Documentation
Documentación

v0.6.0.

sailoog.com

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What is OpenPlotter?

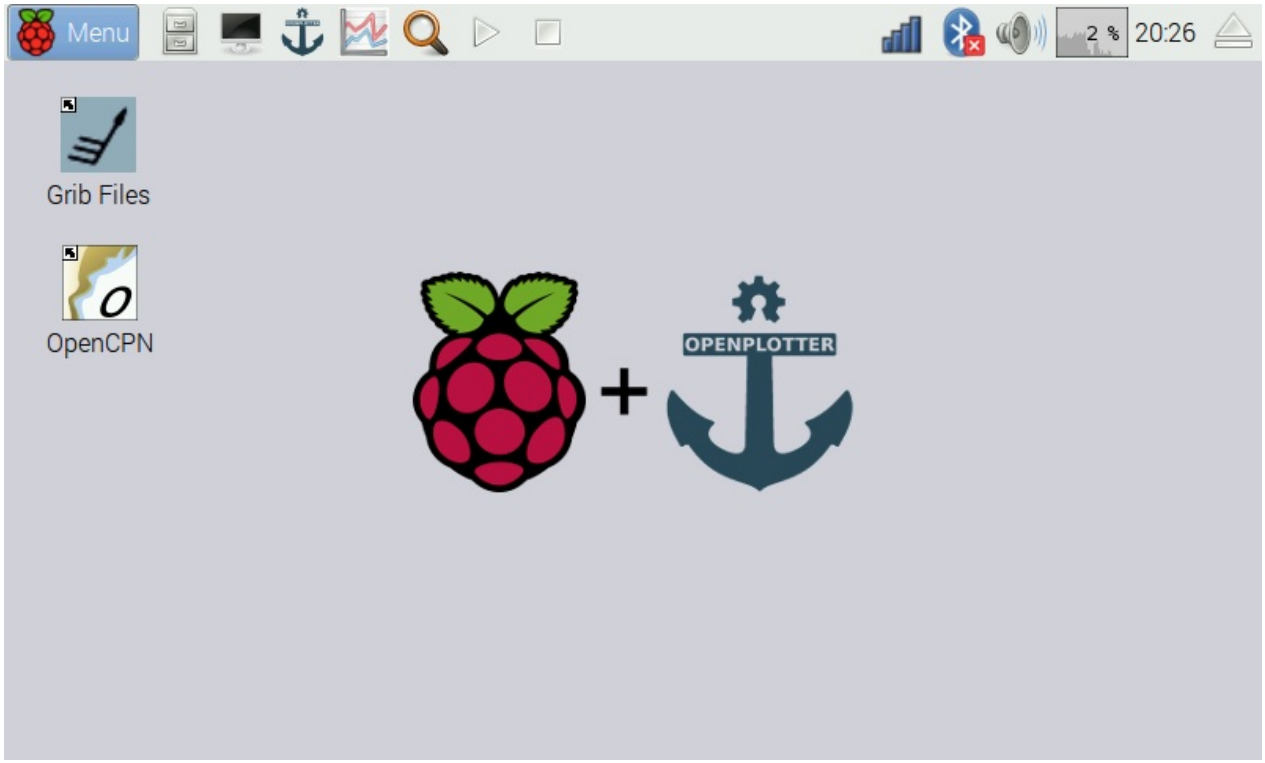
There are people who buy boats but there are also people who build them, why not build your own electronics too? OpenPlotter is a combination of software and hardware to be used as navigational aid on small and medium boats. It is also a complete home automation system onboard. It works on ARM computers like the Raspberry Pi and is open-source, low-cost and low-consumption. Its design is modular, so you just have to implement what your boat needs. Do it yourself.

Features

- **Chartplotter**. With OpenCPN, a navigation software with useful plugins.
- **Weather Forecast**. Download and visualize GRIB files with zyGrib.
- **NMEA 0183 Multiplexer**. Multiplex and filter data inputs from any number of serial and network interfaces. Send and filter to any number of outputs.
- **Signal K (beta)**. OpenPlotter is ready for Signal K, the new, free and open source universal marine data exchange.
- **Inspector**. Check the data traffic to avoid conflicts and overlaps between sources.
- **WiFi Access Point**. Share data (NMEA 0183, Signal K, remote desktop, Internet connection) with laptops, tablets and phones onboard. Connect to internet on port through the same device.
- **Remote Desktop**. Access to OpenPlotter desktop from the cockpit through your mobile devices.
- **Headless**. Easy start without monitor.
- **SDR-AIS**. Receive and decode AIS with cheap DVB-T dongles. Calibration tools

Included.

- **Electronic Compass and Heel**. Read magnetic heading and heel angle from an IMU sensor. Tilt compensated. Calibration tools Included.
- **Barograph, Thermograph and Hygrograph**. From pressure, temperature and humidity sensors. Save logs and display graphs to see trends.
- **Multiple temperature sensors**. Get data from coolant engine, exhaust, fridge, sea...
- **Special Sensors**. Detect opening doors/windows, tanks level, human body motion...
- **Magnetic Variation**. Calculate magnetic variation for date and position.
- **True Heading**. Calculate true heading from magnetic variation and magnetic heading.
- **True Wind**. Calculate true wind from apparent wind and either speed through water (speed log) or speed over ground (GPS).
- **Rate Of Turn**. Calculate the rate the ship is turning.
- **Remote Monitoring**. Publish data on Twitter or send it by email.
- **Actions System**. Compare a custom value with any data flowing through your system and use it as a trigger to run multiple predefined actions.
- **Custom Switches**. Connect external switches and link them with actions.
- **Handle External Devices**. Relays, LEDs, buzzers ...
- **System Time Tools**. Set the system time from NMEA data and set the time zone easily.
- **Startup Programs**. Select some program parameters to automatically launch at start.



How does it work?

OpenPlotter can collect data from different sources:

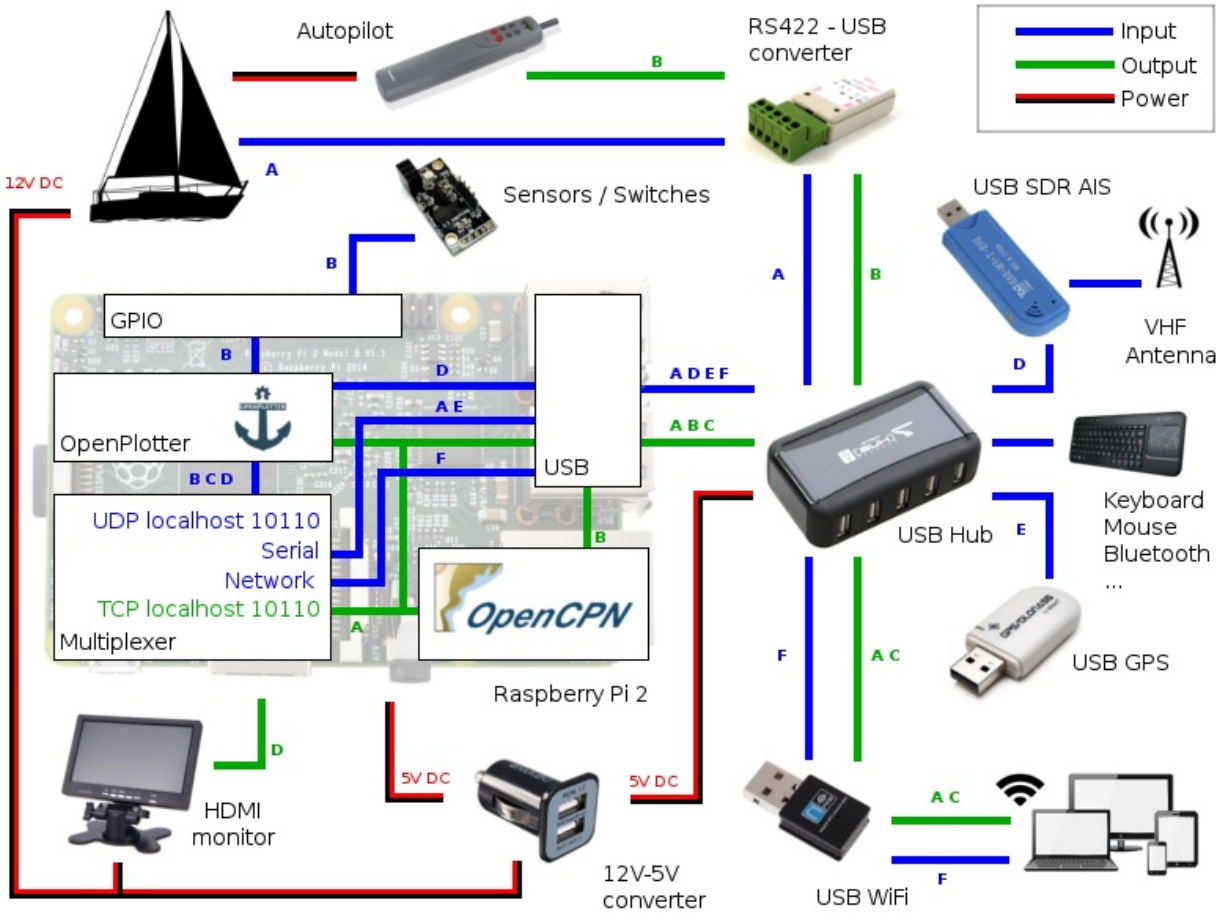
- Sensors and devices connected by GPIO port.
- Serial devices connected by USB port.
- Any computer or portable device connected to the same network.

Most of these sources directly send data in the maritime format called NMEA 0183. Others, like SDR AIS or some sensors, need to be processed by OpenPlotter to convert raw data to NMEA. Finally, there are other devices that do not use NMEA format.

All these sources are combined in a single data stream which can be sent to:

- Internal chartplotter (OpenCPN).
- Internal NMEA calculator to generate new NMEA data.
- Internal triggers/actions system.
- Other external devices through network or serial connections.
- Data Inspector.
- Virtual Instrument Panel
- A twitter account through Internet.
- An e-mail account through Internet.

Through the chapters of this manual we will see how to do this.


Autopilot
RS422 - USB converter
Input
Output
Power
12V DC
A
B
Sensors / Switches
USB SDR AIS
VHF Antenna
GPIO
OpenPlotter
BCD
UDP localhost 10110
Serial
Network
TCP localhost 10110
Multiplexer
USB
ADEF
ABC
AE
F
D
OpenCPN
Raspberry Pi 2
USB Hub
Keyboard
Mouse
Bluetooth
...
USB GPS
HDMI monitor
5V DC
5V DC
12V-5V converter
USB WiFi
AC

What do you need?

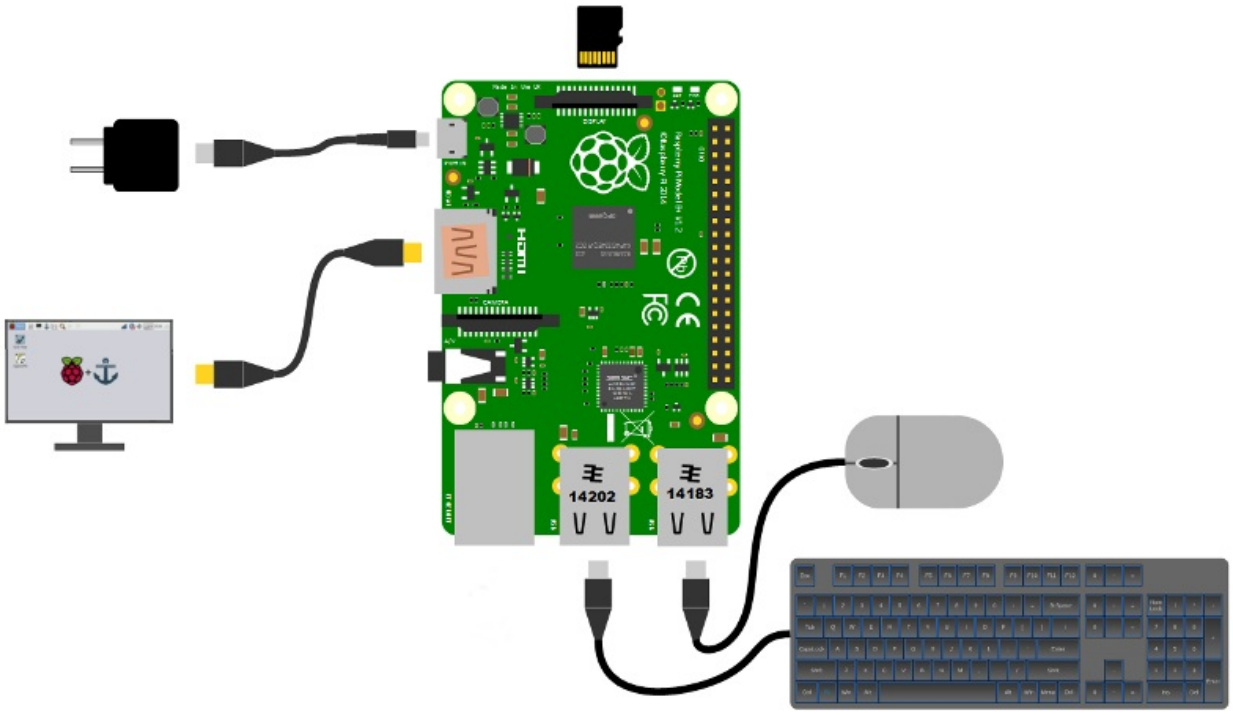
You will need the basic parts and some optional parts. It will depend on what kind of data you want to collect, process or display and what kind of equipment your boat already has.

