CysBOX
Cypilot Dev
Pi4 Installation

SUMMARY

1 Operating System

Current CysBOX software has been tested under Raspberry Pi OS bullseye (Debian version 11)

The latest Buster release are available from the following URL:

- Raspberry Pi OS with desktop

  https://downloads.raspberrypi.org/raspios_arm64/images/raspios_arm64-2022-09-26/2022-09-22-raspios-bullseye-arm64.img.xz

- Raspberry Pi OS Lite

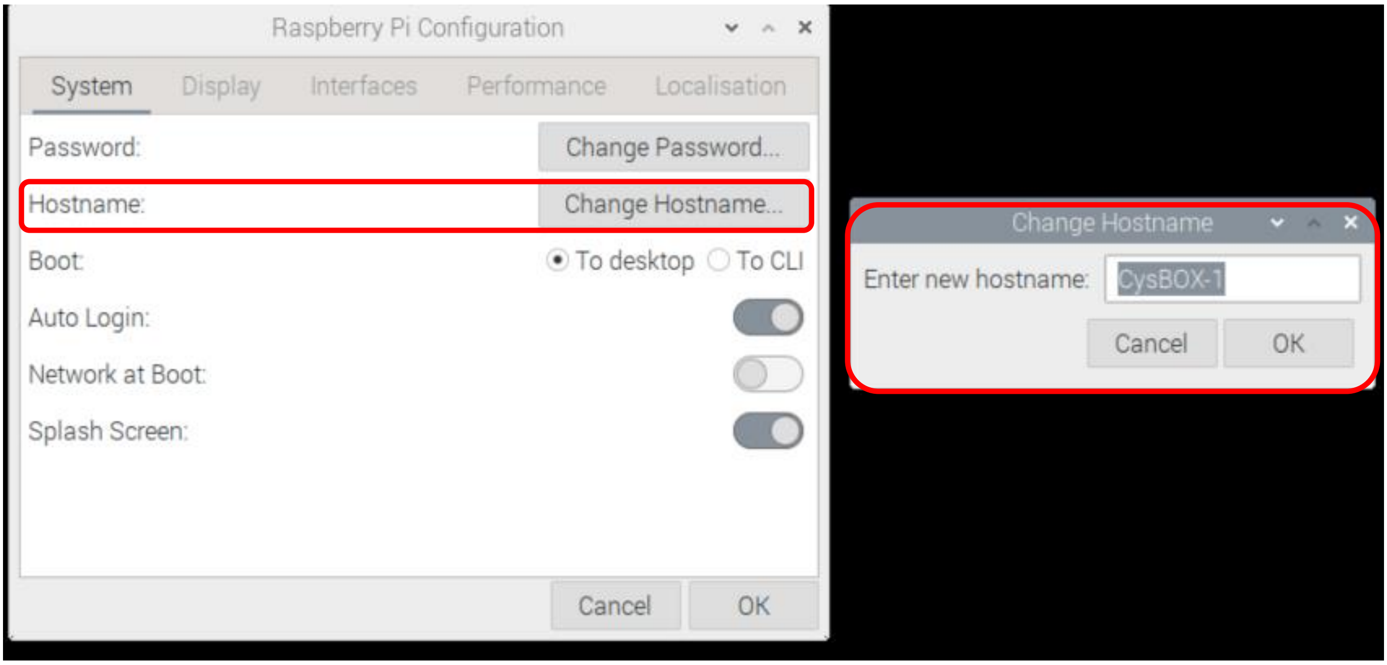
  https://downloads.raspberrypi.org/raspios_lite_arm64/images/raspios_lite_arm64-2022-09-26/2022-09-22-raspios-bullseye-arm64-lite.img.xz

Download and install Etcher tool

https://www.balena.io/etcher/

- Launch Etcher software tool
- Click Flash from URL
- Copy the selected image URL to the “Use Image URL” field
- Select the SD card to flash and Flash!

