

# OpenPilot

## Development and Usage

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To: Scottish Linux User Group  
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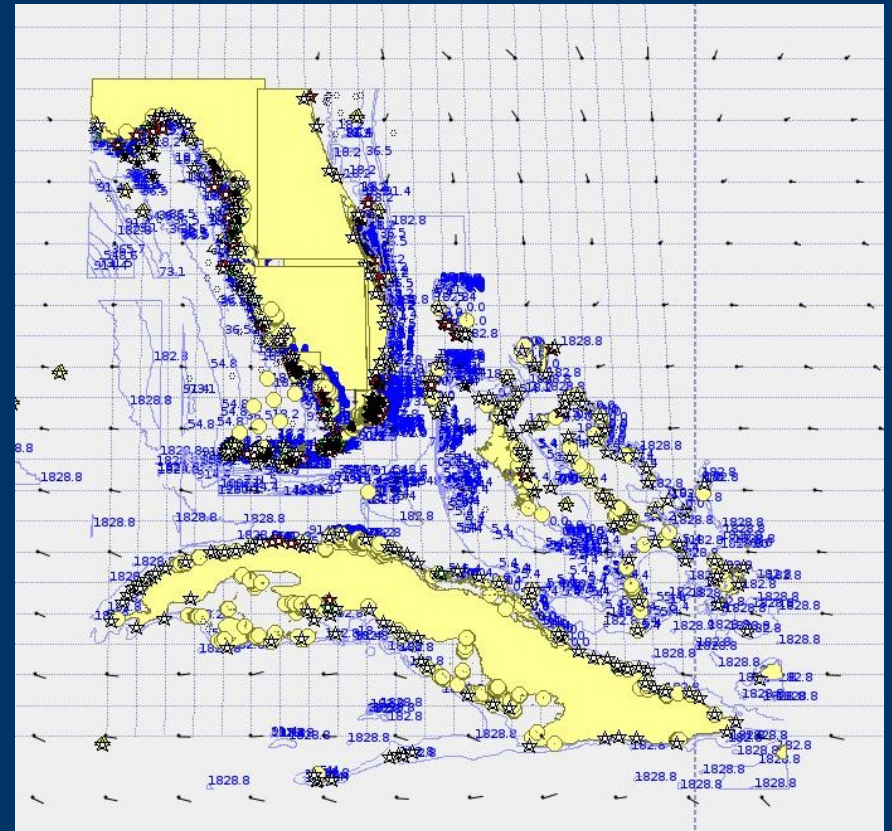
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# What is OpenPilot?


OpenPilot is a collection of widgets for QT4, which provide functionality for both land-based and marine navigation.

The following widgets are available:

- Gauge
- NMEA I/O
- Map
- Satellite view



# Why develop OpenPilot?

- Few FOSS GIS packages designed for marine use.
  - Few propriety packages cover both land and sea.
  - Propriety software is expensive and usually limited to raster charts.
  - FOSS provides flexibility across disciplines and hardware.
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# Creating widgets - QT4

To make life easy, QT has a signal/slot mechanism. This allows the coder to send data between two widgets.

For example:

I have a check-box and I want to use it to enable or disable widget “b”

So I connect the “changed(bool)” signal from the check-box to the “enable(bool)” slot in widget “b”. QT then looks after the code for me.




# Gauge Widget

- Circular or rectangular gauges
- Can be filled or transparent
- Highly customisable
- Can have safe / warning / danger ranges
- Emits signals when value is within s/w/d range
- Several different plate types (for circular gauges)

