

Reference Manual

Generated by Doxygen 1.6.1

Tue Aug 22 18:55:24 2017

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1 Main Page

API for SLS detectors data acquisition

Although the SLS detectors group develops several types of detectors (1/2D, counting/integrating etc.) it is common interest of the group to use a common platform for data acquisition

The architecture of the acquisitions system is intended as follows:

- A socket server running on the detector (or more than one in some special cases)
- C++ classes common to all detectors for client-server communication. These can be supplied to users as libraries and embedded also in acquisition systems which are not developed by the SLS
- the possibility of using a Qt-based graphical user interface (with eventually root analysis capabilities)
- the possibility of running all commands from command line. In order to ensure a fast operation of this so called "text client" the detector parameters should not be re-initialized everytime. For this reason a shared memory block is allocated where the main detector flags and parameters are stored
- a Root library for data postprocessing and detector calibration (energy, angle).

[slsDetectorUsers](#) is a class to control the detector which should be instantiated by the users in their acquisition software (EPICS, spec etc.). A callback for displaying the data can be registered. More advanced configuration functions are not implemented and can be written in a configuration file that can be read/written.

[slsReceiverUsers](#) is a class to receive the data for detectors with external data receiver (e.g. GOTTHARD). Callbacks can be registered to process the data or save them in specific formats.

[detectorData](#) is a structure containing the data and additional information which is used to return the data e.g. to the GUI for displaying them.

You can find examples of how these classes can be instantiated in [mainClient.cpp](#) and [mainReceiver.cpp](#)

Authors:

[Anna Bergamaschi](#), [Dhanya Maliakal](#)

Version:

0.2

Currently supported detectors

- MYTHEN
- GOTTHARD controls
- GOTTHARD data receiver

Coming soon

- EIGER

2 Class Documentation

2.1 detectorData Class Reference

data structure to hold the detector data after postprocessing (e.g. to plot, store in a root tree etc.)

```
#include <detectorData.h>
```

Public Member Functions

- [detectorData](#) (double *val=NULL, double *err=NULL, double *ang=NULL, double p_ind=-1, const char *fname="", int np=-1, int ny=1)

The constructor.

- [~detectorData](#) ()

The destructor deletes also the arrays pointing to data/errors/angles if not NULL.

Public Attributes

- double * [values](#)

pointer to the data

- double * [errors](#)

pointer to the errors

- double * [angles](#)

pointer to the angles (NULL if no angular conversion)

- double [progressIndex](#)

file index

- char [fileName](#) [1000]

file name

- int [npoints](#)

number of points

- int [npy](#)

dimensions in y coordinate

2.1.1 Detailed Description

data structure to hold the detector data after postprocessing (e.g. to plot, store in a root tree etc.)

Definition at line 9 of file detectorData.h.

2.1.2 Constructor & Destructor Documentation

2.1.2.1 detectorData::detectorData (double * *val* = NULL, double * *err* = NULL, double * *ang* = NULL, double *p_ind* = -1, const char * *fname* = "", int *np* = -1, int *ny* = 1) [inline]

The constructor.

Parameters:

val pointer to the data

err pointer to errors

ang pointer to the angles

f_ind file index

fname file name to which the data are saved

np number of points in x coordinate defaults to the number of detector channels (1D detector)

ny dimension in y (1D detector)

Definition at line 20 of file detectorData.h.

2.1.2.2 detectorData::~~detectorData () [inline]

The destructor deletes also the arrays pointing to data/errors/angles if not NULL.

Definition at line 27 of file detectorData.h.

2.1.3 Member Data Documentation

2.1.3.1 double* detectorData::angles

pointer to the angles (NULL if no angular conversion)

Definition at line 31 of file detectorData.h.

2.1.3.2 double* detectorData::errors

pointer to the errors

Definition at line 30 of file detectorData.h.

2.1.3.3 char detectorData::fileName[1000]

file name

Definition at line 33 of file detectorData.h.

2.1.3.4 int detectorData::npoints

number of points

Definition at line 34 of file detectorData.h.

2.1.3.5 int detectorData::npy

dimensions in y coordinate

Definition at line 35 of file detectorData.h.

2.1.3.6 double detectorData::progressIndex

file index

Definition at line 32 of file detectorData.h.

2.1.3.7 double* detectorData::values

pointer to the data

Definition at line 27 of file detectorData.h.

