Alf

1

Generated by Doxygen 1.8.11

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1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 2

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2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 4

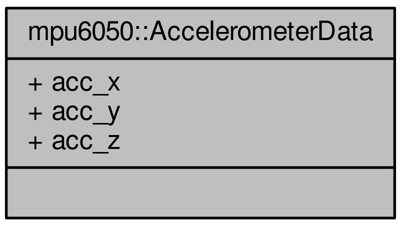
Class Documentation

4.1 mpu6050::AccelerometerData Struct Reference

AccelerometerData.

```
#include <mpu6050.hpp>
```

Collaboration diagram for mpu6050::AccelerometerData:



Public Attributes

- float **acc_x**
- float **acc_y**
- float **acc_z**

4.1.1 Detailed Description

AccelerometerData.

Definition at line 80 of file mpu6050.hpp.

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

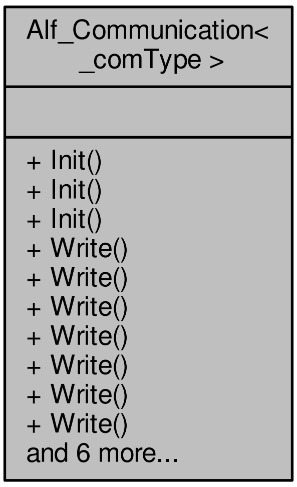
- mpu6050.hpp

4.2 Alf_Communication< _comType > Class Template Reference

CommunicationClass that handles all the communication. Possible template parameters are at the moment std↩
::fstream, Client and Server. No other com-types are supported.

```
#include <alf_communication.hpp>
```

Collaboration diagram for Alf_Communication< _comType >:



Public Member Functions

- bool Init (const string &filename)

  Init, for communication as a file.
- bool Init (const string &server, const uint32_t &portno)

  Init, for communication as a client.
- bool Init (const uint32_t &portno)

  Init, for communication as a server.
- bool Write (std::fstream &file, const char ∗data, const uint32_t &len)

  Writes len bytes from data.
- bool Write (Client &cl, const char ∗data, const uint32_t &len)
- bool Write (Server &ser, const char ∗data, const uint32_t &len)
- alf_error Write (Alf_Urg_Measurements_Buffer &buffer)

  This function writes the a buffer to the communication type. Only calling the internal Write(Alf_Urg_Measurement&) function until the buffer is empty.
- alf_error Write (Alf_Urg_Measurement &meas)

  Creates a string with all, for our application, relevant information for one laser-scanner measurement. The structure of this string is described in Alf_Messages.ods, outside this inline documentation.
- alf_error Write (Alf_Drive_Command &command)

  Creates a string with all, for application relevant information for steering the Alf.
- alf_error Write (Alf_Drive_Info &info)

Creates a string with all, for application relevant information for driving infos.
- alf_error WriteInitMessage ()

  Writes the init message over the choosen communication type with information about the urg sensor.
- bool Read (std::fstream &file, char ∗readPtr, const uint32_t &len)

  Reads len bytes and stores them into readPtr.
- bool Read (Client &cl, char ∗readPtr, const uint32_t &len)
- bool Read (Server &ser, char ∗readPtr, const uint32_t &len)
- alf_error Read (Alf_Urg_Measurements_Buffer &readBuffer, alf_mess_types &msgType, const uint32_t &nr←PackToRead=1)

  Function reads nrPackToRead Messages and stores them to the readBuffer. If the buffer has not enough free entries, no data is read and nothing is changed. Then another read is possible when the buffer has enough free entries.
- bool EndCommunication (void)

  Function to end the communication.

4.2.1 Detailed Description

template<class _comType>
class Alf_Communication< _comType >

CommunicationClass that handles all the communication. Possible template parameters are at the moment std←::fstream, Client and Server. No other com-types are supported.

Definition at line 33 of file alf_communication.hpp.

4.2.2 Member Function Documentation

4.2.2.1 template<class _comType > bool Alf_Communication< _comType >::EndCommunication (void)

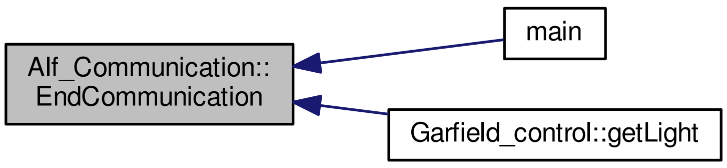
Function to end the communication.

Returns

- true if everything works, false otherwise

Definition at line 343 of file alf_communication.tpp.

Here is the caller graph for this function:



4.2.2.2 template<class _comType > bool Alf_Communication< _comType >::Init (const string & *filename*)

Init, for communication as a file.

Parameters

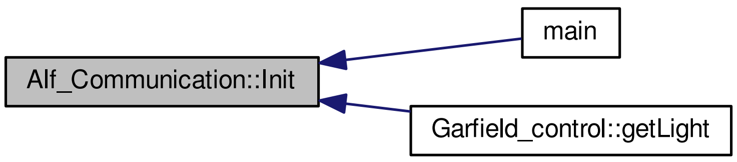
in	*filename*	- for the file, which will be used as communication

Returns

true when everything fine, false otherwise

Definition at line 26 of file alf_communication.tpp.

Here is the caller graph for this function:



4.2.2.3 template<class _comType > bool Alf_Communication< _comType >::Init (const string & *server*, const uint32_t & *portno*)

Init, for communication as a client.

Parameters

in	*server*	- the server IP as a string for the connection
in	*portno*	- the portnumber for the communication

Returns

true when everything fine, false otherwise

Definition at line 39 of file alf_communication.tpp.

4.2.2.4 template<class _comType > bool Alf_Communication< _comType >::Init (const uint32_t & *portno*)

Init, for communication as a server.

Parameters

in	*portno*	- the portnumber for the communication

Returns

true when everything fine, false otherwise

Definition at line 50 of file alf_communication.tpp.

4.2.2.5 template<class _comType > bool Alf_Communication< _comType >::Read (std::fstream & *file*, char ∗ *readPtr*, const uint32_t & *len*)

Reads len bytes and stores them into readPtr.

Parameters

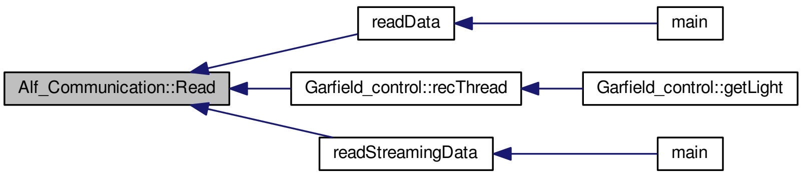
`in`	*file*	- the fstream from which shall be readed
`in,out`	*readPtr*	- where the function shall store the readed data
`in`	*len*	- how much bytes shall be readed

Returns

-

Definition at line 158 of file alf_communication.tpp.

Here is the caller graph for this function:



4.2.2.6 template<class _comType > bool Alf_Communication< _comType >::Read (Client & *cl*, char ∗ *readPtr*, const uint32_t & *len*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

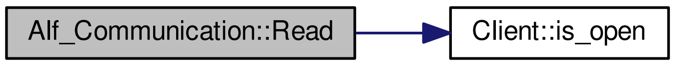
`in`	*cl*	- the client socket where the data shall be readed
`in,out`	*readPtr*	- where the function shall store the readed data
`in`	*len*	- how much bytes shall be readed

Returns

-

Definition at line 170 of file alf_communication.tpp.

Here is the call graph for this function:



4.2.2.7 template<class _comType > bool Alf_Communication< _comType >::Read (Server & *ser*, char * *readPtr*, const uint32_t & *len*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

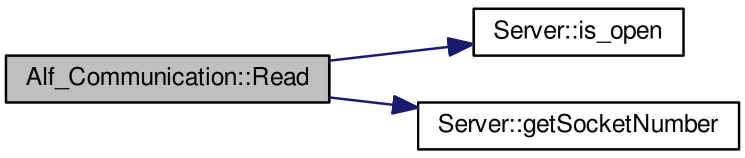
`in`	*ser*	- the server socket where the data shall be readed
`in,out`	*readPtr*	- where the function shall store the readed data
`in`	*len*	- how much bytes shall be readed

Returns

-

Definition at line 181 of file alf_communication.tpp.

Here is the call graph for this function:



4.2.2.8 template<class _comType > alf_error Alf_Communication< _comType >::Read (Alf_Urg_Measurements_Buffer & *readBuffer*, alf_mess_types & *msgType*, const uint32_t & *nrPackToRead* = 1)

Function reads nrPackToRead Messages and stores them to the readBuffer. If the buffer has not enough free entries, no data is read and nothing is changed. Then another read is possible when the buffer has enough free entries.

Parameters

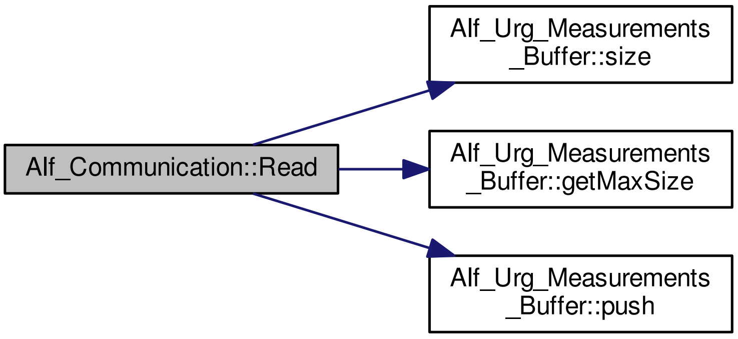
in	*readBuffer*	- This buffer is the memory location for the read data
in	*nrPackToRead*	- default is one packet, otherwise this is the number of packets which will be read

Returns

the first error that occurred or ALF_NO_ERROR when successful

Definition at line 192 of file alf_communication.tpp.

Here is the call graph for this function:


Alf_Communication::Read
Alf_Urg_Measurements _Buffer::size
Alf_Urg_Measurements _Buffer::getMaxSize
Alf_Urg_Measurements _Buffer::push

4.2.2.9 template<class _comType > bool Alf_Communication< _comType >::Write (std::fstream & *file*, const char ∗ *data*, const uint32_t & *len*)

Writes len bytes from data.

Parameters

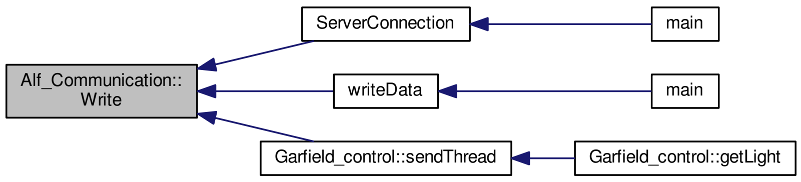
in	*file*	- the fstream, where the bytes should be written
in	*data*	- the pointer to the data which shall be written to the file
in	*len*	- number of bytes from data, which should be written

Returns

- true when everything is fine, false otherwise

Definition at line 60 of file alf_communication.tpp.

Here is the caller graph for this function:



4.2.2.10 template< class _comType > bool Alf_Communication< _comType >::Write (Client & *cl*, const char * *data*, const uint32_t & *len*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

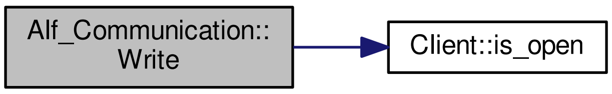
`in`	*cl*	- the client, writes to a socket
`in`	*data*	- the pointer to the data which shall be written to the file
`in`	*len*	- number of bytes from data, which should be written

Returns

- true when everything is fine, false otherwise

Definition at line 70 of file alf_communication.tpp.

Here is the call graph for this function:



4.2.2.11 template<class _comType > bool Alf_Communication< _comType >::Write (Server & *ser*, const char * *data*, const uint32_t & *len*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

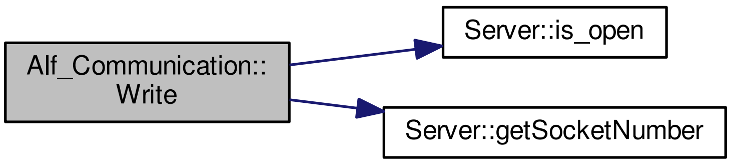
`in`	*ser*	- the server, writes to a socket
`in`	*data*	- the pointer to the data which shall be written to the file
`in`	*len*	- number of bytes from data, which should be written

Returns

- true when everything is fine, false otherwise

Definition at line 80 of file alf_communication.tpp.

Here is the call graph for this function:



4.2.2.12 template<class _comType > alf_error Alf_Communication< _comType >::Write (Alf_Urg_Measurements_Buffer & *buffer*)

This function writes the a buffer to the communication type. Only calling the internal Write(Alf_Urg_Measurement&) function until the buffer is empty.

Parameters

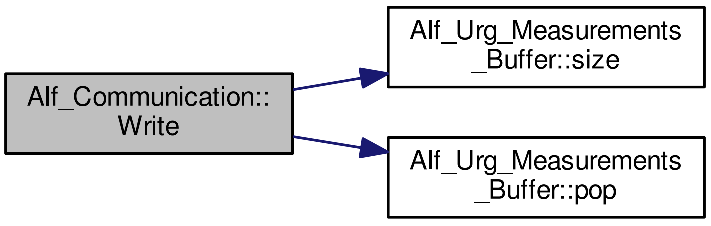
`in,out`	*buffer*	- the queue which includes all of the measurmenets which was taken to the moment, the function is called. It will be changed on calling this function.

Returns

- alf_error code

Definition at line 90 of file alf_communication.tpp.

Here is the call graph for this function:



4.2.2.13 template<class _comType > alf_error Alf_Communication< _comType >::Write (Alf_Urg_Measurement & *meas*)

Creates a string with all, for our application, relevant information for one laser-scanner measurement. The structure of this string is described in Alf_Messages.ods, outside this inline documentation.

Parameters

`in`	*meas*	- one laser scanner measurement

Returns

Definition at line 103 of file alf_communication.tpp.

4.2.2.14 template<class _comType > alf_error Alf_Communication< _comType >::Write (Alf_Drive_Command & *command*)

Creates a string with all, for application relevant information for steering the Alf.

Parameters

`in`	*Command*	- command object

Returns

Definition at line 122 of file alf_communication.tpp.

4.2.2.15 template<class _comType > alf_error Alf_Communication< _comType >::Write (Alf_Drive_Info & *info*)

Creates a string with all, for application relevant information for driving infos.

Parameters

`in`	*Info*	- Info object

Returns

Definition at line 138 of file alf_communication.tpp.