- Insert SD card in the CysBOX
- Connect HDMI cable
- Connect mouse and keyboard cable
- Switch on and follow the install instructions (set user name **pi** pwd **cybele** and choose the Wi-Fi network and its password)
  be patient! this operation is a bit long.
- Restart
- When install is completed:
  - Menu → Preferences → Raspberry Pi configuration → Change Hostname ***(CysBOX-1)***→OK



Password:

Hostname:

Boot: ● To desktop ○ To CLI

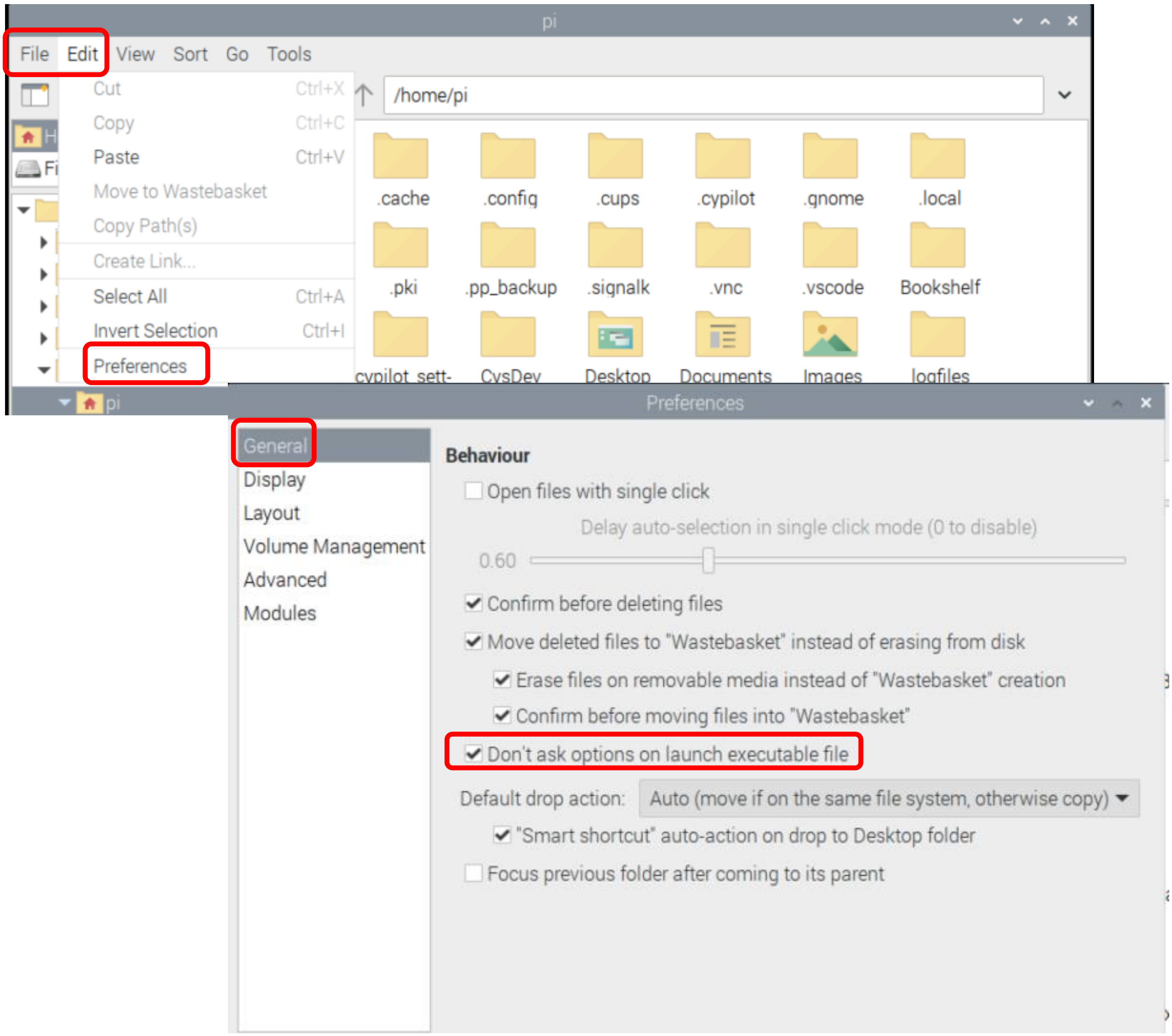
Auto Login: ☑

Network at Boot: ☐

Splash Screen: ☑

Enter new hostname: CysBOX-1

- Open 📁 → Edition → Preferences → General



Behaviour

☐ Open files with single click

Delay auto-selection in single click mode (0 to disable) 0.60

☑ Confirm before deleting files

☑ Move deleted files to "Wastebasket" instead of erasing from disk

☑ Erase files on removable media instead of "Wastebasket" creation

☑ Confirm before moving files into "Wastebasket"

☑ Don't ask options on launch executable file

Default drop action: Auto (move if on the same file system, otherwise copy)

☑ "Smart shortcut" auto-action on drop to Desktop folder

☐ Focus previous folder after coming to its parent

Clic on " Don't ask options on launch executable file".

2 Install Cypilot

This is the basic installation for Autopilot standard user.

2.1 Install the cypilot package

This is a complete suggested installation procedure for basic users.

2.1.1 Install package

While pip alone is sufficient to install from pre-built binary archives, up to date copies of the setuptools and wheel projects are useful to ensure you can also install from source archives:
sudo python3 -m pip install --upgrade pip setuptools wheel

Install **cypilot** from wheel file:
sudo pip3 install cypilot-1.0.0-cp39-cp39-linux_aarch64.whl

or, install from pypi the latest officially published release:
sudo pip3 install cypilot

note: to uninstall = **sudo pip3 uninstall cypilot==1.0.0**

2.1.2 Complete installation

After package has been installed, installation must be completed using the **cypilot_init** command:
cypilot_init

At least, select **-1-** from main menu, then step **-1,2,3-** from the opened submenu, and **-4-** to reboot.

