

LTM driven Artificial Horizon

When you fly FPV with an Cockpit-Camera you might wan't some eyecandy on the dashboard of your plane. With this project I use a Generic NodeMCU ESP8266 to display an artificial horizon on a 0.96" SSD1306 OLED display. Both components together need only a 5V power supply with low current.

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Hardware you need

One of the following development boards will fit your needs:

- NodeMCU ESP8266 development board

The ESP8266 boards are powerful small computer with Wifi-Option. The project does not need Wifi, but these boards can also be used for other purposes. The i2c bus must be supported by the board manager of Arduino IDE. Some ESP8266 with onboard OLED have non standard I2C-Pins and do not work with the Adafruit SSD1306 library used by this project. Prefer boards without soldered Dupont pins if you want to solder cables yourself.

You will need an OLED Display:

- 0.96 inch OLED display for i2c

There are several colors available. I prefer blue or white single colour displays, an OLED with two colours will have 8 or 10 lines in yellow and the rest of the display is blue or another colour. The colour can't be changed, the display only supports 1bit color. On or off.

Price for complete hardware should be around 10\$ to 20\$ for local shops or China direct order.

Software you need

The project uses Arduino IDE. This is available here: <https://www.arduino.cc/en/software>

If you are using Arduino IDE for the first time then you have to set up your preferences. Go to „file“>“Preferences“:

First set your sketchbook location. You have to put the downloaded sketch folder of my project into the folder you set here.

Second add additional Boards Manager URLs at the bottom of the Preferences Window. For ESP8266 and ESP32 you can use one of the following URLs:

- https://arduino.esp8266.com/stable/package_esp8266com_index.json
- https://raw.githubusercontent.com/SpacehuhnTech/arduino/main/package_spacehuhn_index.json

Both URLs have board packages for the hardware mentioned above.

Before you connect your board go to the Boards Manager and install one of the listed Board Managers that lists your development boards (ESP8266).

Go to the Library Manager and install the following Libraries:

- Adafruit GFX Library
- Adafruit SSD1306

Get the Arduino sketch

Go to <https://github.com/altermac/LTM-driven-Artificial-Horizon>

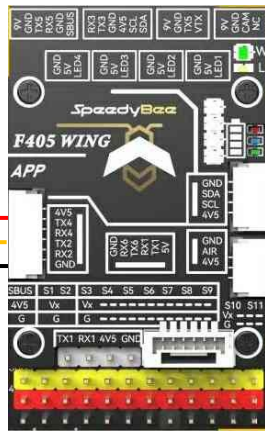
If you read this you might have been there before. download the code as zip-file. There is a folder Artificial-Horizon inside. Put this folder in your local Sketch folder of the Arduino IDE (see above). Open the Sketch in Arduino IDE.

Connect your development board via USB to your PC or Mac and choose the right port an board. Next you upload the Sketch and you are nearly done.