4.2.2.16 template<class _comType > alf_error Alf_Communication< _comType >::WriteInitMessage ( )

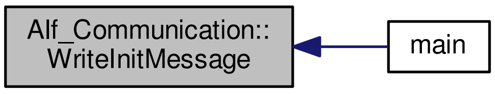
Writes the init message over the choosen communication type with information about the urg sensor.

Returns

- ALF_NO_ERROR if all is ok and it works
- ALF_CANNOT_SEND_MESSAGE if the communication does not work

Definition at line 357 of file alf_communication.tpp.

Here is the caller graph for this function:



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

- alf_communication.hpp
- alf_communication.tpp

4.3 Alf_Data Class Reference

contains all the data about the vehicle which could be exchanges between the vehicle and other applications so serves as interface between a controller and the hardware

```
#include <alf_data.hpp>
```

Collaboration diagram for Alf_Data:

Alf_Data
+ urg_angle_min
+ urg_angle_max
+ urg_angle_increment
+ urg_time_increment
+ urg_range_min
+ urg_range_max
+ Init_Data()

Static Public Member Functions

- static bool Init_Data (float, float, float, int32_t, int32_t, int32_t)

  initialise the Alf_Data

Static Public Attributes

- static float urg_angle_min = 0.0

  the min angle which the urg laser scanner can provide
- static float urg_angle_max = 0.0

  the max angle which the urg laser scanner can provide
- static float urg_angle_increment = 0

  the increment between two measurments of the laser scanner
- static int urg_time_increment = 100

  the time between two measurements of the laser scanner in ms, with our laser scanner this is 100ms
- static uint32_t urg_range_min = 0

  the minimal distance the laser scanner can measure
- static uint32_t urg_range_max = 0

  the maximal distance the laser scanner can measure

4.3.1 Detailed Description

contains all the data about the vehicle which could be exchanges between the vehicle and other applications so serves as interface between a controller and the hardware

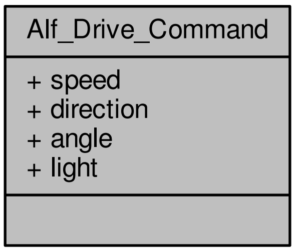
Definition at line 29 of file alf_data.hpp.

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

- alf_data.hpp
- alf_data.cpp

4.4 Alf_Drive_Command Class Reference

Collaboration diagram for Alf_Drive_Command:



Public Attributes

- uint8_t speed

    This variable holds the current speed (0 - 100%)
- uint8_t direction

    This is the direction to drive (0: forward, 1: backward)
- int8_t angle

    This is the currents steering angle (-90 - 90°)
- bool light

    This holds the state of the light.

4.4.1 Detailed Description

Definition at line 31 of file alf_data_info.hpp.

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

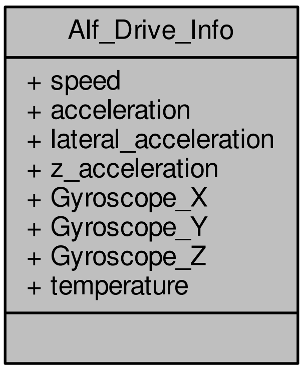
- alf_data_info.hpp

4.5 Alf_Drive_Info Class Reference

The Alf_Drive_Info class holds the Infos for steering the Alf.

```
#include <alf_data_info.hpp>
```

Collaboration diagram for Alf_Drive_Info:



Public Attributes

- uint8_t speed

  This is the current speed.
- float acceleration

  This is the acceleration of the car.
- float lateral_acceleration

  This is the lateral acceleration of the car.
- float z_acceleration

  This is the acceleration in Z direction.
- float Gyroscope_X

  This is the Gyroscope value x axis.
- float Gyroscope_Y

  This is the Gyroscope value y axis.
- float Gyroscope_Z

  This is the Gyroscope value z axis.
- float temperature

  This is the temperature.

4.5.1 Detailed Description

The Alf_Drive_Info class holds the Infos for steering the Alf.

Definition at line 11 of file alf_data_info.hpp.

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

- alf_data_info.hpp

4.6 Alf_Log Class Reference

This class handle all the log informations. There will be always a log file, additional the log can be printed to standard output.

```
#include <alf_log.hpp>
```

Collaboration diagram for Alf_Log:

Alf_Log
+ alf_log_init()
+ alf_log_write()
+ alf_log_end()
+ alf_set_loglevel()

Static Public Member Functions

- static bool alf_log_init (const std::string &filename="dummy.alf_log", const alf_log_level_e &log_level=log_↩ debug, const bool &console_output=false)

    Initialize the logging functionality (performed with a file)
- static bool alf_log_write (const std::string &log_entry, const alf_log_level_e &log_level=log_debug)

    Writes a log entry.
- static bool alf_log_end (void)

    close the logging
- static void alf_set_loglevel (const alf_log_level_e &log_level)

    Set the log level.

4.6.1 Detailed Description

This class handle all the log informations. There will be always a log file, additional the log can be printed to standard output.

Definition at line 45 of file alf_log.hpp.

4.6.2 Member Function Documentation

4.6.2.1 bool Alf_Log::alf_log_end (void) [static]

close the logging

Parameters

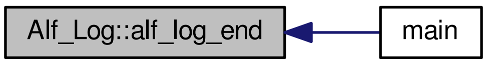
`in`	-	

Returns

true if successful otherwise false

Definition at line 52 of file alf_log.cpp.

Here is the caller graph for this function:



4.6.2.2 bool Alf_Log::alf_log_init (const std::string & *filename* = `"dummy.alf_log"`, const **alf_log_level_e** & *log_level* = **log_debug**, const bool & *console_output* = `false`) `[static]`

Initialize the logging functionality (performed with a file)

Parameters

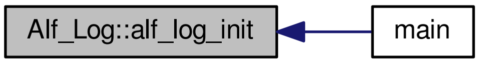
`in`	*filename*	Path to File
`in`	*loglevel*	All Messages with level above will be logged
`in`	*consoleoutput*	If true all messages will be printed on console ouptut

Returns

true if successful otherwise false

Definition at line 28 of file alf_log.cpp.

Here is the caller graph for this function:



4.6.2.3 bool Alf_Log::alf_log_write (const std::string & *log_entry,* const **alf_log_level_e** & *log_level* = **log_debug**) `[static]`

Writes a log entry.

Parameters

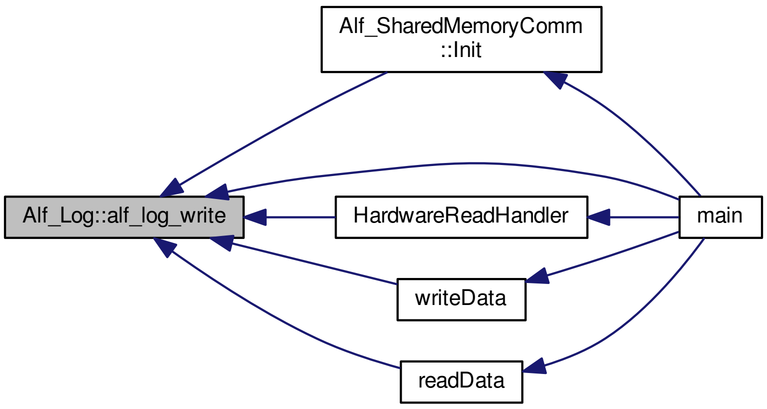
`in`	*log_entry*	the message to be logged
`in`	*log_level*	the significance of the message

Returns

true if successful otherwise false

Definition at line 63 of file alf_log.cpp.

Here is the caller graph for this function:



4.6.2.4 void Alf_Log::alf_set_loglevel (const **alf_log_level_e** & *log_level*) `[static]`

Set the log level.

Parameters

`in`	*log_level*	which messages should be logged from now on

Returns

-

Definition at line 93 of file alf_log.cpp.

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

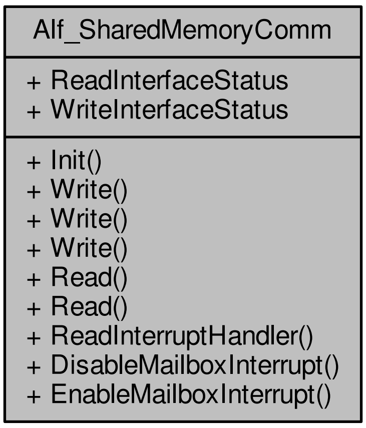
- alf_log.hpp
- alf_log.cpp

4.7 Alf_SharedMemoryComm Class Reference

Implementation for communcatiing via a shared memory section on the fpga. Abstraction for the mailbox, the hardware mutex and the shared memory in both directions.

```
#include <alf_sharedmemory.hpp>
```

Collaboration diagram for Alf_SharedMemoryComm:



Public Member Functions

- bool Init (uint32_t sh_mem_wr_addr, uint32_t wr_mutex_addr, uint32_t wr_mb_addr, uint32_t sh_mem_rd↩_addr, uint32_t rd_mutex_addr, uint32_t rd_mb_addr, uint16_t cp_id, uint32_t addr_offset)

    Initialize the hardware communication with the shared memory.
- alf_error Write (const Alf_Drive_Info &drive)

    Writes an Alf_Drive_Info to the shared memory section.
- alf_error Write (const Alf_Drive_Command &drive)

    Write an Alf_Drive_Command to the shared memory section.
- alf_error Write (uint32_t &num)

    Writes a simple number into the mailbox. This number will be used within the mailbox comannd register and in the shared memory!
- alf_error Read (Alf_Drive_Command &drive)

    Reads one Alf_Drive_Command from the shared memory, if there is one to read. This function changes memory of the given object!
- alf_error Read (Alf_Drive_Info &drive)

Reads one Alf_Drive_Info from the shared memory if there is one to read. Returns an errorcode otherwise.

- void **ReadInterruptHandler** (void)
- void DisableMailboxInterrupt ()

  Disables the interrupt on receiving messages.
- void EnableMailboxInterrupt ()

  Enables all interrupts of the mailbox (at this moment: only on receiving messages)

Public Attributes

- bool ReadInterfaceStatus

  Flag to disable (=false) or enable (=true) the read interface.
- bool WriteInterfaceStatus

  Enables (=true) or disables (=false) the write operations to hardware. If set to false, all write operations Write will return the error #ALF_WRITE_SHARED_MEMORY_DISABLED.

4.7.1 Detailed Description

Implementation for communcatiing via a shared memory section on the fpga. Abstraction for the mailbox, the hardware mutex and the shared memory in both directions.

Definition at line 82 of file alf_sharedmemory.hpp.

4.7.2 Member Function Documentation

4.7.2.1 bool Alf_SharedMemoryComm::Init (uint32_t *sh_mem_wr_addr,* uint32_t *wr_mutex_addr,* uint32_t *wr_mb_addr,* uint32_t *sh_mem_rd_addr,* uint32_t *rd_mutex_addr,* uint32_t *rd_mb_addr,* uint16_t *cp_id,* uint32_t *addr_offset*)

Initialize the hardware communication with the shared memory.

Parameters

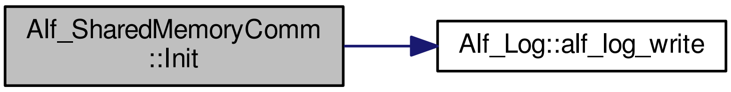
sh_mem_wr_addr	The base address of the shared memory where the instance of this class should write its data
wr_mutex_addr	The base address of the mutex which should lock all writes from this instance
wr_mb_addr	The base address of the mailbox which this instance should write his data
sh_mem_rd_addr	The base address of the shared memory where the instance of this class should read data (receiver)
rd_mutex_addr	The base address of the mutex where the instance is the receiver
rd_mb_addr	The base address of the mailbox where the instance is the receiver
cp_id	The cpu id which instantiate this class. Normally 0x01 for HSP and 0x03 for NIOS 2
addr_offset	The general address offset for all address defined. In NIOS2 this should be 0, within HPS on Cylcone V this is normally 0xff200000

Returns

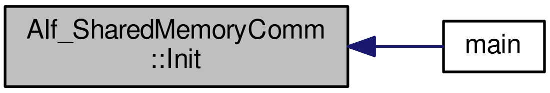
true if all addresses could be mapped in a proper way and all read/write operation can be used, false otherwise

Definition at line 33 of file alf_sharedmemory.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.7.2.2 alf_error Alf_SharedMemoryComm::Read (Alf_Drive_Command & *drive*)

Reads one Alf_Drive_Command from the shared memory, if there is one to read. This function changes memory of the given object!

Parameters

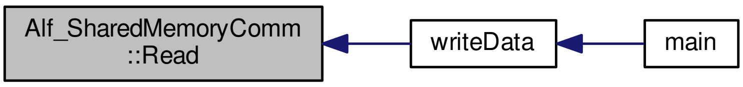
drive	The Alf_Drive_Command where the informations should be stored

Returns

One of ALF_ERROR_CODES

Definition at line 243 of file alf_sharedmemory.cpp.

Here is the caller graph for this function:



4.7.2.3 alf_error Alf_SharedMemoryComm::Read (Alf_Drive_Info & *drive*)

Reads one Alf_Drive_Info from the shared memory if there is one to read. Returns an errorcode otherwise.

Parameters

drive	The Alf_Drive_Info where the informations should be stored

Returns

One of #Alf_Drive_CODES

Definition at line 234 of file alf_sharedmemory.cpp.

4.7.2.4 alf_error Alf_SharedMemoryComm::Write (const Alf_Drive_Info & *drive*)

Writes an Alf_Drive_Info to the shared memory section.

Parameters

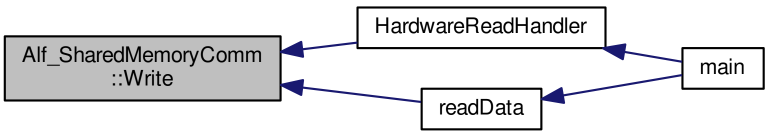
drive	The Alf_Drive_Info object which should be written to the shared memory via memcpj

Returns

One of ALF_ERROR_CODES

Definition at line 201 of file alf_sharedmemory.cpp.

Here is the caller graph for this function:



4.7.2.5 alf_error Alf_SharedMemoryComm::Write (const Alf_Drive_Command & *drive*)

Write an Alf_Drive_Command to the shared memory section.

Parameters

drive	The Alf_Drive_Command which should be written to the shared memory

Returns

One of ALF_ERROR_CODES

Definition at line 197 of file alf_sharedmemory.cpp.

