

DeepVision

OSM2 Software API Introduction

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Introduction

Thank you for choosing a high performance sonar system from DeepVision AB. If you have any comments or feedback on our products, positive as well as negative, do not hesitate to contact us. It is very important for us to know what our customers think of our products, so that we can continue to improve them to suit your requirements.

This document provides an introduction to the C++ API for the DeepVision OSM2. The API itself is not designed to be a complete solution, but rather to show the basics of interfacing and setting up the DeepVision OSM2.



Figure 1: The DeepVision OSM2.

API Contents

The API consists of two classes, the DVSEFileWriter class and the DSSPInterface class. The DSSPInterface class handles the setup and configuration of the DeepVision OSM2. The DVSEFileWriter class is used to store the data received from the DeepVision OSM2 in the .dvs file format. The .dvs file format is a simple file format developed by DeepVision to be used by the DeepView software. In DeepView the .dvs files can be viewed, edited and/or exported to other file formats, such as the .xtf format or a number of image formats. For more information about the DeepView software, its features and how to purchase it, please contact DeepVision (<http://deepvision.se/contact/>).

The DSSPInterface Class

The DSSPInterface class is used to setup the DeepVision OSM2 and to handle the communication once the device is set up. Most of the information below can be found in the source files as comments.

The function DSSPSend needs to be implemented for the DSSPInterface class to work. The DSSPSend function should send 8-bit bytes over the UART connected to the DeepVision OSM2. The bytes to be sent will be provided in the pBytes array, and the number of bytes in the array is given by the nBytes parameter. How to implement the DSSPSend function depends on the hardware and operating system of the host running the API.

The DSSPInterface class contains four public functions, Reset, SetPulse, SetSampling and Run.

The Reset function resets the device, the device always responds to a Reset command on the 9600 BAUD-rate. Remember to make sure that your UART is communicating at 9600 BAUD before issuing a Reset.

The SetPulse function sets the characteristics of the ping transmitted by the DeepVision OSM2. The ping is set up by defining the working frequency and the number of periods to be transmitted. As the DeepVision OSM2 uses Chirp technology, the frequency of the ping is given by a starting frequency and a delta frequency. What frequency to use is based on the type of transceiver in use. The standard transceivers offered by DeepVision has a frequency of either 680 kHz or 340 kHz. A commonly used rule of thumb is to use a delta frequency of about 10% of the transceiver stated frequency, centered about the transceiver frequency. In the case of a 340 kHz transceiver this would result in a starting frequency of 323 kHz and a delta frequency of 34 kHz.

The SetSampling function defines how the DeepVision OSM2 behaves when it samples the returned echo. The nSamples parameter sets the number of samples (8-bit bytes) per ping and side to be sent over the UART. The decimation parameter sets the sample decimation. The resulting resolution can be calculated as:

$$\text{Sample Resolution} = 0.1781303 [\text{mm}] * \text{decimation}$$

Choosing a too low value for the decimation parameter will result in a perceived reduced image quality, due to the physical limitations of the real world.

The range of a ping can be calculated as:

$$\text{Range} = \text{SampleResolution} * \text{nSamples} = 0.1781303 [\text{mm}] * \text{decimation} .* \text{nSamples}$$

The left and right parameter sets the left and right channels of the DeepVision OSM2 as either active (true) or inactive (false) respectively.

The onePing parameter define whether the DeepVision OSM2 is to ping once or ping continuously. If set to ping once, the device will return one ping per received Run command. If set to ping continuously, the device will start a new ping as soon as the last ping is completed. Setting onePing to false while setting a high value for the nSamples parameter and a low value for the decimation parameter results in large amounts of data. Such operation will require a high BAUD-rate and put higher requirements on the hardware saving the data to file.

The Run function starts the DeepVision OSM2 according to the parameters set by the SetPulse and SetSampling functions.

The baudrate parameter defines the BAUD-rate at which the DeepVision OSM2 will send data over the the UART.

The DVSPFileWriter Class

The DVSPFileWriter class is used to record and store the data generated by the DeepVision OSM2 to a .dvs file. The .dvs format gives the possibility of georeferencing the Side Scan Sonar data by adding GPS-data for each ping. All GPS-data has to be of the WGS84 format.

The Create function is used to create a new .dvs file. Each .dvs file can store pings collected with a certain setting, defined by the SetSampling function of the DVSPInterface class. When the settings are changed, a new file needs to be created.

The filename parameter of the Create function defines the path and name of the file to be created. The left and right parameters defines if the left and right channels of the DeepVision OSM2 are active. These parameters correspond to the same parameters of the the SetSampling function of the DVSPInterface class.

The res parameter is the sample resolution of the pings. The sample resolution is the same as that generated by the SetSampling function of the DVSPInterface class and can be calculated as: $\text{Sample Resolution} = 0.1781303 [\text{mm}] * \text{decimation}$

The nSamples parameter defines the number of samples per side per ping and corresponds to the parameter with the same name of the SetSampling function of the

DSSPInterface class.

The AddPingData function adds data to the .dvs file created by the Create function. The lat and long parameters should be given in radians on the WGS84 format. The speed parameter should be in m/s and the heading should be given in radians. The pLeftData and pRightData are byte arrays containing the ping data and the nLeft and nRight parameters is the number of elements in the pLeftData and pRightData arrays respectively.

The CreateDemoFile function generates a demonstration file using the path given by the fileName parameter.

The DSSPExample Files

Two examples are provided along with the API. Both examples show how to set up the DeepVision OSM2 for use with the standard DeepVision transducers. The DSSPExample1 file setup the system for the TX340L transducer and the DSSPExample2 setup the system for the TX680L transducer.

The DSSPSend function needs to be implemented for the examples to work.

The OSM2 Output Data

The DeepVision OSM2 outputs data packets according to the setting sent over UART as described above. The data packets are sent according to the pattern given below, where each line corresponds to one byte of data.

Ping Return Packet

Start of package 1: 0xFE

Start of package 2: 0x05

Size High

Size Low

Type: 0x11 (fixed for this type of sonar)

Sequence number: 0-255, increased by one per ping.

Active Sides: 0x01: left side only, 0x02: right side only, 0x03: both sides active.

Time High [ms]

Time Low [ms]

Data index 0 of the left channel (channel 0)

Data index 0 of the right channel (channel 1)

[...]

Data index [nSamples-1] of the left channel (channel 0)

Data index [nSamples-1] of the right channel (channel 0)

Check sum

If single side is selected, packet data for that side only is transmitted and all data corresponding to the other side is left out.