Some wiring to do

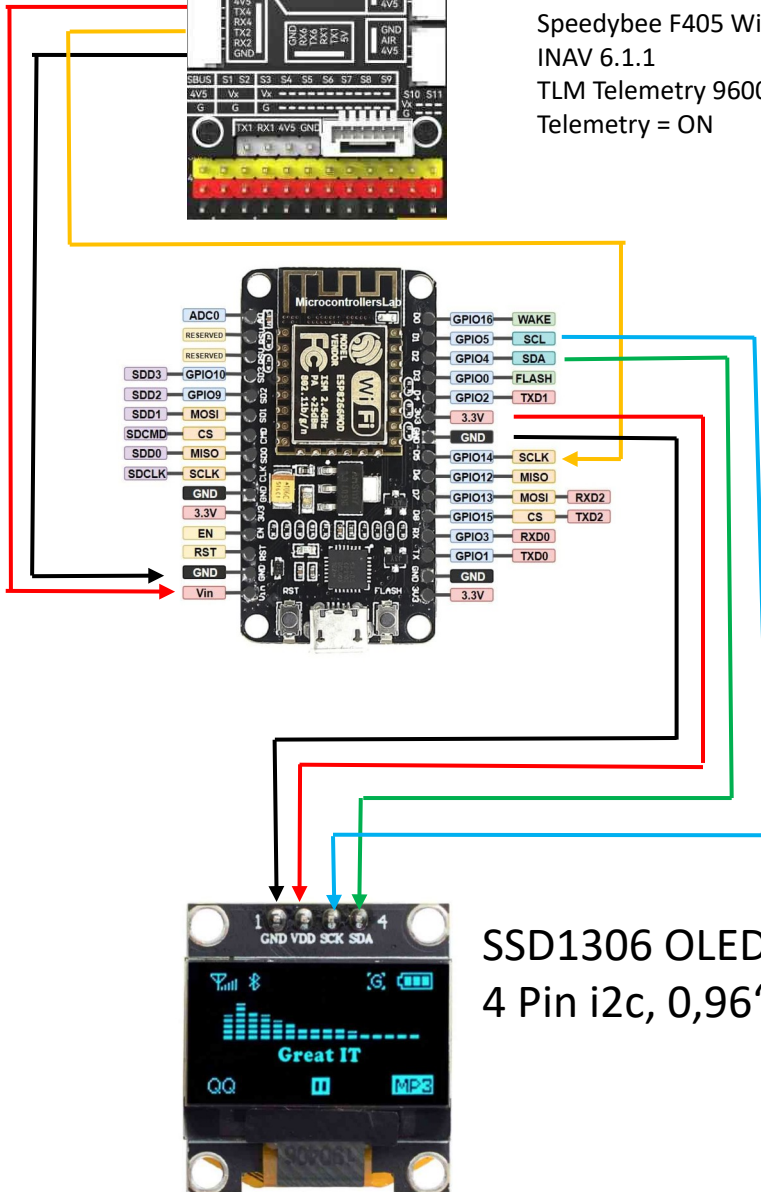
But the opera does not end without the fat lady singing: NodeMCU and a SSD1306 OLED will add around 15g without wiring to your model aircraft. But it has some features to make it a valuable external processor for our flightcontroller.

NodeMCU boards have their own bec. They can be powered from an external source with 5 Volts DC and can power it's own external devices. And there is a Wifi module on board, wich could be used for an OpenID transmitter. So you get the chance to use it as a lost model finder. In my project Wifi is not used.



Flightcontroller

Speedybee F405 Wing
 INAV 6.1.1
 TLM Telemetry 9600 baud on UART2
 Telemetry = ON



NodeMCU:

ESP8266 12E

Softserial RX= Pin14, TX=-1
 TLM is only downstream

SSD1306 OLED
 4 Pin i2c, 0,96"



Blue

With a NodeMCU development boards you will need the following connections :

- 3 wire from flightcontroller to your development board:
 - + 5V
 - GND
 - TX line of the choosen uart
- 4 wire connection from development board to SSD1306 OLED
 - + 3.3V
 - GND
 - SDA
 - SCL

Look at the picture above for the correct pins and check if they match to your board.

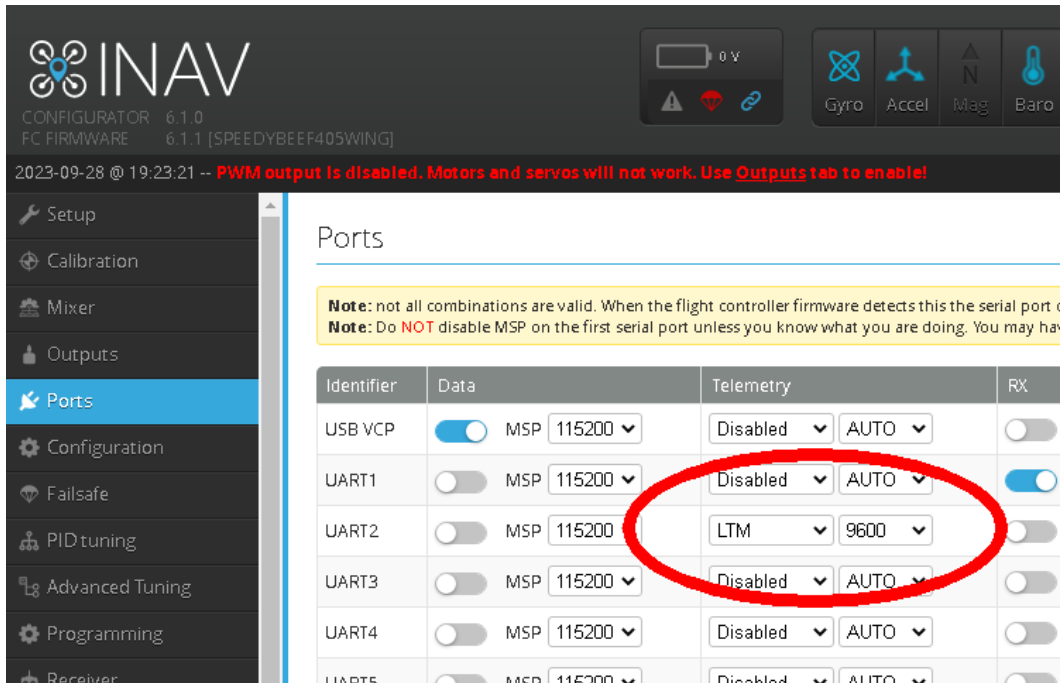
Since flightcontroller and development board can connect to USB, there could be trouble when you connect development board and flightcontroller via USB. So you should connect flightcontroller OR development board to USB. Never connect both. The development board uses an internal BEC to deliver 3.3V that can be damaged with two power sources.