To install **signal-k** server select **step -2-** from main menu, install signal-k dependencies then when installing signal-k server, choose all default settings: default location, update or start from scratch, any vessel name, MMSI (if you have one), do not use port 80 (use default port 3000), do not enable SSL

2.1.3 Customize configuration to match your boat specifications.

Update the configuration files which are located in $HOME/.cypilot directory:

- NMEA, COM, ... ports assignment
- sensor priorities
- ...

Calibrate IMU (mounting position, gyro, heading, ...) using **cypilot_calibration** utility.
See detailed documentation in the doc directory.

2.2 How to Prepare system for development:

This is a complete suggested installation procedure for developers.

2.2.1 Prepare system for development:

2.2.1.1 Clone project from github

We advise to use our common directory structure, so to clone git to /home/pi/CysDev/cypilot

2.2.1.2 Install package

While pip alone is sufficient to install from pre-built binary archives, up to date copies of the setuptools and wheel projects are useful to ensure you can also install from source archives:
sudo python3 -m pip install --upgrade pip setuptools wheel

Use wheel distribution from the dist directory **/home/pi/CysDev/cypilot/dist**

```
cd /home/pi/CysDev/cypilot/dist
sudo pip3 install *.whl
```

2.2.1.3 Complete installation from development environment

To install with menu shortcuts pointing to development files, just run **python3 cypilot_init.py** from the development environment. At least, select **-1-** from main menu, then step **-1,2,3-** from the opened submenu, and **-4-** to reboot.

```
cd /home/pi/CysDev/cypilot/src/cypilot_init
python3 cypilot_init.py
```

To build C extensions (linebuffer, servo, ...) in the development source tree:

```
cd /home/pi/CysDev/cypilot
python3 setup.py build_ext
```

To install **signal-k** server select **step -2-** from main menu, install signal-k dependencies then when installing signal-k server, choose all default settings: default location, update or start from scratch, any vessel name, MMSI (if you have one), do not use port 80 (use default port 3000), do not enable SSL

