Serial Hardware

Synerduino STM

VERSIONS: F405, F411, H743

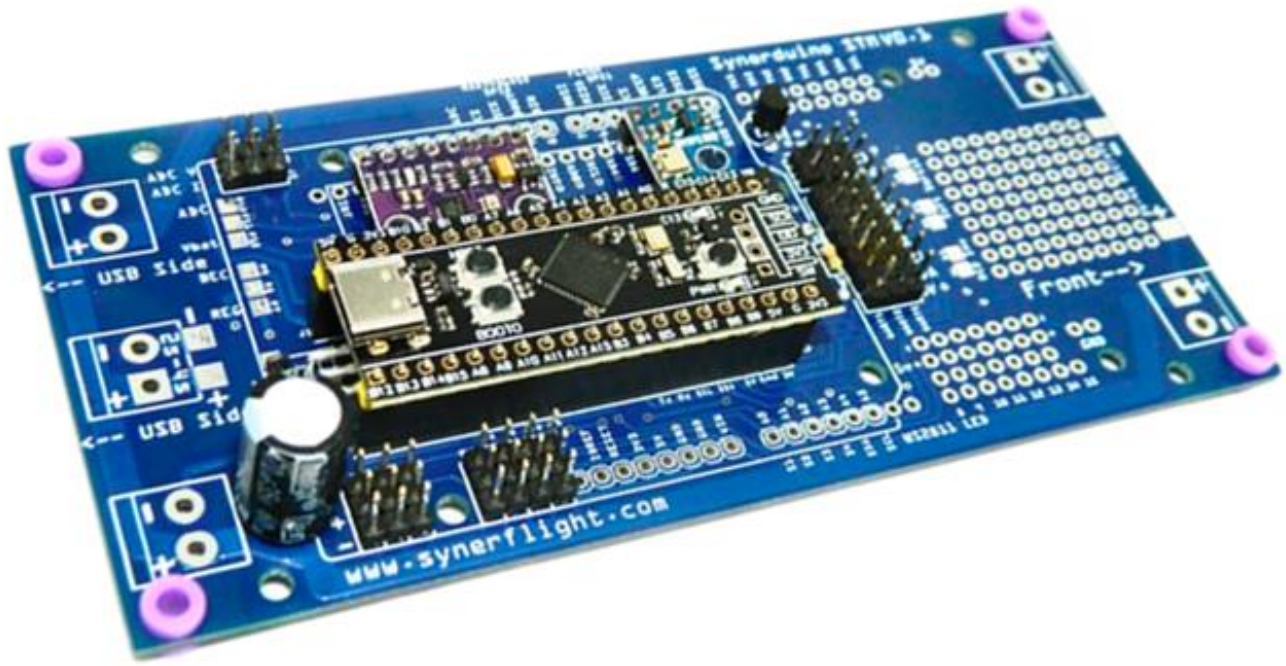
For more Information:
www.synerflight.com

INTRODUCTION

This is where you install your

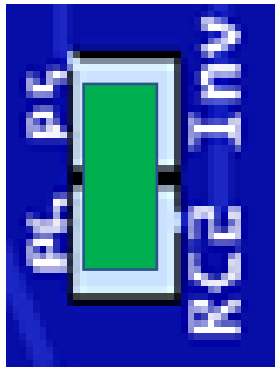
- Serial Devices
- RC Receivers

This guide shows the layout of installation process



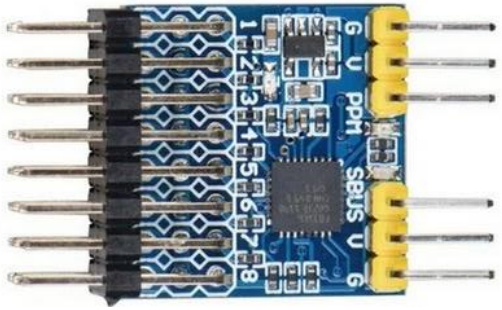
RECEIVER TYPES

PPM AND PWM RECEIVER



The Invert Pads are only Present in the F411 boards .

F405 and H743 boards does a way with this by Connecting to RC2



PWM/PPM/SBUS CONVERTER

For those who Uses PWM or PPM Receiver Require to add an Additional PWM/PPM/SBUS Converter and connect it to RC2 to Reciver

SERIAL RECEIVER

SBUS RECEIVER

ELRS 2.4G Receiver

IBUS RECEIVER

GPS

Ensure the Pins are installed correctly according to the Layout Gnd, TX-RX, RX-TX, V+,

220 GPS modules
This model only outputs UART data

1 2 3 4

UART4
3V / 5V
Gnd
RX
TX

I2C
SDA
SCL

PIN	PIN Name	I/O	Description
1	SDA	O	Compass SDA
2	GND	G	Ground
3	TX	O	Serial Data Output.
4	RX	I	Serial Data input.
5	VCC	I	DC 3.6V~ 5.5V supply input,Typical: 5.0V
6	SCL	I	Compass SCL

123456

Antenna pad side up

Pin Description:

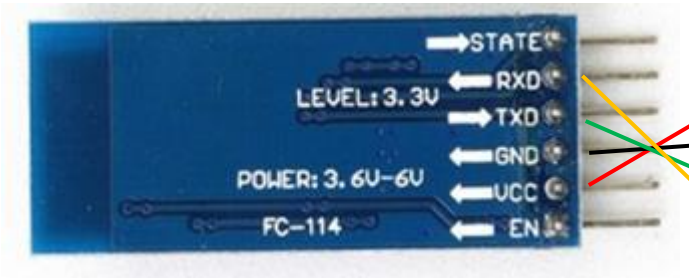
UART4
3V / 5V
Gnd
RX
TX

PIN	PIN Name	I/O	Description
1	GND	G	Ground
2	TX	O	Serial Data Output.
3	RX	I	Serial Data Input.
4	VCC	I	DC 3.6V - 5.5V supply input,Typical: 5.0V

880 GPS modules
This usually comes with a Mag depending on the model pls refer to the GPS manual
HMC5883 , QMC 5883 , QMC5883P . Check orientation of mag require alignment
Onboard Mag need to be disconnected