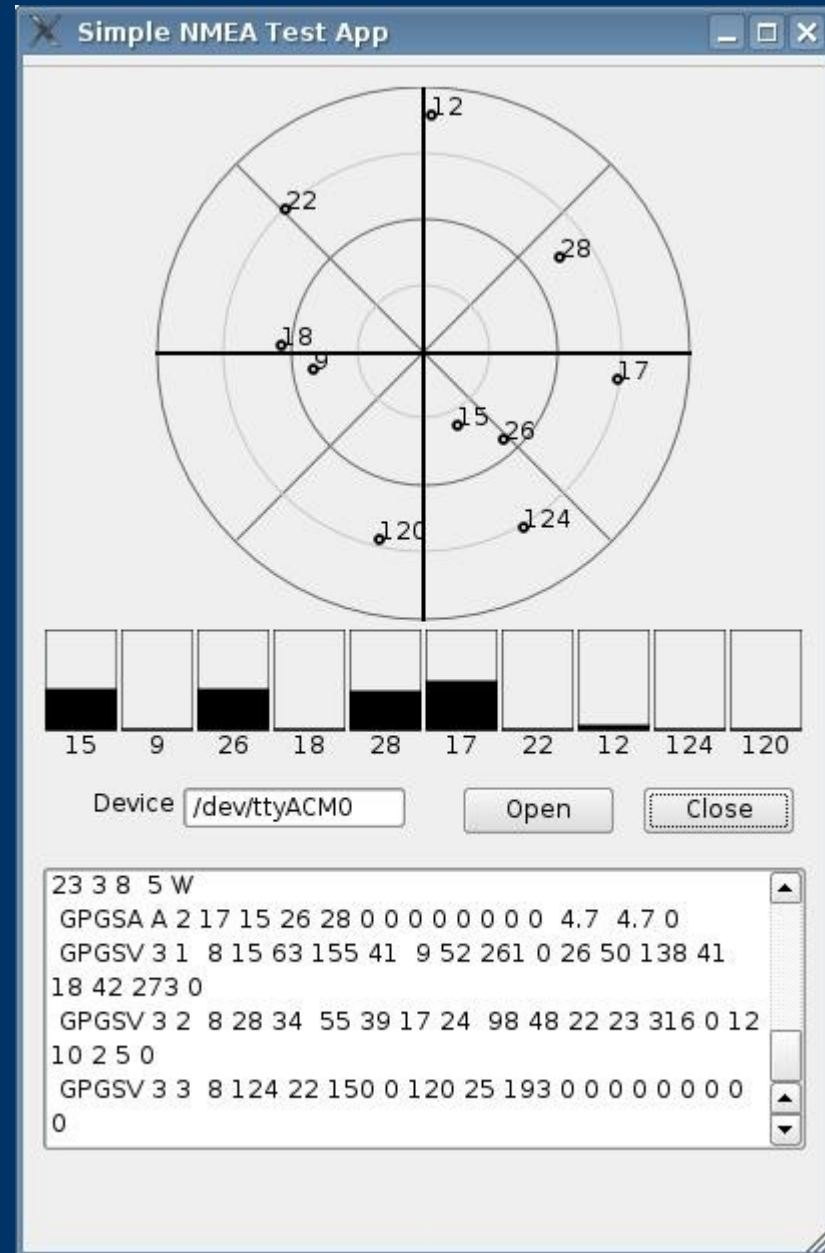


# NMEA I/O Widget

- Primary interfacing method
  - Handles NMEA-0183 sentences
  - Provides logging capabilities
  - Emits numerous signals directly (position, speed, etc.)
  - Fully configurable for any serial port
  - May be extended to handle NMEA-2000 at some point
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# Satellite View Widget

- Provides information about Satellites
- Shows SV location and signal strength
- Informs user of position fix quality



# Map Widget

Handles the following Data:

Coastlines

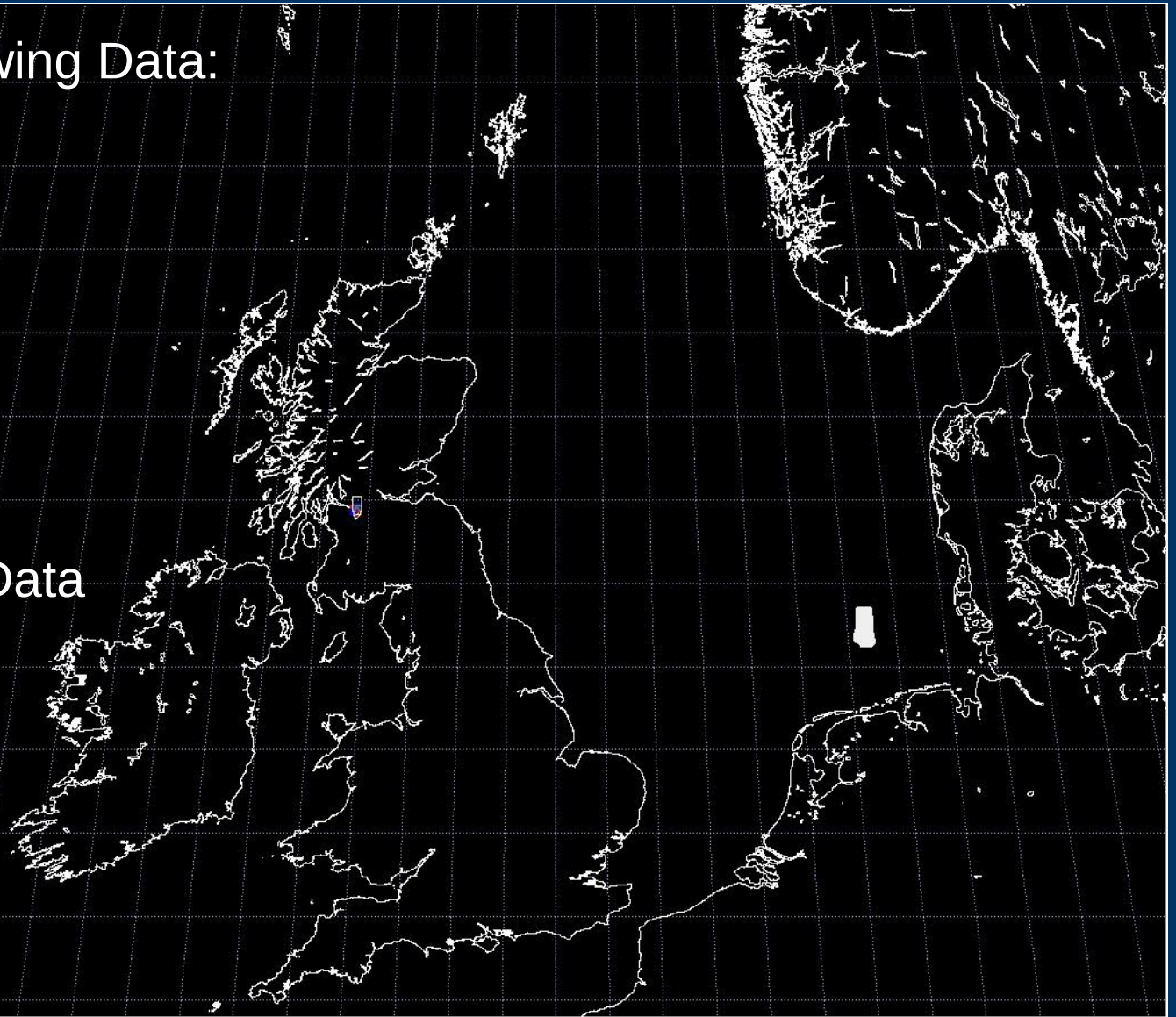
AIS

Charts

GRIB (Weather) Data

OpenStreetMap

GPS Tracks





# Map Widget - Coastlines

## GSHHS Format

"Global Self-consistent, Hierarchical, High-resolution Shoreline Database"

GSHHS is developed and maintained by Dr. Paul Wessel at the University of Hawai'i, and Dr. Walter H. F. Smith at the NOAA Laboratory for Satellite Altimetry.

Various resolutions available

Initially one polygon per continent / island

OpenPilot discretises this data into short sections

Plotted as lines, when required



# Map Widget - AIS

Automatic Identification System

Allows users to identify what a ship is and where it is.

Mandatory on all ships

“The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size. The requirement became effective for all ships by 31 December 2004.”

Various webservers covering much of the channel.  
Direct Serial Support will be added when I can get hold of an AIS receiver (about £109.95)

Each vessel is “assigned” a gps track

Tail length is variable

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# Map Widget - Charts

“Landranger maps for the seabed”

Show position/type of buoys/lights

Uses OGR (part of GDAL) to read S-57 Charts

Charts for America are free!!!

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# Map Widget - GRIB

Predicted weather information every 6 hours (source dependant)

