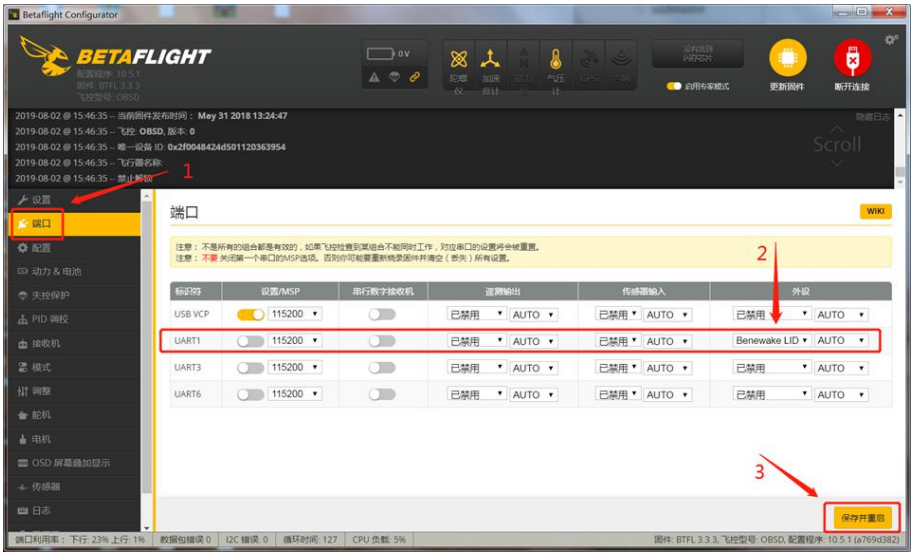
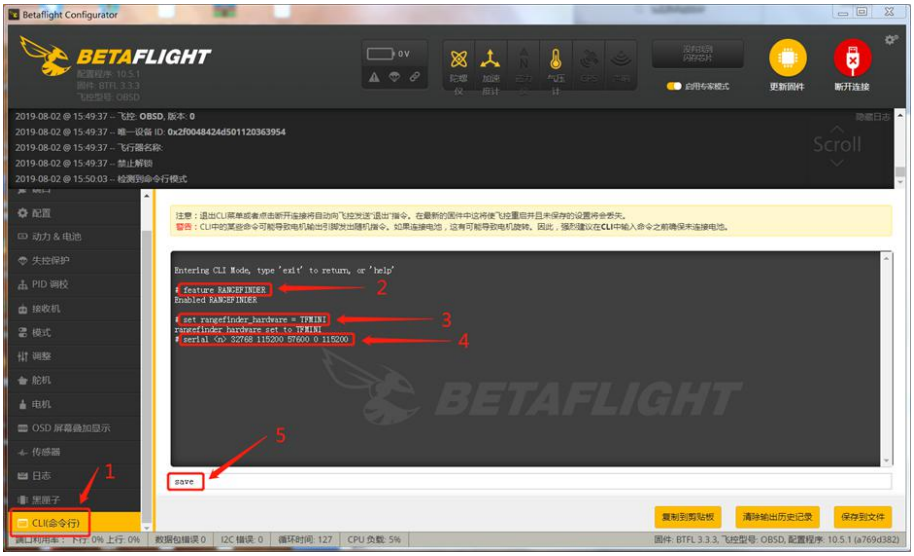
Ground Station	Firmware versions are supported	Download Link
BF	3.3.2 3.3.3	https://github.com/betaflight/betaflight/releases
CF	2.3.2	https://github.com/cleanflight/cleanflight/releases
INAV	2.2.0 2.2.1	https://github.com/iNavFlight/inav/releases