4.7.2.6 alf_error Alf_SharedMemoryComm::Write (uint32_t & *num*)

Writes a simple number into the mailbox. This number will be used within the mailbox comannd register and in the shared memory!

Parameters

num	The number

Returns

One of ALF_ERROR_CODES

Definition at line 205 of file alf_sharedmemory.cpp.

4.7.3 Member Data Documentation

4.7.3.1 bool Alf_SharedMemoryComm::ReadInterfaceStatus

Flag to disable (=false) or enable (=true) the read interface.

Attention

Actual not used, just for completness

Definition at line 196 of file alf_sharedmemory.hpp.

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

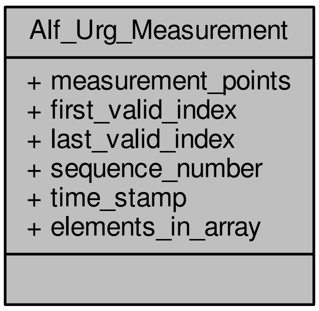
- alf_sharedmemory.hpp
- alf_sharedmemory.cpp

4.8 Alf_Urg_Measurement Class Reference

This class stands for **one** whole measurement of the laser scanner and provides additional informations It contains all measurement values, also this one, which are invalid in case of the datasheet.

```
#include <alf_data.hpp>
```

Collaboration diagram for Alf_Urg_Measurement:



Public Attributes

- long int measurement_points [elements_in_array]

  The storage for the measurement points. Each index represents one urg_angle_increment.
- uint32_t first_valid_index

  The first index of the measurement_points which should be used (derived from the data sheet)
- uint32_t last_valid_index

  The last index of the measurement_points which should be used.
- uint32_t sequence_number

  To provide a chronological sequence of the various measurements.
- long int time_stamp

  The timestamp of the measurement. Its no absolut time, just the internal counter, so several measurements can be set in an chronologically relation.

Static Public Attributes

- static constexpr uint32_t elements_in_array = URG_NUMBER_OF_MEASUREMENT_DATA + 1

  how much measurement points do we have for one measurement

4.8.1 Detailed Description

This class stands for **one** whole measurement of the laser scanner and provides additional informations It contains all measurement values, also this one, which are invalid in case of the datasheet.

Definition at line 54 of file alf_data.hpp.

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

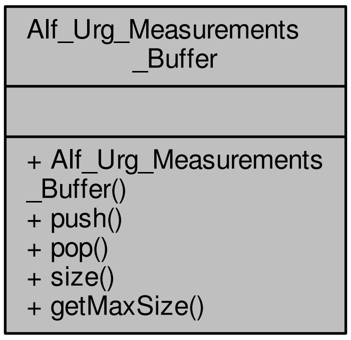
- alf_data.hpp

4.9 Alf_Urg_Measurements_Buffer Class Reference

This buffer can store a set of Alf_Urg_Measurement . It use the std::queue for storing the data and have a maximum size to determine the maximum RAM size which can be used.

```
#include <alf_data.hpp>
```

Collaboration diagram for Alf_Urg_Measurements_Buffer:



Public Member Functions

- Alf_Urg_Measurements_Buffer (uint32_t size=MAX_SIZE_OF_MEASUREMENT_BUFFER_DEFAULT)

  constructor for the Alf_Urg_Measurement_Buffer set _max_size to the given value or default to the macro MAX_S↩ IZE_OF_MEASUREMENT_BUFFER_DEFAULT
- alf_error push (const Alf_Urg_Measurement &)

  append one Alf_Urg_Measurement to the buffer
- alf_error pop (Alf_Urg_Measurement ∗)

  pops one element of the buffer and stores it in the memory given by a pointer
- uint32_t size () const

  returns the actual size of the queue (so how much elements are stored within)
- uint32_t getMaxSize (void) const

  returns the maximal number of elements which could be stored

4.9.1 Detailed Description

This buffer can store a set of Alf_Urg_Measurement . It use the std::queue for storing the data and have a maximum size to determine the maximum RAM size which can be used.

Definition at line 74 of file alf_data.hpp.

4.9.2 Constructor & Destructor Documentation

4.9.2.1 Alf_Urg_Measurements_Buffer::Alf_Urg_Measurements_Buffer (uint32_t *size* = MAX_SIZE_OF_MEASUREMEN↩ T_BUFFER_DEFAULT)

constructor for the Alf_Urg_Measurement_Buffer set _max_size to the given value or default to the macro MAX_↩ SIZE_OF_MEASUREMENT_BUFFER_DEFAULT

Parameters

in	*size*	- the size, default MAX_SIZE_OF_MEASUREMENT_BUFFER_DEFAULT

Returns

-

Definition at line 37 of file alf_data.cpp.

4.9.3 Member Function Documentation

4.9.3.1 uint32_t Alf_Urg_Measurements_Buffer::getMaxSize (void) const

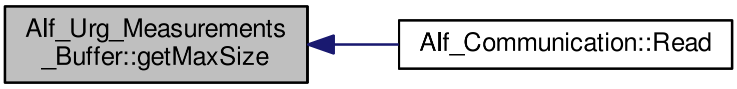
returns the maximal number of elements which could be stored

Returns

the maximal number of elements

Definition at line 70 of file alf_data.cpp.

Here is the caller graph for this function:



4.9.3.2 alf_error Alf_Urg_Measurements_Buffer::pop (Alf_Urg_Measurement * *a*)

pops one element of the buffer and stores it in the memory given by a pointer

Parameters

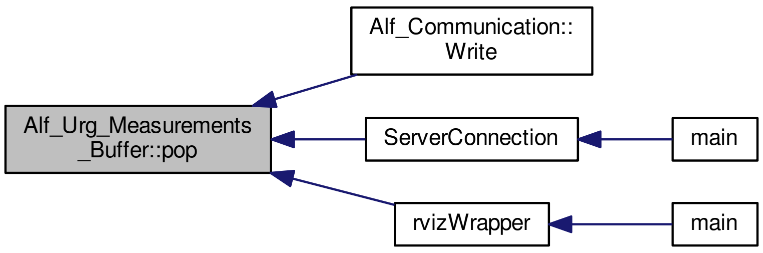
in,out	*a*	- the memory where the Alf_Urg_Measurement shall be stored

Returns

- ALF_NO_ERROR if everything works
- ALF_NOTHING_IN_BUFFER if there is no more element in the queue which could be removed

Definition at line 53 of file alf_data.cpp.

Here is the caller graph for this function:



4.9.3.3 alf_error Alf_Urg_Measurements_Buffer::push (const Alf_Urg_Measurement & *a*)

append one Alf_Urg_Measurement to the buffer

Parameters

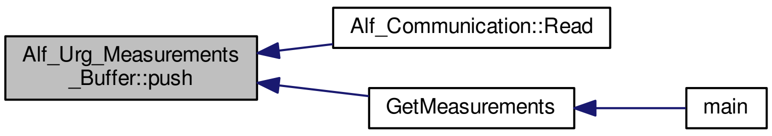
`in`	*a*	- the measurement

Returns

- ALF_NO_ERROR if the element can be appended to the queue
- ALF_BUFFER_IS_FULL if the queue is full and cannot store any additonal elements

Definition at line 41 of file alf_data.cpp.

Here is the caller graph for this function:



4.9.3.4 uint32_t Alf_Urg_Measurements_Buffer::size ( ) const

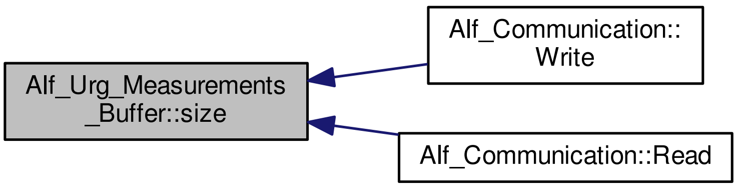
returns the actual size of the queue (so how much elements are stored within)

Returns

the number of elements

Definition at line 66 of file alf_data.cpp.

Here is the caller graph for this function:



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

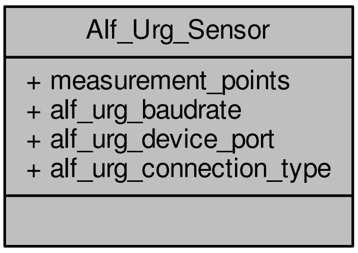
- alf_data.hpp
- alf_data.cpp

4.10 Alf_Urg_Sensor Class Reference

Represents the laser scanner on the alf vehicle and provide common settings etc.

```
#include <alf_sensors.hpp>
```

Collaboration diagram for Alf_Urg_Sensor:



Static Public Attributes

- static const uint16_t measurement_points = 768

    how much measurement points does the sensor have
- static const long alf_urg_baudrate = 115200

    the baudrate to communicate with the scanner
- static const std::string alf_urg_device_port = "/dev/ttyACM0"

    the port on which the scanner is connected with the hardware
- static const urg_connection_type_t alf_urg_connection_type = URG_SERIAL

    which communication type we use

4.10.1 Detailed Description

Represents the laser scanner on the alf vehicle and provide common settings etc.

Attention

this settings are only vaild with the URG-04LX

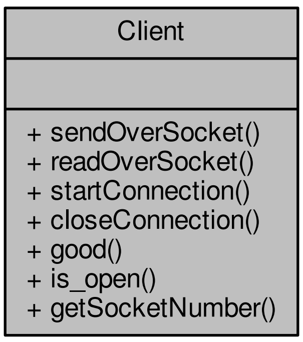
Definition at line 18 of file Software_ARM/alf_urg/alf_sensors.hpp.

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

- Software_ARM/alf_urg/alf_sensors.hpp
- Software_ARM/alf_urg/alf_sensors.cpp

4.11 Client Class Reference

Collaboration diagram for Client:



Public Member Functions

- alf_error sendOverSocket (const string &data)

    Sending the string to over the socket via the underlying linux functaion.
- alf_error readOverSocket (string &s)

    reads a string object over the socket. three conditions for read ending are given 1) if the end delimiter is reached ';' 2) no more readable data is available 3) more than 20 characters were read and no delimiter '|' or end delimiter ';' was read
- uint8_t startConnection (const uint32_t &_portno, const string &_server)

    starts the socket connection
- void closeConnection (void)

    closes the connection, communication is no longer possible
- bool good ()

    dummy function to satisfy the compiler (std::fstream, Server/Client all have the good() function so no explicit type handling must be done
- bool is_open ()

    returns the state of the socket connection
- int32_t **getSocketNumber** (void)

4.11.1 Detailed Description

Definition at line 16 of file Client_Server_impl.hpp.

4.11.2 Member Function Documentation

4.11.2.1 bool Client::is_open ( ) [inline]

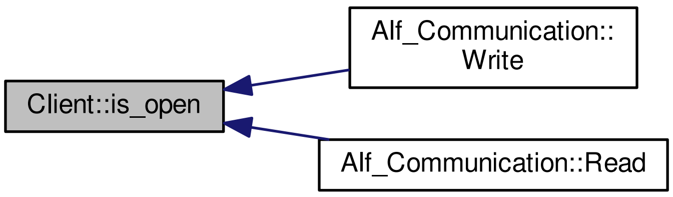
returns the state of the socket connection

Returns

true if connection is good, false otherwise

Definition at line 58 of file Client_Server_impl.hpp.

Here is the caller graph for this function:



4.11.2.2 alf_error Client::readOverSocket (string & *s*)

reads a string object over the socket. three conditions for read ending are given 1) if the end delimiter is reached ';' 2) no more readable data is available 3) more than 20 characters were read and no delimiter '|' or end delimiter ';' was read

Parameters

`in`	*the*	string data object were the read data is stored (no appending string gets overwritten)

Returns

- ALF_NO_ERROR if the read works
- ALF_CANNOT_READ_SOCKET if it does not work

Definition at line 55 of file Client_Server_impl.cpp.

4.11.2.3 alf_error Client::sendOverSocket (const string & *data*)

Sending the string to over the socket via the underlying linux functaion.

Parameters

`in`	*data*	- the string with the message which shall be transmitted

Returns

- ALF_NO_ERROR if the message can be transmitted
- ALF_SOCKET_NOT_READY if the socket is not initialised and
- ALF_CANNOT_SEND_MESSAGE if there are errors in the linux functionalitys, typical triggered by a too long message etc.

Definition at line 40 of file Client_Server_impl.cpp.

4.11.2.4 uint8_t Client::startConnection (const uint32_t & *_portno,* const string & *_server*)

starts the socket connection

Parameters

`in`	*the*	portnumber
`in`	*servername*	

Returns

1 if successful otherwise error < 0

Definition at line 15 of file Client_Server_impl.cpp.

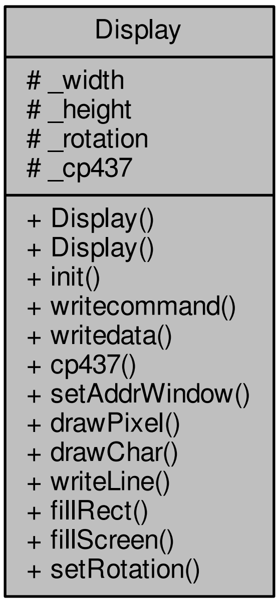
The documentation for this class was generated from the following files:

- Client_Server_impl.hpp
- Client_Server_impl.cpp

4.12 Display Class Reference

```
#include <Display.hpp>
```

Collaboration diagram for Display:



Public Member Functions

- Display ()=delete
- Display (alt_16 width, alt_16 height)
- void init (alt_u16 bgcolor)
- void writecommand (alt_u8 c)
- void writedata (alt_u8 c)
- void cp437 (bool x)
- void setAddrWindow (alt_u16 x0, alt_u16 y0, alt_u16 x1, alt_u16 y1)
- void drawPixel (alt_16 x, alt_16 y, alt_u16 color)
- void drawChar (alt_16 x, alt_16 y, unsigned char c, alt_u16 color, alt_u16 bg, alt_u8 size)
- void writeLine (const char ∗constline, alt_u16 color, alt_u8 size)
- void fillRect (alt_16 x, alt_16 y, alt_16 w, alt_16 h, alt_u16 color)
- void fillScreen (alt_u16 color)
- void setRotation (alt_u8 m)

Protected Attributes

- alt_16 _width
- alt_16 _height
- alt_u8 _rotation
- bool _cp437

4.12.1 Detailed Description

class Display wich contains all necessary methods for witing to LCD

Definition at line 128 of file Display.hpp.

4.12.2 Constructor & Destructor Documentation

4.12.2.1 Display::Display ( ) `[delete]`

Delete the default constructor

4.12.2.2 Display::Display (alt_16 *width*, alt_16 *height*)

Constructor for Display class

Parameters

width	is for instancing the display (use 240 as width for used display)
height	is for instancing the display (use 240 as width for used display)

Definition at line 72 of file Display.cpp.