2.2.2 How to build a package:

The development environment must have been installed (see "Prepare system for development" just before)

2.2.2.1 Install build if not already done

```
sudo pip3 install --upgrade build
```

2.2.2.2 Build

```
cd /home/pi/CysDev/cypilot
```

Optionaly clean previous build:
rm -r build rm -r dist

Build package:
python3 -m build . –wheel

The built package is in dist repertory: **cypilot-1.0.0-cp39-cp39-linux_aarch64.whl**

2.3 Running Autopilot:

2.3.1 Using Raspberry PI GUI:

Run **Autopilot UI** from Raspberry pi Menu: **AutoPilot > ApControl** or Double-click **ApControl** UI icon on PI desktop

2.3.2 Using Web UI:

Run **Autopilot Web UI** from Raspberry pi Menu: **AutoPilot > Web UI**

When the UI or the Web UI is started, if no active server is detected, the Autopilot server is automatically launched, and it is closed on UI termination. When the Web UI is started, a local Chromium Web Browser is launched in kiosk mode, and the Autopilot can be controled from any Wifi browser at address http://CysBOX-1:8000 The Remote Control device can be used to control the Autopilot as soon as the Autopilot server is running.

3 *Using command line:*

3.1 Running Autopilot servers

These server scripts can be run as tests, only one executes at a time:

cypilot -- run the complete autopilot server: main pilot processes, sensors, servo communication, remote control receiver, ... The debug trace is displayed on the console windows. * useful for testing the complete Autopilot server
Instead of running the complete autopilot these scripts provide a server with specific functionality:
cypilot_boatimu -- run imu specific to boat motions * useful for testing the imu (gyros) or even just reading gyros
cypilot_sensors -- convert and multiplex nmea0183 data reads nmea0183 from serial ports or from tcp connections, and multiplexes the output to tcp port 20220 by default * convert and multiplex nmea0183 data
cypilot_servo -- use to test or verify a working motor controller is detected, * can be used to control the servo

3.2 Running Autopilot clients

Run as many of these autopilot clients to connect to an Autopilot server:

autopilot -- Raspberry PI GUI to command autopilot (if not active, Autopilot server is launched)
autopilot_web -- Autopilot Web UI (Chromium started in kiosk mode, and if not active, Autopilot server is launched)
cypilot_calibration -- run Autopilot calibration dialog (IMU alignment, rudder calibration, settings)
cypilot_config -- allow simple access to Autopilot current data

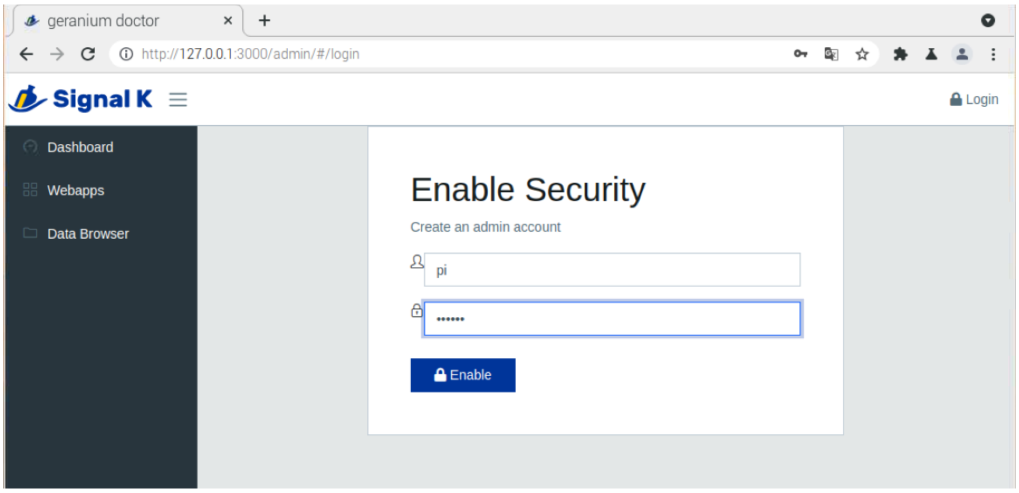
3.3 Test and configuration scripts

cypilot_version -- display software version
cypilot_bno085 -- test and configure BNO085 IMU
cypilot_ble -- test and configure Calypso Anemometer

