



Roadmap

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Nomenclature

- Versions
 - “*” present in all versions (basic functionality).
 - “1” present in version 1 onward.
 - “2” present in version 2 onward.
 - “b” present in beta release onward.
 - “r” present in release version.
 - “Linux” available on Linux Systems.
 - “Win32” available on Windows (32 bit, may work on 64 bit).
 - “Mac” available on Mac-OS systems.

- Colours
 - No Colour – Feature Present.
 - Pink – Partial Implementation.
 - Red – Feature not yet present.
 - Blue – Feature in next version not yet present.
 - Light Blue (blue6)– Feature in next version partly completed.
 - Grey – Superseded feature.

- Completion Status
 - A status (yes/part) possibly with brief description and author's initials.

Introduction

OpenPilot started life as a variety of primarily academic software and hardware projects. With more sailing, and an interest in recording GPS data of each sailing session, the focus turned more toward navigation, and with friends trying to find a chart-plotter, towards on-board navigation. The primary focus of OpenPilot is very much on navigation, but given the platform on which we are developing, we recognise that there are many more possibilities which can make life easier on-board. Indeed, in version 2 we fully intend to support data-sharing across a network, and this will lay the foundations for fully integrated bridge systems.

OpenPilot is unique in the way that it bases all its functionality on the QT4 framework. This is done to give a virtually “plug and play” system. Each of the widgets which make up OpenPilot can be plugged together using QT's signals and slots, which gives an extremely flexible system, and enables the user (or developer) to produce a system that is not only tailored to their needs, but their personal preferences and layout.

The modular nature of OpenPilot makes it very easy to work on a small section of the project, without affecting the overall code-base. It also allows developers to have a very detailed knowledge of one area, without having to worry about the rest of the code, due to the simple signal/slot mechanism used. It also makes it easy to add features, as the features may be assigned to their own widget (which may be a new or existing widget), and these new features have little, if any impact on existing code.

OpenPilot is currently being developed on Linux, and as such is in a very small group of Linux maritime packages. This choice, though is not as strange as it sounds. There is a considerable amount of GIS (Geographic Information Systems) development around, much of which is done on Linux. Linux also provides a very comfortable and stable environment to work on. It provides all the tools you would expect from a modern system, as well as some of the best development tools in the industry.

Ultimately, we are interested in providing a high-quality, low cost marine chart plotting package. So far, we have made a good start, but there is still more work to be done, and it is the purpose of this document to take the feature requests and put them into a consistent framework.

Widgets

ADCInput

Introduction

This widget provides an interface for analogue inputs. The intention is to use an ADC to measure critical voltages and currents. The widget itself takes samples at a user defined interval (or on request). These values are stored in the widget, and may be plotted using qt4gnuplot. Each sample also emits all channel data on signals.

Features

Feature	Version	Complete	Description
Parallel port write access	*	Yes	Allow write access to the parallel port. Hardware inverted lines are corrected, such that a pin set true is +5v.
Parallel port read access	*	D0-D7 not read Not Critical	Read Access enabled on input-only pins, and IO pins. Data pins are not currently read.
Regular sampling	*	Yes	Samples are controlled by a QTimer mechanism. This can be set to a user-defined interval via Qt Designer. The sample is recorded with a time-stamp.
GNUPlot	*	Dropped	Support for graph plotting using the <i>qt4gnuplot</i> widget. This widget emits a signal containing a gnuplot script which is then plotted by <i>qt4gnuplot</i> . As of July 2010 this feature has been dropped. Please use the GNUPlot output from Demux for plotting.
Logging	*	Yes	Support for outputting calibrated data to <i>Logger</i> widget. Basic system is in place, but referencing needs to be updated, uses a single line for each channel.
Calibrate	*	Dropped	As of July 2010 calibration has now been moved into the Demux widget.
Store limit	1b	Dropped	Mechanism to store only the last “n” samples to save memory. If the limit is set to -1 then all samples are recorded. As of July 2010 this feature has been dropped. Please use the history in the demux widget instead. Only the latest sample is stored in the widget.
Max186	*	Yes	Driver support for MAX186 ADC. This is an 8 channel, 12 bit converter from Maxim Semiconductors.