Required items

You need at least these items to run *the software* and you have two options: either with monitor or without monitor (headless).

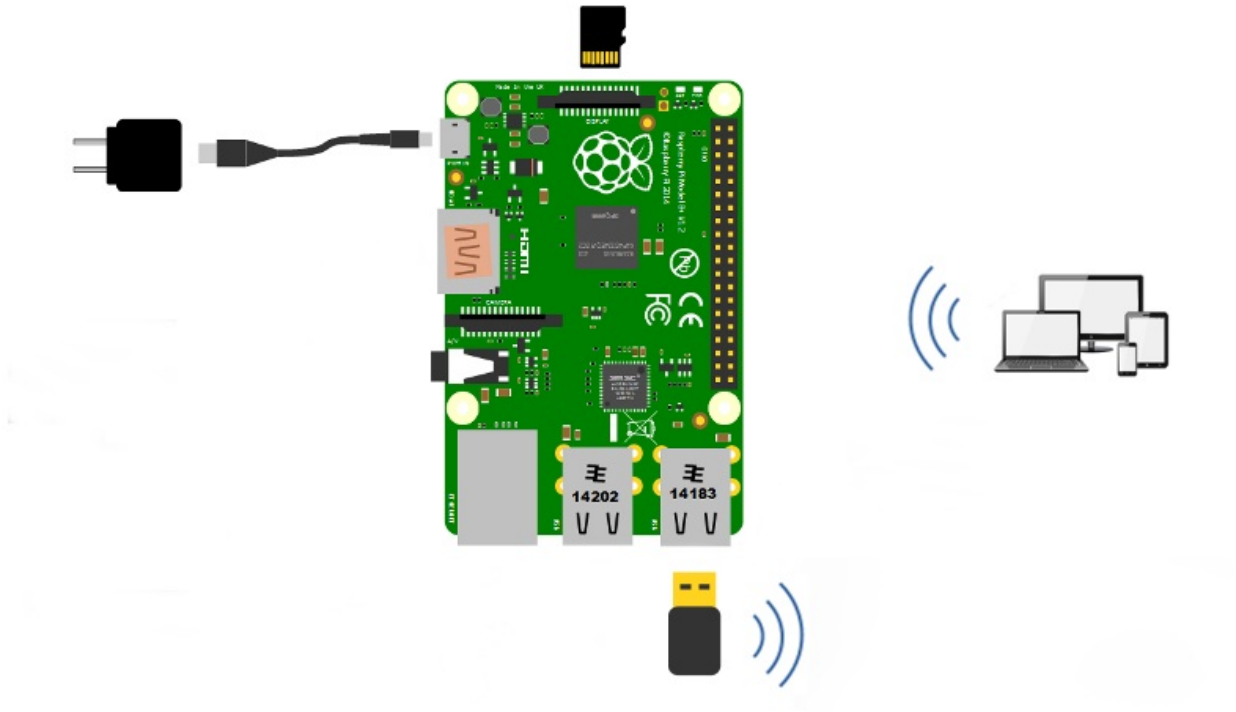
Monitor option

- ARM embedded computer (Raspberry Pi)
- Box
- Power supply
- HDMI monitor
- Keyboard and mouse
- SD card
- OpenPlotter RPI (*the software*)



Headless option

- ARM embedded computer (Raspberry Pi)
- Box
- Power supply
- USB WiFi dongle
- SD card
- OpenPlotter RPI (*the software*)
- Any laptop tablet or smartphone



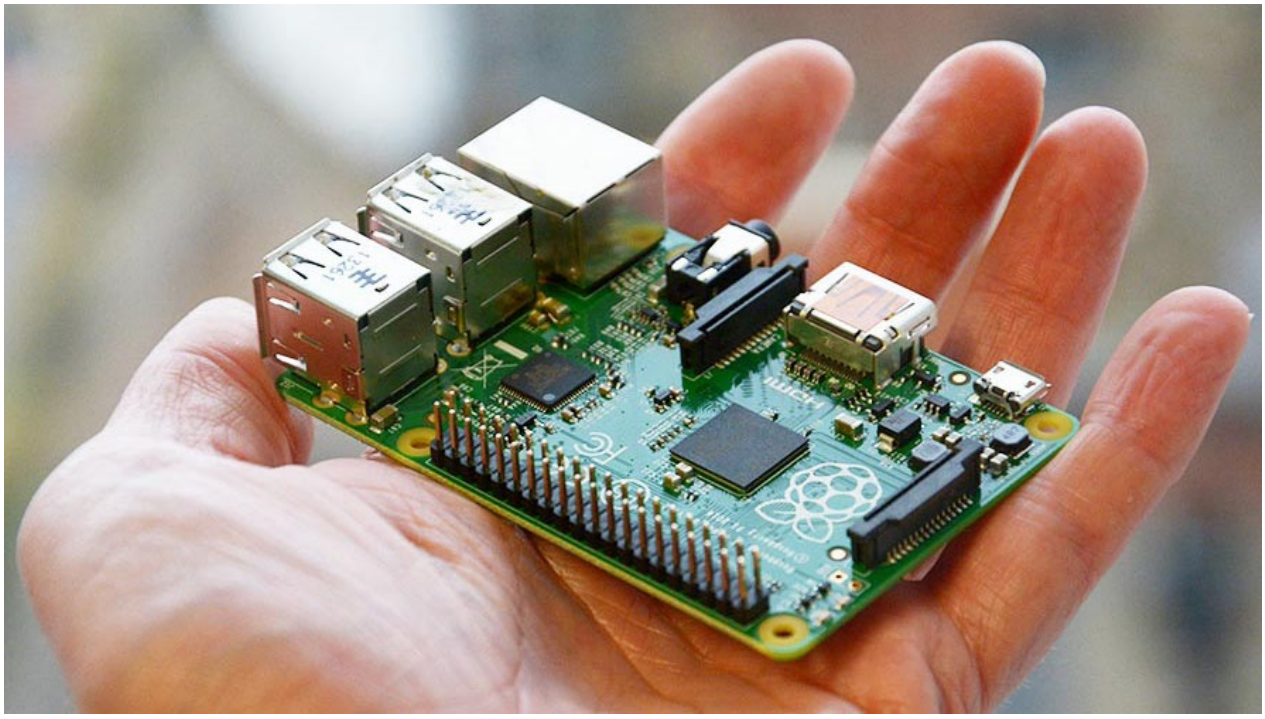
Optional items

Devices to communicate with boat and sensors to collect data from environment.

- Self powered USB Hub
- USB WiFi dongle
- USB GPS dongle
- NMEA 0183 to USB converter
- USB DVB-T dongle (AIS reception)
- IMU sensor
- Pressure/Temperature sensor
- Humidity/Temperature sensor
- One wire temperature sensor
- PIR motion sensor
- Common switch
- Door switch

- Float switch
- Relay
- LED
- Buzzer

ARM embedded computer



We recommend the popular Raspberry Pi 2 because it fits the requeriments: open-source, low-cost, low-consumption and has a huge community of developers.

We are developing **OpenPlotter RPI**, a special operating system for Raspberry Pi based on Linux Raspbian distribution. When development is done we will migrate to other ARM boards.

You can use OpenPlotter with Raspberry Pi model Zero and model 1 but they have poor performance running OpenCPN. These models are perfect for headless systems.

Box

There are a lot of box models to protect the Raspberry Pi board. **We are working on a waterproof enclosure.**

Power supply

The Raspberry Pi is powered by a 5V USB power supply with a micro USB connector (like most standard mobile phone chargers). Exactly how much current (Amp) the Raspberry Pi requires is dependent on what you connect to it. A 1.2A (1200mA) power supply will provide you with ample power to run your Raspberry Pi for most applications, though you may want to get a 2.5A (2500mA) if you want to use all 4 USB ports without using an external powered USB hub. If you need to connect USB devices that will take the power requirements above 2.5A, then you must connect them to an externally-powered USB Hub.

It would be a good idea to get an USB car charger adapter (12v to 5V) with two outputs in case you need to power an USB Hub too. We recommend a power supply capable of providing a minimum of 3A.

Pay special attention to power supply as it is the main source of issues.

Buy a tested USB Power supply

http://www.sailoog.com/shop-category/openplotter

HDMI monitor

The Raspberry Pi has a HDMI port which you can plug directly into a monitor or TV with an HDMI cable.

The minimum size to use conveniently OpenPlotter is 7 inches (800x480px).

Actually this is not essential, you can use OpenPlotter from your laptop, tablet or phone by remote desktop. See chapter Headless.

Keyboard and mouse

Any standard USB keyboard and mouse will work with your Raspberry Pi. Wireless keyboard & mouse combos are a good option.

You will not need neither keyboard nor mouse if you are using OpenPlotter by remote desktop.

SD card

You need an SD card to work as the hard disk of your system and where you will install the operating system.

The Raspberry Pi 2 should work with any micro-SD-compatible card, although there are some guidelines that should be followed:

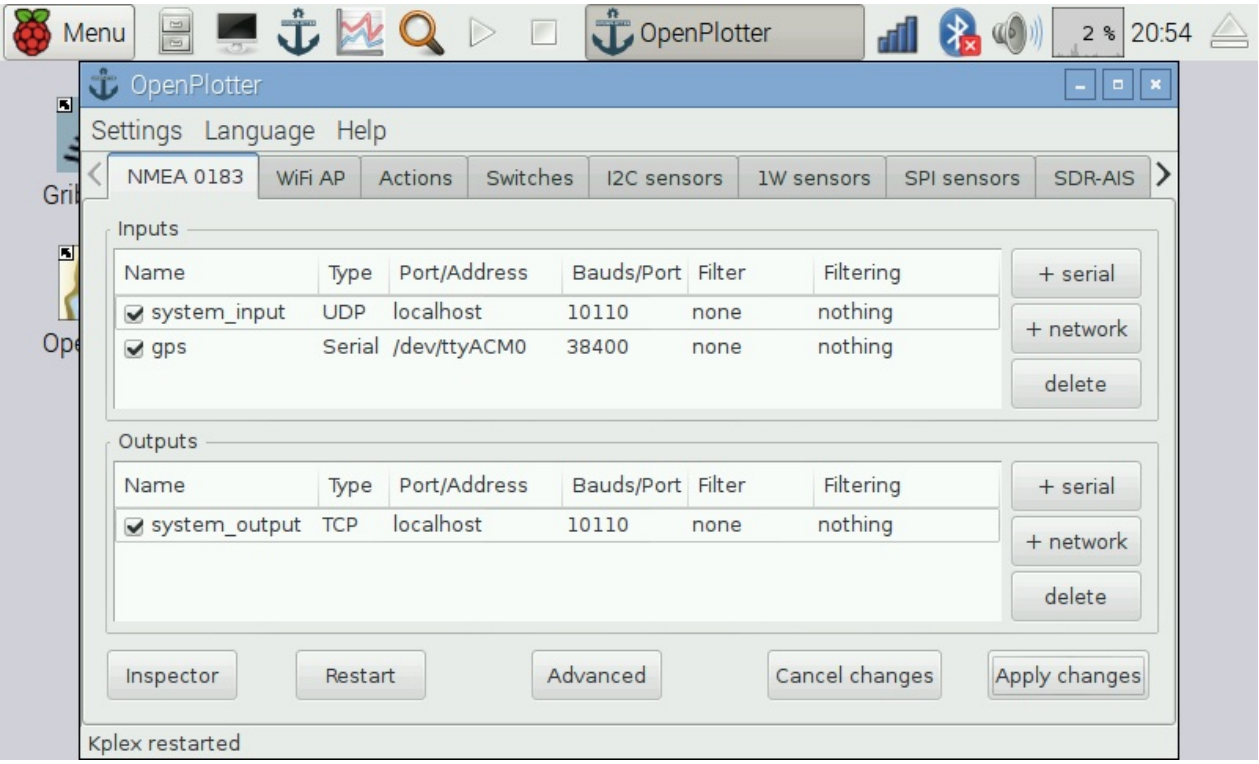
A minimum of 4GB is required but 8GB is recommended.