More Details at GPS Doc

TELEMETRY



UART1

UART1
3V / 5V
Gnd
RX
TX

Bluetooth

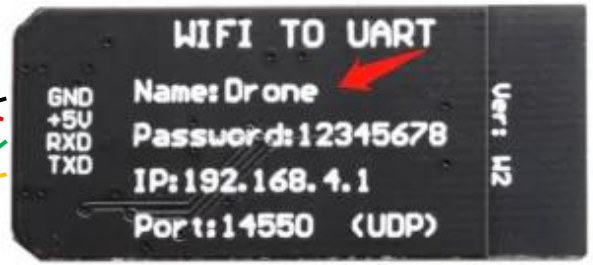
UART1

UART1
3V / 5V
Gnd
RX
TX

SIK Serial Radio

UART1

UART1
3V / 5V
Gnd
RX
TX



WIFI / ESP32

UART1

UART1
3V / 5V
Gnd
RX
TX

LORA

More Details at Telemetry Doc

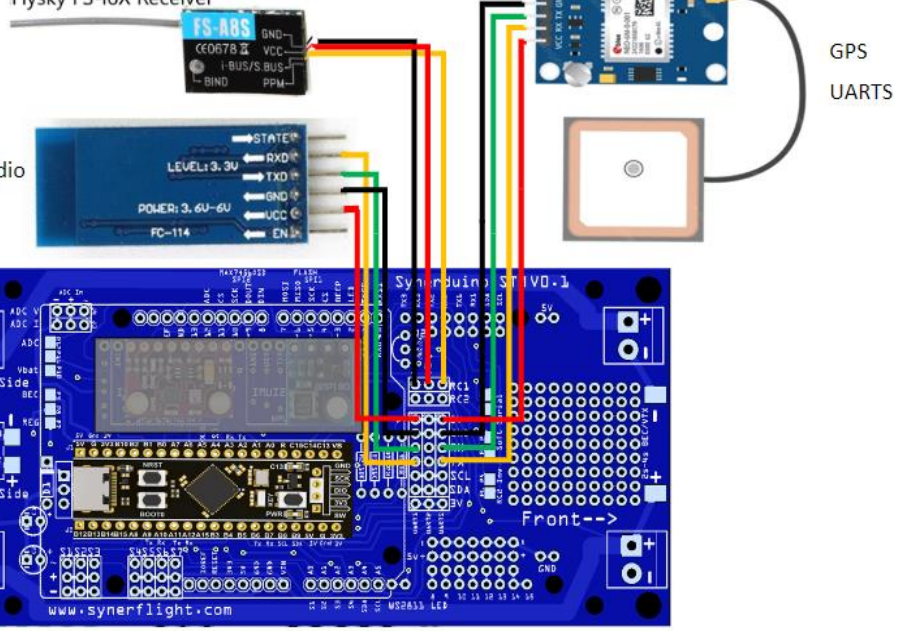
F411 RC RECEIVER & UARTS

UART Serial Devices

AS if INAV5 and INAV6 its Required Receiver supports SBUS Serial

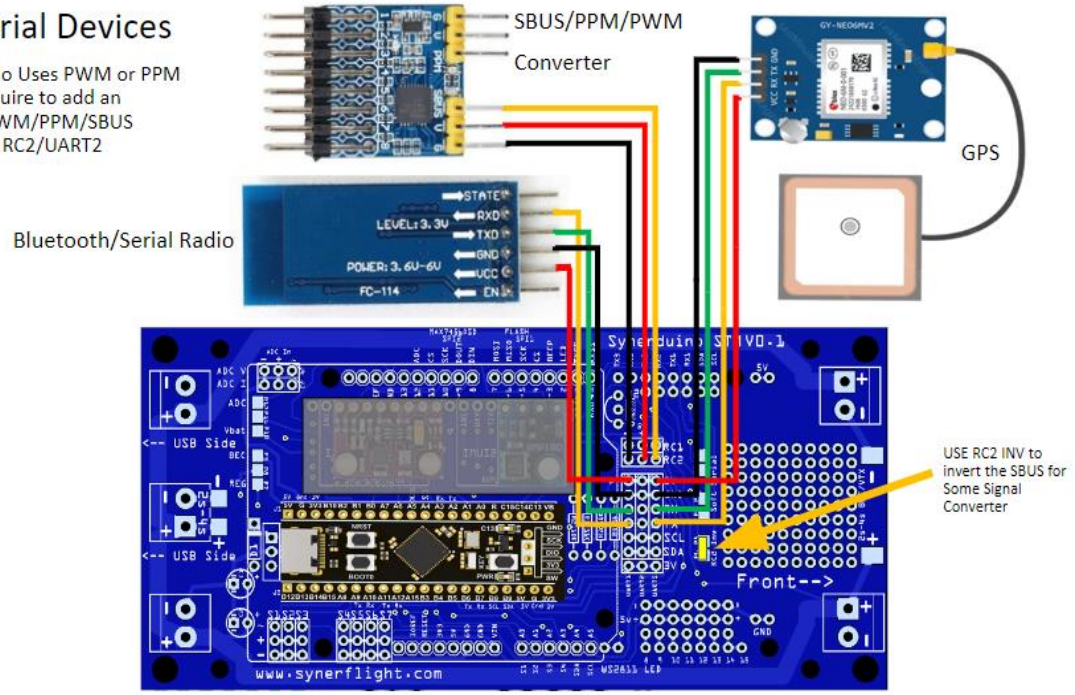
Receiver : Connect to RC1 / UART2

Flysky FS-i6X Receiver



UART Serial Devices

For those who Uses PWM or PPM Receiver Require to add an Additional PWM/PPM/SBUS Converter to RC2/UART2