The documentation for this class was generated from the following file:

- [detectorData.h](#)

2.2 slsDetectorUsers Class Reference

Class for detector functionality to embed the detector controls in the users custom interface e.g. EPICS, Lima etc.

```
#include <slsDetectorUsers.h>
```

Public Member Functions

- [slsDetectorUsers](#) (int id=0)
default constructor
- virtual [~slsDetectorUsers](#) ()
virtual destructor
- string [getDetectorDeveloper](#) ()
useful to define subset of working functions
- int [setOnline](#) (int const online=-1)
sets the onlineFlag
- void [startMeasurement](#) ()
start measurement and acquires
- int [stopMeasurement](#) ()
stop measurement
- int [getDetectorStatus](#) ()
get run status
- string [getFilePath](#) ()
returns the default output files path
- string [setFilePath](#) (string s)
sets the default output files path
- string [getFileName](#) ()
- string [setFileName](#) (string s)
sets the default output files path
- int [getFileIndex](#) ()
- int [setFileIndex](#) (int i)
sets the default output file index
- string [getFlatFieldCorrectionDir](#) ()
get flat field corrections file directory

- string [setFlatFieldCorrectionDir](#) (string dir)
set flat field corrections file directory
- string [getFlatFieldCorrectionFile](#) ()
get flat field corrections file name
- int [setFlatFieldCorrectionFile](#) (string fname="")
set flat field correction file
- int [enableFlatFieldCorrection](#) (int i=-1)
enable/disable flat field corrections (without changing file name)
- int [enableCountRateCorrection](#) (int i=-1)
enable/disable count rate corrections
- int [enablePixelMaskCorrection](#) (int i=-1)
enable/disable bad channel corrections
- int [enableAngularConversion](#) (int i=-1)
enable/disable angular conversion
- int [enableWriteToFile](#) (int i=-1)
- int [setPositions](#) (int nPos, double *pos)
set positions for the acquisition
- int [getPositions](#) (double *pos=NULL)
get positions for the acquisition
- int [setDetectorSize](#) (int x0=-1, int y0=-1, int nx=-1, int ny=-1)
sets the detector size
- int [getDetectorSize](#) (int &x0, int &y0, int &nx, int &ny)
gets detector size
- int [getMaximumDetectorSize](#) (int &nx, int &ny)
sets the maximum detector size
- int [setBitDepth](#) (int i=-1)
set/get dynamic range
- int [setSettings](#) (int isettings=-1)
set detector settings
- int [getThresholdEnergy](#) ()
get threshold energy

- int [setThresholdEnergy](#) (int e_eV)
set threshold energy
- double [setExposureTime](#) (double t=-1, bool inseconds=false)
set/get exposure time value
- double [setExposurePeriod](#) (double t=-1, bool inseconds=false)
set/get exposure period
- double [setDelayAfterTrigger](#) (double t=-1, bool inseconds=false)
set/get delay after trigger
- int64_t [setNumberOfGates](#) (int64_t t=-1)
set/get number of gates
- int64_t [setNumberOfFrames](#) (int64_t t=-1)
set/get number of frames i.e. number of exposure per trigger
- int64_t [setNumberOfCycles](#) (int64_t t=-1)
set/get number of cycles i.e. number of triggers
- int [setTimingMode](#) (int pol=-1)
set/get the external communication mode
- int [readConfigurationFile](#) (string const fname)
Reads the configuration file -- will contain all the informations needed for the configuration (e.g. for a PSI detector caldir, settingsdir, angconv, badchannels, hostname etc.).
- int [dumpDetectorSetup](#) (string const fname)
Reads the parameters from the detector and writes them to file.
- int [retrieveDetectorSetup](#) (string const fname)
Loads the detector setup from file.
- string [getDetectorType](#) ()
useful for data plotting etc.
- int [setReceiverMode](#) (int n=-1)
sets the mode by which gui requests data from receiver
- void [registerDataCallback](#) (int(*userCallback)(detectorData *d, int f, int s, void *), void *pArg)
register callback for accessing detector final data
- void [registerRawDataCallback](#) (int(*userCallback)(double *p, int n, void *), void *pArg)

register callback for accessing raw data - if the rawDataCallback is registered, no filewriting/postprocessing will be carried on automatically by the software - the raw data are deleted by the software

- virtual void `initDataset` (int refresh)
function to initialize a set of measurements (reset binning if angular conversion, reset summing otherwise) - can be overcome by the user's functions thanks to the virtual property
- virtual void `addFrame` (double *data, double pos, double i0, double t, string fname, double var)
adds frame to merging/summation - can be overcome by the user's functions thanks to the virtual property
- virtual void `finalizeDataset` (double *a, double *v, double *e, int &np)
finalizes the data set returning the array of angles, values and errors to be used as final data - can be overcome by the user's functions thanks to the virtual property
- int `enableDataStreamingFromReceiver` (int i=-1)
- int64_t `getModuleFirmwareVersion` ()
- int64_t `getModuleSerialNumber` (int imod=-1)
- int64_t `getDetectorFirmwareVersion` ()
- int64_t `getDetectorSerialNumber` ()
- int64_t `getDetectorSoftwareVersion` ()
- int64_t `getThisSoftwareVersion` ()
- void `registerAcquisitionFinishedCallback` (int(*func)(double, int, void *), void *pArg)
register callback for accessing detector final data
- void `registerGetPositionCallback` (double(*func)(void *), void *arg)
register callback for reading detector position
- void `registerConnectChannelsCallback` (int(*func)(void *), void *arg)
register callback for connecting to the epics channels
- void `registerDisconnectChannelsCallback` (int(*func)(void *), void *arg)
register callback to disconnect the epics channels
- void `registerGoToPositionCallback` (int(*func)(double, void *), void *arg)
register callback for moving the detector
- void `registerGoToPositionNoWaitCallback` (int(*func)(double, void *), void *arg)
register callback for moving the detector without waiting
- void `registerGetI0Callback` (double(*func)(int, void *), void *arg)
register callback reading to I0