AIS Parser

Introduction

This is a Parser for AIS data, which is encoded within an NMEA sentence. It takes a string passed from an NMEA widget and emits signals to the map widget based on what the string contains.

Features

Feature	Version	Complete	Description
AIS Location	*		Handles AIS position reports.

Demux

Introduction

This widget provides a link between the ADCInput widget which outputs many channels of data, and a widget such as a Gauge, which can only handle a single value. The Demux widget also allows the user to store data, which may then be plotted against time using qt4Gnuplot. This function is provided so that data such as boat speed or wind-speed can be plotted against time.

It is worth noting that the Demux widget may be used with other widgets to provide an oversampling filter. For instance, if a 12-bit ADC was used sampling at 256 times the required rate, then the result of reading the average value of every 256 samples would be an effective increase to 16-bit accuracy. This could then be routed to another demux for further processing.

Features

Feature	Version	Complete	Description
Multiplexed data Input	*	Yes	Stores data if the channel identifier is the same as the current channel.
Single Channel Data Input	*	Yes	Store data from a single channel source.
Single Channel Output	*	Yes	The latest value passed to the widget is output via a signal as a double precision value.
GNUPlot	*	Yes	Support for graph plotting using the <i>qt4gnuplot</i> widget. This widget emits a signal containing a gnuplot script which is then plotted by <i>qt4gnuplot</i> .
Calibration Data	*	Yes	Simple, linear, calibration calculated as (data-offset)*factor. This has been moved from the ADC Widget. Data is calibrated before any calculations are undertaken.
Store limit	*	Yes	Mechanism to store only the last “n” samples to save memory. If the limit is set to -1 then all samples are recorded.
Average Value	*	Yes	Returns the average value of the collected dataset.
Maximum Value	*	Yes	Returns the maximum value of the collected dataset.
Minimum Value	*	Yes	Returns the minimum value of the collected dataset.
Data Duration	*	Yes	Returns the duration of the collected dataset.

GSM

Introduction

This is a software interface for standard GSM modems and some mobile phones. The widget should be capable of sending updates via SMS at pre-defined intervals.

Features

Feature	Version	Complete	Description
Send SMS	2	Part	Basic sending works, very unstable, no clear limits on message size.
Receive SMS	2		Receive SMS over mobile device.
HW version	2		Obtain details about hardware.
Lat/Long input	2		Set latitude and longitude from NMEA Parser.
Interval updates	2		Report current lat/long at user defined intervals.
Vessel Callsign	2		Report the vessel's callsign in the interval update.

Gauge

Introduction

This is an “electronic” implementation of a standard panel gauge. It should find uses in similar applications.

Features

Feature	Version	Complete	Description
Round dial gauges	*	Yes	Standard “moving iron” gauges. Options with chevrons and “digital” readouts are available.
Rect block gauges	*	Yes	Simple gauges where a rectangular block fills part of a rectangular box. Available for both horizontal and vertical use.
Safe warn danger marks	*	Yes	Green, Yellow and Red ranges available for all gauges. These ranges may be set by the user, if they choose to enable them.
S/W/D signals	*	Yes	If markings are enabled, then signals are only emitted on entering these ranges.
Units conversion	*	Part	Provision for a scale factor and offset to convert one set of units to another. Eg. m/s to knots, meters to miles etc.
Artwork	2		Improved artwork for gauges, and options for different fonts. The gauge panel and needle could be developed from SVG images.
Tape gauges	2		Improvement to the standard rectangular gauges. Moving tape markings with fixed arrow at the centre.

Logger

Introduction

A simple widget to log data to a file (or network interface) in real time. It also supports reading a log file.

This widget also allows the software to communicate over the network, allowing the user to spread the data-capture, or display as required.

Features

Feature	Version	Complete	Description
Log string to file	*	Yes	Log an incoming string to a file.
Read log file	2	Yes (v1r)	Read a local log file and send appropriate signals.
Log output to network	2	Yes (v1r)	Log an incoming string to a network socket.
Read network log	2	Yes (v1r)	Read log data from a network socket and send appropriate signals.