4.12.3 Member Function Documentation

4.12.3.1 void Display::cp437 (bool *x* = `true`)

Method for enabling/disabling cp437 charset

Parameters

x	enabled if true, disabled if false

Definition at line 340 of file Display.cpp.

4.12.3.2 void Display::drawChar (alt_16 *x*, alt_16 *y*, unsigned char *c*, alt_u16 *color*, alt_u16 *bg*, alt_u8 *size*)

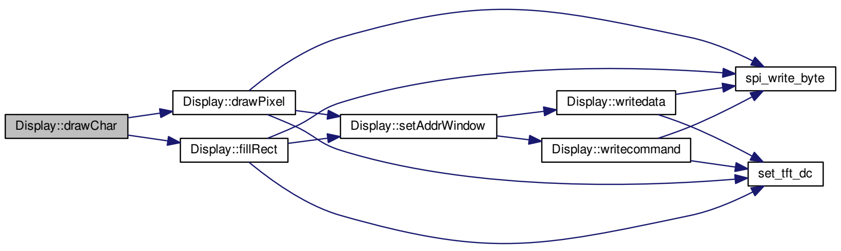
Method for drawing char to LCD

Parameters

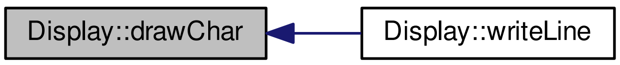
x	is the x position for the character
y	is the y position for the character `is` the character to be printed is the textcolor is the background color is the textsize

Definition at line 224 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.3 void Display::drawPixel (alt_16 *x*, alt_16 *y*, alt_u16 *color*)

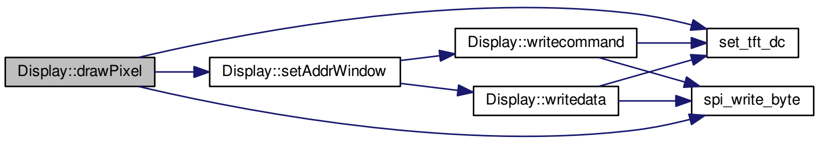
Draw Pixel Function for writing char on LCD

Parameters

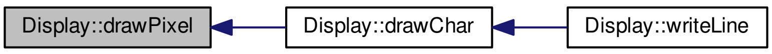
x	This is the x position of the pixel that should be written
y	This is the y position of the pixel that should be written
color	The color of the pixel

Definition at line 212 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.4 void Display::fillRect (alt_16 *x*, alt_16 *y*, alt_16 *w*, alt_16 *h*, alt_u16 *color*)

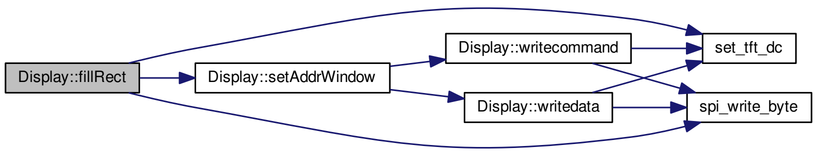
Method fill Rect creates a filled rectangle with one color. This funtcion is used by fillScreen

Parameters

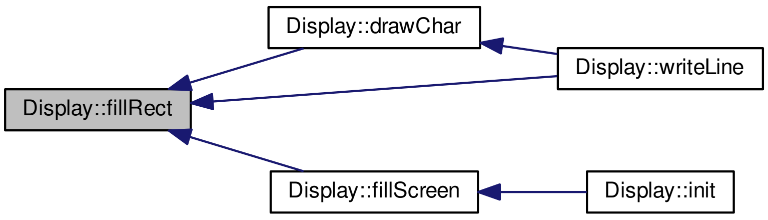
x	This is the x position where the rectangle should start
y	This is the y position where the rectangle should start
w	This is the width of the rectangle
h	This is the height of the rectangle
color	This is the color in which the rectangle should be filled

Definition at line 301 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.5 void Display::fillScreen (alt_u16 *color*)

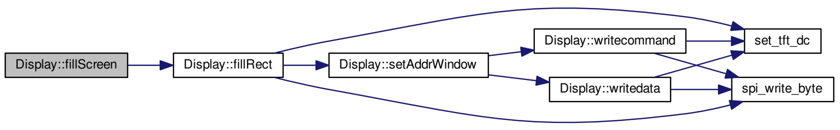
Method for filling Screen with one color. Function uses the fillRect() method

Parameters

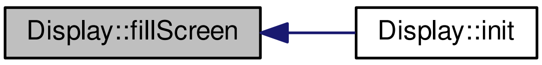
color	The color for filling the screen

Definition at line 297 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.6 void Display::init (alt_u16 *bgcolor*)

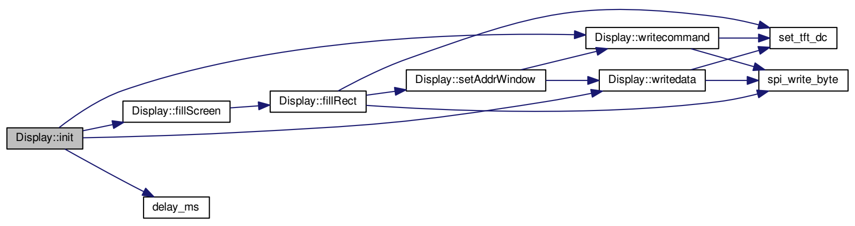
Init Function for initializing the LCD

Parameters

bgcolor	This bgcolor is used for filling the screen after initializing and for clearing lines to override

Definition at line 81 of file Display.cpp.

Here is the call graph for this function:



4.12.3.7 void Display::setAddrWindow (alt_u16 *x0*, alt_u16 *y0*, alt_u16 *x1*, alt_u16 *y1*)

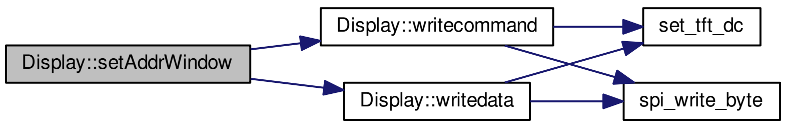
Method for setting the internal address for a x-y coordinate. It is used by drawPixel()

Parameters

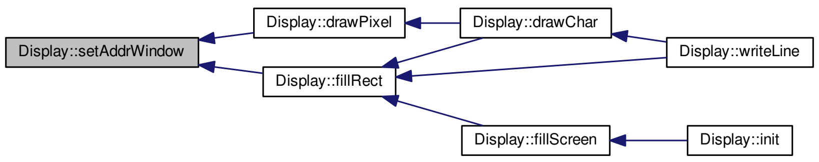
x0	The x0 position of the address window
y0	The y0 position of the address window
x1	The x1 position of the address window
y1	The y1 position of the address window

Definition at line 324 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.8 void Display::setRotation (alt_u8 *m*)

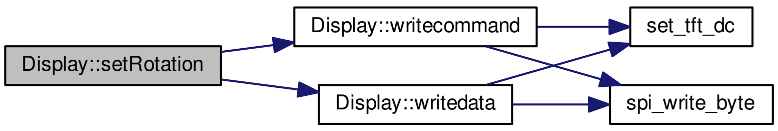
Rotate Screen with parameter m

Parameters

m	could take values from 0 to 3 (0: , 1: , 2: , 3:)

Definition at line 344 of file Display.cpp.

Here is the call graph for this function:



4.12.3.9 void Display::writecommand (alt_u8 *c*)

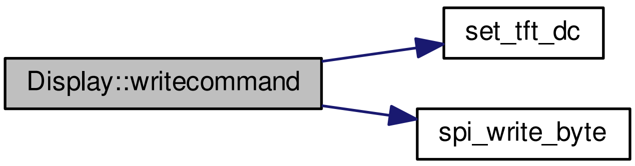
Method writecommand sends a command to the LCD DC Pin low to send a command

Parameters

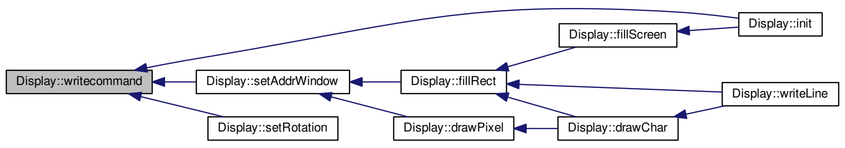
c	command byte to be written

Definition at line 200 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.10 void Display::writedata (alt_u8 *c*)

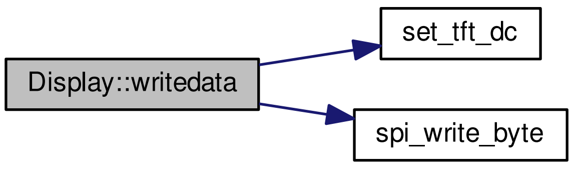
Method writedata sends data to the LCD DC Pin high to send data

Parameters

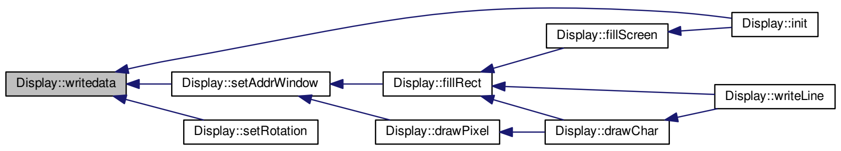
c	data byte to be written

Definition at line 206 of file Display.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.12.3.11 void Display::writeLine (const char ∗ *constline,* alt_u16 *color,* alt_u8 *size*)

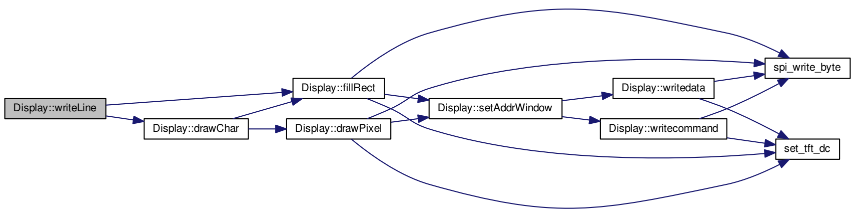
Method for writing a line to the screen. Bevor each line the current number is printed, to check the current line. After 100 lines the number is to 1 again

Parameters

constline	this is the line to be printed
color	The textcolor which should be printed
size	Is the textsize (1: normal. 2: double size. 3: triple size)

Definition at line 249 of file Display.cpp.

Here is the call graph for this function:



4.12.4 Member Data Documentation

4.12.4.1 bool Display::_cp437 [protected]

cp charset enabled or disabled

Definition at line 233 of file Display.hpp.

4.12.4.2 alt_16 Display::_height [protected]

height of the display

Definition at line 231 of file Display.hpp.

4.12.4.3 alt_u8 Display::_rotation [protected]

rotation of the dsiplay (0-3)

Definition at line 232 of file Display.hpp.

4.12.4.4 alt_16 Display::_width [protected]

width of the display

Definition at line 230 of file Display.hpp.

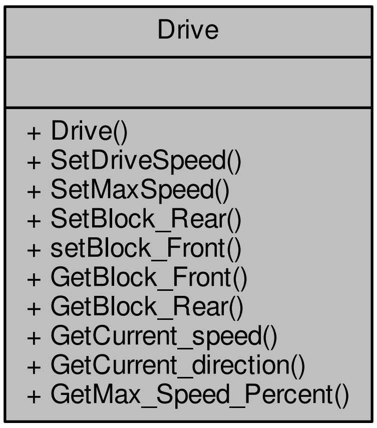
The documentation for this class was generated from the following files:

- Display.hpp
- Display.cpp

4.13 Drive Class Reference

```
#include <Drive.hpp>
```

Collaboration diagram for Drive:



Public Member Functions

- Drive ()=delete

Static Public Member Functions

- static void SetDriveSpeed (alt_u8 direction, alt_u8 speed)
- static void SetMaxSpeed (alt_u8 max_percent_speed)
- static void SetBlock_Rear (const bool val)

    set/get Methods for variables
- static void **setBlock_Front** (const bool val)
- static bool **GetBlock_Front** (void)
- static bool **GetBlock_Rear** (void)
- static alt_u8 **GetCurrent_speed** (void)
- static alt_u8 **GetCurrent_direction** (void)
- static alt_u8 **GetMax_Speed_Percent** (void)

4.13.1 Detailed Description

class Drive for setting the speed an direction and getting the speed from the rotary encoder

Definition at line 10 of file Drive.hpp.

4.13.2 Constructor & Destructor Documentation

4.13.2.1 Drive::Drive ( ) `[delete]`

Delete the default constructor

4.13.3 Member Function Documentation

4.13.3.1 void Drive::SetDriveSpeed (alt_u8 *direction*, alt_u8 *speed*) `[static]`

Method SetDriveSpeed for setting the speed and direction to the motor. The speed value gets rescaled by the maximum percent speed given by SetMaxSpeed(alt_u8 max_percent_speed)

Parameters

`in`	*direction*	1: backwards, 0: forward
`in`	*speed*	value from 0 - 255 for setting speed. SPEED_PRESCALER is divided by speed for setting max speed

Definition at line 19 of file Drive.cpp.

4.13.3.2 void Drive::SetMaxSpeed (alt_u8 *max_percent_speed*) `[static]`

Method SetMaxSpeed for setting the max percentage speed. The speed value which is given by SetDriveSpeed gets rescaled to the maximum percentage speed value

Parameters

`in`	*max_percent_speed*	is the maximum percentage speed value.

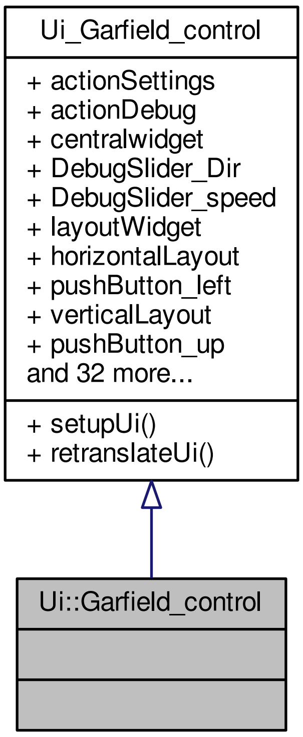
Definition at line 37 of file Drive.cpp.