F405 RC RECEIVER & UARTS

ELRS 2.4G Receiver

UART2

FS-i6X Receiver

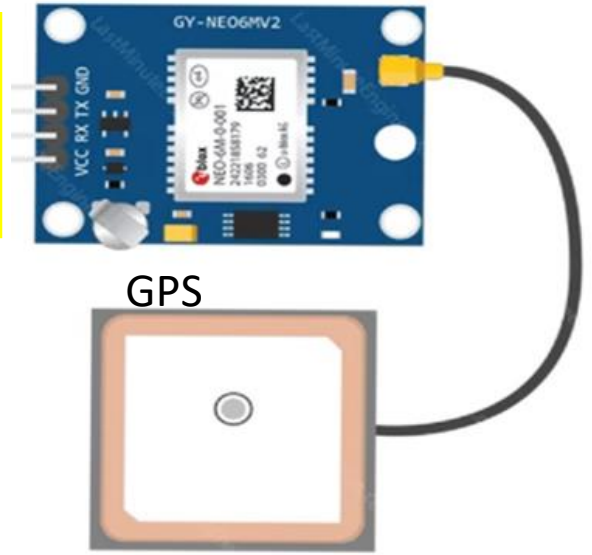
RC1

Receiver : Connect to RC1 / UART2

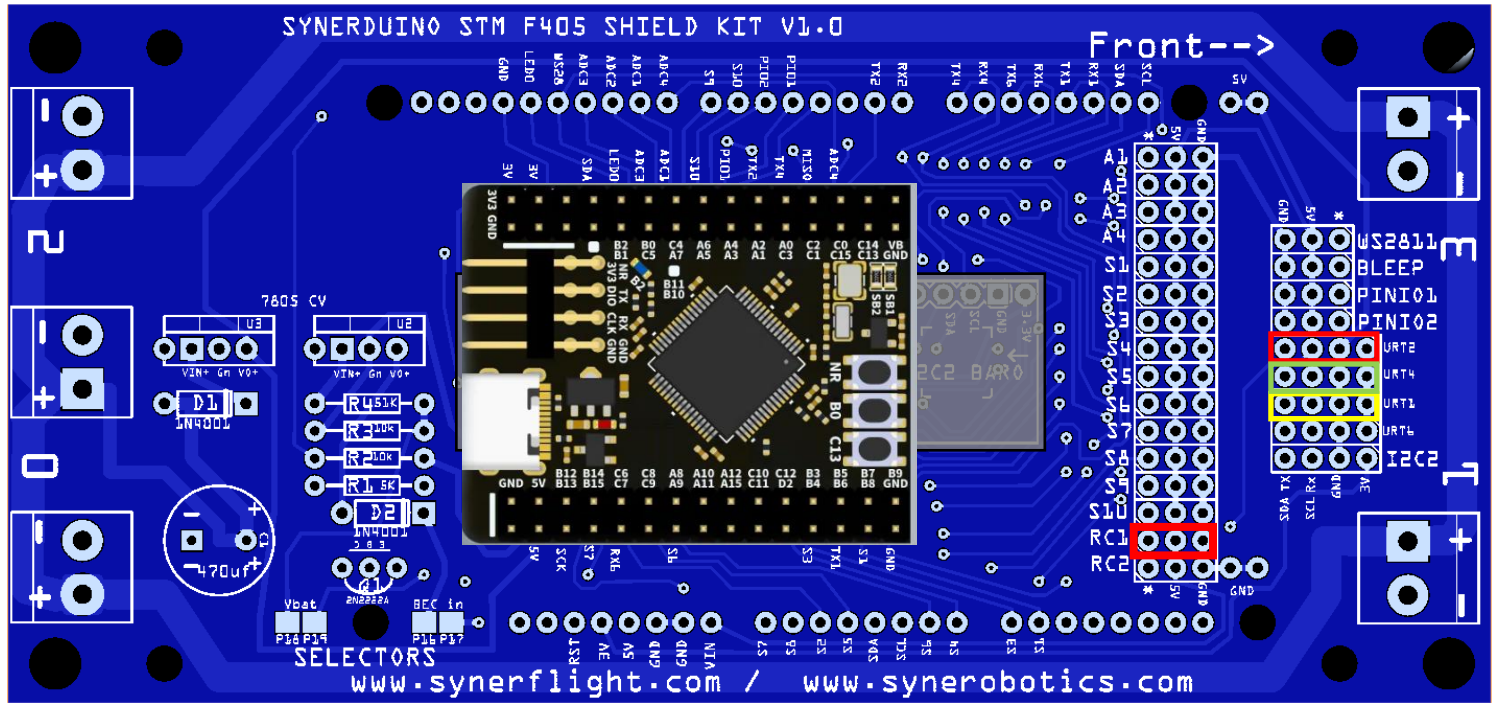
UART1

Bluetooth/Serial Radio

UART4

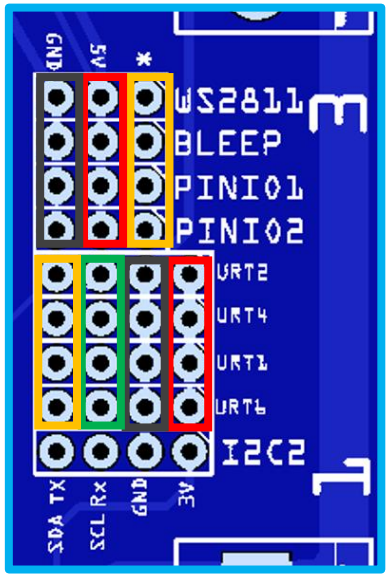


GPS



STMF405

V+ Gn Dat



TX RX Gn V+

Check connection Polarity

H743 RC RECEIVER & UARTS

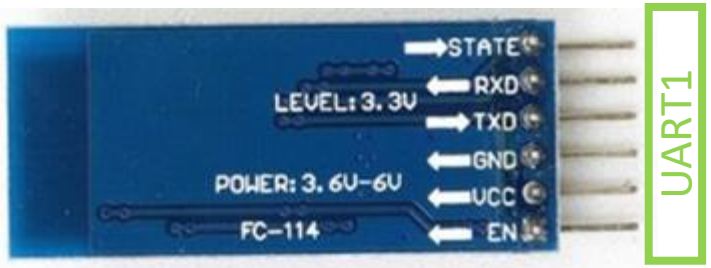
ELRS 2.4G Receiver

UART2

FS-i6X Receiver

RC1

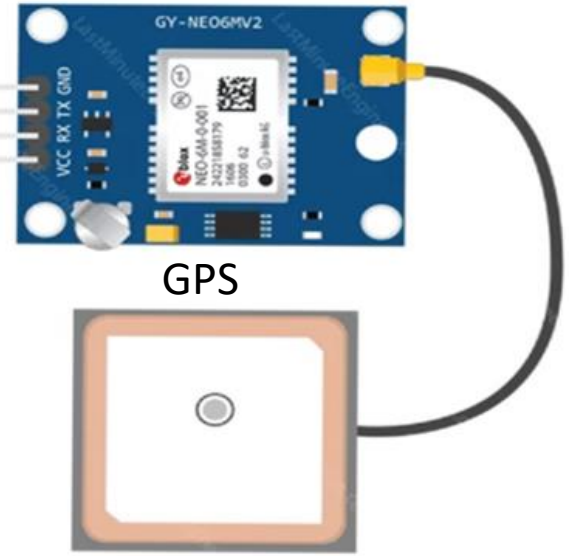
Receiver : Connect to RC1 / UART2



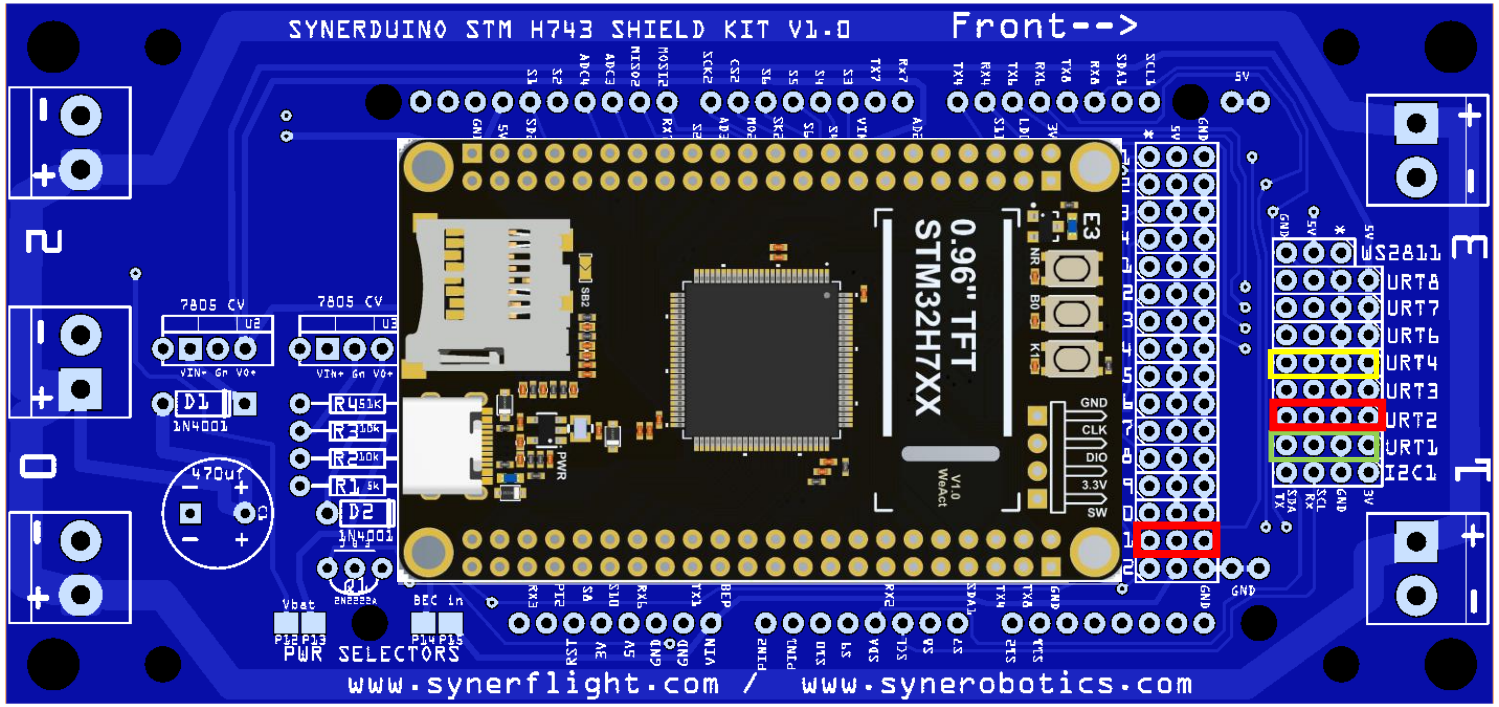
UART1

Bluetooth/Serial Radio

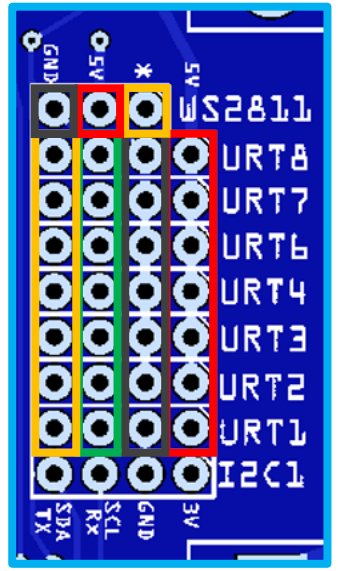
UART4



GPS



V+ Gn Dat