- string `putCommand` (int nargs, char *args[], int pos=-1)
sets parameters in command interface <http://www.psi.ch/detectors/UsersSupportEN/slsDetectorC>
- string `getCommand` (int nargs, char *args[], int pos=-1)
gets parameters in command interface <http://www.psi.ch/detectors/UsersSupportEN/slsDetectorC>

Static Public Member Functions

- static string `runStatusType` (int s)
returns string from run status index
- static int `getDetectorSettings` (string s)
returns detector settings string from index
- static string `getDetectorSettings` (int s)
returns detector settings string from index
- static string `getTimingMode` (int f)
returns external communication mode string from index
- static int `getTimingMode` (string s)
returns external communication mode string from index

2.2.1 Detailed Description

Class for detector functionalities to embed the detector controls in the users custom interface e.g. EPICS, Lima etc. The `slsDetectorUsers` class is a minimal interface class which should be instantiated by the users in their acquisition software (EPICS, spec etc.). More advanced configuration functions are not implemented and can be written in a configuration or parameters file that can be read/written.

Definition at line 84 of file `slsDetectorUsers.h`.

2.2.2 Constructor & Destructor Documentation

2.2.2.1 `slsDetectorUsers::slsDetectorUsers` (int id = 0)

default constructor

2.2.2.2 virtual slsDetectorUsers::~~slsDetectorUsers () [virtual]

virtual destructor

2.2.3 Member Function Documentation

2.2.3.1 virtual void slsDetectorUsers::addFrame (double * *data*, double *pos*, double *i0*, double *t*, string *fname*, double *var*) [virtual]

adds frame to merging/summation - can be overcome by the user's functions thanks to the virtual property

Parameters:

data pointer to the raw data

pos encoder position

i0 beam monitor readout for intensity normalization (if 0 not performed)

t exposure time in seconds, required only if rate corrections

fname file name (unused since filewriting would be performed by the user)

var optional parameter - unused.

2.2.3.2 int slsDetectorUsers::dumpDetectorSetup (string const *fname*)

Reads the parameters from the detector and writes them to file.

Parameters:

fname file to write to

Returns:

OK or FAIL

2.2.3.3 int slsDetectorUsers::enableAngularConversion (int *i* = -1)

enable/disable angular conversion

Parameters:

i 0 disables, 1 enables, -1 gets

Returns:

0 if angular conversion disabled, 1 if enabled

2.2.3.4 `int slsDetectorUsers::enableCountRateCorrection (int i = -1)`

enable/disable count rate corrections

Parameters:

i 0 disables, 1 enable, -1 gets

Returns:

0 if count corrections disabled, 1 if enabled

2.2.3.5 `int slsDetectorUsers::enableDataStreamingFromReceiver (int i = -1)`

Enable data streaming from receiver (zmq)

Parameters:

i 1 to set, 0 to reset and -1 to get

Returns:

data streaming enable

2.2.3.6 `int slsDetectorUsers::enableFlatFieldCorrection (int i = -1)`

enable/disable flat field corrections (without changing file name)

Parameters:

i 0 disables, 1 enables, -1 gets

Returns:

0 if ff corrections disabled, 1 if enabled

2.2.3.7 `int slsDetectorUsers::enablePixelMaskCorrection (int i = -1)`

enable/disable bad channel corrections

Parameters:

i 0 disables, 1 enables, -1 gets

Returns:

0 if bad channels corrections disabled, 1 if enabled

2.2.3.8 int sIsDetectorUsers::enableWriteToFile (int *i* = -1)

Enable write file function included

2.2.3.9 virtual void sIsDetectorUsers::finalizeDataset (double * *a*, double * *v*, double * *e*, int & *np*) [virtual]

finalizes the data set returning the array of angles, values and errors to be used as final data - can be overcome by the user's functions thanks to the virtual property