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

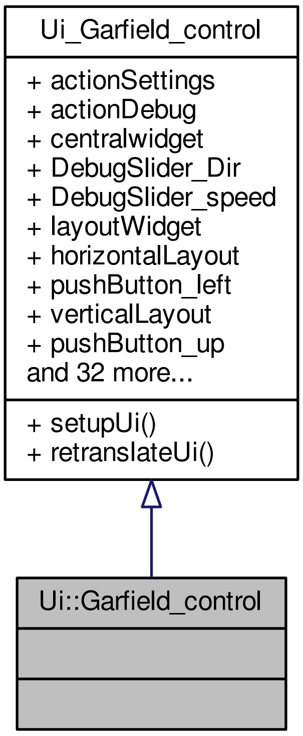
- Drive.hpp
- Drive.cpp

4.14 Ui::Garfield_control Class Reference

Inheritance diagram for Ui::Garfield_control:



Collaboration diagram for Ui::Garfield_control:



Additional Inherited Members

4.14.1 Detailed Description

Definition at line 311 of file ui_Garfield_control.h.

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

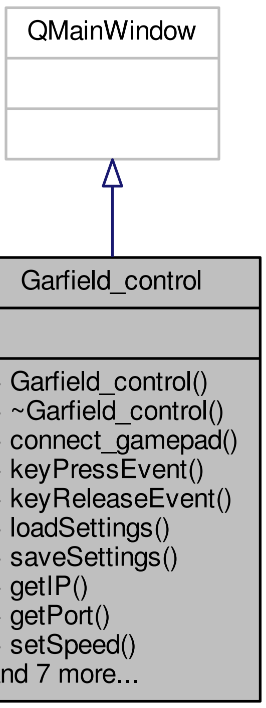
- ui_Garfield_control.h

4.15 Garfield_control Class Reference

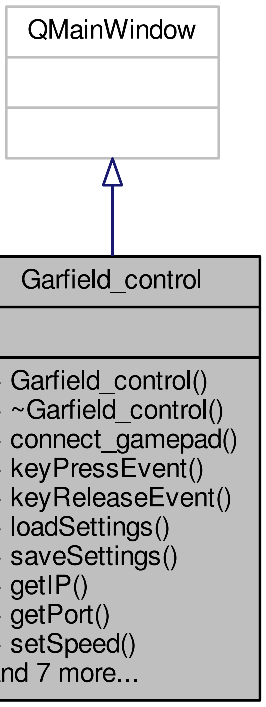
Garfield_control is the main class that provides all functionalities for the Garfield control program.

```
#include <Garfield_control.h>
```

Inheritance diagram for Garfield_control:



Collaboration diagram for Garfield_control:



Public Member Functions

- Garfield_control (QMainWindow ∗parent=0)

  The constructor.
- ∼Garfield_control ()

  The destructor.
- bool connect_gamepad ()

  connect_gamepad() function connects the gamepad. It takes the _Dev object which contains the device name
- void keyPressEvent (QKeyEvent ∗e)

  keyPressEvent handles all pressed keys which are necessary for controling the car. After that the keyPressEvent of the base class is called
- void keyReleaseEvent (QKeyEvent ∗e)

  keyReleaseEvent handles all released keys which are necessary for controling the car. After that the keyRelease←Event of the base class is called
- void loadSettings ()

  ladSettings() loads the settings file and stores all settings in its variables
- void saveSettings ()

  saveSettings() saves all settings to the Garfield.conf file if the settings window gets closed
- void getIP (QString ∗IP)

  getIP() is the getter function for the IP
- void getPort (int ∗Port)

  getPort() is the getter function for the Port

- void setSpeed (int speed)

  setSpeed() is the setter function for the Speed
- void setAngle (int angle)

  setAngle() is the setter function for the Angle
- void setLight (bool light)

  setLight() is the setter function for the Light
- void getSpeed (int &speed)

  getSpeed() is the getter function for the Speed
- void getAngle (int &angle)

  getAngle() is the getter function for the Angle
- void getLight (bool &light)

  getLight() is the getter function for the Light
- void sendThread ()

  sendThread() is executed in an extra thread. It handles all data that are sent over the socket
- void recThread ()

  recThread() is executed in an extra thread. It handles all data that are received over the socket

4.15.1 Detailed Description

Garfield_control is the main class that provides all functionalities for the Garfield control program.

Definition at line 90 of file Garfield_control.h.

4.15.2 Member Function Documentation

4.15.2.1 void Garfield_control::keyPressEvent (QKeyEvent ∗ *e*)

keyPressEvent handles all pressed keys which are necessary for controling the car. After that the keyPressEvent of the base class is called

Parameters

`in`	*e*	- The QKeyEvent of the key that is pressed.

Definition at line 187 of file Garfield_control.cpp.

4.15.2.2 void Garfield_control::keyReleaseEvent (QKeyEvent ∗ *e*)

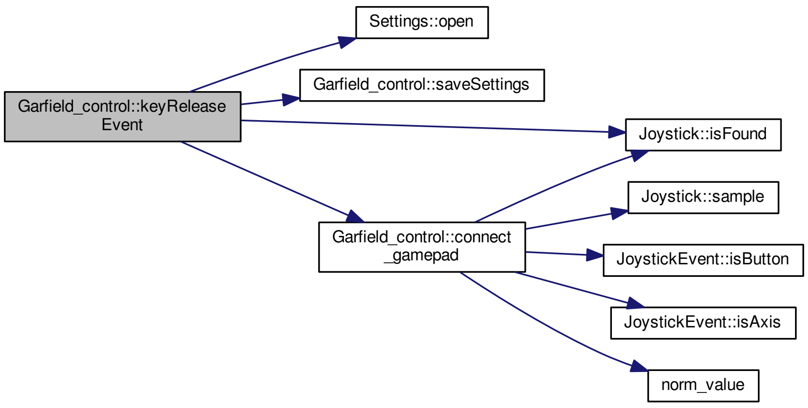
keyReleaseEvent handles all released keys which are necessary for controling the car. After that the keyRelease↩
Event of the base class is called

Parameters

`in`	*e*	- The QKeyEvent of the key that is released.

Definition at line 212 of file Garfield_control.cpp.

Here is the call graph for this function:



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

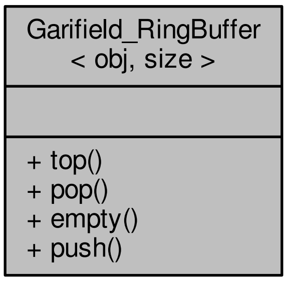
- Garfield_control.h
- Garfield_control.cpp

4.16 Garifield_RingBuffer< obj, size > Class Template Reference

Implementation of a ringbuffer with fixed size. If the queue is full, the oldest element will be overwritten.

```
#include <alf_sharedmemory.hpp>
```

Collaboration diagram for Garifield_RingBuffer< obj, size >:



Public Member Functions

- obj top ()

    returns the top element on the ring buffer (is the actualst)
- void pop ()

    Removes the top element of the ringbuffer. This element is the actualst element, next top element ist n-1.
- bool empty ()

    Is the ring buffer empty?
- void push (const obj &a)

    Pushs a element to the ring buffer. If the ring buffer is full, the oldest element in there will be overwritten.

4.16.1 Detailed Description

template<class obj, uint32_t size>
class Garifield_RingBuffer< obj, size >

Implementation of a ringbuffer with fixed size. If the queue is full, the oldest element will be overwritten.

Definition at line 22 of file alf_sharedmemory.hpp.

4.16.2 Member Function Documentation

4.16.2.1 template<class obj, uint32_t size> bool Garifield_RingBuffer< obj, size >::empty ( ) [inline]

Is the ring buffer empty?

Returns

true = empty, false = elements in the ring buffer

Definition at line 51 of file alf_sharedmemory.hpp.

4.16.2.2 template<class obj, uint32_t size> void Garifield_RingBuffer< obj, size >::push (const obj & *a*) [inline]

Pushs a element to the ring buffer. If the ring buffer is full, the oldest element in there will be overwritten.

Parameters

in	*a*	The element to push into.

Definition at line 59 of file alf_sharedmemory.hpp.

4.16.2.3 template<class obj, uint32_t size> obj Garifield_RingBuffer< obj, size >::top ( ) [inline]

returns the top element on the ring buffer (is the actualst)

Returns

the top element, could be of any datatype

Attention

a call to pop() is necessary if the element should removed from the ring buffer

Definition at line 30 of file alf_sharedmemory.hpp.

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

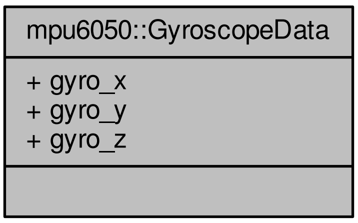
- alf_sharedmemory.hpp

4.17 mpu6050::GyroscopeData Struct Reference

GyroscopeData.

```
#include <mpu6050.hpp>
```

Collaboration diagram for mpu6050::GyroscopeData:



Public Attributes

- float **gyro_x**
- float **gyro_y**
- float **gyro_z**

4.17.1 Detailed Description

GyroscopeData.

Definition at line 88 of file mpu6050.hpp.

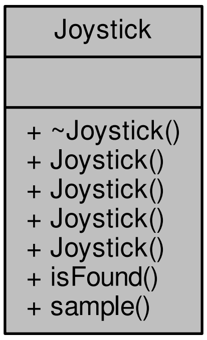
The documentation for this struct was generated from the following file:

- mpu6050.hpp

4.18 Joystick Class Reference

```
#include <joystick.h>
```

Collaboration diagram for Joystick:



Public Member Functions

- Joystick ()
- Joystick (int joystickNumber)
- Joystick (std::string devicePath)
- Joystick (std::string devicePath, bool blocking)
- bool isFound ()
- bool sample (JoystickEvent ∗event)

4.18.1 Detailed Description

Represents a joystick device. Allows data to be sampled from it.

Definition at line 103 of file joystick.h.

4.18.2 Constructor & Destructor Documentation

4.18.2.1 Joystick::Joystick ( )

Initialises an instance for the first joystick: /dev/input/js0

Definition at line 28 of file joystick.cpp.

4.18.2.2 Joystick::Joystick (int *joystickNumber*)

Initialises an instance for the joystick with the specified, zero-indexed number.

Definition at line 33 of file joystick.cpp.

4.18.2.3 Joystick::Joystick (std::string *devicePath*)

Initialises an instance for the joystick device specified.

Definition at line 40 of file joystick.cpp.

4.18.2.4 Joystick::Joystick (std::string *devicePath,* bool *blocking*)

Initialises an instance for the joystick device specified and provide the option of blocking I/O.

Definition at line 45 of file joystick.cpp.

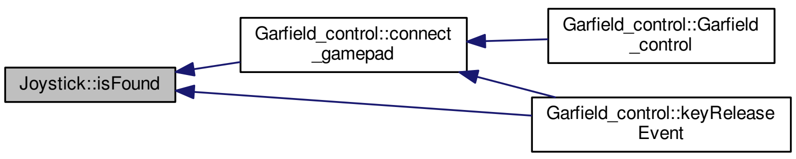
4.18.3 Member Function Documentation

4.18.3.1 bool Joystick::isFound ( )

Returns true if the joystick was found and may be used, otherwise false.

Definition at line 68 of file joystick.cpp.

Here is the caller graph for this function:

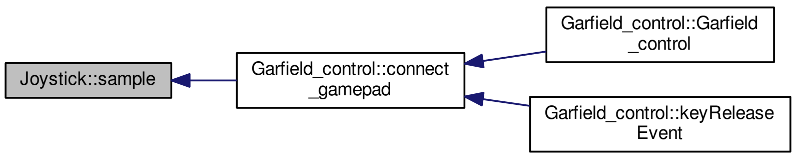

Joystick::isFound
Garfield_control::connect _gamepad
Garfield_control::Garfield _control
Garfield_control::keyRelease Event

4.18.3.2 bool Joystick::sample (**JoystickEvent** ∗ *event*)

Attempts to populate the provided JoystickEvent instance with data from the joystick. Returns true if data is available, otherwise false.

Definition at line 56 of file joystick.cpp.

Here is the caller graph for this function:


Joystick::sample
Garfield_control::connect _gamepad
Garfield_control::Garfield _control
Garfield_control::keyRelease Event

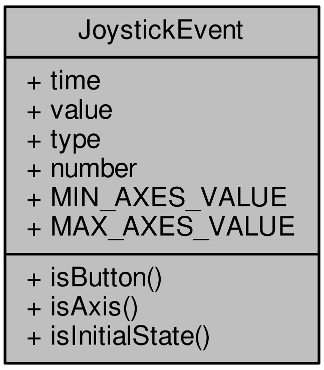
The documentation for this class was generated from the following files:

- joystick.h
- joystick.cpp

4.19 JoystickEvent Class Reference

```
#include <joystick.h>
```

Collaboration diagram for JoystickEvent:



Public Member Functions

- bool isButton ()
- bool isAxis ()
- bool isInitialState ()

Public Attributes

- unsigned int time
- short value
- unsigned char type
- unsigned char number

Static Public Attributes

- static const short MIN_AXES_VALUE = -32768
- static const short MAX_AXES_VALUE = 32767

Friends

- std::ostream & operator<< (std::ostream &os, const JoystickEvent &e)

4.19.1 Detailed Description

Encapsulates all data relevant to a sampled joystick event.

Definition at line 31 of file joystick.h.

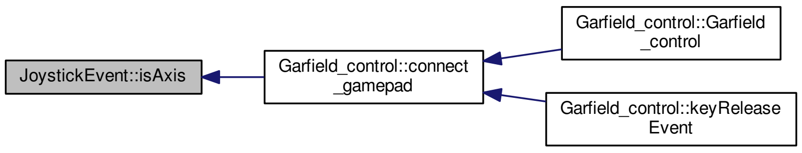
4.19.2 Member Function Documentation

4.19.2.1 bool JoystickEvent::isAxis ( ) [inline]

Returns true if this event is the result of an axis movement.

Definition at line 73 of file joystick.h.

Here is the caller graph for this function:

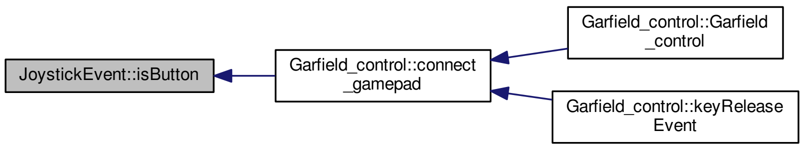

JoystickEvent::isAxis
Garfield_control::connect_gamepad
Garfield_control::Garfield_control
Garfield_control::keyReleaseEvent

4.19.2.2 bool JoystickEvent::isButton ( ) [inline]

Returns true if this event is the result of a button press.