The flightcontroller will update the TLM port less frequent on startup. After some time the TLM updates will come faster.

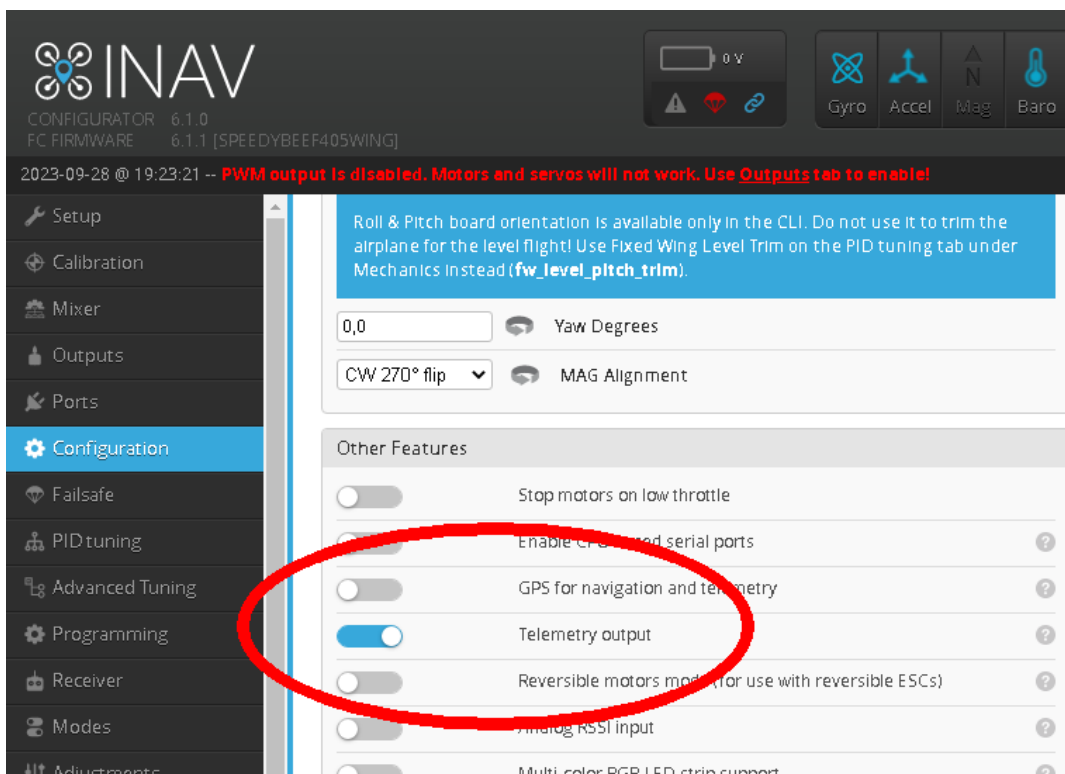
I have tested this setup with INAV 6.1.1 but Ardupilot and even Betaflight will support the TLM protocol as part of their receiver telemetry. I used a Speedybee F405 Wing i had lying around. Any other flightcontroller will do.

Settings for inav 6

At first go to the ports tab in inav configurator and look for a free UART. The UART TX pin on the flightcontroller should be available to connect to the NodeMCU.



Then you have to activate Telemetry on the Configuration Tab:



Thats all.