Parameters:

a pointer to the array of angles - can be null if no angular conversion is required

v pointer to the array of values

e pointer to the array of errors

np reference returning the number of points

2.2.3.10 string sIsDetectorUsers::getCommand (int *narg*, char * *args*[], int *pos* = -1)

gets parameters in command interface <http://www.psi.ch/detectors/UsersSupportEN/sIsDetector>

Parameters:

narg value to be set

args value to be set

pos position of detector in multisIsDetector list

Returns:

answer string

2.2.3.11 string slsDetectorUsers::getDetectorDeveloper ()

useful to define subset of working functions

Returns:

"PSI" or "Dectris"

2.2.3.12 int64_t slsDetectorUsers::getDetectorFirmwareVersion ()

get get Detector Firmware Version

Returns:

id

2.2.3.13 int64_t slsDetectorUsers::getDetectorSerialNumber ()

get get Detector Serial Number

Returns:

id

2.2.3.14 static string slsDetectorUsers::getDetectorSettings (int *s*) [inline, static]

returns detector settings string from index

Parameters:

s settings index

Returns:

standard, fast, highgain, dynamicgain, lowgain, mediumgain, veryhighgain, undefined when wrong index

Definition at line 585 of file slsDetectorUsers.h.

2.2.3.15 static int slsDetectorUsers::getDetectorSettings (string *s*) [inline, static]

returns detector settings string from index

Parameters:

s can be standard, fast, highgain, dynamicgain, lowgain, mediumgain, veryhighgain

Returns:

setting index (-1 unknown string)

Definition at line 571 of file slsDetectorUsers.h.

2.2.3.16 int slsDetectorUsers::getDetectorSize (int & *x0*, int & *y0*, int & *nx*, int & *ny*)

gets detector size

Parameters:

x0 horizontal position origin in channel number

y0 vertical position origin in channel number

nx number of channels in horizontal

ny number of channels in vertical

Returns:

OK/FAIL

2.2.3.17 int64_t slsDetectorUsers::getDetectorSoftwareVersion ()

get get Detector Software Version

Returns:

id

2.2.3.18 int slsDetectorUsers::getDetectorStatus ()

get run status

Returns:

status mask

2.2.3.19 string slsDetectorUsers::getDetectorType ()

useful for data plotting etc.

Returns:

Mythen, Eiger, Gotthard etc.

2.2.3.20 int slsDetectorUsers::getFileIndex ()

Returns:

the default output file index

2.2.3.21 string slsDetectorUsers::getFileName ()

Returns:

the default output files root name

2.2.3.22 string slsDetectorUsers::getFilePath ()

returns the default output files path

2.2.3.23 string slsDetectorUsers::getFlatFieldCorrectionDir ()

get flat field corrections file directory

Returns:

flat field correction file directory

2.2.3.24 string slsDetectorUsers::getFlatFieldCorrectionFile ()

get flat field corrections file name

Returns:

flat field correction file name

2.2.3.25 int slsDetectorUsers::getMaximumDetectorSize (int & *nx*, int & *ny*)

sets the maximum detector size

Parameters:

x0 horizontal position origin in channel number

y0 vertical position origin in channel number

nx number of channels in horizontal

ny number of channels in vertical

Returns:

OK/FAIL

2.2.3.26 int64_t slsDetectorUsers::getModuleFirmwareVersion ()

get get Module Firmware Version

Returns:

id

2.2.3.27 int64_t slsDetectorUsers::getModuleSerialNumber (int *imod* = -1)

get get Module Serial Number

Parameters:

imod module number

Returns:

id

2.2.3.28 int slsDetectorUsers::getPositions (double * *pos* = NULL)

get positions for the acquisition

Parameters:

pos array which will contain the encoder positions

Returns:

number of positions

2.2.3.29 int64_t sIsDetectorUsers::getThisSoftwareVersion ()

get this Software Version

Returns:

id

2.2.3.30 int sIsDetectorUsers::getThresholdEnergy ()

get threshold energy

Returns:

current threshold value for imod in ev (-1 failed)

2.2.3.31 static int sIsDetectorUsers::getTimingMode (string *s*) [inline, static]

returns external communication mode string from index

Parameters:

f index for communication mode

Returns:

auto, trigger, ro_trigger, gating, triggered_gating, unknown when wrong mode

Definition at line 621 of file sIsDetectorUsers.h.

2.2.3.32 static string sIsDetectorUsers::getTimingMode (int *f*) [inline, static]

returns external communication mode string from index

Parameters:

f index for communication mode

Returns:

auto, trigger, ro_trigger, gating, triggered_gating, unknown when wrong mode

Definition at line 605 of file sIsDetectorUsers.h.