4 *Autopilot and Signal K server*

NOTE: When you first run the program

- Launch ***Signal K*** from desktop shortcut
  Create an admin *account* **pi** *and password* **password** and Enable

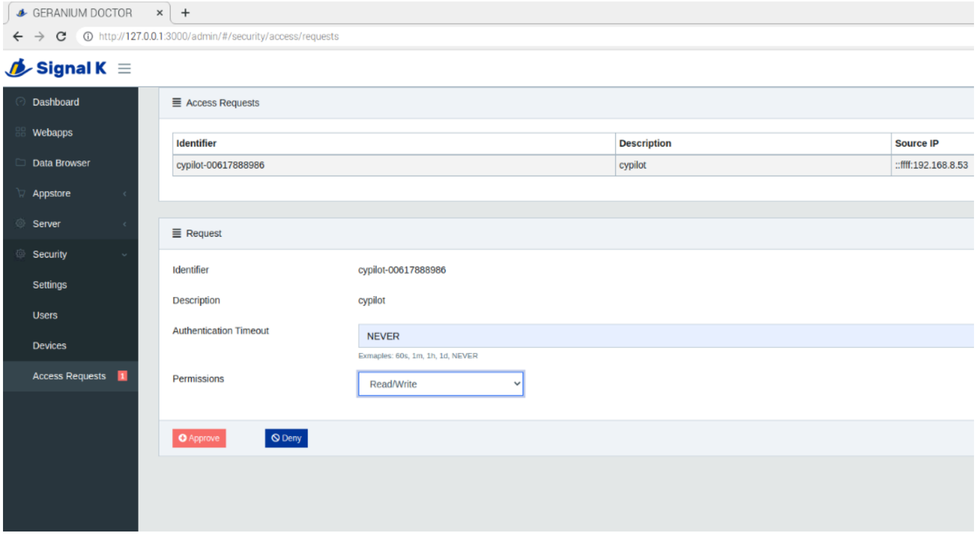


Enable Security
Create an admin account
pi
••••••
Enable

Create a user *account* **pi** *and password* **password** and Login

- Run Autopilot from "**ApControl**" desktop shortcut

- In the **Signal *K*** windows
  - To allow connexion to Signal K
    - ***Security*** → access requests→ click on Identifier
      → Authentication Timeout: **NEVER**
      → Permissions **Read/Write**
      → Approve