Map

Introduction

Features

Feature	Version	Complete	Description
AIS			
Receive AIS data from web	*	Yes	AIS data is downloaded from the web as an XML file. This file is then loaded and the data extracted.
Receive AIS data from transponder	1r	Yes	AIS data is processed from the AIS Decoder widget and displayed on the screen.
Use GPS trace for each vessels	*	Yes	The AIS data is handled as a series of GPS tracks.
Icons and colours for each vessel type	* Update in v2	Yes	Each different vessel type has a different icon or colour, so that the vessels can be identified quickly. V2 will see a better set of icons.
Item Query	*	Yes	Displays the ship's name, speed and heading when the mouse is hovered over the icon.
Chart			
ENC load data	*	Yes	Load ENC (S57) charts and store associated data for plotting and reference.
ENC basic plotting	*	Yes	Plot ENC (S57) data with depth contours as lines. Land areas are plotted solid, icons are plotted.
ENC filled contours	2		Plot Vector Chart Data with filled depth contours.
BSB 3 raster charts	2		Plot Raster Charts through GDAL. For later versions of BSB we are dependant on proprietary formats, so this will be slow progress.
Item query	2		Chart Items queried by holding the mouse over them. Only for Vector charts.
CM-93/2	1r		C-Map vector chart support (primarily) for UK waters. This has been brought forward due to general usability requirements.

Feature	Version	Complete	Description
Coastline			
Load world coastline data	*	Yes	Load Coastline data from gshhs data. http://www.ngdc.noaa.gov/mgg/shorelines/gshhs.html Versions 1 and 2 are supported
Plot local sections	*	Yes	Plot high-quality coastline data efficiently
Gazetteer			
Load gazetteer data	*	Yes	Load gazetteer data for a country from the files at http://earth-info.nga.mil/gns/html/cntry_files.html
Plot gazetteer data	*	Part Some types not clear	Plot data as a cross with the place name and type next to it.
Find closest entry	*	Yes	Find the closest entry to a GPS location for working out where a GPS track starts and ends.
Item query	*	Yes	Show data for a gazetteer item when the mouse is hovered over it.
GPS			
Storage of gps track	*	Yes	Store track for own vessel.
Calc speed and direction	*	Yes	Calculation of speed and direction for future analysis from GPS locations.
Export of GPS track	2		Export of tracks to Magellan and Garmin formats. GPS logs can be captured using the logger widget in V1.
Import Magellan Track	*	Yes	Import a GPS track from a Magellan GPS unit, for analysis in OpenPilot.
Import Garmin Track	2		Import a GPS track from a Garmin GPS unit, for analysis in OpenPilot.
Track Plotting	*	Yes	Plot the vessel's track with user-defined colour.

Feature	Version	Complete	Description
Handle route data	2		Store route and calculate heading/distance/time to next waypoint
Trigger Zone	2		Widget emits a signal if your vessel is within a series of pre-set radii of a waypoint.
Point Of Interest (Now included in chart plotting section of code)			
Load from XML file	*	Yes	Loads data from an OpenPilot XML file. If a "POI" tag is found.
Plot Data	*	Yes	Plot POI data on the chart. This routine relies on the chartItem class. Hence any data that can be displayed on the chart can be described as a POI.
Trigger Zone	2		Widget emits a signal if a vessel is within a pre-set radius of a POI.
GRIB (Weather) Data			
Load Weather Data	2	Yes (v1r)	Load grib data and store data of differing types.
Plot Weather Data	2	Limited (v1r)	Plot weather with correct meteorological symbols. Plot pressures with contours.
Plot Current Data	2	Limited (v1r)	Current is plotted using arrows with numeric flow speed marked. Alternative display is by raster map.
Weather Routing	3		Routing based on forecast weather conditions.
World Grid			
Plot basic grid	* V2	Yes	Plot a simple world grid, for reference puposes. V2 allows the user to set the grid limits and density.
Plot Radius Rose	1r	Yes	Plot a radius rose (concentric circles with X/Y axes) at the current ship location.
OpenStreetMap			
Query web server for OSM data	*	Yes	Downloads an XML "tile" from the OpenStreetmap API web server, and loads the resulting, local, XML file.