Definition at line 65 of file joystick.h.

Here is the caller graph for this function:


JoystickEvent::isButton
Garfield_control::connect _gamepad
Garfield_control::Garfield _control
Garfield_control::keyRelease Event

4.19.2.3 bool JoystickEvent::isInitialState ( ) [inline]

Returns true if this event is part of the initial state obtained when the joystick is first connected to.

Definition at line 82 of file joystick.h.

4.19.3 Friends And Related Function Documentation

4.19.3.1 std::ostream& operator<< (std::ostream & *os*, const JoystickEvent & *e*) [friend]

The ostream inserter needs to be a friend so it can access the internal data structures.

Stream insertion function so you can do this: cout << event << endl;

Definition at line 78 of file joystick.cpp.

4.19.4 Member Data Documentation

4.19.4.1 const short JoystickEvent::MAX_AXES_VALUE = 32767 [static]

Minimum value of axes range

Definition at line 38 of file joystick.h.

4.19.4.2 const short JoystickEvent::MIN_AXES_VALUE = -32768 [static]

Minimum value of axes range

Definition at line 35 of file joystick.h.

4.19.4.3 unsigned char JoystickEvent::number

The axis/button number.

Definition at line 60 of file joystick.h.

4.19.4.4 unsigned int JoystickEvent::time

The timestamp of the event, in milliseconds.

Definition at line 43 of file joystick.h.

4.19.4.5 unsigned char JoystickEvent::type

The event type.

Definition at line 55 of file joystick.h.

4.19.4.6 short JoystickEvent::value

The value associated with this joystick event. For buttons this will be either 1 (down) or 0 (up). For axes, this will range between MIN_AXES_VALUE and MAX_AXES_VALUE.

Definition at line 50 of file joystick.h.

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

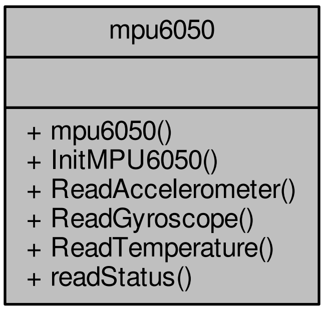
- joystick.h

4.20 mpu6050 Class Reference

represents the mpu6050 hardware device

```
#include <mpu6050.hpp>
```

Collaboration diagram for mpu6050:



Classes

- struct AccelerometerData

  AccelerometerData.
- struct GyroscopeData

  GyroscopeData.

Public Types

- using temp = float

  typedef for the temperature value

Public Member Functions

- mpu6050 (const MPU6050_Addresses deviceAddress)

  constructs a mpu6050 object with the given address
- alt_u8 InitMPU6050 (const AccelerometerSettings acc_sens, const GyroscopeSettings gyro_sens)

  initializes the mpu with the given settings
- alt_u8 ReadAccelerometer (AccelerometerData &acc_data)

  reads the current acc data
- alt_u8 ReadGyroscope (GyroscopeData &gyro_data)

  reads the current gyro data
- alt_u8 ReadTemperature (temp &temp_data)

  reads the current temperature
- alt_u8 readStatus (void)

  reads the status register and returns the current measurement status (temp, gyro and acc), the register is automatically reseted by the read operation

4.20.1 Detailed Description

represents the mpu6050 hardware device

Definition at line 74 of file mpu6050.hpp.

4.20.2 Constructor & Destructor Documentation

4.20.2.1 mpu6050::mpu6050 (const **MPU6050_Addresses** *deviceAddress*)

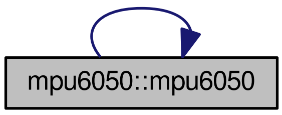
constructs a mpu6050 object with the given address

Parameters

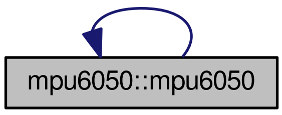
`in`	*deviceAddress*	the used iic address for communication

Definition at line 9 of file mpu6050.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



4.20.3 Member Function Documentation

4.20.3.1 alt_u8 mpu6050::InitMPU6050 (const **AccelerometerSettings** *acc_sens,* const **GyroscopeSettings** *gyro_sens*)

initializes the mpu with the given settings

Parameters

`in`	*acc_sens*	the sensitivity for the accelerometer (between 2G and 16G)
`in`	*gyro_sens*	the sensitivity for the gyroscope (between 250° and 2000°)

Returns

currently return always 1; the idea was if the iic device acks the address set result to 0, but this mechanism is currently disabled

Definition at line 15 of file mpu6050.cpp.

4.20.3.2 alt_u8 mpu6050::ReadAccelerometer (**AccelerometerData** & *acc_data*)

reads the current acc data

Parameters

out	*acc_data*	provides the memory buffer for the data

Returns

s.a.

Definition at line 67 of file mpu6050.cpp.

4.20.3.3 alt_u8 mpu6050::ReadGyroscope (GyroscopeData & *gyro_data*)

reads the current gyro data

Parameters

out	*gyro_data*	provides the memory buffer for the data

Returns

s.a.

Definition at line 111 of file mpu6050.cpp.

4.20.3.4 alt_u8 mpu6050::readStatus (void)

reads the status register and returns the current measurement status (temp, gyro and acc), the register is automatically reseted by the read operation

Returns

1: if the current measurement is finished 0: no measurement is finished

Definition at line 175 of file mpu6050.cpp.

4.20.3.5 alt_u8 mpu6050::ReadTemperature (temp & *temp_data*)

reads the current temperature

Parameters

out	*temp_data*	provides the memory buffer for the data

Returns

s.a.

Definition at line 155 of file mpu6050.cpp.

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

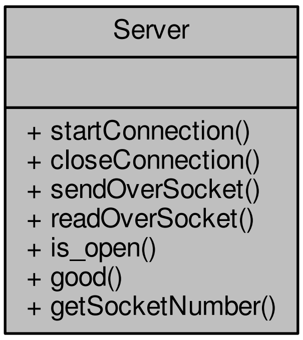
- mpu6050.hpp
- mpu6050.cpp

4.21 Server Class Reference

Represents the serverside of an communication for the whole application.

`#include <Client_Server_impl.hpp>`

Collaboration diagram for Server:



Public Member Functions

- alf_error startConnection (const uint32_t &)

  Trys to open the given port and listen to incoming connections It is using the underlying linux functions for socket handling.
- void closeConnection (void)

  Closing the binded socket and close the server connection.
- alf_error sendOverSocket (const string &)

  Sending the string to over the socket via the underlying linux functaion.
- alf_error readOverSocket (string &s)

  read from the underlying socket
- bool is_open ()

  returns the state of the socket connection
- bool good ()

  dummy function to satisfy the compiler (std::fstream, Server/Client all have the good() function so no explicit type handling must be done
- int32_t getSocketNumber (void)

  returns the socket handler id given from linux at initalisation of the socket

4.21.1 Detailed Description

Represents the serverside of an communication for the whole application.

Attention

at the moment this server implementation can only handle **ONE** connection!

Definition at line 74 of file Client_Server_impl.hpp.

4.21.2 Member Function Documentation

4.21.2.1 int32_t Server::getSocketNumber (void) `[inline]`

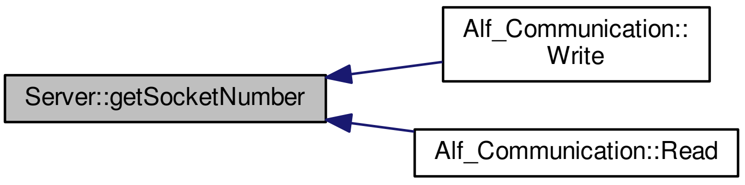
returns the socket handler id given from linux at initalisation of the socket

Returns

the socket handler number

Definition at line 121 of file Client_Server_impl.hpp.

Here is the caller graph for this function:



4.21.2.2 bool Server::is_open ( ) `[inline]`

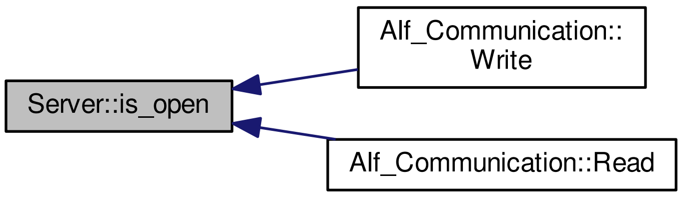
returns the state of the socket connection

Returns

true if connection is good, false otherwise

Definition at line 111 of file Client_Server_impl.hpp.

Here is the caller graph for this function:



4.21.2.3 alf_error Server::readOverSocket (string & *s*)

read from the underlying socket

Parameters

`in`	*s*	- a string reference

Returns

at this moment -> nothing

Attention

this is just the dummy function, the implementation of this function is missing

Definition at line 128 of file Client_Server_impl.cpp.

4.21.2.4 alf_error Server::sendOverSocket (const string & *data*)

Sending the string to over the socket via the underlying linux functaion.

Parameters

`in`	*data*	- the string with the message which shall be transmitted

Returns

- ALF_NO_ERROR if the message can be transmitted
- ALF_SOCKET_NOT_READY if the socket is not initialised and
- ALF_CANNOT_SEND_MESSAGE if there are errors in the linux functionalitys, typical triggered by a too long message etc.

Definition at line 150 of file Client_Server_impl.cpp.

4.21.2.5 alf_error Server::startConnection (const uint32_t & *portno*)

Trys to open the given port and listen to incoming connections It is using the underlying linux functions for socket handling.

Parameters

`in`	*portno*	- the portnumber on which the socket should be opened

Returns

- ALF_SOCKET_SERVER_NOT_READY if something goes wrong (the port is blocked, the function gets no socket handler from os etc.) and

- ALF_NO_ERROR if the port can be catched and the port is working

Definition at line 84 of file Client_Server_impl.cpp.

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

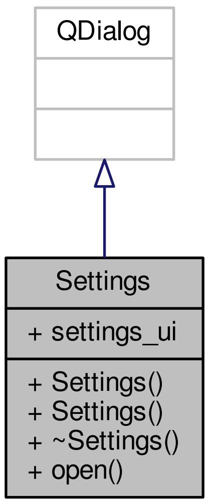
- Client_Server_impl.hpp
- Client_Server_impl.cpp

4.22 Settings Class Reference

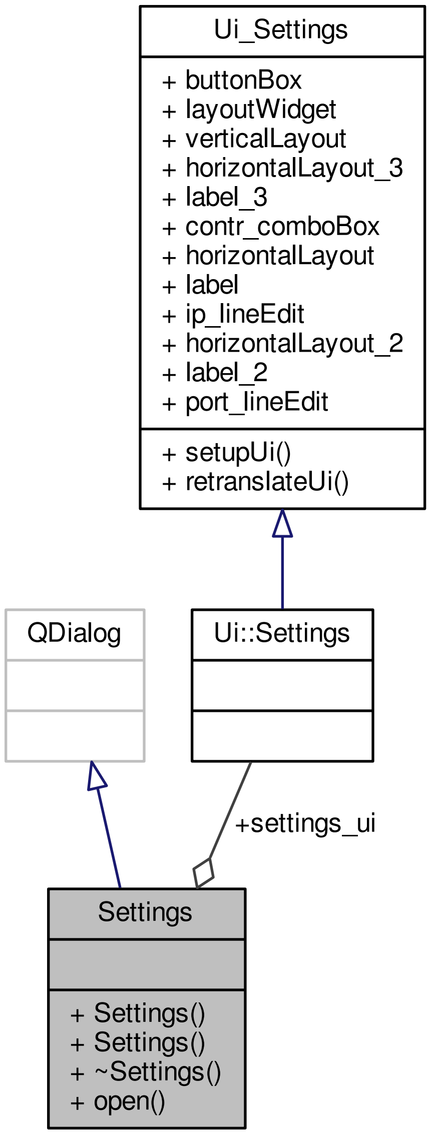
Settings is the settings class for the settings window.

```
#include <Settings.h>
```

Inheritance diagram for Settings:



Collaboration diagram for Settings:



Public Member Functions

- Settings ()

  This is the default constructor.
- Settings (QMainWindow ∗parent, QString IP, QString Port, QString Dev)

  The constructor for creating the settings window.
- ∼Settings ()

  This is the destructor.
- void open ()

  open() this function opens the settings window

Public Attributes

- Ui::Settings ∗ settings_ui

  The settings user interface for setting data in the gui.

4.22.1 Detailed Description

Settings is the settings class for the settings window.

Definition at line 17 of file Settings.h.

4.22.2 Constructor & Destructor Documentation

4.22.2.1 Settings::Settings (QMainWindow ∗ *parent*, QString *IP*, QString *Port*, QString *Dev*)

The constructor for creating the settings window.

Parameters

`in`	∗*parent*	- The object of the parent Window
`in`	*IP*	- The IP which is currently stored in the settings file and should be displayed
`in`	*Port*	- The Port which is currently stored in the settings file and should be displayed
`in`	*Dev*	- The device name of the gamepad which is currently saved in the settings file and should be set as active

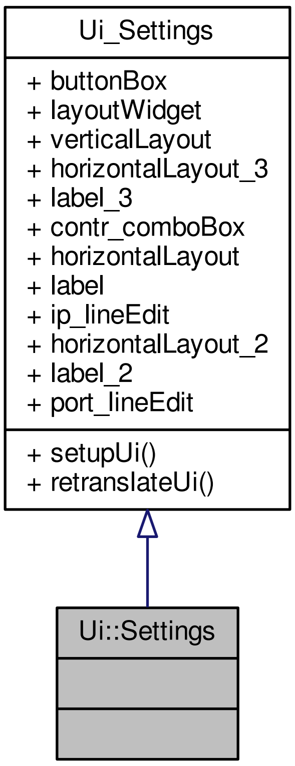
Definition at line 11 of file Settings.cpp.

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

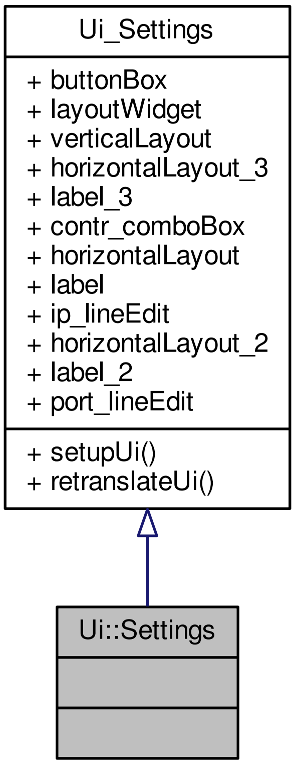
- Settings.h
- Settings.cpp

4.23 Ui::Settings Class Reference

Inheritance diagram for Ui::Settings:



Collaboration diagram for Ui::Settings:



Additional Inherited Members

4.23.1 Detailed Description

Definition at line 126 of file ui_Settings.h.