The card class determines the sustained write speed for the card; a class 4 card will be able to write at 4MB/s, whereas a class 10 should be able to attain 10 MB/s. However it should be noted that this does not mean a class 10 card will outperform a class 4 card for general usage, because often this write speed is achieved at the cost of read speed and increased seek times.

Buy an 8GB SD card with OpenPlotter RPI ready to run.

http://www.sailoog.com/shop-category/openplotter

Software



OpenPlotter RPI is a modified version of Raspbian, the official operating system for the Raspberry Pi. It contains all you need.

OpenPlotter RPI is open-source and free. Download and follow the instructions:

http://www.sailoog.com/en/blog-categories/openplotter-rpi

or buy our plug and play SD card with OpenPlotter RPI:

Buy an 8GB SD card with OpenPlotter RPI ready to run.

http://www.sailoog.com/shop-category/openplotter

Self powered USB Hub

If you are connecting devices which use more power than your Raspberry can provide, you will need a self powered USB Hub.

You can start connecting devices to the raspberry and switch to a self powered hub when you start to see strange behavior of the devices.

Hubs with **FE1.1S** chip work right, avoid hubs with MA8601 chip. Often the same model can contain any of them. And some of them do not contain chip at all! just a glob of black material to hide what is underneath ... nothing.

It would be a good idea to get a Hub with 5V input so that you could power it with the same source as your raspberry.

Buy a tested USB Hub

http://www.sailoog.com/shop-category/openplotter

USB WiFi dongle

You will need an USB WiFi dongle if you want to connect either OpenPlotter to internet or your mobile devices on board to OpenPlotter.

A good WiFi adapter will probably need more power than the Raspberry Pi USB port can provide, especially if there is a large distance from the WiFi adapter to the WiFi Access Point, or it is transferring large amounts of data. Therefore, you may need to plug the WiFi adapter into a powered USB hub.

To share data with on board devices by WiFi you have to set OpenPlotter as an access point and connect devices to it. However not all WiFi dongles can function as an access point, only devices with the **RT5370**, **RTL8188CU/CUS** or **RTL8192CU/CUS** chipset will work (OpenPlotter RPI v0.6.0 supports **RTL8192EU** too). We recommend **RTL8192CU/CUS**.

Buy a tested WiFi dongle

http://www.sailoog.com/shop-category/openplotter

USB GPS dongle

If you don't have any GPS on board or you want an extra positioning device, this is the cheapest and most effective way.

Connecting an USB GPS dongle to OpenPlotter will provide accurate position, date/time and speed/course over ground.

Buy a tested GPS/GLONASS USB dongle

http://www.sailoog.com/shop-category/openplotter

NMEA 0183 to USB converter

If you have electronics with NMEA 0183 outputs on board (depth, wind, heading...), you will need an USB converter to connect it to OpenPlotter. Additionally, if this converter is bi-directional, you will be able to talk to electronics with NMEA 0183 inputs like the autopilot.

The NMEA 0183 hardware standard uses **RS422** connectors but you may find some devices with **RS232** as well. Find out about what type of connection you need.

Buy a tested USB-RS422 bi-directional converter

http://www.sailoog.com/shop-category/openplotter

USB DVB-T dongle

DVB-T dongles based on the Realtek **RTL2832U** chip can be used as a cheap one channel AIS receptors.

A DVB-T dongle will need more power than the Raspberry Pi USB port can provide. You need to plug the dongle into a self powered USB hub.

Antenna

The most important factor for good reception is the antenna. Any VHF antenna will work right. Some proficient homemade antennas:

http://sdrformariners.blogspot.com.es/p/blog-page.html

http://nmearouter.com/docs/ais/aerial.html

https://www.youtube.com/watch?v=SdEglNHyHB4

Buy a tested USB DVB-T dongle

http://www.sailoog.com/shop-category/openplotter

IMU sensor

If you don't have a electronic compass on board you will need an IMU.

An Inertial Measurement Unit, or IMU, measures and reports on velocity, orientation and gravitational forces, using a combination of an accelerometer, gyroscope, and a magnetometer.

Connecting an IMU to OpenPlotter will provide magnetic heading which is needed to calculate true heading and true wind. You will have heel angle data as well.

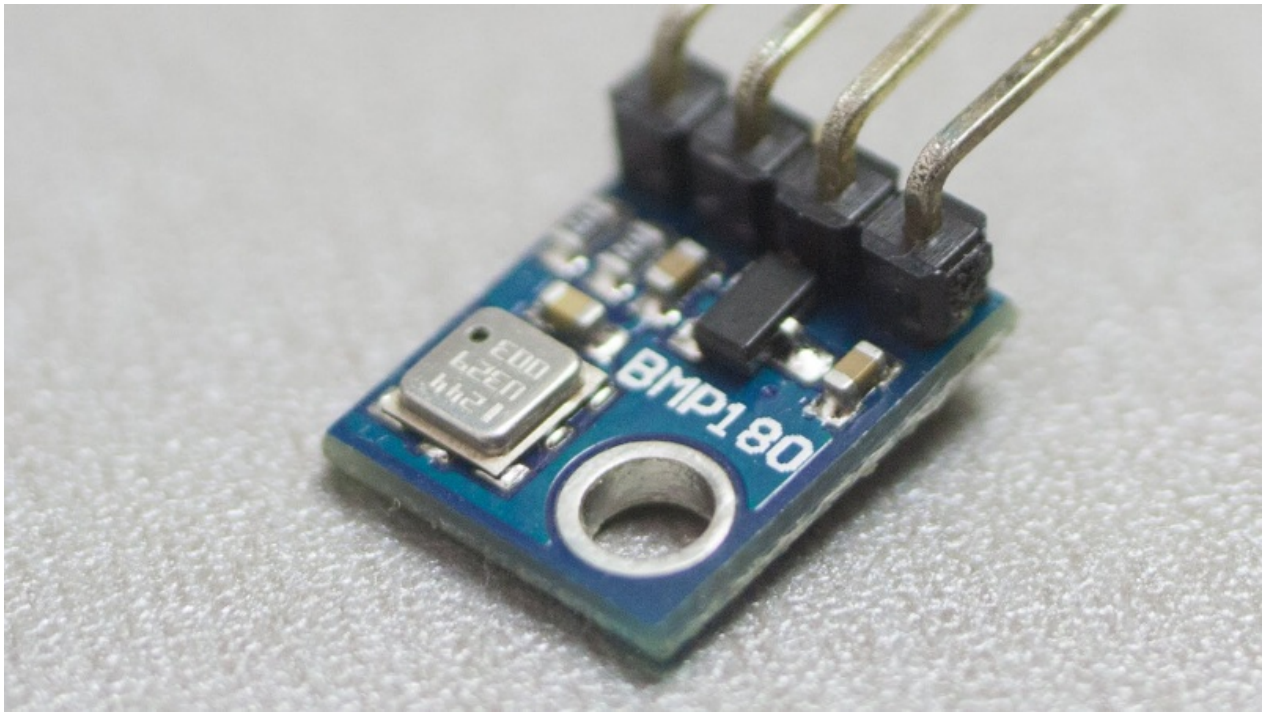
IMU sensors have to be connected by I2C interface.

Supported IMU sensors

- InvenSense MPU-9150 single chip IMU.
- InvenSense MPU-6050 plus HMC5883 magnetometer on MPU-6050's aux bus (handled by the MPU-9150 driver).
- InvenSense MPU-6050 gyros + acclerometers. Treated as MPU-9150 without magnetometers.

- InvenSense MPU-9250 single chip IMU (I2C and SPI).
- STM LSM9DS0 single chip IMU.
- STM LSM9DS1 single chip IMU.
- L3GD20H + LSM303D (optionally with the LPS25H) as used on the Pololu AltIMU-10 v4.
- L3GD20 + LSM303DLHC as used on the Adafruit 9-dof (older version with GD20 gyro) IMU.
- L3GD20H + LSM303DLHC (optionally with BMP180) as used on the new Adafruit 10-dof IMU.
- Bosch BMX055 (although magnetometer support is experimental currently).
- Bosch BNO055 IMU with onchip fusion. Note: will not work reliably with RaspberryPi/Pi2 due to clock-stretching issues.

Pressure/Temperature sensor



Connecting a pressure sensor to OpenPlotter will provide air pressure data to build graphs and monitor weather.

Often, pressure and temperature sensors are on the same board.

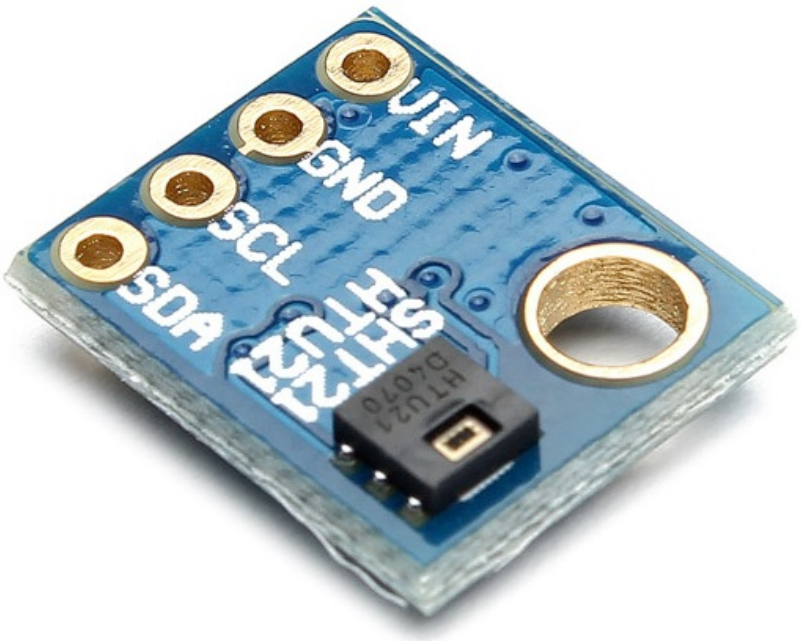
If you have another board like an humidity sensor which has a temperature sensor too, you will be able to select which one you prefer.

Pressure/Temperature sensors have to be connected by I2C interface.

Supported pressure/temperature sensors

- BMP180
- LPS25H
- MS5611
- MS5637

Humidity/Temperature sensor



Connecting a humidity sensor to OpenPlotter will provide air relative humidity data to build graphs and monitor weather.

Often, humidity and temperature sensors are on the same board.

If you have another board like a pressure sensor which has a temperature sensor too, you will be able to select which one you prefer.

Humidity/Temperature sensors have to be connected by I2C interface.

Supported humidity/temperature sensors

- HTS221
- HTU21D

One wire temperature sensor

You can connect one wire **DS18B20** sensors to OpenPlotter. These sensor are waterproof and can withstand high temperatures. Connecting multiple DS18B20 in parallel to the same pins, you will be able to get temperature data from coolant engine, exhaust, engine room, fridge, sea ...