2.2.3.33 virtual void slsDetectorUsers::initDataset (int *refresh*) [virtual]

function to initialize a set of measurements (reset binning if angular conversion, reset summing otherwise) - can be overcome by the user's functions thanks to the virtual property

Parameters:

refresh if 1, all parameters like ffcoefficients, badchannels, ratecorrections etc. are reset (should be called at least once with this option), if 0 simply reset merging/ summation

2.2.3.34 string slsDetectorUsers::putCommand (int *narg*, char * *args*[], int *pos* = -1)

sets parameters in command interface <http://www.psi.ch/detectors/UsersSupportEN/slsDetector>

Parameters:

narg value to be set
args value to be set
pos position of detector in multislsdetector list

Returns:

answer string

2.2.3.35 int slsDetectorUsers::readConfigurationFile (string const *fname*)

Reads the configuration file -- will contain all the informations needed for the configuration (e.g. for a PSI detector caldir, settingsdir, angconv, badchannels, hostname etc.).

Parameters:

fname file name

Returns:

OK or FAIL

2.2.3.36 void slsDetectorUsers::registerAcquisitionFinishedCallback (int*)(double, int, void *)*func*, void **pArg*)

register callback for accessing detector final data

Parameters:

func function to be called at the end of the acquisition. gets detector status and progress index as arguments

2.2.3.37 void slsDetectorUsers::registerConnectChannelsCallback (int*)(void *)*func*, void **arg*)

register callback for connecting to the epics channels

Parameters:

func function for connecting to the epics channels

2.2.3.38 void slsDetectorUsers::registerDataCallback (int*)(detectorData **d*, int *f*, int *s*, void *) *userCallback*, void **pArg*)

register callback for accessing detector final data

Parameters:

userCallback function for plotting/analyzing the data. Its arguments are the data structure *d* and the frame number *f*, *s* is for subframe number for eiger for 32 bit mode

2.2.3.39 void slsDetectorUsers::registerDisconnectChannelsCallback (int*)(void *)*func*, void **arg*)

register callback to disconnect the epics channels

Parameters:

func function to disconnect the epics channels

2.2.3.40 void slsDetectorUsers::registerGetI0Callback (double*)(int, void *)
func, void * *arg*)

register callback reading to IO

Parameters:

func function for reading the IO (called with parameter 0 before the acquisition, 1 after and the return value used as IO)

2.2.3.41 void slsDetectorUsers::registerGetPositionCallback (double*)(void *)
func, void * *arg*)

register callback for reading detector position

Parameters:

func function for reading the detector position

2.2.3.42 void slsDetectorUsers::registerGoToPositionCallback (int*)(double,
void *) *func*, void * *arg*)

register callback for moving the detector

Parameters:

func function for moving the detector

2.2.3.43 void slsDetectorUsers::registerGoToPositionNoWaitCallback
(int*)(double, void *) *func*, void * *arg*)

register callback for moving the detector without waiting

Parameters:

func function for moving the detector

2.2.3.44 void slsDetectorUsers::registerRawDataCallback (int*)(double **p*, int
n, void *) *userCallback*, void * *pArg*)

register callback for accessing raw data - if the `rawDataCallback` is registered, no filewriting/postprocessing will be carried on automatically by the software - the raw data are deleted by the software

Parameters:

userCallback function for postprocessing and saving the data - *p* is the pointer to the data, *n* is the number of channels

2.2.3.45 int slsDetectorUsers::retrieveDetectorSetup (string const *fname*)

Loads the detector setup from file.

Parameters:

fname file to read from

Returns:

OK or FAIL

2.2.3.46 static string slsDetectorUsers::runStatusType (int *s*) [inline, static]

returns string from run status index

Parameters:

s run status index

Returns:

string error, waiting, running, data, finished or unknown when wrong index

Definition at line 553 of file `slsDetectorUsers.h`.

2.2.3.47 int slsDetectorUsers::setBitDepth (int *i* = -1)

set/get dynamic range

Parameters:

i dynamic range (-1 get)

Returns:

current dynamic range

2.2.3.48 double sIsDetectorUsers::setDelayAfterTrigger (double $t = -1$, bool $inseconds = false$)

set/get delay after trigger

Parameters:

t time in ns (-1 gets)
 $inseconds$ true if the value is in s, else ns

Returns:

timer set value in ns, or s if specified

2.2.3.49 int sIsDetectorUsers::setDetectorSize (int $x0 = -1$, int $y0 = -1$, int $nx = -1$, int $ny = -1$)

sets the detector size

Parameters:

$x0$ horizontal position origin in channel number (-1 unchanged)
 $y0$ vertical position origin in channel number (-1 unchanged)
 nx number of channels in horizontal (-1 unchanged)
 ny number of channels in vertical (-1 unchanged)

Returns:

OK/FAIL

2.2.3.50 double sIsDetectorUsers::setExposurePeriod (double $t = -1$, bool $inseconds = false$)

set/get exposure period

Parameters:

t time in ns (-1 gets)
 $inseconds$ true if the value is in s, else ns

Returns:

timer set value in ns, or s if specified

2.2.3.51 double sIsDetectorUsers::setExposureTime (double *t* = -1, bool *inseconds* = false)

set/get exposure time value

Parameters:

t time in sn (-1 gets)

inseconds true if the value is in s, else ns

Returns:

timer set value in ns, or s if specified

2.2.3.52 int sIsDetectorUsers::setFileIndex (int *i*)

sets the default output file index

Parameters:

i file index

Returns:

the default output file index

2.2.3.53 string sIsDetectorUsers::setFileName (string *s*)

sets the default output files path

Parameters:

s file name

Returns:

the default output files root name

2.2.3.54 string sIsDetectorUsers::setFilePath (string *s*)

sets the default output files path

Parameters:

s file path

Returns:

file path

2.2.3.55 string slsDetectorUsers::setFlatFieldCorrectionDir (string *dir*)

set flat field corrections file directory

Parameters:

dir flat field correction file directory

Returns:

flat field correction file directory

2.2.3.56 int slsDetectorUsers::setFlatFieldCorrectionFile (string *fname* = "")

set flat field correction file

Parameters:

fname name of the flat field file (or "" if disable)

Returns:

0 if disable (or file could not be read), >0 otherwise

2.2.3.57 int64_t slsDetectorUsers::setNumberOfCycles (int64_t *t* = -1)

set/get number of cycles i.e. number of triggers

Parameters:

t number of frames (-1 gets)

Returns:

number of frames

2.2.3.58 int64_t slsDetectorUsers::setNumberOfFrames (int64_t *t* = -1)

set/get number of frames i.e. number of exposure per trigger

Parameters:

t number of frames (-1 gets)

Returns:

number of frames

2.2.3.59 int64_t slsDetectorUsers::setNumberOfGates (int64_t *t* = -1)

set/get number of gates

Parameters:

t number of gates (-1 gets)

Returns:

number of gates

2.2.3.60 int slsDetectorUsers::setOnline (int const *online* = -1)

sets the onlineFlag

Parameters:

online can be: -1 returns whether the detector is in online (1) or offline (0) state; 0 detector in offline state; 1 detector in online state

Returns:

0 (offline) or 1 (online)

2.2.3.61 int slsDetectorUsers::setPositions (int *nPos*, double * *pos*)

set positions for the acquisition

Parameters:

nPos number of positions

pos array with the encoder positions

Returns:

number of positions

2.2.3.62 int slsDetectorUsers::setReceiverMode (int *n* = -1)

sets the mode by which gui requests data from receiver

Parameters:

n is 0 for random requests for fast acquisitions and greater than 0 for nth read requests

Returns:

the mode set in the receiver

2.2.3.63 int slsDetectorUsers::setSettings (int *isettings* = -1)

set detector settings

Parameters:

isettings settings index (-1 gets)

Returns:

current settings

2.2.3.64 int slsDetectorUsers::setThresholdEnergy (int *e_eV*)

set threshold energy

Parameters:

e_eV threshold in eV

Returns:

current threshold value for imod in ev (-1 failed)

2.2.3.65 int slsDetectorUsers::setTimingMode (int *pol* = -1)

set/get the external communication mode

Parameters:

pol value to be set

See also:

[getTimingMode](#)

Returns:

current external communication mode

2.2.3.66 void slsDetectorUsers::startMeasurement ()

start measurement and acquires

Returns:

OK/FAIL

2.2.3.67 int slsDetectorUsers::stopMeasurement ()

stop measurement

Returns:

OK/FAIL

The documentation for this class was generated from the following file:

- [slsDetectorUsers.h](#)

2.3 slsReceiverUsers Class Reference

Class for implementing the SLS data receiver in the users application. Callbacks can be defined for processing and/or saving data.

```
#include <slsReceiverUsers.h>
```

Public Member Functions

- [slsReceiverUsers](#) (int argc, char *argv[], int &success)
- [~slsReceiverUsers](#) ()
- int [start](#) ()
- void [stop](#) ()
- int64_t [getReceiverVersion](#) ()
- void [registerCallbackStartAcquisition](#) (int(*func)(char *filepath, char *filename, uint64_t fileindex, uint32_t datasize, void *), void *arg)
- void [registerCallbackAcquisitionFinished](#) (void(*func)(uint64_t nf, void *), void *arg)
- void [registerCallbackRawDataReady](#) (void(*func)(uint64_t frameNumber, uint32_t expLength, uint32_t packetNumber, uint64_t bunchId, uint64_t timestamp, uint16_t modId, uint16_t xCoord, uint16_t yCoord, uint16_t zCoord, uint32_t debug, uint16_t roundRNumber, uint8_t defType, uint8_t version, char *datapointer, uint32_t datasize, void *), void *arg)

Public Attributes

- slsReceiver * [receiver](#)

2.3.1 Detailed Description

Class for implementing the SLS data receiver in the users application. Callbacks can be defined for processing and/or saving data. [slsReceiverUsers](#) is a class that can be instantiated in the users software to receive the data from the detectors. Callbacks can be defined for processing and/or saving data

Definition at line 16 of file slsReceiverUsers.h.