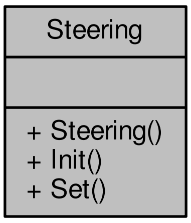
The documentation for this class was generated from the following file:

- ui_Settings.h

4.24 Steering Class Reference

```
#include <Steering.hpp>
```

Collaboration diagram for Steering:



Public Member Functions

- Steering ()=delete

Static Public Member Functions

- static void Init (alt_u8 max_angle)
- static void Set (alt_8 angle)

4.24.1 Detailed Description

class Steering for controlling the steering servo. No object is needed because of static functions

Definition at line 16 of file Steering.hpp.

4.24.2 Constructor & Destructor Documentation

4.24.2.1 Steering::Steering ( ) [delete]

Delete the default constructor

4.24.3 Member Function Documentation

4.24.3.1 void Steering::Init (alt_u8 *max_angle*) [static]

Init Function for initializing the Steering with the maximum steering angle

Parameters

max_angle	This is the maximum steering angle in one direction (e.g. 50 deg). If the Set(alt_8 angle) is called with a bigger angle, it is set to max_angle_delta

Definition at line 14 of file Steering.cpp.

4.24.3.2 void Steering::Set (alt_8 *angle*) `[static]`

Set Function for setting given angle to the servo

Parameters

angle	This is the angle to set the servo (between -max_angle_delta and max_angle_delta)

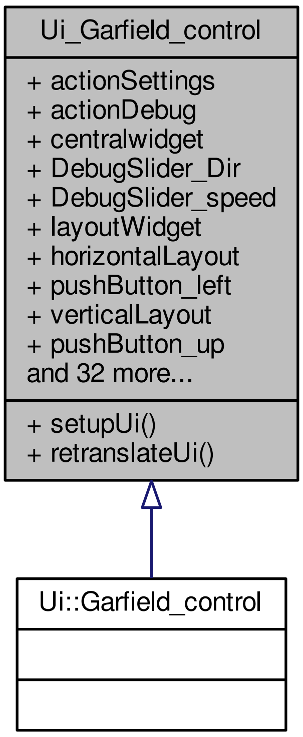
Definition at line 24 of file Steering.cpp.

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

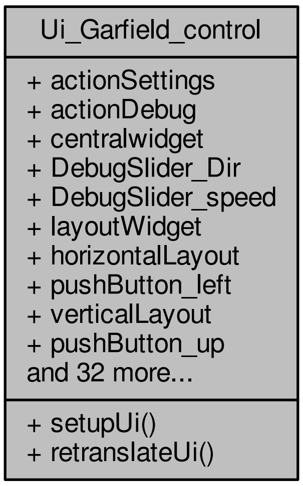
- Steering.hpp
- Steering.cpp

4.25 Ui_Garfield_control Class Reference

Inheritance diagram for Ui_Garfield_control:



Collaboration diagram for Ui_Garfield_control:



Public Member Functions

- void **setupUi** (QMainWindow ∗Garfield_control)
- void **retranslateUi** (QMainWindow ∗Garfield_control)

Public Attributes

- QAction ∗ **actionSettings**
- QAction ∗ **actionDebug**
- QWidget ∗ **centralwidget**
- QSlider ∗ **DebugSlider_Dir**
- QSlider ∗ **DebugSlider_speed**
- QWidget ∗ **layoutWidget**
- QHBoxLayout ∗ **horizontalLayout**
- QPushButton ∗ **pushButton_left**
- QVBoxLayout ∗ **verticalLayout**
- QPushButton ∗ **pushButton_up**
- QPushButton ∗ **pushButton_down**
- QPushButton ∗ **pushButton_right**
- QCheckBox ∗ **checkBox_light**
- QWidget ∗ **layoutWidget1**
- QHBoxLayout ∗ **horizontalLayout_2**
- QLabel ∗ **angle_label**
- QLineEdit ∗ **angle_lineEdit**
- QLabel ∗ **speed_label**
- QLineEdit ∗ **speed_lineEdit**
- QLabel ∗ **AccGrid_label**
- QLabel ∗ **GridPoint_label**

- QLabel ∗ **acc_label**
- QPushButton ∗ **connect_pushButton**
- QLabel ∗ **connstate_label**
- QWidget ∗ **verticalLayoutWidget**
- QVBoxLayout ∗ **verticalLayout_2**
- QHBoxLayout ∗ **horizontalLayout_3**
- QLabel ∗ **Gyro_X_label**
- QLineEdit ∗ **Gyro_X_lineEdit**
- QHBoxLayout ∗ **horizontalLayout_4**
- QLabel ∗ **Gyro_Y_label**
- QLineEdit ∗ **Gyro_Y_lineEdit**
- QHBoxLayout ∗ **horizontalLayout_5**
- QLabel ∗ **Gyro_Z_label**
- QLineEdit ∗ **Gyro_Z_lineEdit**
- QSpacerItem ∗ **verticalSpacer**
- QHBoxLayout ∗ **horizontalLayout_6**
- QLabel ∗ **temperature_label**
- QLineEdit ∗ **temperatur_lineEdit**
- QMenuBar ∗ **menubar**
- QMenu ∗ **menuConfig**
- QStatusBar ∗ **statusBar**

4.25.1 Detailed Description

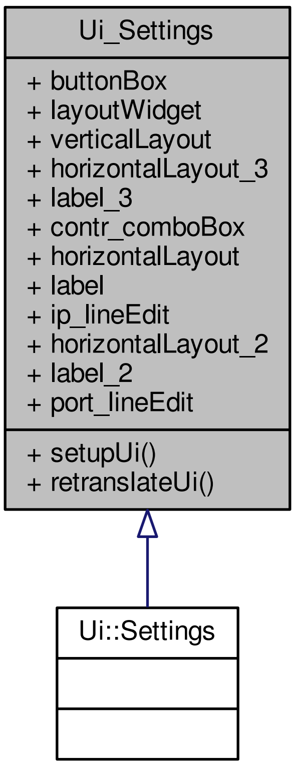
Definition at line 33 of file ui_Garfield_control.h.

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

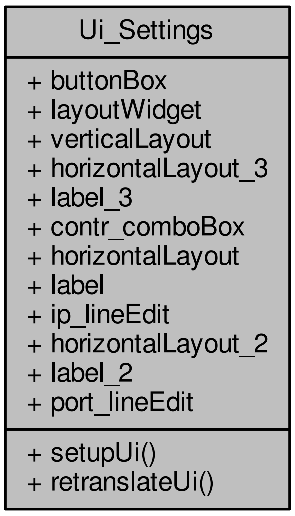
- ui_Garfield_control.h

4.26 Ui_Settings Class Reference

Inheritance diagram for Ui_Settings:



Collaboration diagram for Ui_Settings:



Public Member Functions

- void **setupUi** (QDialog ∗Settings)
- void **retranslateUi** (QDialog ∗Settings)

Public Attributes

- QDialogButtonBox ∗ **buttonBox**
- QWidget ∗ **layoutWidget**
- QVBoxLayout ∗ **verticalLayout**
- QHBoxLayout ∗ **horizontalLayout_3**
- QLabel ∗ **label_3**
- QComboBox ∗ **contr_comboBox**
- QHBoxLayout ∗ **horizontalLayout**
- QLabel ∗ **label**
- QLineEdit ∗ **ip_lineEdit**
- QHBoxLayout ∗ **horizontalLayout_2**
- QLabel ∗ **label_2**
- QLineEdit ∗ **port_lineEdit**

4.26.1 Detailed Description

Definition at line 28 of file ui_Settings.h.

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

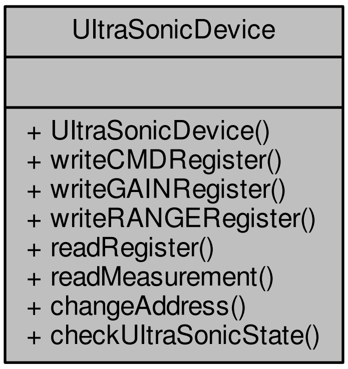
- ui_Settings.h

4.27 UltraSonicDevice Class Reference

represents a ultrasonic hardware device

```
#include <ultrasonic.hpp>
```

Collaboration diagram for UltraSonicDevice:



Public Member Functions

- UltraSonicDevice (const UltraSonicAddress deviceAddress)

  constructs a ultrasonic device with the given address
- alt_u8 writeCMDRegister (const UltraSonicCommands val, const bool broadcast=false) const

  function to write to the command srf08 register;
- alt_u8 writeGAINRegister (const alt_u8 val) const

  function to write to the gain srf08 register
- alt_u8 writeRANGERegister (const alt_u8 val) const

  function to write to the range srf08 register
- alt_u8 readRegister (const UltraSonicRegisterRead reg, alt_u16 &readPtr) const

  function to read from specific srf08 register (reads always high and low byte if available)
- alt_u8 readMeasurement (alt_u8 ∗ultrasonic_measurement, const alt_u8 length) const

  function to read one complete range measurement
- alt_u8 changeAddress (const UltraSonicAddress newAddress)

  function to change the IIC address of the ultrasonic devicer
- alt_u8 checkUltraSonicState (bool &check) const

  function to check if the device does currently a ranging

4.27.1 Detailed Description

represents a ultrasonic hardware device

Definition at line 85 of file ultrasonic.hpp.

4.27.2 Member Function Documentation

4.27.2.1 alt_u8 UltraSonicDevice::changeAddress (const UltraSonicAddress *newAddress*)

function to change the IIC address of the ultrasonic devicer

Parameters

in	*newAddress*	the new address that should be given to the device

Returns

result (status) of this operation

Definition at line 105 of file ultrasonic.cpp.

4.27.2.2 alt_u8 UltraSonicDevice::checkUltraSonicState (bool & *check*) const

function to check if the device does currently a ranging

Parameters

out	*check*	will be set to true if ranging is currently ongoing otherwise set to false

Returns

result (status) of this operation

Warning

do not use this function with the RTOS,

Definition at line 133 of file ultrasonic.cpp.

4.27.2.3 alt_u8 UltraSonicDevice::readMeasurement (alt_u8 ∗ *ultrasonic_measurement,* const alt_u8 *length*) const

function to read one complete range measurement

Parameters

out	*ultrasonic_measurement*	buffer to store the current measurement
in	*length*	maximal length to read

Returns

result (status) of this operation

Definition at line 81 of file ultrasonic.cpp.

4.27.2.4 alt_u8 UltraSonicDevice::readRegister (const UltraSonicRegisterRead *reg*, alt_u16 & *readPtr*) const

function to read from specific srf08 register (reads always high and low byte if available)

Parameters

`in`	*reg*	register to read from
`out`	*readPtr*	stores the read value from reg

Returns

result (status) of this operation

Definition at line 51 of file ultrasonic.cpp.

4.27.2.5 alt_u8 UltraSonicDevice::writeCMDRegister (const UltraSonicCommands *val*, const bool *broadcast* = `false`) const

function to write to the command srf08 register;

Parameters

`in`	*val*	value which will be written to reg
`in`	*broadcast*	if true the command will be sent with address 0x00, which indicates a broadcast

Returns

result (status) of this operation

Definition at line 15 of file ultrasonic.cpp.

4.27.2.6 alt_u8 UltraSonicDevice::writeGAINRegister (const alt_u8 *val*) const

function to write to the gain srf08 register

Parameters

`in`	*val*	value which will be written to reg

Returns

result (status) of this operation

Definition at line 29 of file ultrasonic.cpp.

4.27.2.7 alt_u8 UltraSonicDevice::writeRANGERegister (const alt_u8 *val*) const

function to write to the range srf08 register

Parameters

`in`	*val*	value which will be written to reg

Returns

result (status) of this operation

Definition at line 40 of file ultrasonic.cpp.

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

- ultrasonic.hpp
- ultrasonic.cpp

Chapter 5

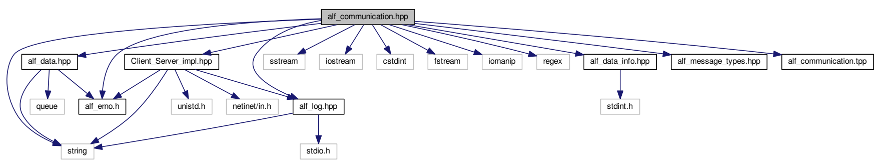
File Documentation

5.1 alf_communication.hpp File Reference

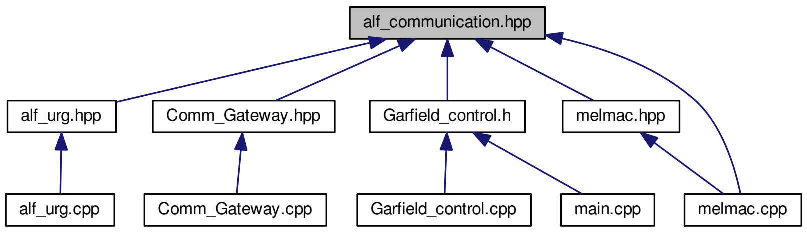
a library for handling all the communication between a client and a server. This file contains all types of communications like writing to files or socket communication over LAN

```
#include <string>
#include <sstream>
#include <iostream>
#include <cstdint>
#include <fstream>
#include <iomanip>
#include <regex>
#include "alf_data.hpp"
#include "alf_data_info.hpp"
#include "alf_log.hpp"
#include "alf_erno.h"
#include "alf_message_types.hpp"
#include "Client_Server_impl.hpp"
#include "alf_communication.tpp"
```

Include dependency graph for alf_communication.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Alf_Communication< _comType >

  CommunicationClass that handles all the communication. Possible template parameters are at the moment std↩ ::fstream, Client and Server. No other com-types are supported.