Buy a tested DS18B20 sensor

http://www.sailoog.com/shop-category/openplotter

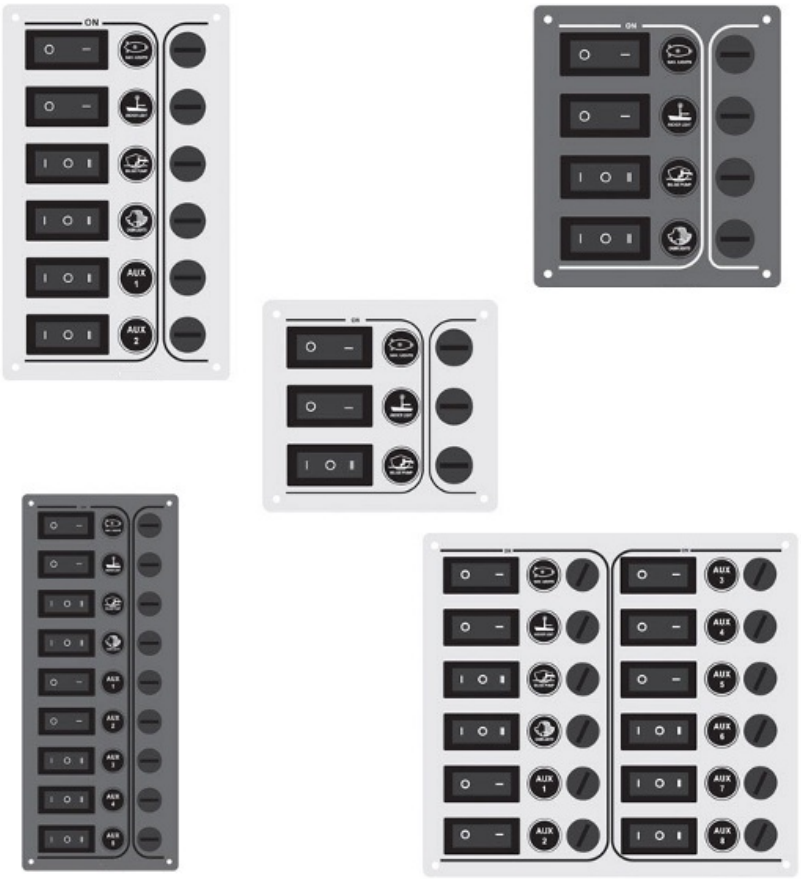
PIR motion sensor

Connecting this sensor you can detect if a human has moved in or out of the sensor range. They are small, inexpensive, low-power and easy to use. It is basically made of a pyroelectric sensor which can detect levels of infrared radiation. Everything emits some low level radiation and the hotter something is, the more radiation is emitted. If you connect OpenPlotter to internet you will be aware of what is happening in your boat when you are not there.

Buy a tested PIR motion sensor

http://www.sailoog.com/shop-category/openplotter

Common switch



Almost all of the OpenPlotter features have a defined action. You can connect any type of external switch (momentary, toggle...) and assign an action to each state (on/off). So you can shutdown/reset the system, run a custom Linux command, play/stop services, trigger external devices, play/stop an audio ...

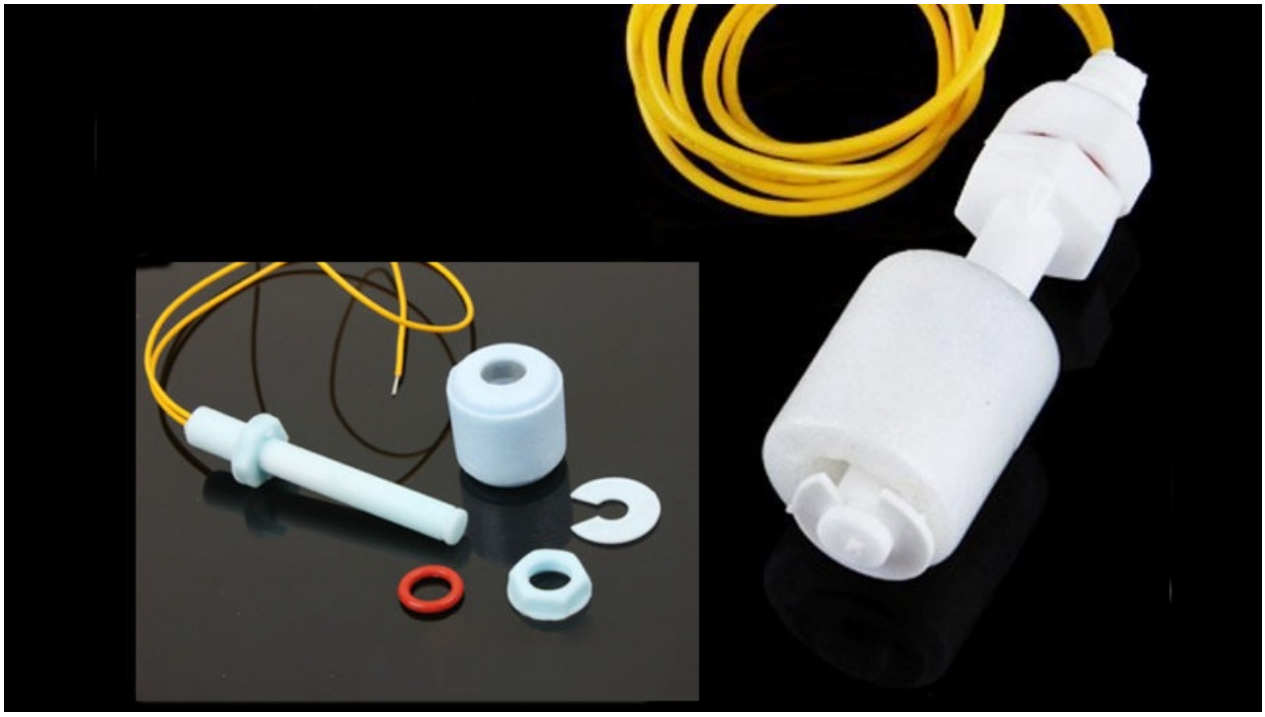
Door switch

Installing this little magnetic switches on doors and windows you will be able to detect any unauthorized opening. If you connect OpenPlotter to internet you will be aware of what is happening in your boat when you are not there.

Buy a tested Door switch

http://www.sailoog.com/shop-category/openplotter

Float switch



Installing this little magnetic switches on tanks and bilges you will be able to detect when they are full or empty. OpenPlotter may actuate a pump, an indicator, an alarm or warn you by Twitter or email.

Buy a tested Float switch

http://www.sailoog.com/shop-category/openplotter

Relay

This chapter is under construction

LED

This chapter is under construction

Buzzer

This chapter is under construction

Getting started

First of all you have to put together all the required parts. If you have trouble with some aspect, try to find help on the Raspberry Pi official page.

Second you have to run the software on your new ARM computer and here you have two options, either buy our plug and play SD card or download and install the software on an SD card.

Buy an 8GB SD card with OpenPlotter RPI ready to run.

http://www.sailoog.com/shop-category/openplotter

Installing OpenPlotter RPI on an SD card

Download the last version of **OpenPlotter RPI** from

http://sailoog.com/blog-categories/openplotter-rpi

It is a compressed file and weighs just over 1GB so it will take a little.

Once the download is complete we have to unzip it and at the end we will have an .img file of about 4GB to be recorded on an SD card.

OpenPlotter RPI is built from Raspbian operating system and therefore the way to pass it to an SD card is the same as for that system. On these links are the instructions to do so depending on which system we are using to perform the process.

Linux: https://www.raspberrypi.org/documentation/installation/installing-images/linux.md

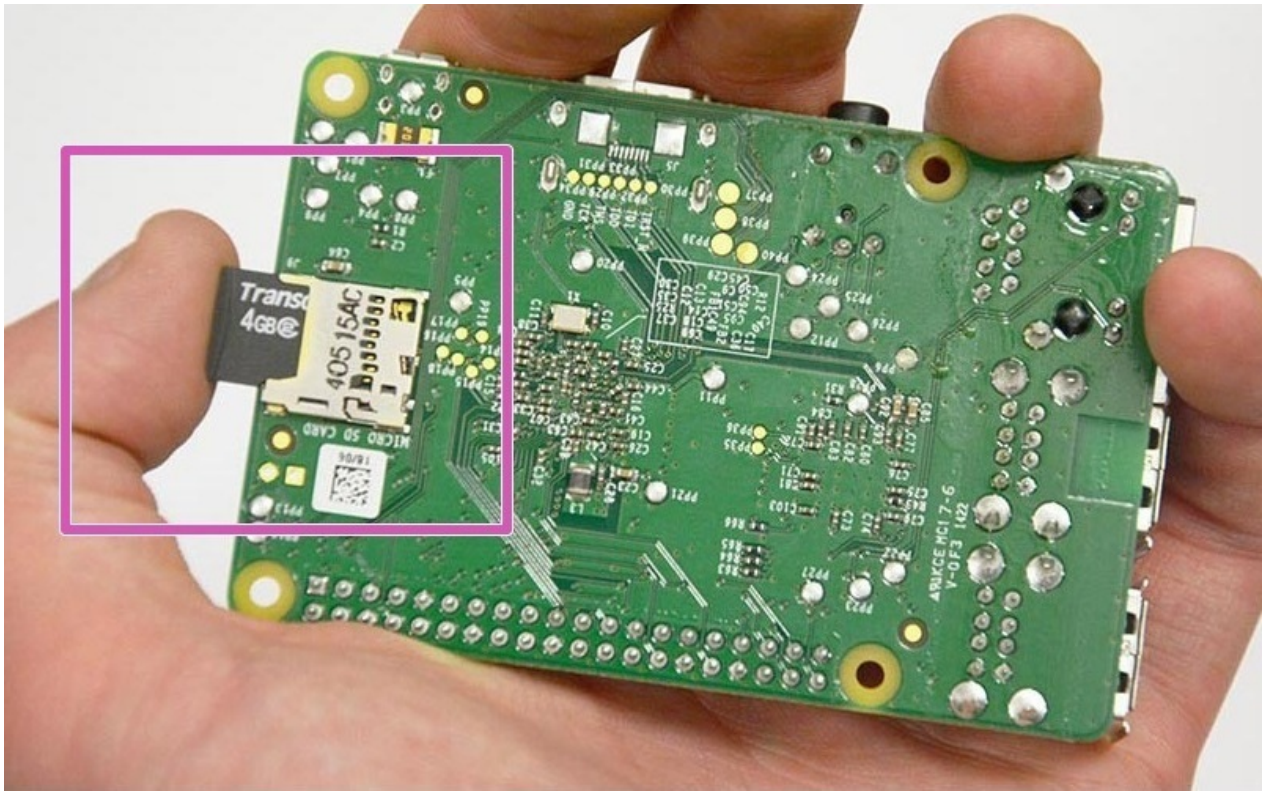
MAC: https://www.raspberrypi.org/documentation/installation/installing-images/mac.md

Windows: https://www.raspberrypi.org/documentation/installation/installing-images/windows.md