Feature	Version	Complete	Description
Query file index and load local map.	2	T.B.	A file index with map extents is stored in the map widget. If the user wishes, this index may be queried and the file loaded from local storage.
Load local XML file	*	Yes	Loads a local Open-StreetMap XML file.
Plot map with correct colours	*	Yes	Map colours are taken as the “typical” colours found on road maps. ie. Blue motorways, Red Primary roads, Brown Secondary, and Yellow unclassified. Line thicknesses also change with road type.
Calculates map extents	*	Yes	Finds extents of map data for indexing.
<i>Radar – Version 2???</i>			
<i>Sonar – Version 4???</i>			

SatView

Introduction

This is a widget which replicates the plot found on many GPS units to allow the user to visualise the number of satellites and current fix quality.

Features

Feature	Version	Complete	Description
Number of sats	1b	Yes	Number of satellites displayed next to fix quality.
Signal strength	*	Yes	Signal strength displayed along the bottom of the widget for each satellite.
Graphic view	*	Yes	Polar view with Azimuth as the angle, and elevation as the distance from centre. Low elevations are shown at the edges of the plot.
Fix quality	*	Yes	Text description of GPS fix quality (None / Simulation / 2D / 3D)
Artwork	2		Maybe possible to use qt4gnuplot for 3d polar plotting

Serial I/O

Introduction

This widget connects to a serial port, and accepts serial commands via a slot, and emits incoming serial strings via a signal. Development for OSs other than Linux is paused at present, as other issues are more pressing, though some legacy code for windows is still present.

Features

Feature	Version	Complete	Description
Open serial port	* Linux * Win32 * Mac	Yes No No	Open the serial port with correct options.
Close serial port	* Linux * Win32 * Mac	Yes	Close the serial port.
Read line from port	* Linux * Win32 * Mac	Yes	Read a line from the serial port and emit a signal containing the line data.
Send a line to the port	* Linux * Win32 * Mac	Yes	Send a line of data to the serial port
Options available through QTDes.	*	Yes	Set the port options through a Qt Designer interface.

Seatalk

Introduction

This widget handles sea-talk data, by using *SerialIO* to connect to a custom-built sea-talk converter (for which details are provided).

Features

Feature	Version	Complete	Description
Parse Data	2	Part M.G.	Parse Sea-talk data and emit appropriate signals.

NMEA 0183 Parser

Introduction

This is a Parser for NMEA data. It takes a string passed from another widget and emits signals based on what the string contains.

Features

Feature	Version	Complete	Description
GPS sentence	*	Yes	Handles all major GPS location sentences.
Fix quality	*	Yes	Handles all sentences relating to Satellite fix quality.
TacTic sentence	*	Not Tested	Handles Tactic sentences relating to wind speed/direction and vessel speed, heading and water depth.

NMEA 2000 Interface

Introduction

This is an interface for NMEA 2000 data.

Features

Feature	Version	Complete	Description
NMEA 2000 Parsing	2		More details to come.

CAN-BUS Parser

Introduction

This is an interface for CAN-BUS data after popular demand.

Features

Feature	Version	Complete	Description
CAN-BUS Parsing	2		More details to come.

QT4Gnuplot

Introduction

Enables graph plotting in QT4 by using gnuplot. The widget is passed a GNUplot script, which is processed by gnuplot, then the resultant graph (in gif) is plotted on the widget.

Features

Feature	Version	Complete	Description
Plot GNUplot output	*	Yes	Plot output from gnuplot on the widget
Handle GNUplot script	*	Yes	Accept gnuplot script, process it, and pass it to gnuplot for plotting.
Speed	*	Yes	Improvement to speed of plotting by using QProcess to allow GNUPlot to work as a background task.