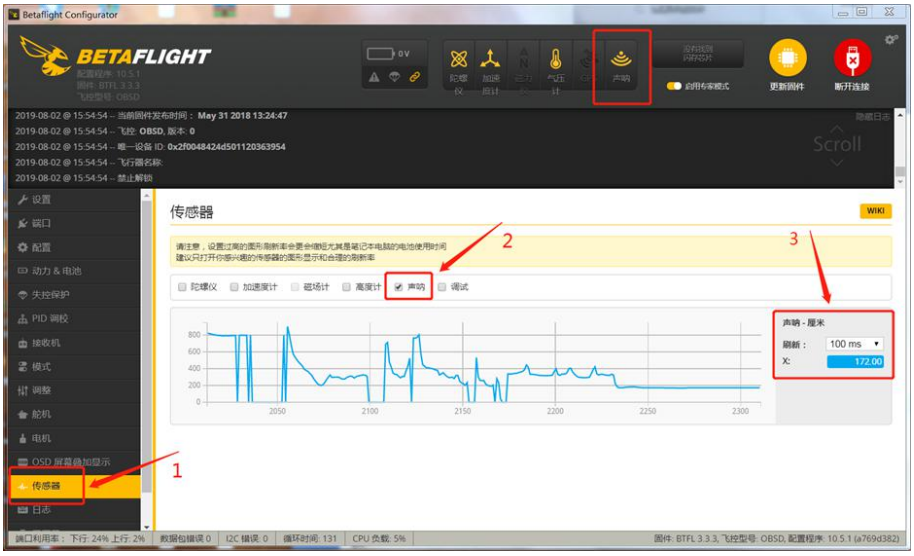
To ensure full functionality, please use the latest version of the ground station.

4 Betaflight Configuration

Take the F4 flight control model as OMNIBUSF4 SD for example. The steps are as follows:

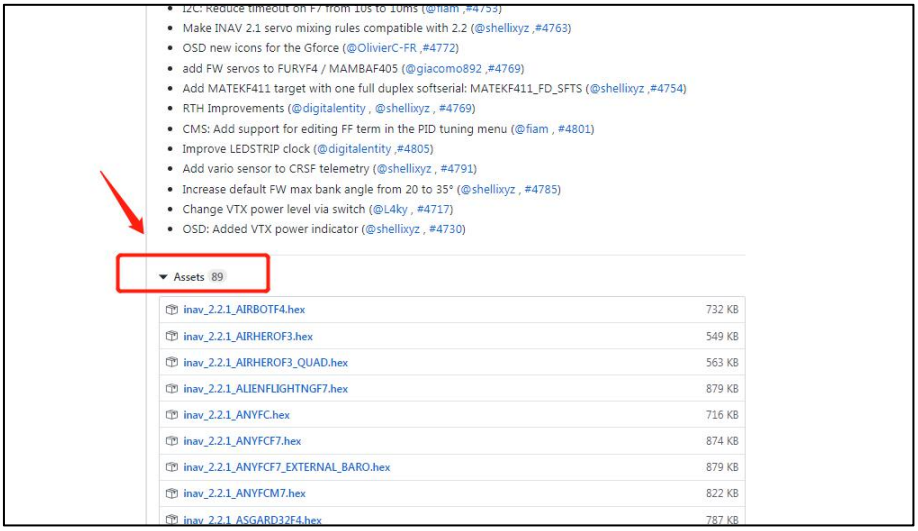
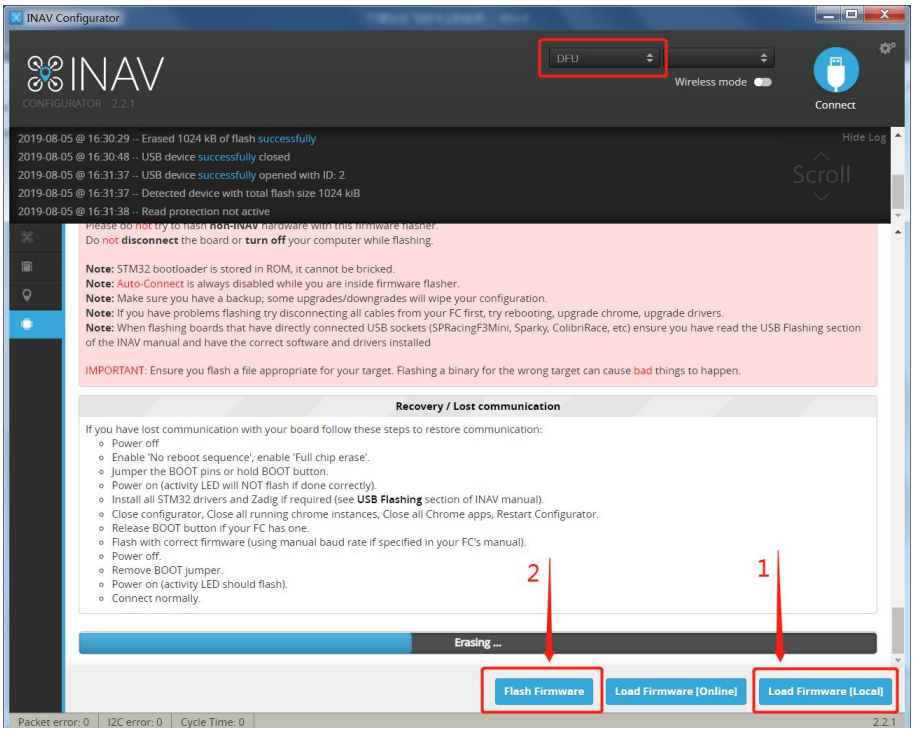
Steps	Content
①	Go to the website to download the related F4 firmware 
②	Burn the downloaded firmware into F4 flight control 