First boot

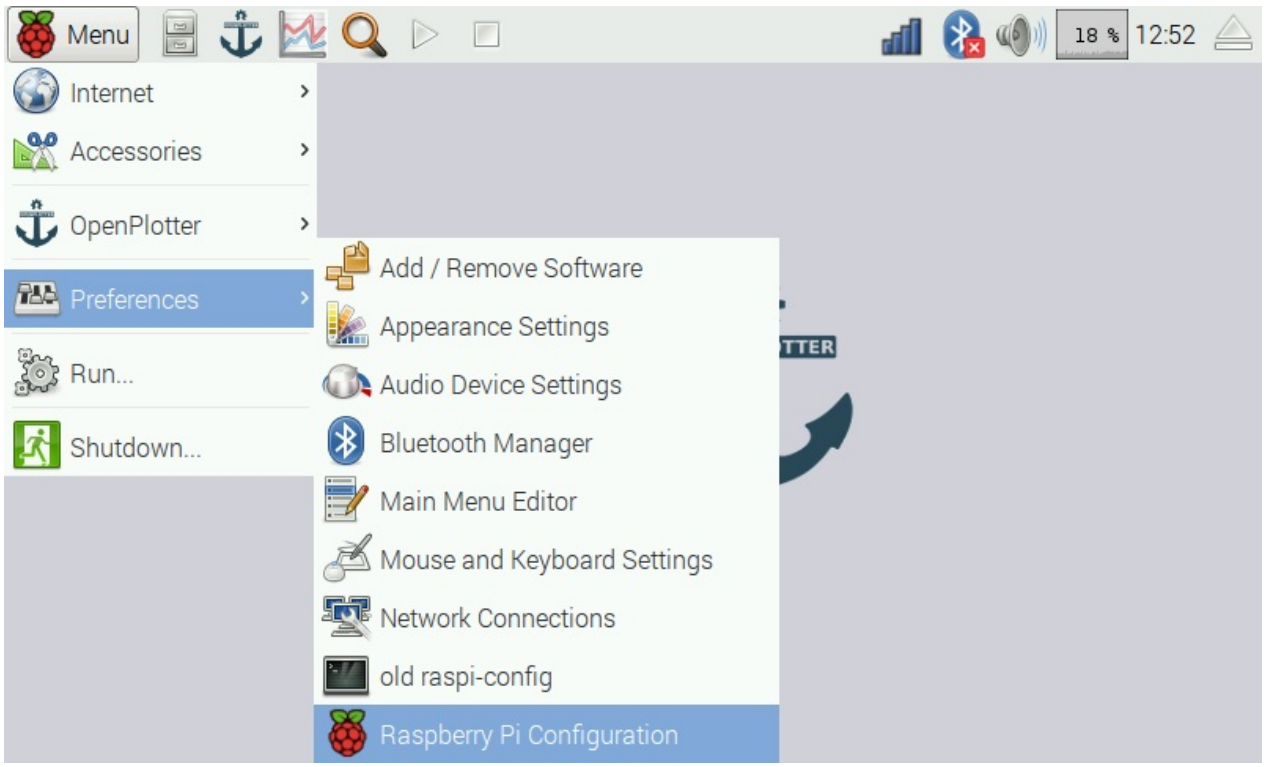
If you want to build a headless system see the next chapter Headless before reading further.

Once we have created the SD card with OpenPlotter RPI, we will insert it into our Raspberry Pi.

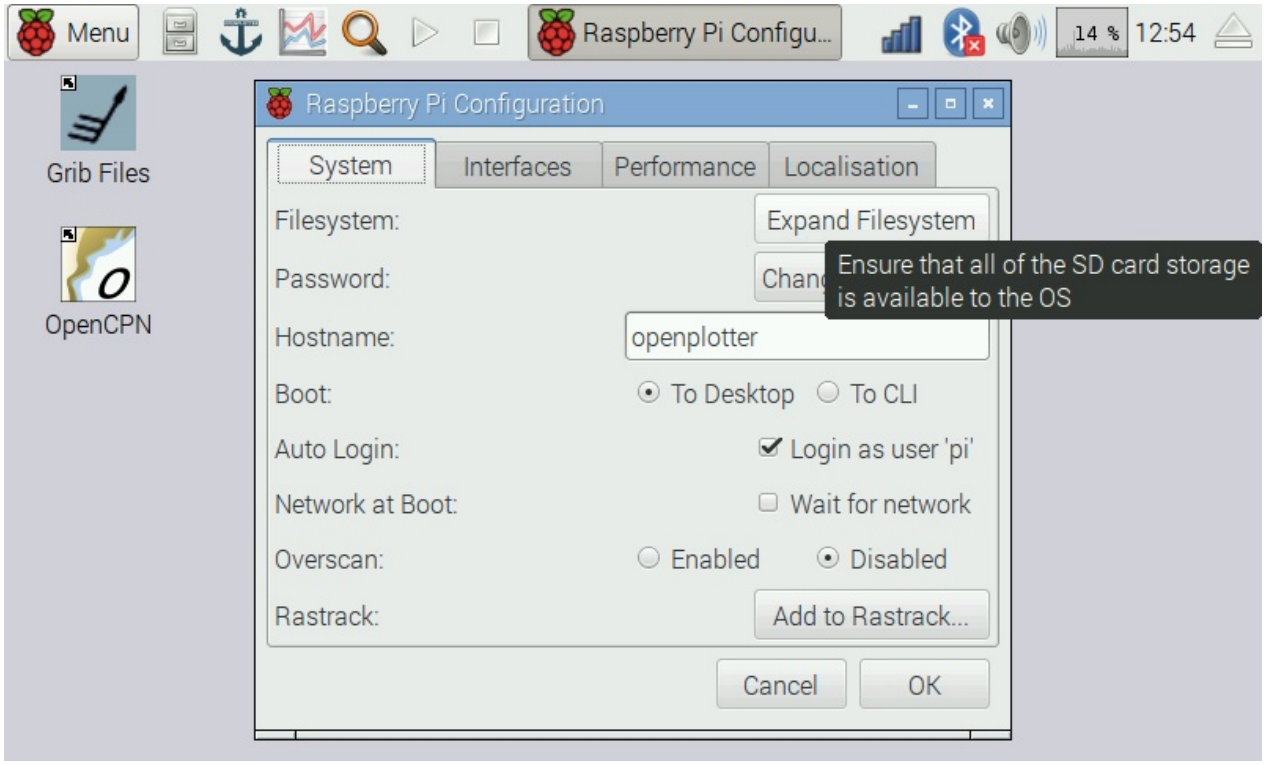


If you bought our SD card you can skip this last step, just turn on the system and start using OpenPlotter.

Turn the Raspberry on and go to *Menu* > *Preferences* and select *Raspberry Pi Configuration*.

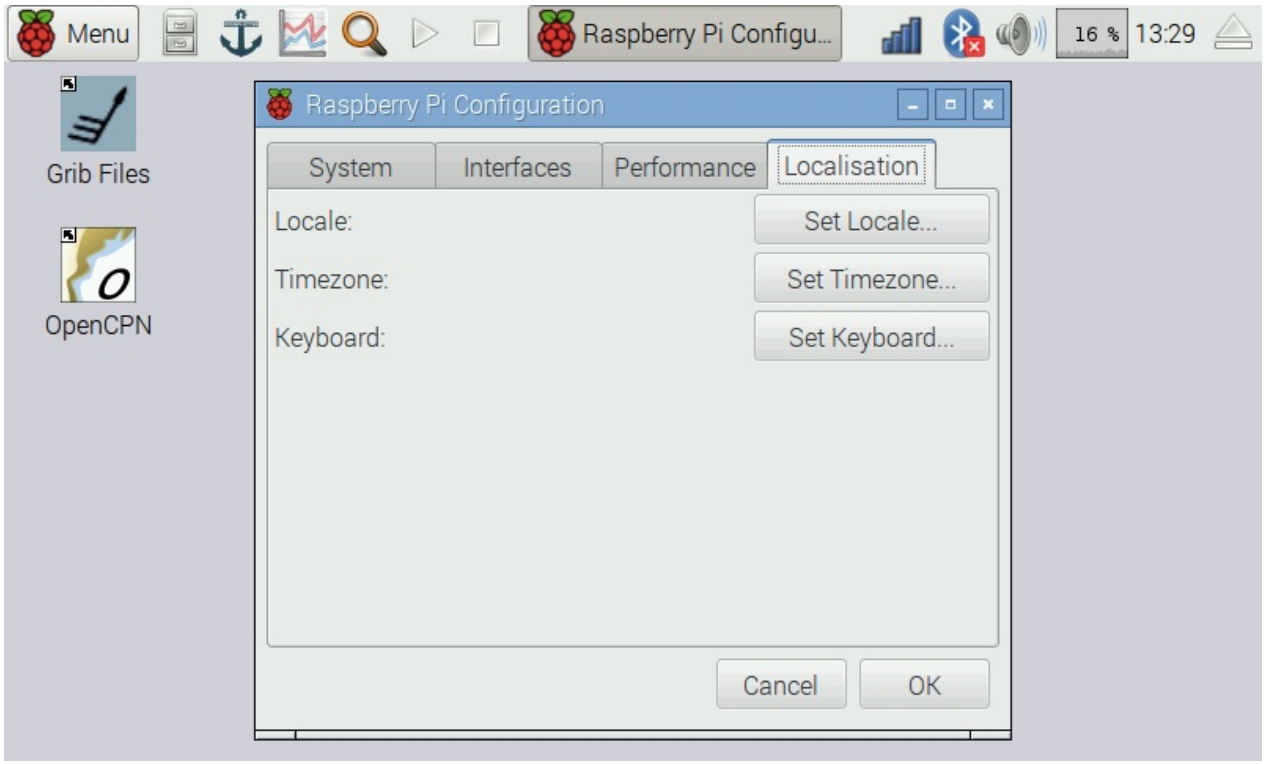


A window will open and we have to click on *Expand Filesystem*. Doing this, the next time you reboot, the system will use the full capacity of the SD card.



Setting language

If you need to set your system in other language than English, click on the *Localisation* tab and then on *Set Locale*, *Set Timezone* and *Set Keyboard* buttons.



Ok, now what?

Congratulations! You have your system running so it is time to start getting some data from the world. The most common and logic step it would be connecting a GPS through the NMEA 0183 multiplexer.

Headless

In order to save money and power, you can use the system without monitor. Connecting your desktop computer, laptop, tablet or smartphone to OpenPlotter by remote desktop, you will be able to access to the interface. To do this, we have to convert openplotter into a WiFi hotspot to connect our devices.

Once we have created the SD card with OpenPlotter RPI, we have to insert it into any computer with any OS (Linux, MAC, Windows). The mounted device should be called *boot* and there should be a file called *config.txt*. Open this file in a text editor like notepad on windows, but not anything like MS Word which can save it as something which is not just plain text.

The top lines should look like this:

```
[OPENPLOTTER]

#HEADLESS

#uncomment to force screen resolution (only VNC remote desktop)
#framebuffer_width=800
#framebuffer_height=600

#uncomment to set WiFi access point
#device=wlan0
#ssid=OpenPlotter
#pass=12345678

[RASPBIAN]
...
```

If you are going to connect to OpenPlotter by VNC remote desktop, you have to remove the # character from words ***framebuffer_width*** and ***framebuffer_height*** and set the screen size (800x600 by default).

If you are going to connect to OpenPlotter by RDP remote desktop, you do not have to remove the # characters from words *framebuffer_width* and *framebuffer_height*, you will set the screen size from RDP software. See more information in Remote desktop chapter.

To create the WiFi hotspot you have to remove the # character from words ***device***, ***ssid*** and ***pass***.

If only one WiFi dongle is connected, the *device* value should always be *wlan0* but if more than one is connected, the *device* value could be *wlan0*, *wlan1* ...

ssid will be the name of your WiFi network. Use any character but a maximun of 32.

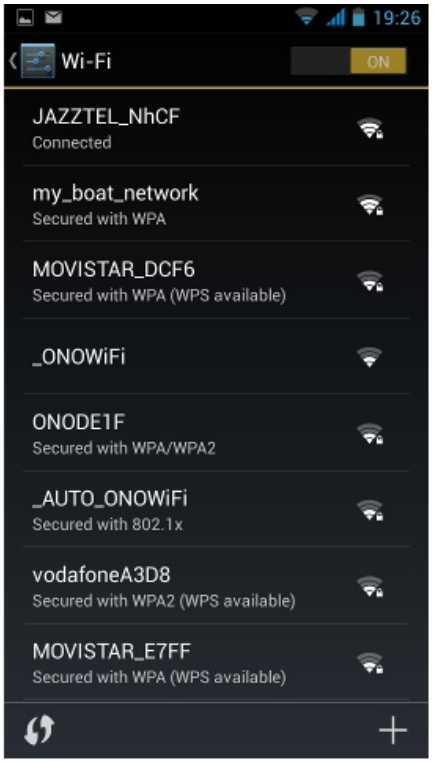
pass will be the password of your WiFi network. Use any character but a minimum of 8.