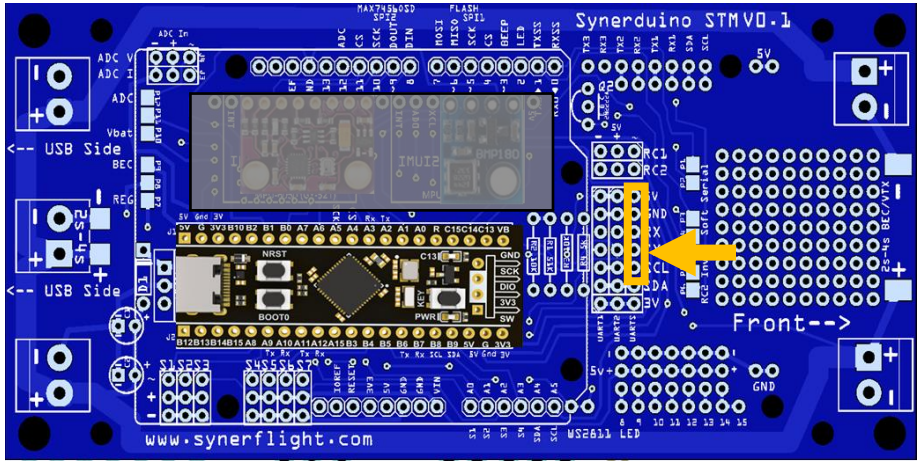
TX RX Gn V+

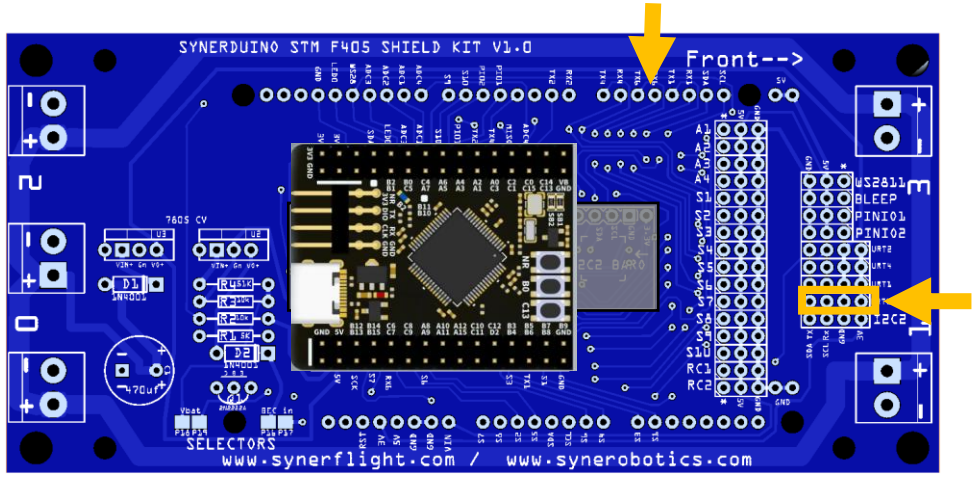
Check connection Polarity

STMH743

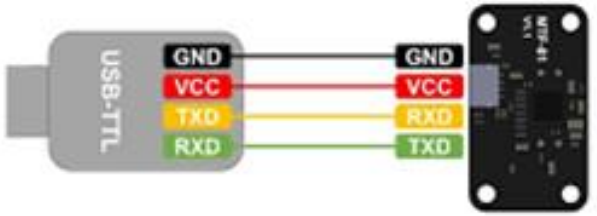
SERIAL SENSORS

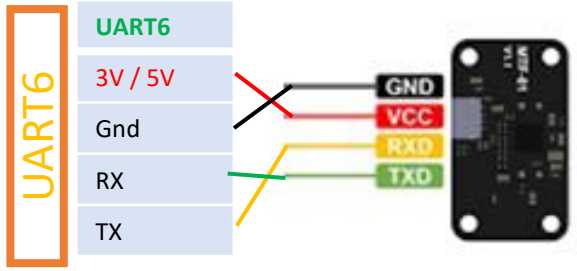
Optical sensors expansion allows position hold and basic navigation in GPS denied environments utilizing downward facing sensors. Not we will use the MTF 01 for sample

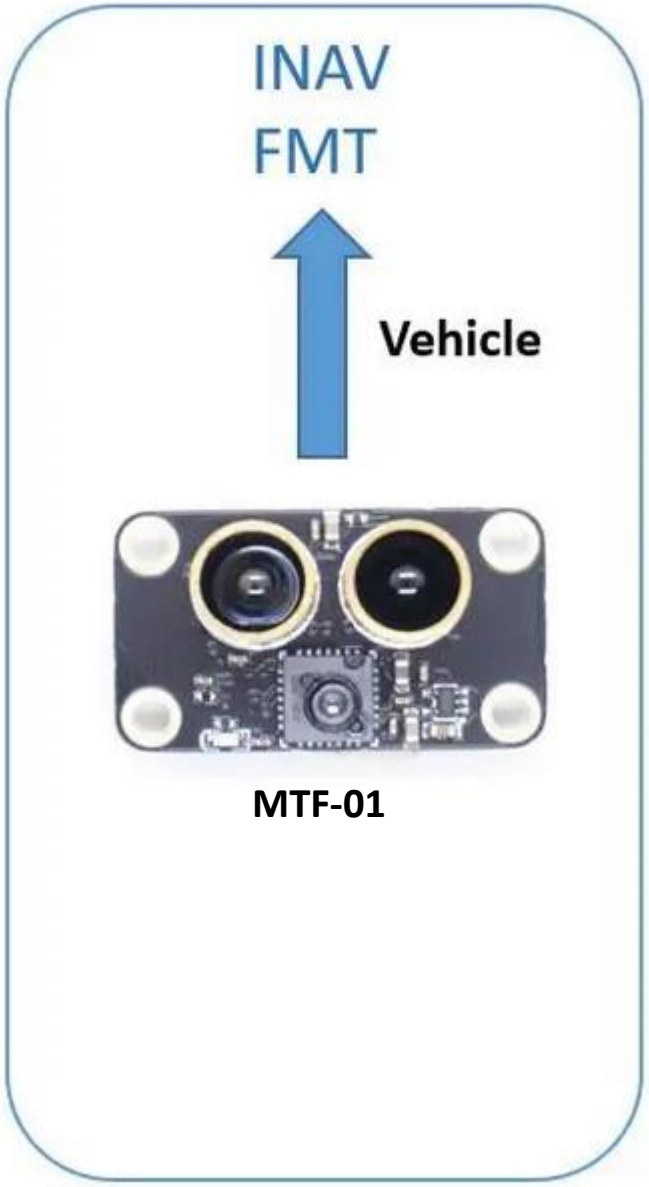




MTF-01







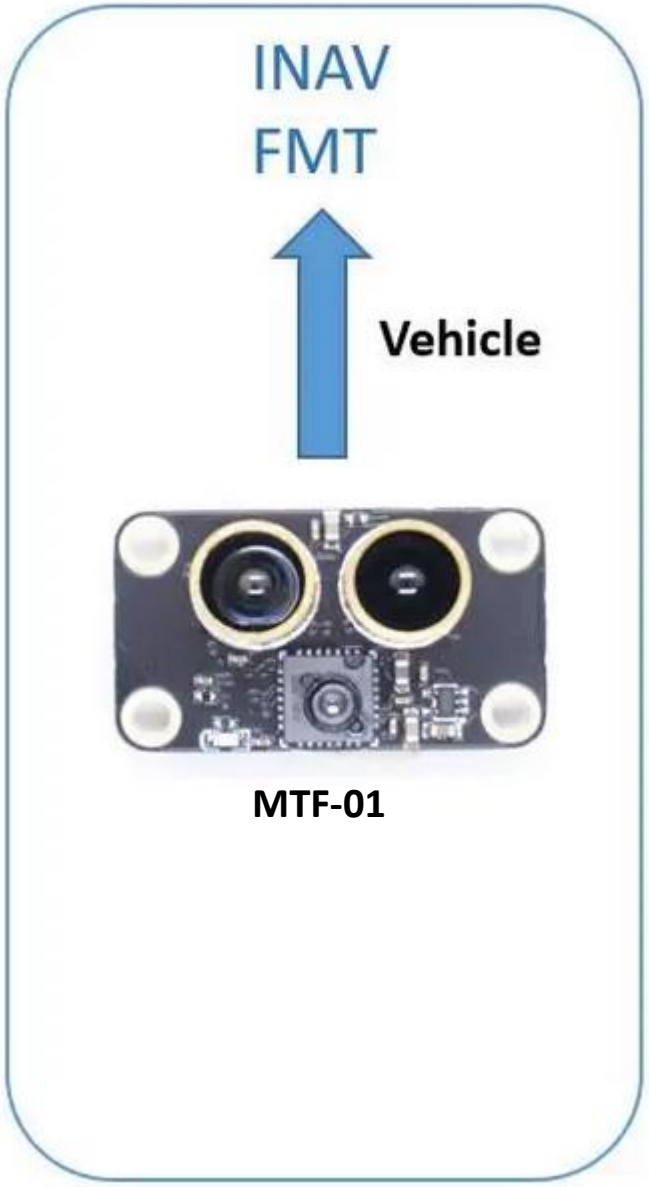
MTF-01

MTF - 01 Guide

Down load the Guide and Programmer here
https://github.com/micoair/MTF-01_USER_MANUAL

Connect the MTF-01 to your PC using the USB to TTL module.