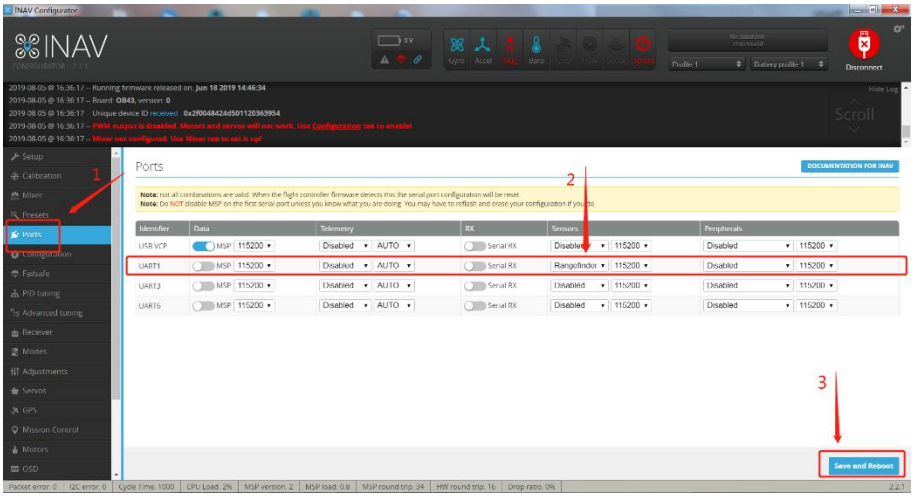
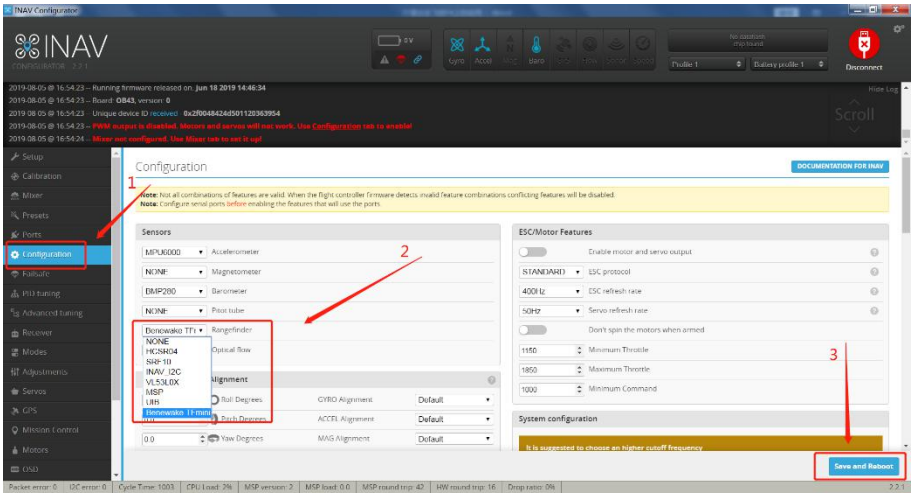
③	After burning, connect to the "port" option, find the UART port connected to the TF Lidar, select "Benewake LIDAR" in the "peripheral", and finally click "Save and restart". 
④	Open the CLI(Command line) and run the following commands: feature RANGEFINDER set rangefinder_hardware = TFMINI serial <n> 32768 115200 57600 0 115200 save  **Note** : There are protocols of TFMINI and TF02 in the firmware source code, so the command sending of different TF Lidars corresponds to the following: TFmini-S, TFmini-Plus, TF03— set rangefinder_hardware = TFMINI TF02— set rangefinder_hardware = TF02