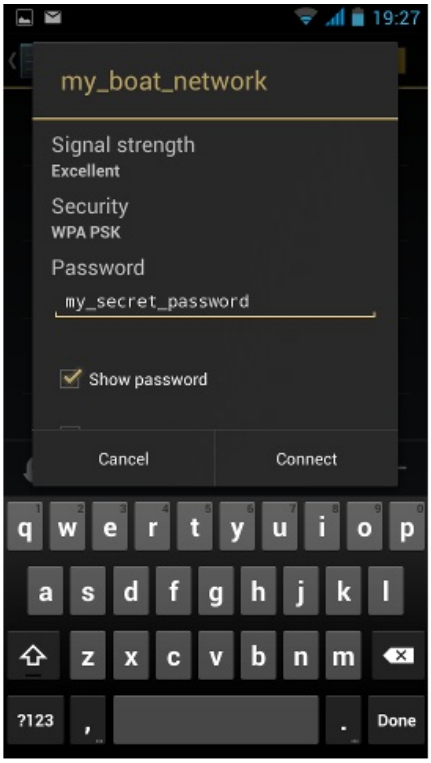
After changes, the top lines should look like this:

```
[OPENPLOTTER]

#HEADLESS

#uncomment to force screen resolution (only VNC remote desktop)
framebuffer_width=800
framebuffer_height=480

#uncomment to set WiFi access point
device=wlan0
ssid=my_boat_network
pass=my_secret_password

[RASPBIAN]
...
```

Save and eject the SD card, then insert it into the Raspberry Pi. Make sure the WiFi dongle is also inserted and power up the Pi.

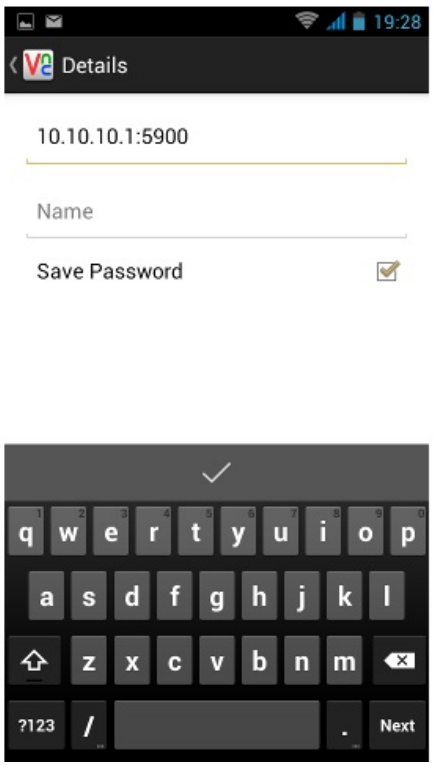
After it has finished booting up, there should be a new WiFi network called *my_boat_network* available. Log onto this network using the password *my_secret_password*.

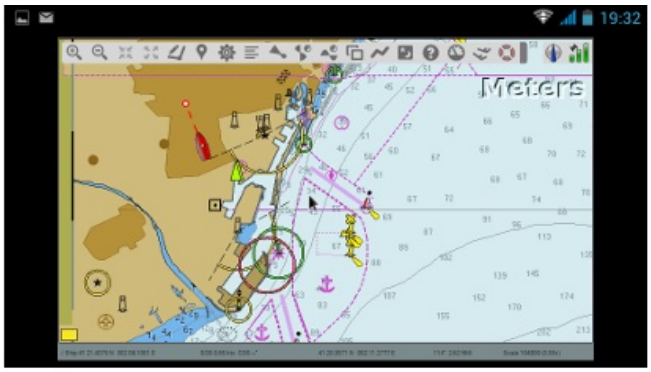


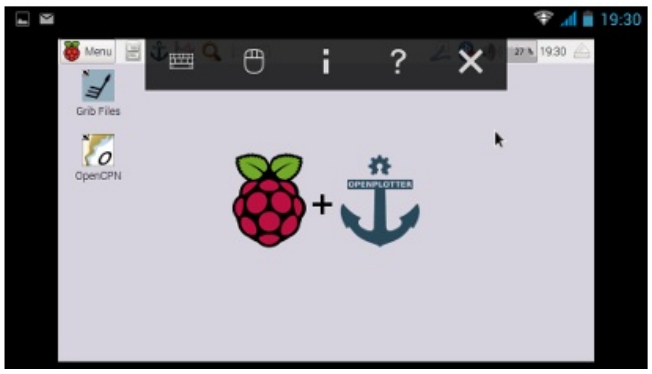


Finally, open your favourite remote desktop software on your laptop, tablet or smartphone and make a new connection with the address **10.10.10.1:5900**.

Connect and enjoy!



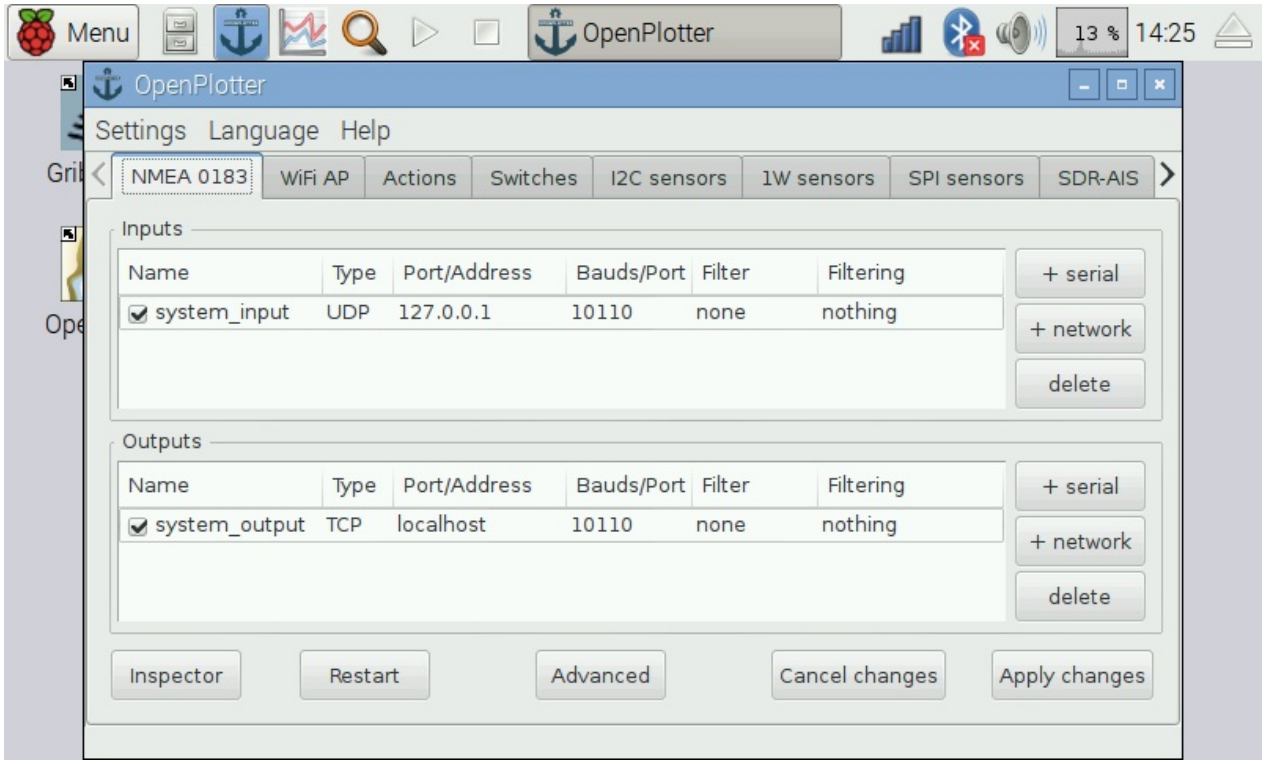




See more information about tested remote desktop software in Remote desktop chapter.

NMEA 0183 Multiplexer

This chapter is under construction



It is important that you understand that OpenPlotter must drive all the data traffic to work properly, so you do not need to configure OpenCPN to get GPS signal, we will set this in OpenPlotter.

If you want to connect a GPS USB dongle or a NMEA 0183 to USB converter, you will have to create a serial input in the NMEA 0183 Multiplexer.

System defaults

All the data generated by OpenPlotter (Sensors, SDR AIS, Calculations ...) will be automatically sent to *system input* (UDP localhost 10110) in the NMEA 0183 Multiplexer.

All the inputs will be automatically multiplexed and available at the *system output* (TCP localhost 10110). You have just to configure OpenCPN to listen to *system output* (TCP localhost 10110) to get all the data.

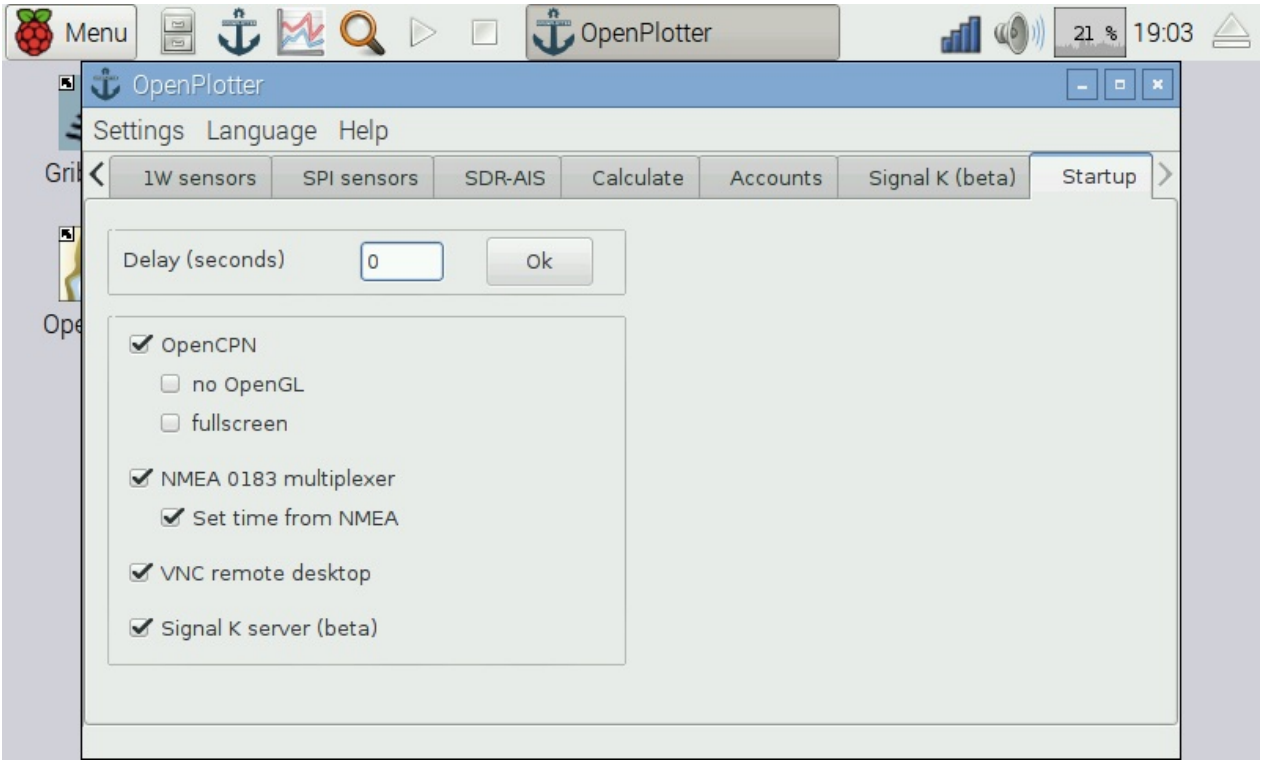
Remote desktop

This chapter is under construction

If you want to connect to OpenPlotter by remote desktop from external devices (laptops, tablets or smartphones), all of them have to be connected to the same network. To do this you can either set OpenPlotter as a WiFi access point and connect your devices to him or connect devices and OpenPlotter to the same router.

VNC

Be sure the checkbox "VNC remote desktop" is enabled.



Tested VNC remote desktop clients

Linux

Vinagre.

Windows

RealVNC Viewer, TightVNC.

MAC

Android

bVNC, RealVNC Viewer, VNC per Android.