SERIAL SENSORS

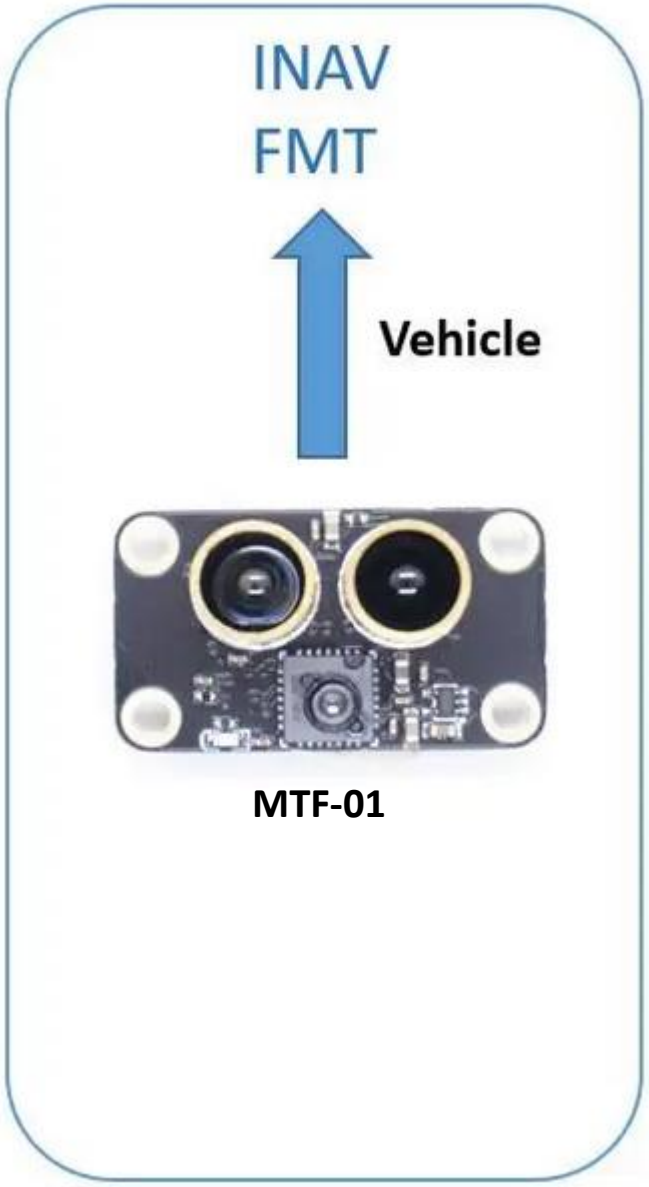


MTF-01

MTF - 01 Guide

Open the MicoAssistant software, select the correct COM port in the upper right corner, set the baud rate to 115200, and click on the connection icon.

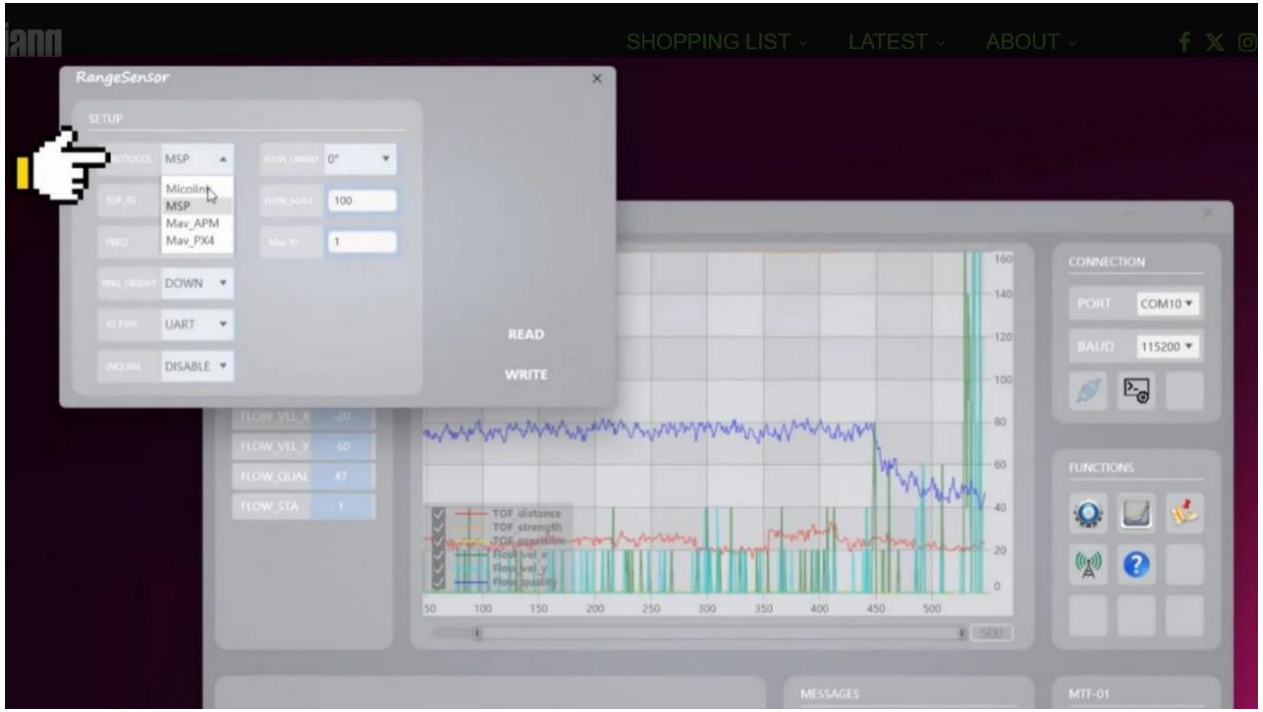
SERIAL SENSORS



MTF-01

MTF - 01 Guide

Once connected, click on the Setup Menu (gear icon), select the protocol you want to use (in this case, MSP), and then click the WRITE button.



SERIAL SENSORS

ArduPilot/PX4

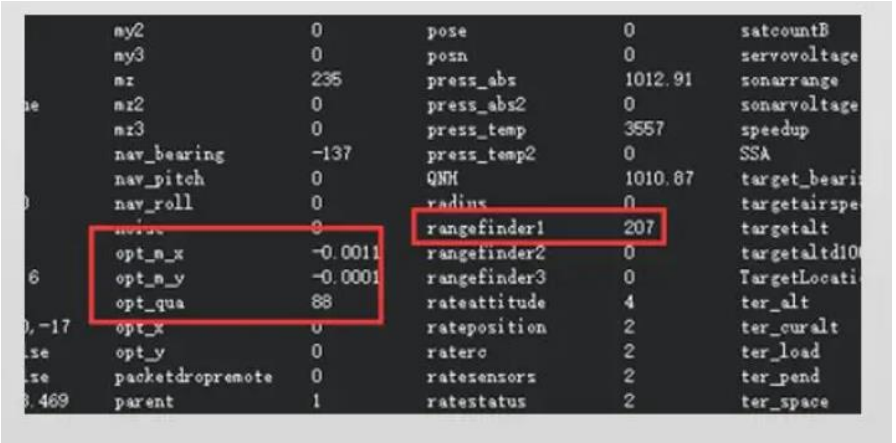
MTF-01

Vehicle

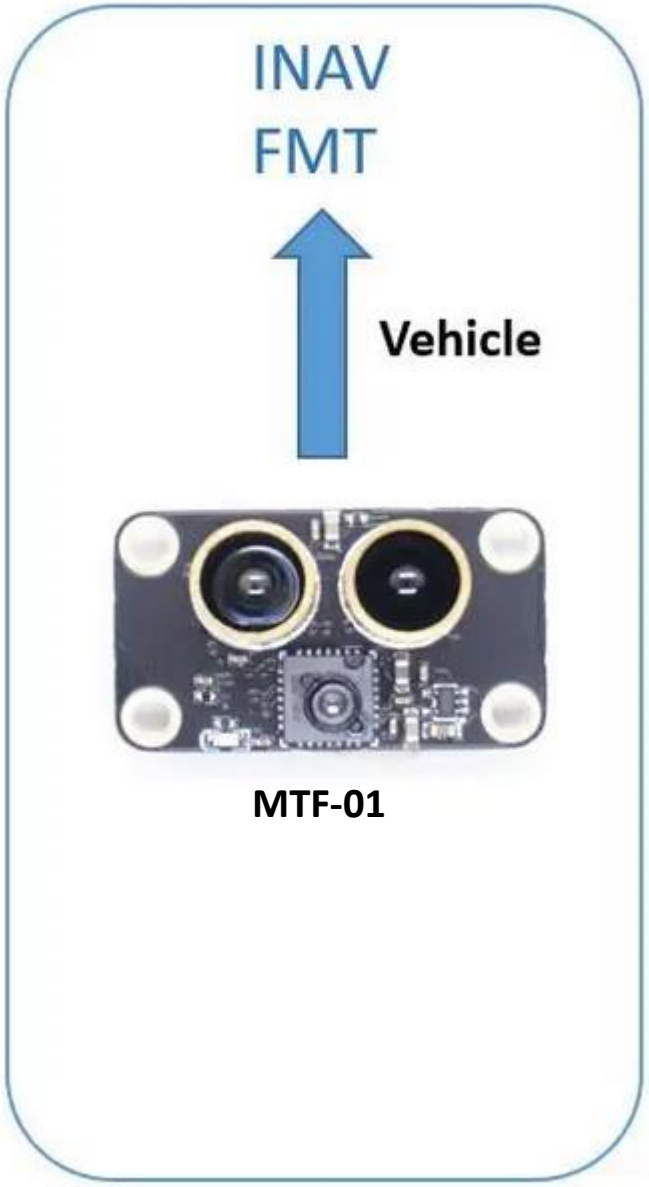
Ardupilot Guide

- Make sure the module is set to mav_apm
- Connect the Module to Synerduino UART 6
- Set SERIAL4_BAUD as 115 “SERIAL4_PROTOCOL” as 1
- Set “FLOW_TYPE” as 5;
- Set “RNGFND1” as 10 “RNGFND1_MAX_CM” as 800;
- Restart to save
- EK3 Setup
- 1 set “EK3_SRC_OPTIONS” as 0;
- 1 set “EK3_SRC_POSXY” as 0;
- 1 set “EK3_SRC_VELXY” as 5;