Available on the web

Small File Size

Requires the latest GDAL Libraries

Primarily for wind data

Pressure, temperature, rainfall data also available

Obvious benefits for yachtsmen, and also pilots/walkers

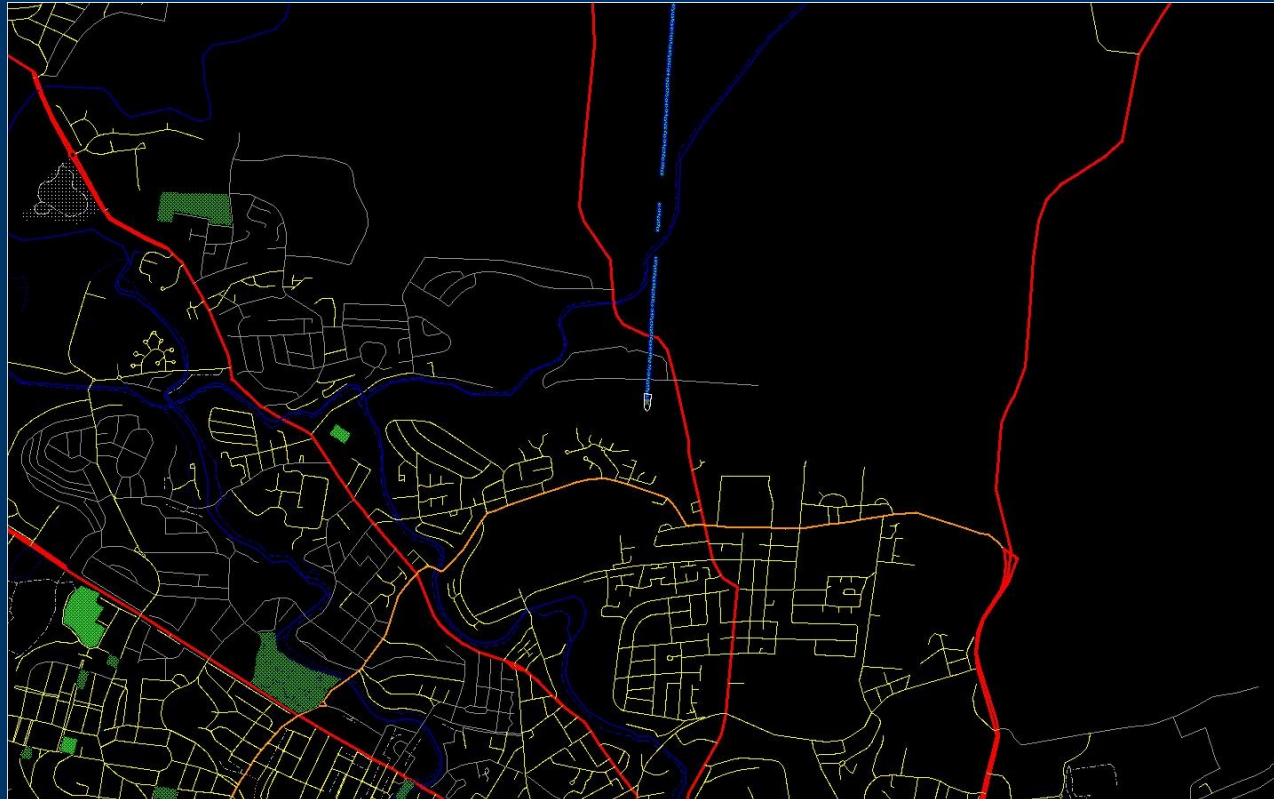
Still in early development stage - Only wind data supported



# Map Widget - OpenStreetMap

## Why Support OSM in a chart plotter?

It provides a capability that is quite rare – usage on land as well as sea. Imagine having the same Sat-Nav software in your car and boat!!