IOS

RealVNC.

RDP

Tested RDP remote desktop clients

Linux

Vinagre.

Windows

Windows 10 Remote Desktop Client, Windows CE 5.0 Remote Desktop Client.

MAC

Android

Remote RDP Lite, RDC, Remote Desktop Client, aRDP, RDP Remote Desktop

IOS

DVB-T dongle (AIS)

This chapter is under construction

DVB-T dongles based on the Realtek RTL2832U chip and the new R820T2 tuner can work as a SDR AIS receiver.

A DVB-T dongle will need more power than the Raspberry Pi USB port can provide. You need to plug the dongle into a powered USB hub. Connecting and disconnecting can draw too much power and cause malfunction, try to do it when the system is off.

OpenPlotter is ready to get SDR AIS signal out of the box, you just have to calibrate to find **gain** and correction (**ppm**) values.

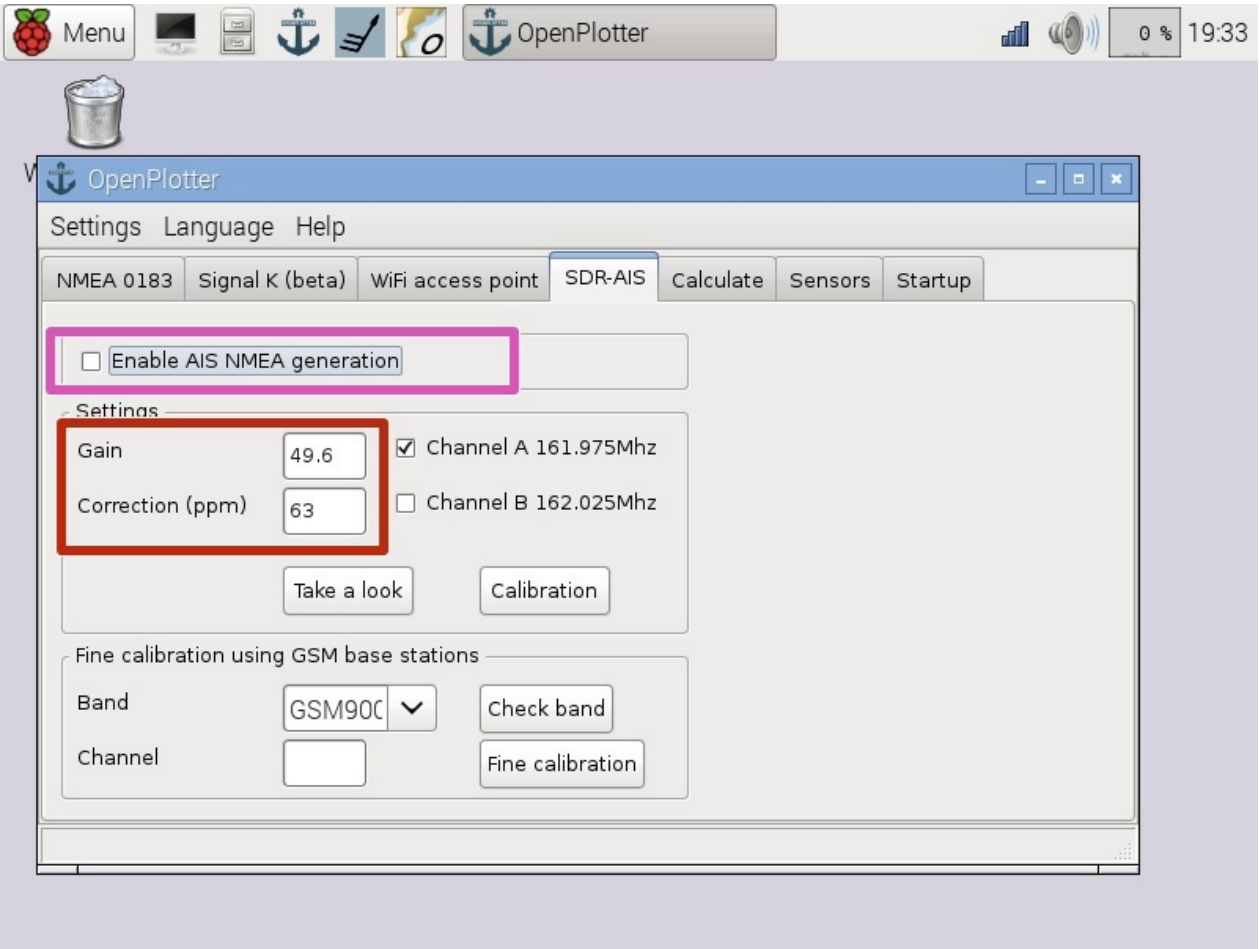
You can buy our DVB-T dongle and we can calibrate it for you and include a note with the gain and ppm values:

http://www.sailoog.com/shop-category/openplotter

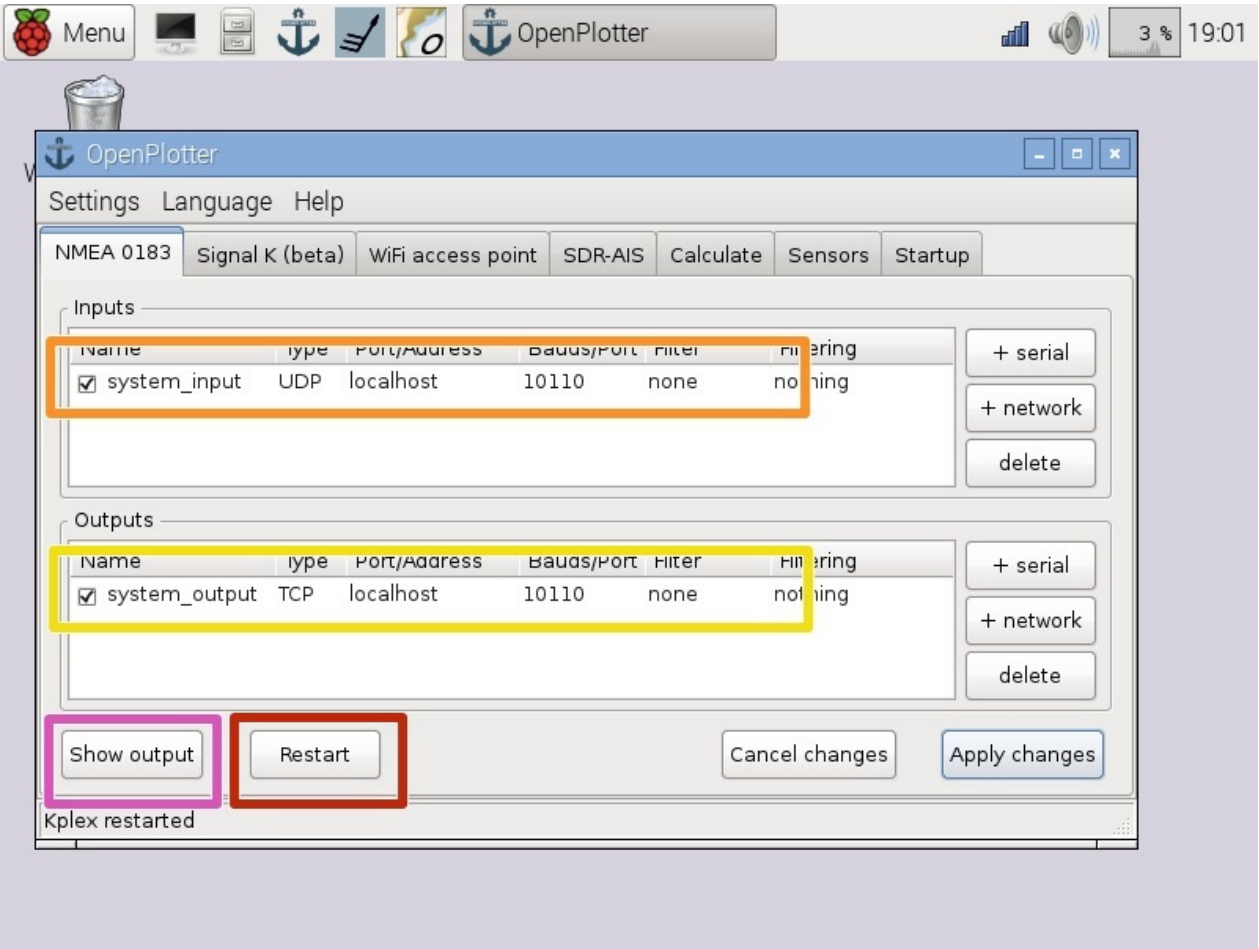
or you can follow this detailed guide:

http://sailoog.dozuki.com/Guide/Connecting+and+calibrating+SDR-AIS+dongles/3

Receiving



Once you have found your **gain** and **ppm** value (in red), select ***Enable AIS NMEA generation*** (in pink).