- Flight mode to Loiter



SERIAL SENSORS

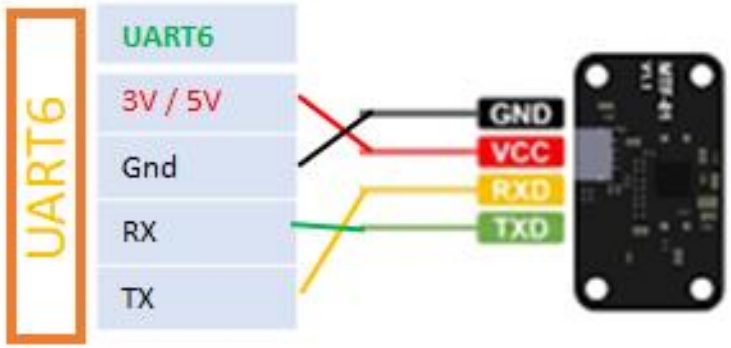


MTF-01

INAV Guide

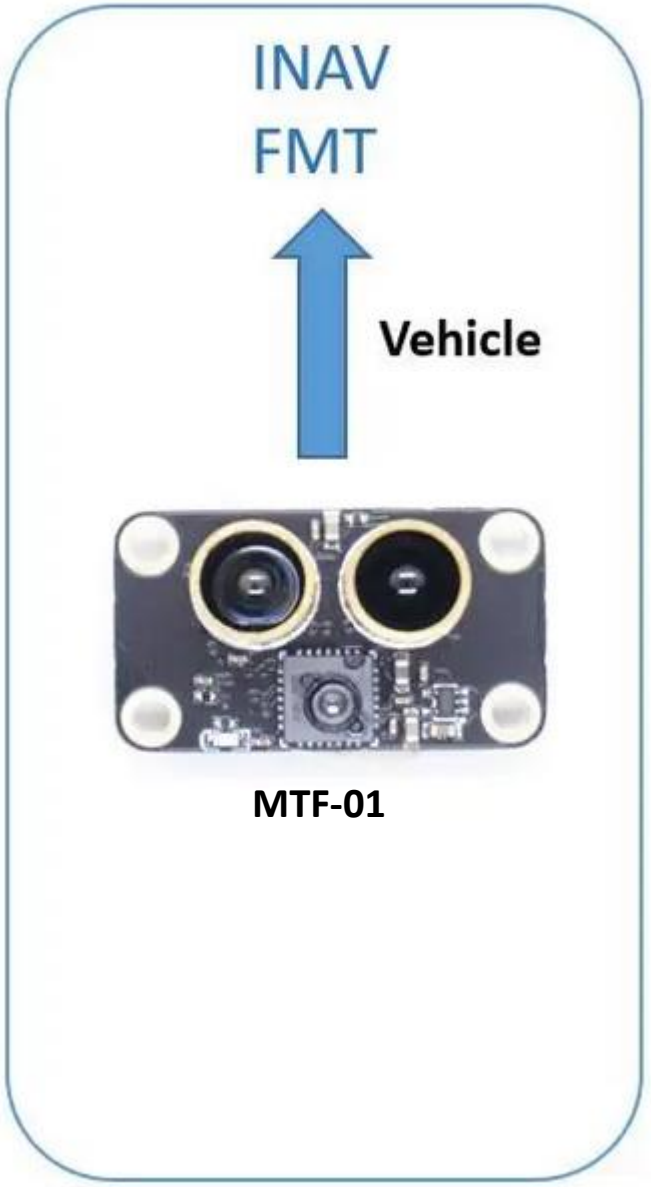
Connect the four wires from the MicroAir MTF-01 sensor to any spare UART on your flight controller. I connected it to UART4 or UART6 on my FC.

- 5V to 5V
- GND to GND
- TX to RX
- RX to TX



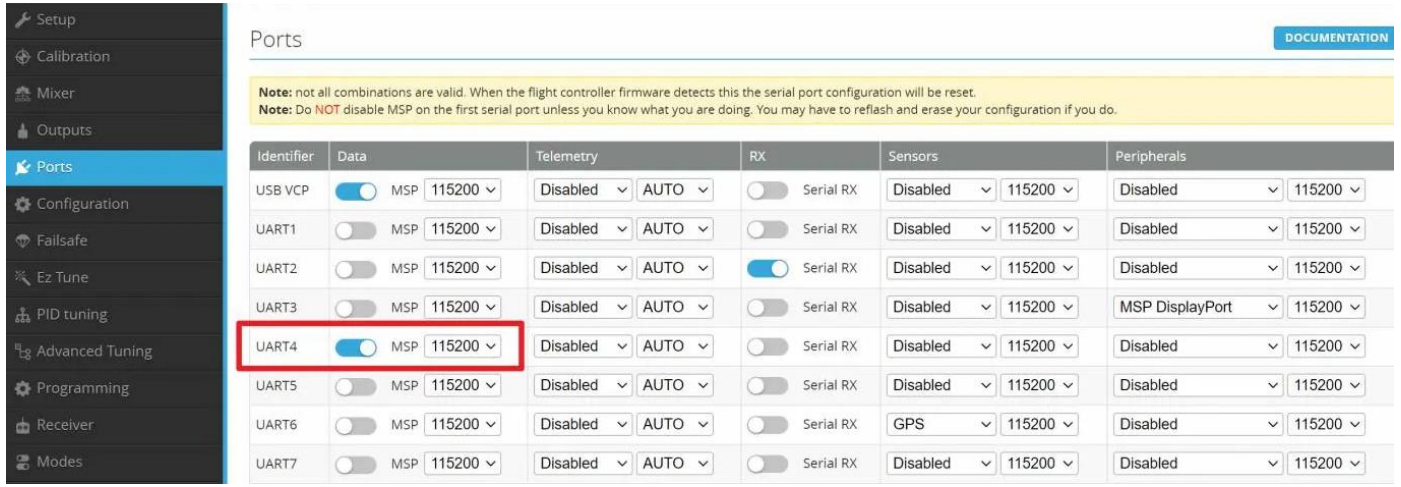
Mount the sensor on the bottom of the quad, ensuring there's nothing obstructing the view of the sensors. Use landing gears to ensure there's sufficient clearance between the ground and the sensors during takeoff, ideally a couple of centimeters or more.