Main Software

OpenPilot

Introduction

This is the main code for OpenPilot. In V1 there is not a lot of functionality, it is basically a shell, allowing users to set up the program the way they want it, and showing some of OpenPilot's capabilities.

Features

Feature	Version	Complete	Description
Serial Input	*	Yes	Setup Serial Input to allow users to connect GPS units.
Map Plot	*	Yes	Chart Plotter Widget on one tab of a tab widget
Satellite View	*	Yes	Detail of GPS fix quality
Load log menu	1r		Load log file to replicate previous tracks etc. This is done without compromising the current navigation system.
Load track menu	* V2	Yes	Capability to load Magellan track logs into existing chart data. Other track log formats (eg. GPX + KML) will be supported in V2.
ENC and XML indexing	*	Yes	Impemented via op_Index
One page voyage summary	*		Implemented via op_OnePage

op_Viewer

Introduction

This is a viewer for “playing back” and analysing (in V2) previous data.

Features

Feature	Version	Complete	Description
Map Plot	1r	Yes	Chart Plotter Widget on one tab of a tab widget
Satellite View	1r	Yes	Detail of GPS fix quality
Load log menu	1r		Load log file to replicate previous tracks etc. This is done without compromising the current navigation system.
Load track menu	1r V2	Yes	Capability to load Magellan track logs into existing chart data. Other track log formats (eg. GPX + KML) will be supported in V2.
Track Menus	*	Yes	Impemented via op_Index
Chart Display Menus	*	Yes	Implemented via op_OnePage

op_Index

Introduction

This utility indexes chart and OSM data so that the map widget can load the data automatically, as required.

Features

Feature	Version	Complete	Description
Index ENC charts	*	Yes	Sequentially load all charts in a directory, find their limits and record this in an index file.
Index OSM data	2		Sequentially load all OSM data files in a directory, find their limits and record this in an index file.
Download area of OSM data	2		Download an area of OpenStreetmap data from a web-server, as a series of tiles and add them to the current repository.

op_ChartLimits

Introduction

Load a single chart and print (on stdout) the extents of this chart and other useful data. This must be run as a separate process because GDAL has a number of memory leaks, which aren't noticeable in our normal use, but become considerable over hundreds of charts.

Features

Feature	Version	Complete	Description
Use ENC Charts	*	Yes	Load ENC charts and go through all data points to find extents.
Use BSB3 Charts	2		Load BSB3 charts, and extract extents data.

op_OnePage

Introduction

op_OnePage creates a one-page summary of any voyage. The idea behind this is to provide an output which can be stored in a log folder, giving a quick reference of both the route, and the conditions for the voyage.

Features

Feature	Version	Complete	Description
Load Magellan logs	*	Yes	Load a Magellan log file and read all data.
Load Log Files	1r		Load an OpenPilot log file.
Plot route on chart	*	Yes	Plots the route on a map. This system will use chart data and OpenStreetMap data if it is available.
Find start and end towns	*		Uses gazetteer data to find the nearest towns to the start and end points of the log.
Extract major weather data	2		Extract wind data from the (OpenPilot) log file and note maximum and average wind-speed.
Print to PDF	*	Yes	Produce an output file as PDF. This can either be saved into a report directory, or printed to a folder.
Plot speed with time	*	Yes	Produces a graph of speed with time on the report.

op_POI2XML

Introduction

op_POI2XML allows users to convert point objects into an OpenPilot XML file to allow them to be plotted on a chart. The OpenPilot XML format can handle any data which can normally be described on a chart. However, op_POI2XML is primarily focussed on buoys.

Features

Feature	Version	Complete	Description
Load Magellan POI File	*	Yes	Load a Magellan POI file and read all data.
Load CSV file in Cowes-Week Format	*	Yes	Load Data from the Cowes-Week repository at www.cowes.co.uk
Save to OpenPilot XML format	*	Yes	Full Support for buoys in the OpenPilot XML format. The resulting file can be loaded by the Map widget by default at startup.
Change Type and Colour	*	Part – Cannot save data	Allows the user to change the type and colour of the buoy (and name and location)