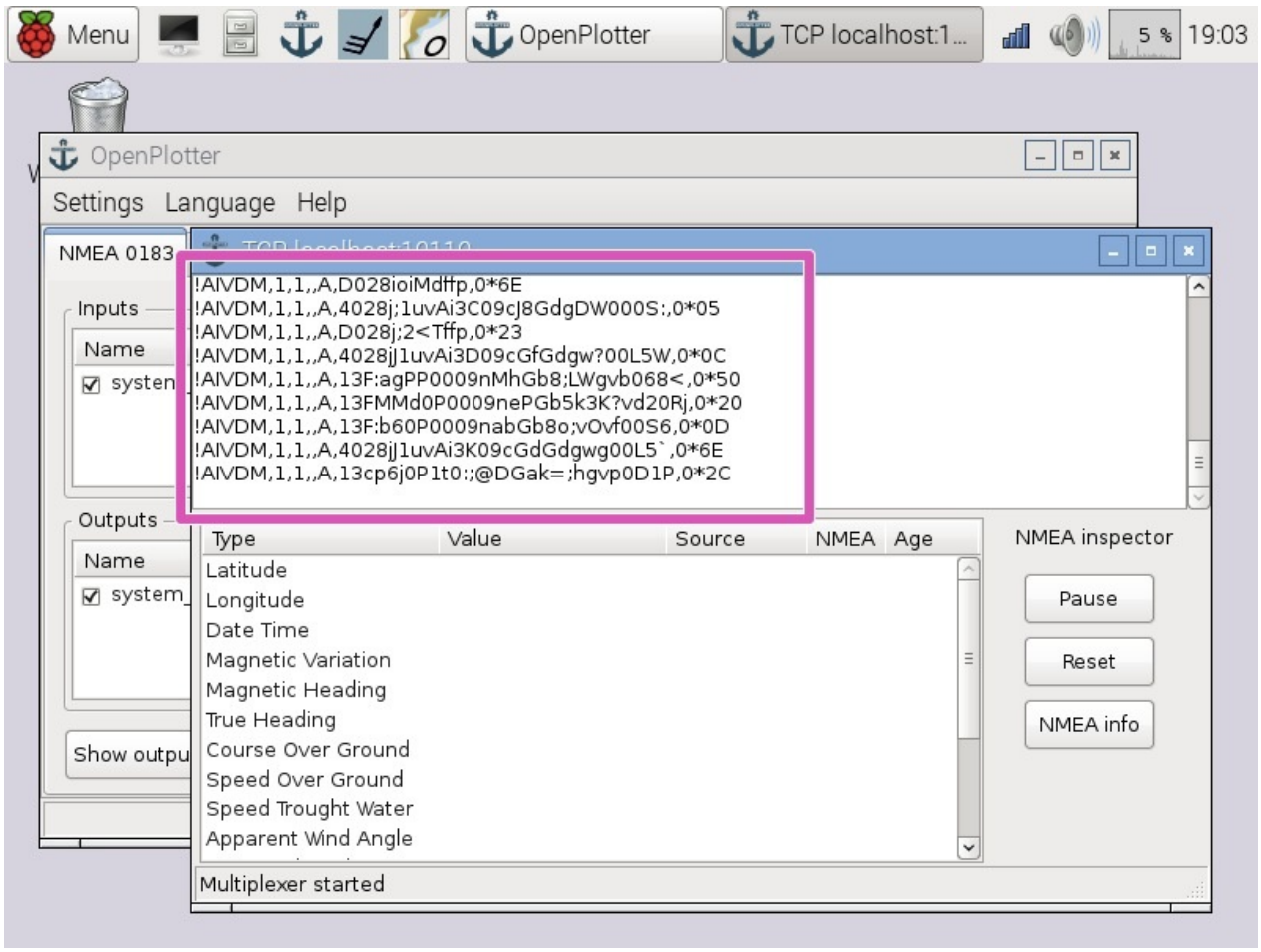


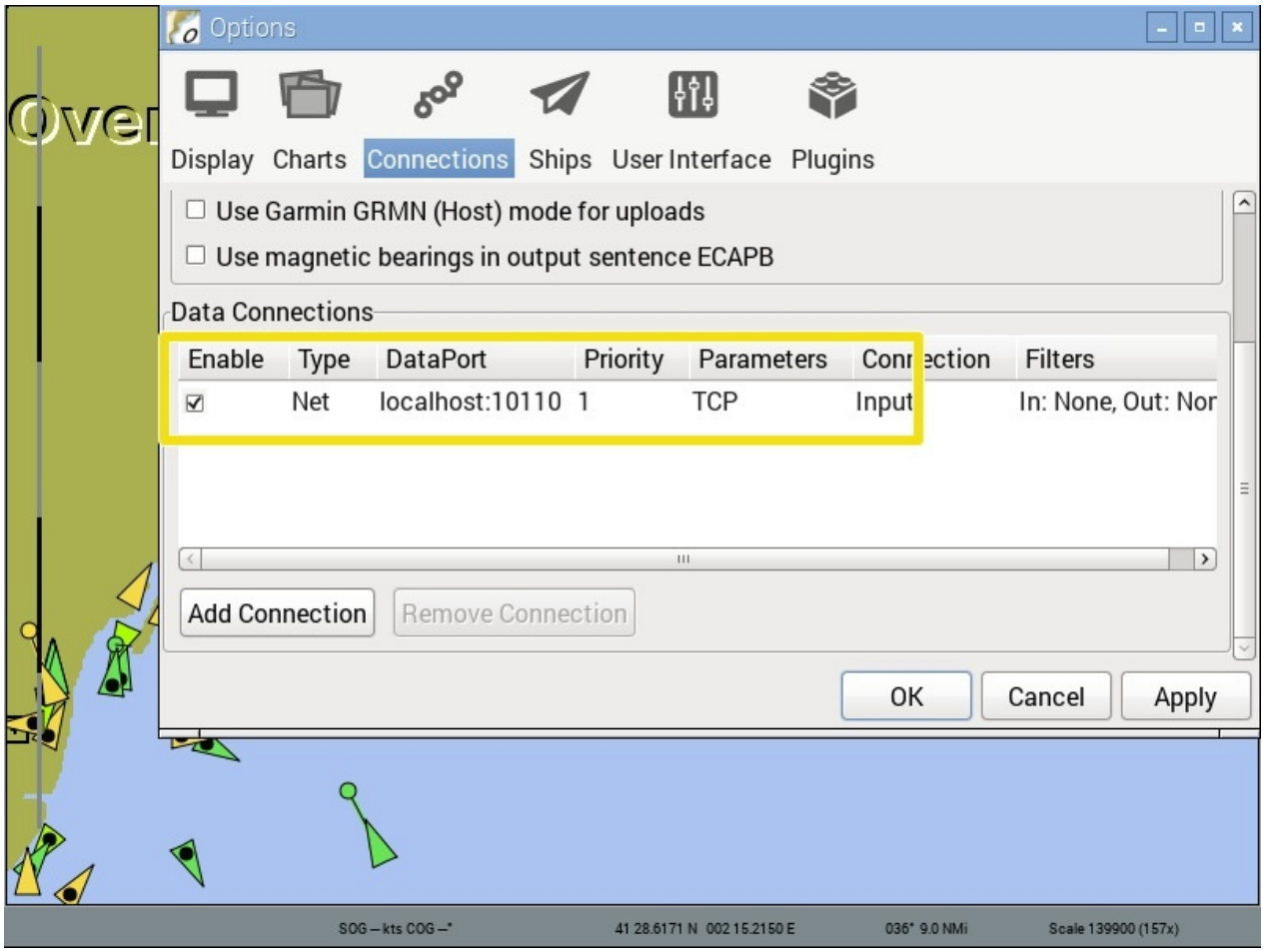
If you have AIS traffic around, AIS NMEA data will be decoded and sent to **system input UDP localhost 10110** (in orange).

If you want to have access to AIS data you will have to connect your software (OpenCPN) to **system output TCP localhost 10110** (in yellow).

Press **Restart** (in red) to be sure the multiplexer is working.

Press **Show output** (in pink) to see AIS data in the NMEA Inspector.


Menu
OpenPlotter
TCP localhost:1...
5 %
19:03
OpenPlotter
Settings Language Help
NMEA 0183
Inputs
Name
Outputs
Name
Show outpu
!AIVDM,1,1,,A,D028ioiMdffp,0*6E
!AIVDM,1,1,,A,4028j;1uvAi3C09cJ8GdgDW000S:,0*05
!AIVDM,1,1,,A,D028j;2<Tffp,0*23
!AIVDM,1,1,,A,4028jJ1uvAi3D09cGfGdgw?00L5W,0*0C
!AIVDM,1,1,,A,13F:agPP0009nMhGb8;LWgvb068<,0*50
!AIVDM,1,1,,A,13FMMd0P0009nePGb5k3K?vd20Rj,0*20
!AIVDM,1,1,,A,13F:b60P0009nabGb8o;vOvf00S6,0*0D
!AIVDM,1,1,,A,4028jJ1uvAi3K09cGdGdgwg00L5`,0*6E
!AIVDM,1,1,,A,13cp6j0P1t0:;@DGak=;hgvp0D1P,0*2C
Type
Value
Source
NMEA
Age
Latitude
Longitude
Date Time
Magnetic Variation
Magnetic Heading
True Heading
Course Over Ground
Speed Over Ground
Speed Trought Water
Apparent Wind Angle
NMEA inspector
Pause
Reset
NMEA info
Multiplexer started


Options
Display
Charts
Connections
Ships
User Interface
Plugins
Use Garmin GRMN (Host) mode for uploads
Use magnetic bearings in output sentence ECAPB
Data Connections
Enable
Type
DataPort
Priority
Parameters
Filters
Net
localhost:10110
1
TCP
In: None, Out: Nor
Add Connection
Remove Connection
OK
Cancel
Apply
SOG -- kts COG --°
41 28.6171 N 002 15.2150 E
036° 9.0 NMi
Scale 139900 (157x)

Be sure OpenCPN is listening to **TCP localhost 10110** (in yellow).

You do not need to enable the rtlsdr plugin in OpenCPN. If you want to use that plugin you must disable SDR AIS reception in OpenPlotter.

Antenna

Although you can get to receive some boat with the supplied mini antenna, it is not enough for optimal reception of AIS frequencies. Any VHF antenna with the appropriate connector adapter will work fine. The antenna connector type of the dongle is female MCX.

Some home-made antennas:

http://sdrformariners.blogspot.com.es/p/blog-page.html

http://nmearouter.com/docs/ais/aerial.html

https://www.youtube.com/watch?v=SdEglNHyHB4

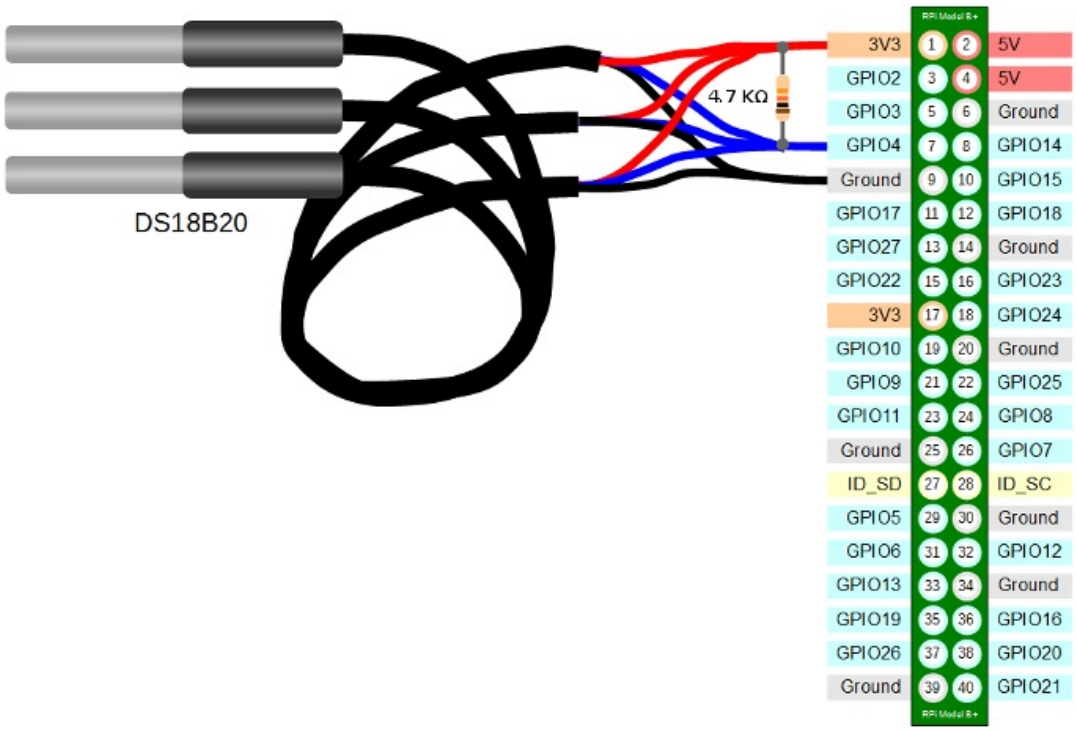
1W sensors

This chapter is under construction

DS18B20 sensors

Connection

You have to connect these sensors to GPIO4 and use a pull-up resistor as shown in the image below. You can connect multiple sensors in paralel using just one resistor.



Switches

This chapter is under construction

For normal switches (opened by default), you have to select "Pull down" in "Switches" tab an connect switch between selected GPIO pin and +3.3v pin (DANGER, NEVER TO +5v).

For special switches (closed by default), you have to select "Pull up" in "Switches" tab an connect switch between selected GPIO pin and GND pin.

It is not a problem if you make a mistake connecting to GND or +3.3v but be careful and avoid +5v pin.

Pins numbers are according to this diagram: http://raspi.tv/wp-content/uploads/2014/07/Raspberry-Pi-GPIO-pinouts.png, for example: pin GPIO22 is pin position number 15.

Accounts

This chapter is under construction

To test remote monitoring by Twitter and Gmail feature, open new accounts. DO NOT use existing accounts or usual passwords because they can be exposed.

Open a new Gmail account and enable:

https://www.google.com/settings/security/lesssecureapps

Using your new Gmail account, open a new Twitter account following this manual:

http://www.instructables.com/id/Raspberry-Pi-Twitterbot/step2/Create-ema

Funding

This project is financed by selling related products and voluntary contributions. Please help us to continue our research. Thanks!

Web shop: www.sailoog.com/shop

Donations: Paypal

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Credits

This chapter is under construction

Documentation

English: Sailoog

French: Nicolas Janvier

Spanish:

Software

OpenPlotter: http://www.sailoog.com

Chartplotter: http://opencpn.org/ocpn/

Weather forecast: http://www.zygrib.org

NMEA 0183 multiplexer: http://www.stripydog.com/kplex/index.html

NMEA 0183 Parser: http://github.com/Knio/pynmea2

IMU, pressure, temperature, humidity sensors: http://github.com/richards-tech/RTIMULib

RTL SDR: http://sdr.osmocom.org/trac/wiki/rtl-sdr

RTL SDR calibration: https://github.com/steve-m/kalibrate-rtl

AIS decoder: http://www.aishub.net/aisdecoder-via-sound-card.html

Python wrapper for librtlsdr: https://github.com/roger-/pyrtlsdr

Magnetic variation: http://github.com/cmweiss/geomag

Signal K: http://signalk.org