2.3.2 Constructor & Destructor Documentation

2.3.2.1 slsReceiverUsers::slsReceiverUsers (int *argc*, char * *argv*[], int & *success*)

Constructor reads config file, creates socket, assigns function table

Parameters:

- argc* from command line
- argv* from command line
- success* socket creation was successful

2.3.2.2 slsReceiverUsers::~~slsReceiverUsers ()

Destructor

2.3.3 Member Function Documentation

2.3.3.1 int64_t slsReceiverUsers::getReceiverVersion ()

get get Receiver Version

Returns:

id

2.3.3.2 void slsReceiverUsers::registerCallBackAcquisitionFinished (void(*)(uint64_t nf, void *) *func*, void * *arg*)

register callback for end of acquisition

Parameters:

func end of acquisition callback. Argument nf is total frames caught

Returns:

nothing

2.3.3.3 void slsReceiverUsers::registerCallBackRawDataReady (void(*)(uint64_t frameNumber, uint32_t expLength, uint32_t packetNumber, uint64_t bunchId, uint64_t timestamp, uint16_t modId, uint16_t xCoord, uint16_t yCoord, uint16_t zCoord, uint32_t debug, uint16_t roundRNumber, uint8_t detType, uint8_t version, char *datapointer, uint32_t datasize, void *) *func*, void * *arg*)

register callback to be called when data are available (to process and/or save the data).

Parameters:

func raw data ready callback. arguments are frameNumber, expLength, packetNumber, bunchId, timestamp, modId, xCoord, yCoord, zCoord, debug, roundRNumber, detType, version, dataPointer, dataSize

Returns:

nothing

2.3.3.4 void slsReceiverUsers::registerCallBackStartAcquisition (int*)(char *filepath, char *filename, uint64_t fileindex, uint32_t datasize, void *) *func*, void * *arg*)

register calbback for starting the acquisition

Parameters:

func callback to be called when starting the acquisition. Its arguments are filepath, filename, fileindex, datasize

Returns:

value is insignificant at the moment, we write depending on file write enable, users get data to write depending on call backs registered

2.3.3.5 int slsReceiverUsers::start ()

starts listening on the TCP port for client communication

Returns:

0 for success or 1 for FAIL in creating TCP server

2.3.3.6 void slsReceiverUsers::stop ()

stops listening to the TCP & UDP port and exit receiver program

2.3.4 Member Data Documentation**2.3.4.1 slsReceiver* slsReceiverUsers::receiver**

Definition at line 75 of file slsReceiverUsers.h.

The documentation for this class was generated from the following file:

- [slsReceiverUsers.h](#)

3 File Documentation

3.1 detectorData.h File Reference

```
#include <unistd.h>
```

```
#include <cstring>
```

Classes

- class [detectorData](#)

data structure to hold the detector data after postprocessing (e.g. to plot, store in a root tree etc.)

3.2 mainClient.cpp File Reference

```
#include <iostream>
#include "slsDetectorUsers.h"
#include "detectorData.h"
#include <cstdlib>
```

Functions

- int [dataCallback](#) ([detectorData](#) *pData, int iframe, int isubframe, void *pArg)
- int [main](#) (int argc, char **argv)

3.2.1 Detailed Description

This file is an example of how to implement the [slsDetectorUsers](#) class You can compile it linking it to the slsDetector library

```
gcc mainClient.cpp -L lib -l SlsDetector -lm -pthread
```

where lib is the location of libSlsDetector.so gcc [mainClient.cpp](#) -L . -l SlsDetector -lm -pthread -o users

Definition in file [mainClient.cpp](#).

3.2.2 Function Documentation

3.2.2.1 int dataCallback (detectorData * pData, int iframe, int isubframe, void * pArg)

Definition of the data callback which simply prints out the number of points received and teh frame number

Definition at line 20 of file [mainClient.cpp](#).

3.2.2.2 int main (int argc, char ** argv)

example of a main program using the [slsDetectorUsers](#) class
if specified, argv[3] is used as detector ID (default is 0)

[slsDetectorUsers](#) is instantiated

if specified, argv[1] is used as detector config file (necessary at least the first time it is called to properly configure advanced settings in the shared memory)

registering data callback

checking detector status and exiting if not idle

load detector settings

start measurement

returning when acquisition is finished or data are available

Definition at line 27 of file mainClient.cpp.