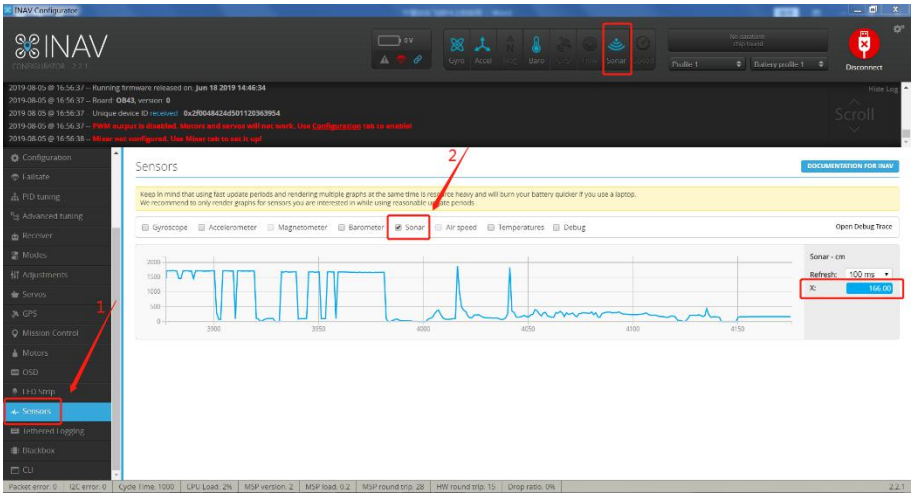
	The distance varies according to the Settings. You can modify the firmware source code to customize the Settings. The 'n' in serial <n> is the identifier of port, for example ,"UART1"means serial <1>
⑤	Enter the "sensor" option, check the "sonar", you can see the distance display. 

5 Inavflight Configuration

Ground station: INAV. The F4 flight control model used is OMNIBUSF4 V3. The steps are as follows:

Step	Content
①	Go to the website to download the related F4 firmware 
②	Burn the downloaded firmware into F4 flight control 

③	After burning, connect to "Ports", find the UART port connected to TF Lidar, select "Rangefinder" in "Sensors", and click "Save and Reboot". 
④	After the Reboot, go to the "Configuration" option, select "Benewake TFmini" in the "Rangefinder", and finally click "Save and Reboot". Note: TFmini-S, TFMini-Plus and TF02 are applicable. 

⑥	Enter "Sensors" option, check "Sonar",then can see the distance display. 

6 Cautions

① TF Lidar should be the factory default serial mode

② The serial port of F4 flight control terminal shall not be occupied by other peripherals such as receiver

③ F4 flight control should be placed horizontally, otherwise will show "-1"

④ In BF and CF source code, there are "TFMINI" and "TF02" two protocols,

Protocol	Applicable TF Lidar
″TFMINI″	TFmini-S、TFmini-Plus、TF02、TF03
″TF02″	TFmini-Plus、TF02

⑤ TF03 cannot be used in INAV