Access Requests

Identifier	Description	Source IP
cypilot-00617888986	cypilot	::ffff:192.168.8.53

Request

Identifier: cypilot-00617888986

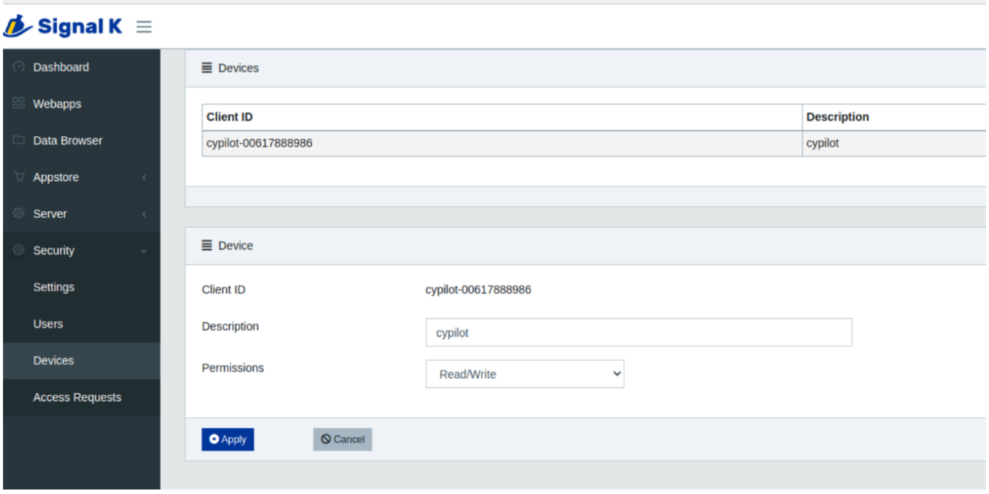
Description: cypilot

Authentication Timeout: NEVER

Exmaples: 60s, 1m, 1h, 1d, NEVER

Permissions: Read/Write

- ***Devices*** → cypilot → click on Identifier
  → Permissions **Read/Write**
  → Apply



Devices

Client ID	Description
cypilot-00617888986	cypilot

Device

Client ID: cypilot-00617888986

Description: cypilot

Permissions: Read/Write

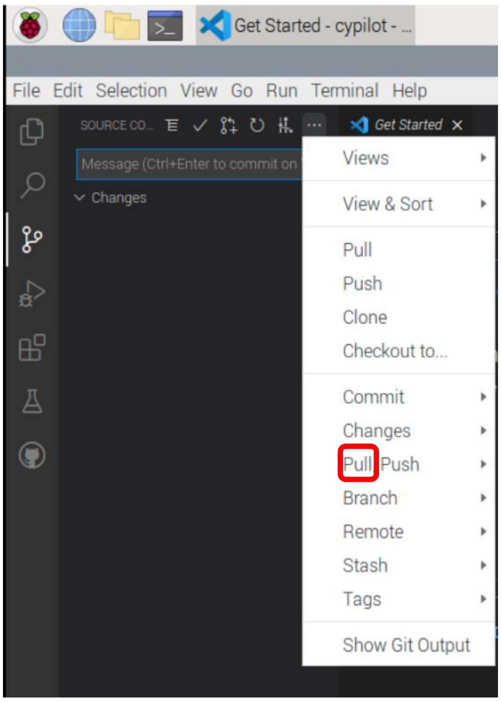
- ***Server*** → ***Plugin config*** → convert Signal K to NMEA083→configure (Enable)
  → select NMEA sentences (list) →submit
  for example choose the following sentences if you wish to use CyAlarm software:

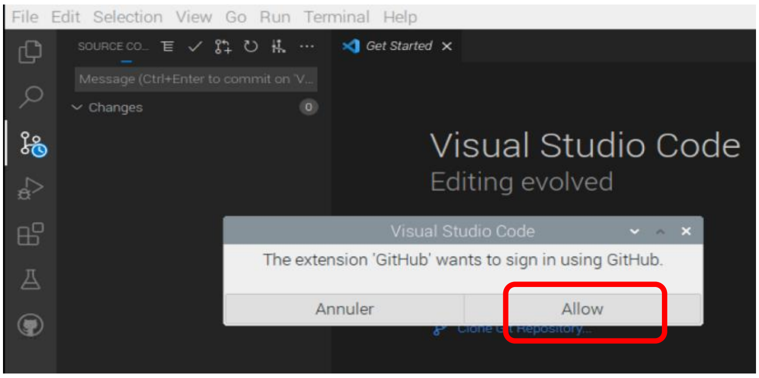
5 Visual Studio Code

- Final setup VS Code:

  - File → open folder→Folder CysDev/cypilot→Open
    In the bottom of the screen (on the right) choose the recommended interpreter: Python3.9.2.64-bit (usr/bin/python)

  - Source control →Pull





The extension 'GitHub' wants to sign in using GitHub.

  - Connect you with your GitHub account and password

  - Terminal → New terminal:
    - Enter command: **$ git config --global user.name "*your username*"**
    - Enter command: **$ git config --global user.email "*your email*"**