SERIAL SENSORS

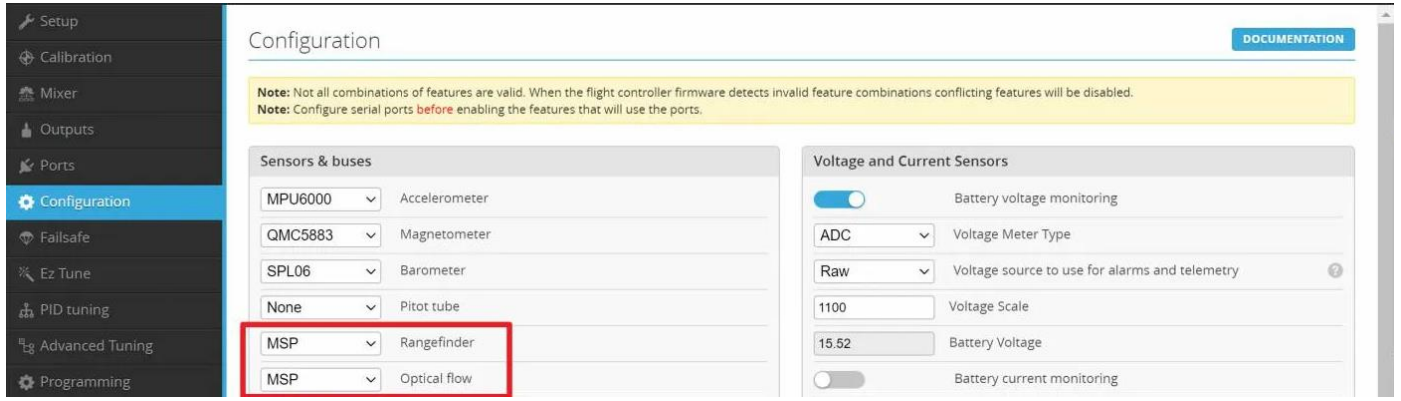


MTF-01

INAV Guide

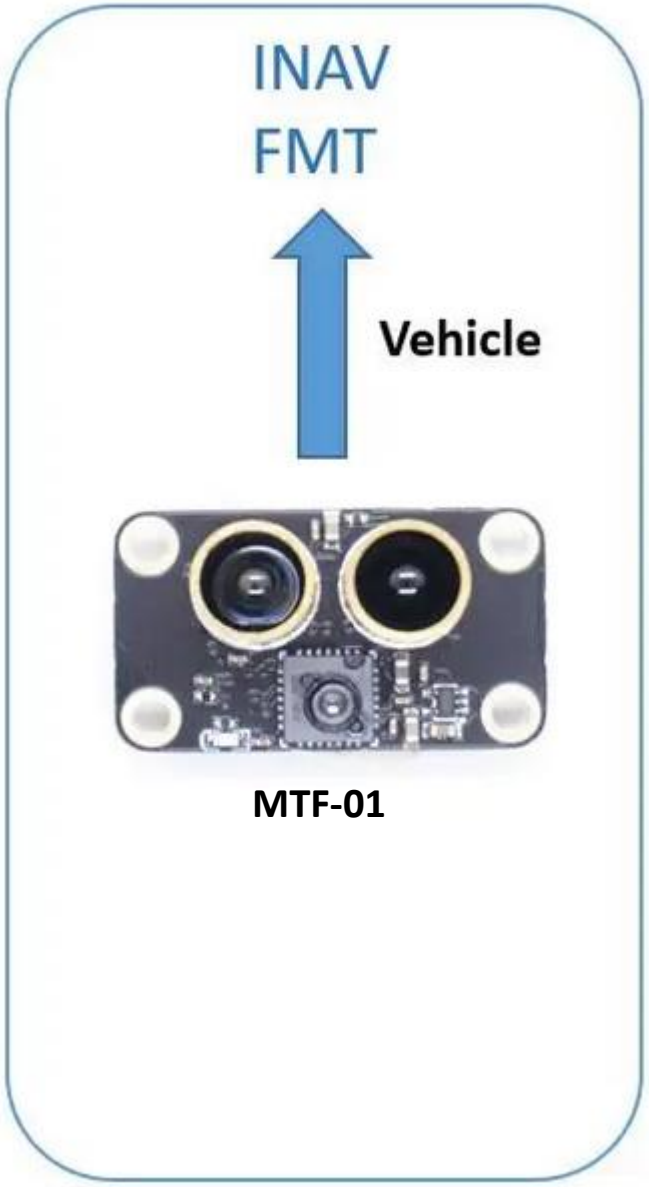


On Inav Configurator set the Port your sensor is on to MSP and 115200



On Inav Configurator set the Configuration to active Rangefinder and optical flow to MSP

SERIAL SENSORS



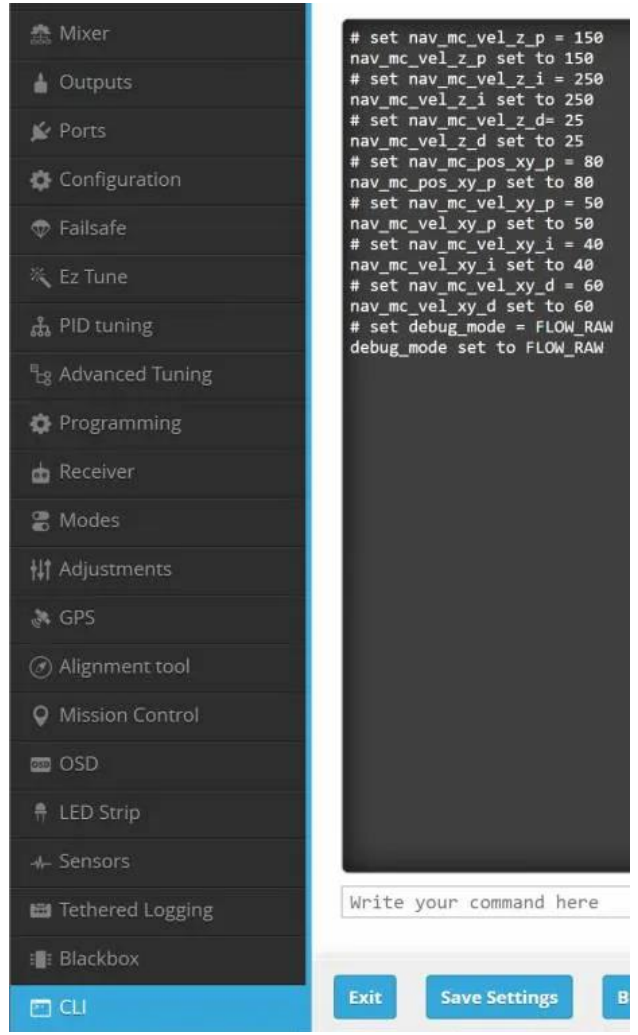
MTF-01

INAV Guide

Copy and paste the following lines in the CLI (these are configurations suggested by the maker of MTF-01).

- **Dead Reckoning**: by enabling iNav_allow_dead_reckoning in the CLI, it improve performance during brief GPS outages.
- **Maximum Height Setting**: by setting the inav_max_surface_altitude in the CLI, it defines the maximum height at which the rangefinder is effective, in cm.

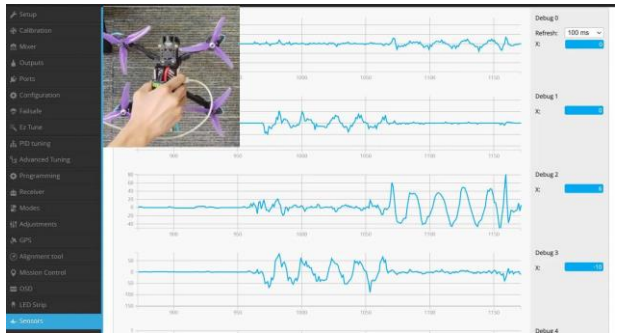
```
set nav_mc_vel_z_p = 150
set nav_mc_vel_z_i = 250
set nav_mc_vel_z_d= 25
set nav_mc_pos_xy_p = 80
set nav_mc_vel_xy_p = 50
set nav_mc_vel_xy_i = 40
set nav_mc_vel_xy_d = 60
set debug_mode = FLOW_RAW
set inav_allow_dead_reckoning = ON
set nav_max_terrain_follow_alt = 200
set inav_max_surface_altitude = 200
save
```



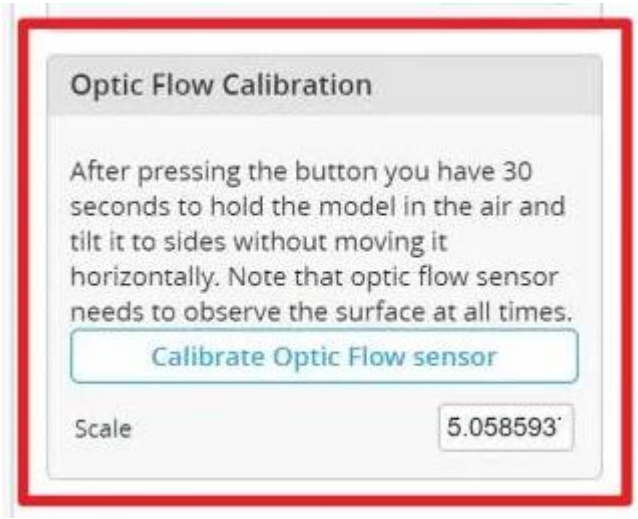
On Inav Configurator CLI copy and paste this then save . These are the recommended parameters