Reads OSM XML files and renders them

Fairly standard colours used

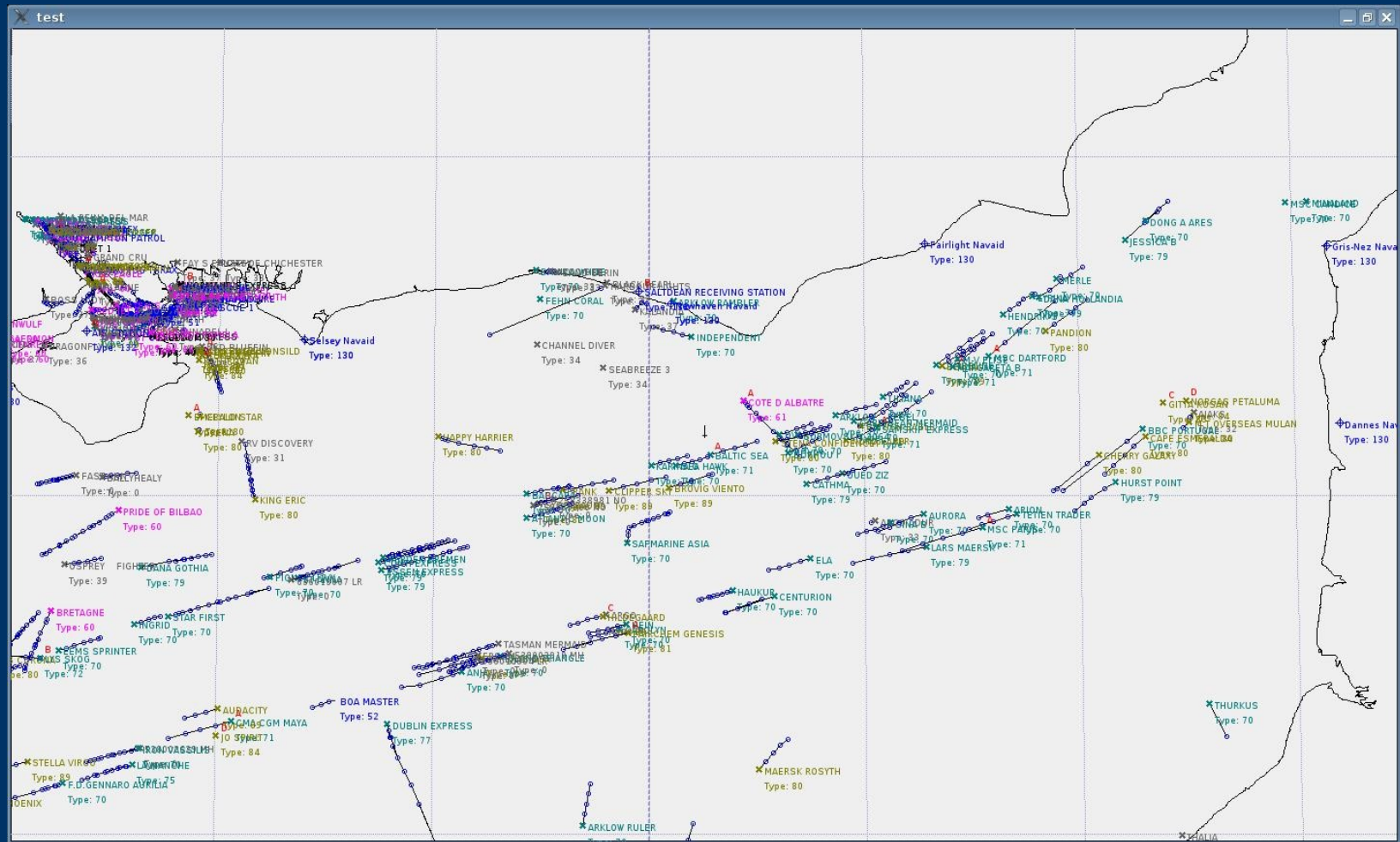
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# Map Widget – GPS Tracks


Main Code behind the AIS Plotting.

Can also read track-logs (Magellan) from files



# Map Widget - Projection

Projection is a major problem

- We are trying to represent a 3D object on a 2D plane
  - We are trying to use this to represent distances accurately
  - We really want both headings and distances to be maintained
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# Map Widget - Projection

4 methods are in development.

## True Plotting of Latitude & Longitude Data

Plots the points with no transform at all. Very fast but not particularly useful. Lines of constant separation diverge at high/low latitudes.

## Mercator Projection

Expands the Y axis to project the surface of the earth onto a cylinder through the equator. Lines of constant separation diverge at high/low latitudes.

## Sinusoidal Projection

Plots the location of a point as if it were measured around the circumference of a sphere. Not quite as accurate as Ellipsoidal projection but a lot faster. Lines of constant separation stay parallel, but North/South slants as you get further from the centre of projection.

## Ellipsoidal Projection

Plots the point as measured around the WGS-85 reference ellipsoid. This currently uses a numerical integration, so is quite slow. Has the same problems as Ellipsoidal projection.

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# Map Widget - Development

Coastlines

- Support filled land regions

AIS

- Support feeds from and to AIS Units

Charts

- Further Plotting improvements
- Support for more formats?

GRIB (Weather) Data

- Proper plotting of wind data!!
- Temperature / Pressure contours

OpenStreetMap

- Custom colours for label-types

GPS Tracks

- Support for plotting saved track logs