3.3 mainReceiver.cpp File Reference

```
#include "sls_receiver_defs.h"
#include "slsReceiverUsers.h"
#include <iostream>
#include <string.h>
#include <signal.h>
#include <cstdlib>
#include <sys/types.h>
#include <sys/wait.h>
#include <string>
```

Defines

- #define [NUM_RECEIVERS](#) 2
- #define [START_TCP_PORT](#) 1954
- #define [PRINT_IN_COLOR](#)(c, f,...) printf ("\033[%dm" f RESET, 30 + c+1, ##__VA_ARGS__)

Functions

- void [sigChildExitedHandler](#) (int sig)
- void [sigInterruptHandler](#) (int p)
- int [StartAcq](#) (char *filepath, char *filename, uint64_t fileindex, uint32_t datasize, void *p)
- void [AcquisitionFinished](#) (uint64_t frames, void *p)
- void [GetData](#) (uint64_t frameNumber, uint32_t expLength, uint32_t packetNumber, uint64_t bunchId, uint64_t timestamp, uint16_t modId, uint16_t xCoord, uint16_t yCoord, uint16_t zCoord, uint32_t debug, uint16_t roundRNumber, uint8_t defType, uint8_t version, char *datapointer, uint32_t datasize, void *p)
- int [main](#) (int argc, char *argv[])

Variables

- pid_t [childPid](#) [NUM_RECEIVERS]
- bool [keeprunning](#)
- int [numrunning](#)

3.3.1 Define Documentation

3.3.1.1 #define NUM_RECEIVERS 2

Definition at line 21 of file mainReceiver.cpp.

3.3.1.2 #define PRINT_IN_COLOR(c, f, ...) printf ("\033[%dm" f RESET, 30 + c+1, ##__VA_ARGS__)

Definition at line 23 of file mainReceiver.cpp.

3.3.1.3 #define START_TCP_PORT 1954

Definition at line 22 of file mainReceiver.cpp.

3.3.2 Function Documentation

3.3.2.1 void AcquisitionFinished (uint64_t frames, void * p)

Definition at line 52 of file mainReceiver.cpp.

3.3.2.2 void GetData (uint64_t frameNumber, uint32_t expLength, uint32_t packetNumber, uint64_t bunchId, uint64_t timestamp, uint16_t modId, uint16_t xCoord, uint16_t yCoord, uint16_t zCoord, uint32_t debug, uint16_t roundRNumber, uint8_t defType, uint8_t version, char * datapointer, uint32_t datasize, void * p)

Definition at line 57 of file mainReceiver.cpp.

3.3.2.3 int main (int argc, char * argv[])

Call back for start acquisition callback arguments are filepath filename fileindex data-size

return value is insignificant at the moment we write depending on file write enable users get data to write depending on call backs registered

Call back for acquisition finished callback argument is total frames caught

Call back for raw data args to raw data ready callback are frameNumber is the frame number expLength is the subframe number (32 bit eiger) or real time exposure time in 100ns (others) packetNumber is the packet number bunchId is the bunch id from beamline timestamp is the time stamp with 10 MHz clock modId is the unique module id (unique even for left, right, top, bottom) xCoord is the x coordinate in the complete detector system yCoord is the y coordinate in the complete detector system zCoord is the z coordinate in the complete detector system debug is for debugging purposes roundRNumber is the round robin set number detType is the detector type see :: detectorType version is the version number of this structure format dataPointer is the pointer to the data dataSize in bytes is the size of the data in bytes

Definition at line 74 of file mainReceiver.cpp.

3.3.2.4 void sigChildExitedHandler (int sig)

Definition at line 32 of file mainReceiver.cpp.

3.3.2.5 void sigInterruptHandler (int p)

Definition at line 39 of file mainReceiver.cpp.

3.3.2.6 int StartAcq (char * filepath, char * filename, uint64_t fileindex, uint32_t datasize, void * p)

Definition at line 43 of file mainReceiver.cpp.

3.3.3 Variable Documentation

3.3.3.1 pid_t childPid[NUM_RECEIVERS]

Definition at line 26 of file mainReceiver.cpp.

3.3.3.2 bool keeprunning

Definition at line 27 of file mainReceiver.cpp.

3.3.3.3 int numrunning

Definition at line 28 of file `mainReceiver.cpp`.

3.4 `slsDetectorUsers.h` File Reference

```
#include <stdint.h>
#include <string>
```

Classes

- class [slsDetectorUsers](#)

Class for detector functionality to embed the detector controls in the users custom interface e.g. EPICS, Lima etc.

3.5 `slsReceiverUsers.h` File Reference

```
#include <stdio.h>
#include <stdint.h>
```

Classes

- class [slsReceiverUsers](#)

Class for implementing the SLS data receiver in the users application. Callbacks can be defined for processing and/or saving data.

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