SERIAL SENSORS

INAV Guide



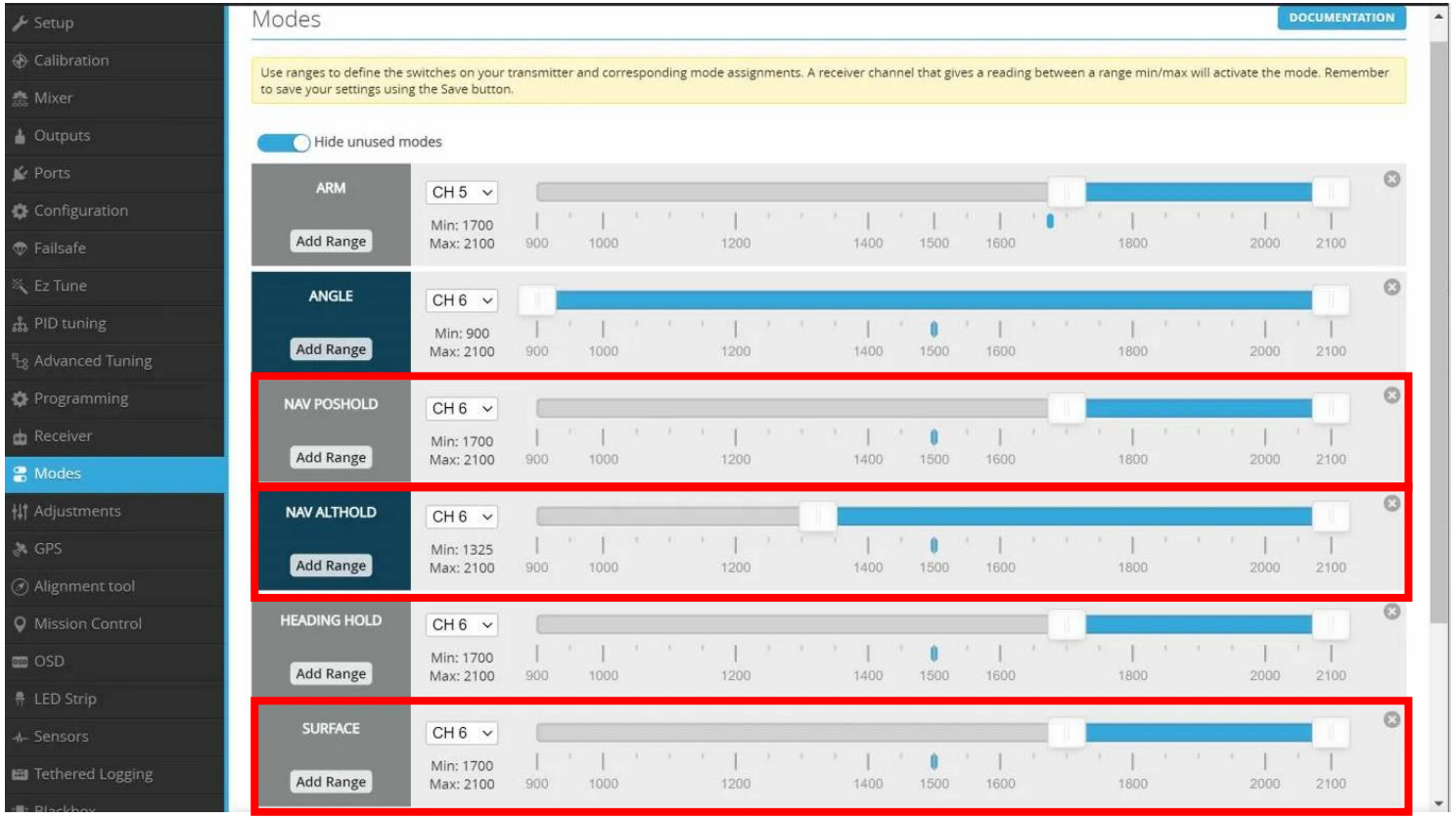
Check sensors tab



Calibration tab

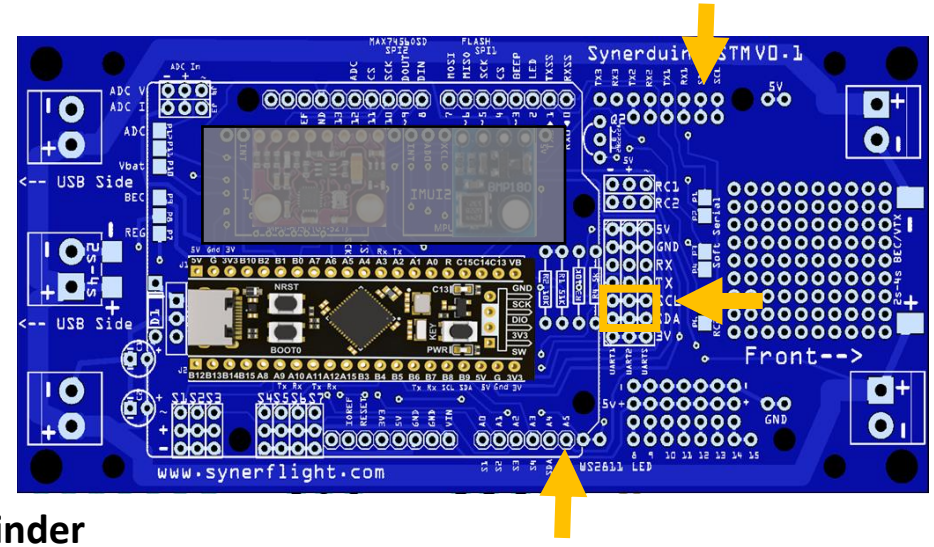
Modes Tab

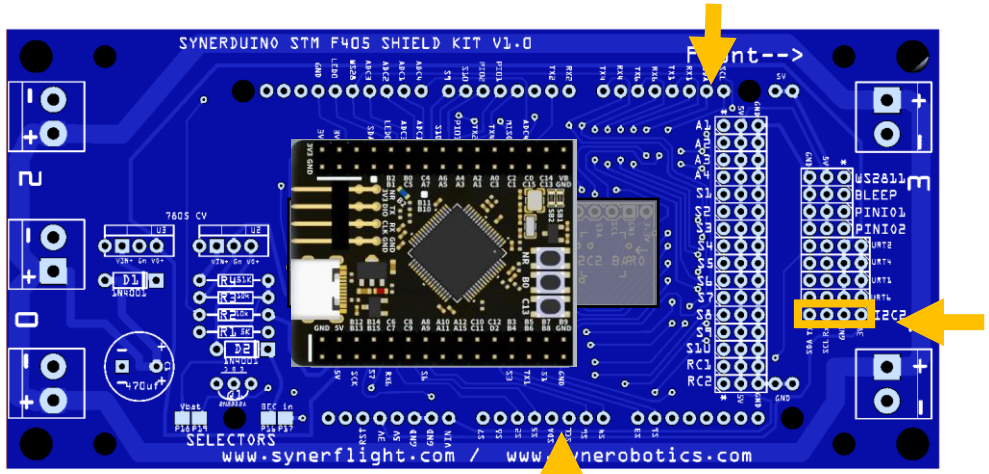
Assign a switch that can enable ANGLE, NAV POSHOLD (position hold), NAV ALTHOLD (altitude hold), HEADING HOLD, and SURFACE at the same time.



I2C SENSORS

I2C digital sensors expansion allows you to add a host of external sensors to the current board via i2C pin (SLC SDA)





Range Finder

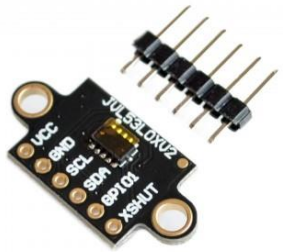
- **VL53L0X**
- **VL53L1X**
- **TOF10120**

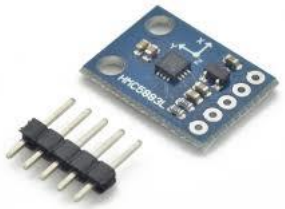
Airspeed sensor

- **MS4525**
- **ASPD-DLVR L10D**

Magnetometer (you can disconnect the Mag onboard should you need to connect an external mag)

- HMC5883
  QMC5883
  IST8310
  MAG3110
  LIS3MDL
  MPU9250





WS2811 LED

LED in drones serves as Nav Lights and visual indicator of flight status in LOS

There are 2 ways of installing this hardware

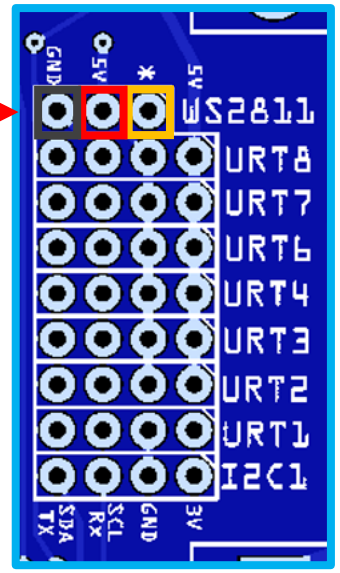
INAV - WS2811 Dedicated Pin Assign in the LED Tab

https://www.youtube.com/watch?v=kjHruLW8KT0

Ardupilot – Assign any unoccupied PWM as SERVOx_FUNCTION in parameters

https://ardupilot.org/copter/docs/common-serial-led-neopixel.html

V+ Gn Dat



Check connection Polarity