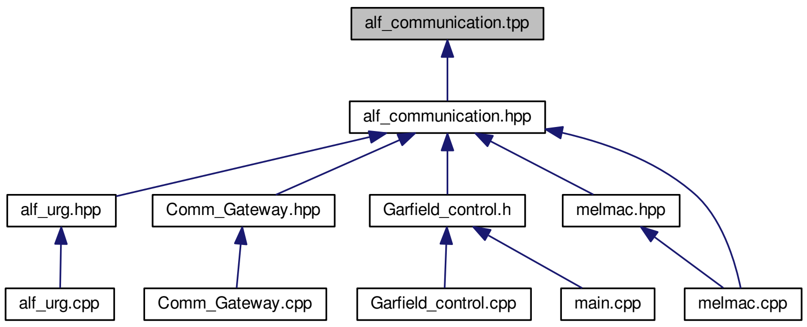
5.1.1 Detailed Description

a library for handling all the communication between a client and a server. This file contains all types of communications like writing to files or socket communication over LAN

5.2 alf_communication.tpp File Reference

contains the implementations for template functions to be outside of the hpp

This graph shows which files directly or indirectly include this file:



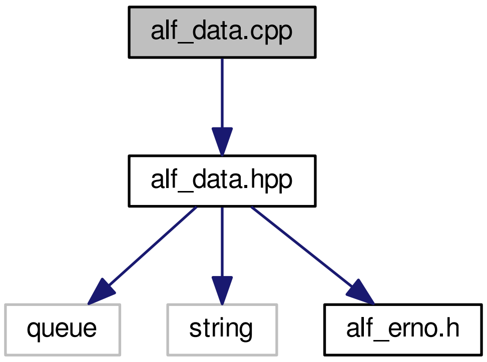
5.2.1 Detailed Description

contains the implementations for template functions to be outside of the hpp

5.3 alf_data.cpp File Reference

```
#include "alf_data.hpp"
```

Include dependency graph for alf_data.cpp:

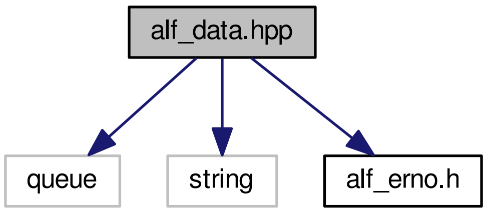


5.4 alf_data.hpp File Reference

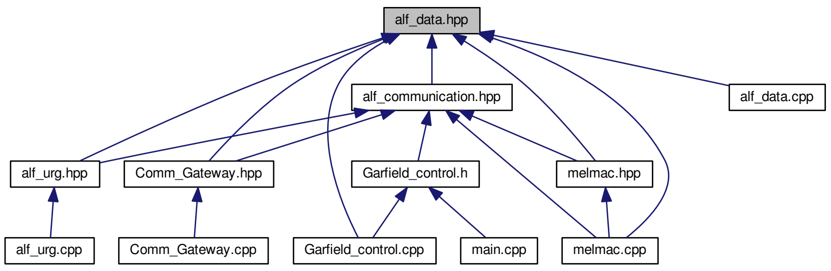
a library for collect all classes which represents any physical data

```
#include <queue>
#include <string>
#include "alf_erno.h"
```

Include dependency graph for alf_data.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Alf_Data

  contains all the data about the vehicle which could be exchanges between the vehicle and other applications so serves as interface between a controller and the hardware

- class Alf_Urg_Measurement

  This class stands for ***one*** *whole measurement of the laser scanner and provides additional informations It contains all measurement values, also this one, which are invalid in case of the datasheet.*

- class Alf_Urg_Measurements_Buffer

  This buffer can store a set of Alf_Urg_Measurement . It use the std::queue for storing the data and have a maximum size to determine the maximum RAM size which can be used.

Macros

- #define MAX_SIZE_OF_MEASUREMENT_BUFFER_DEFAULT 10

  the number of elements the measurement buffer can store by default.

- #define URG_NUMBER_OF_MEASUREMENT_DATA 768

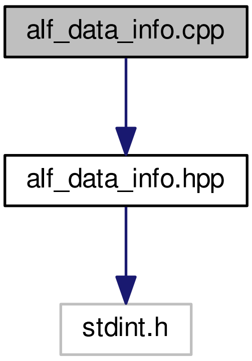
  number of the measurements the urg_sensors made. These number varies from sensor to sensor, so with another sensor this value must be adjusted

5.4.1 Detailed Description

a library for collect all classes which represents any physical data

5.5 alf_data_info.cpp File Reference

```
#include "alf_data_info.hpp"
```
Include dependency graph for alf_data_info.cpp:



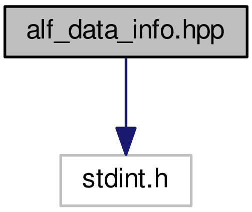
Variables

- Alf_Drive_Info global_drive_info {}

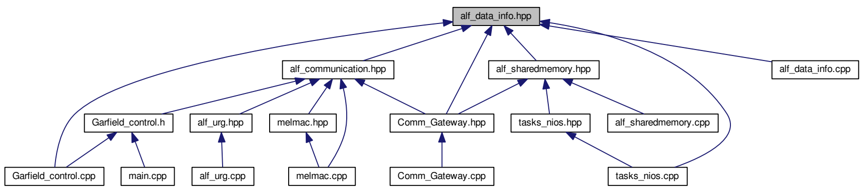
  global variables
- Alf_Drive_Command **global_drive_command** {}

5.6 alf_data_info.hpp File Reference

```
#include "stdint.h"
```
Include dependency graph for alf_data_info.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Alf_Drive_Info

  The Alf_Drive_Info class holds the Infos for steering the Alf.
- class Alf_Drive_Command

Variables

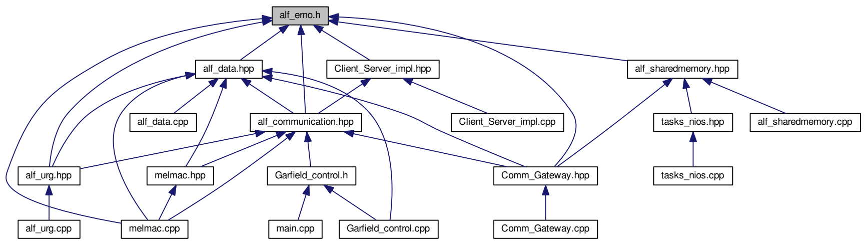
- Alf_Drive_Info global_drive_info

  global variables
- Alf_Drive_Command **global_drive_command**

5.7 alf_erno.h File Reference

contains various means for error coding

This graph shows which files directly or indirectly include this file:



Typedefs

- typedef enum ALF_ERROR_CODES alf_error

  the error codes are available within a type

Enumerations

- enum ALF_ERROR_CODES {
  ALF_BUFFER_READ_IS_WRITE = -100, **ALF_BUFFER_NOTHING_TO_READ**, **ALF_BUFFER_IS_FULL**, **ALF_NOTHING_IN_BUFFER**,
  ALF_NO_COMMUNICATION_FILE, **ALF_IO_ERROR**, **ALF_SOCKET_NOT_READY**, ALF_SOCKET_S↩ERVER_NOT_READY,
  ALF_CANNOT_SEND_MESSAGE, **ALF_CANNOT_READ_SOCKET**, **ALF_NO_WELL_FPGABridge_↩MAPPING**, **ALF_LOCK_MEMORY_FAILED**,
  ALF_WRITE_SHARED_MEMORY_DISABLED, **ALF_UNKNOWN_ERROR** = -1, ALF_NO_ERROR = 1 }

  contains error codes for all errors which could occur during execution of the application and the information could be interesting for error handling

5.7.1 Detailed Description

contains various means for error coding

5.7.2 Enumeration Type Documentation

5.7.2.1 enum ALF_ERROR_CODES

contains error codes for all errors which could occur during execution of the application and the information could be interesting for error handling

Enumerator

ALF_SOCKET_SERVER_NOT_READY the serverconnection can not be opened, there are some errors in catching the port, opening the file etc.

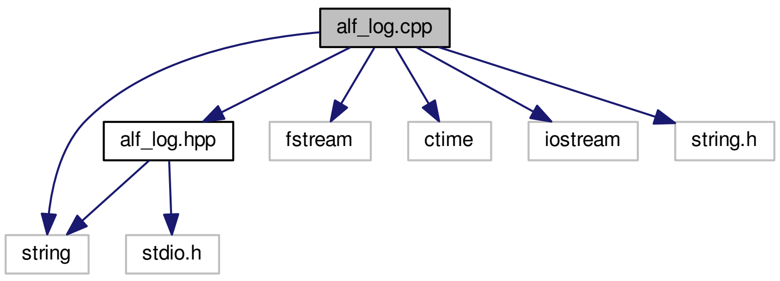
ALF_NO_ERROR alright, there was no error in the functionality

Definition at line 13 of file alf_erno.h.

5.8 alf_log.cpp File Reference

```
#include "alf_log.hpp"
#include <fstream>
#include <ctime>
#include <iostream>
#include <string.h>
#include <string>
```

Include dependency graph for alf_log.cpp:

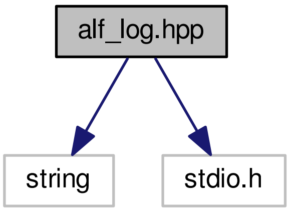


5.9 alf_log.hpp File Reference

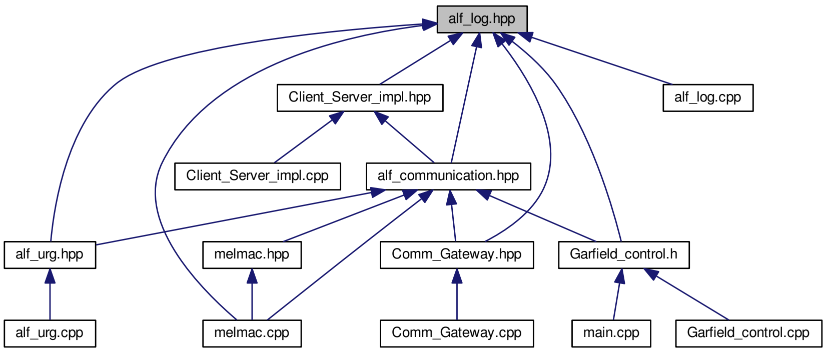
a library give access to log variants and functionality for this

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

Include dependency graph for alf_log.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Alf_Log

  This class handle all the log informations. There will be always a log file, additional the log can be printed to standard output.

Macros

- #define LOG_ENABLE

  LOG_ENABLE does enabling the log, with LOG_DISABLE there are no further log informations.
- #define **ALF_LOG_INIT**(args...) Alf_Log::alf_log_init(args)
- #define **ALF_LOG_WRITE**(args...) Alf_Log::alf_log_write(args)
- #define **ALF_LOG_END**() Alf_Log::alf_log_end()
- #define **ALF_LOG_SET_LEVEL**(a) ALF_Log::alf_set_loglevel(a)

Enumerations

- enum alf_log_level_e { log_error = 0, log_warning, log_info, log_debug }

  all log leves which are available
  the log levels are based on each other, which means, that every log_error is also a log_warning, log_info, log_debug, but a log_info is no log_warning but a log_debug

5.9.1 Detailed Description

a library give access to log variants and functionality for this

5.9.2 Enumeration Type Documentation

5.9.2.1 enum **alf_log_level_e**

all log leves which are available
the log levels are based on each other, which means, that every log_error is also a log_warning, log_info, log_debug, but a log_info is no log_warning but a log_debug

Enumerator

log_error strongest error, should be used if the desired function of the application could not be provided

log_warning a warning should be used it the execution of the application is in danger, but it is still running

log_info just for info messages, which could be later used in case of errors or warnings to see the control flow etc.

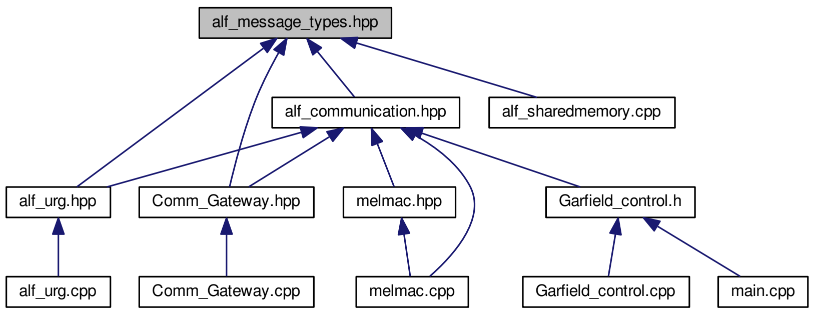
log_debug developer informations

Definition at line 31 of file alf_log.hpp.

5.10 alf_message_types.hpp File Reference

contains enumeration for easy identification of various messages

This graph shows which files directly or indirectly include this file:



Typedefs

- typedef enum ALF_MESSAGE_TYPES **alf_mess_types**

Enumerations

- enum ALF_MESSAGE_TYPES {
  ALF_INIT_ID = 2, ALF_MEASUREMENT_DATA_ID = 1, ALF_DRIVE_COMMAND_ID = 3, ALF_DRIVE_I←
  NFO_ID = 4,
  ALF_END_ID = 255 }

  contains the IDs for all of the messages which can be sended

5.10.1 Detailed Description

contains enumeration for easy identification of various messages

5.10.2 Enumeration Type Documentation

5.10.2.1 enum ALF_MESSAGE_TYPES

contains the IDs for all of the messages which can be sended

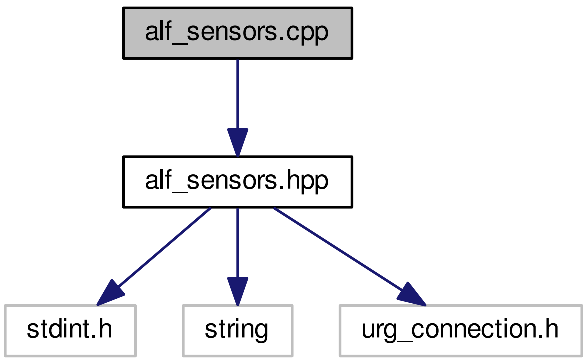
Enumerator

ALF_INIT_ID	initalisation data of the laser scanner
ALF_MEASUREMENT_DATA_ID	a measurement is sended
ALF_DRIVE_COMMAND_ID	ALF drive command.
ALF_DRIVE_INFO_ID	ALF drive info.
ALF_END_ID	the communication should stop or interrupt now

Definition at line 12 of file alf_message_types.hpp.

5.11 alf_sensors.cpp File Reference

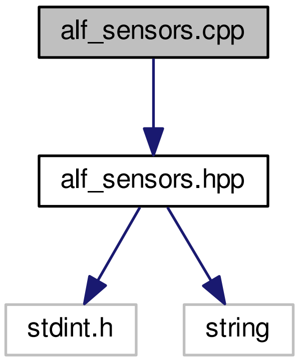
```
#include "alf_sensors.hpp"
```
Include dependency graph for Software_ARM/alf_urg/alf_sensors.cpp:



5.12 alf_sensors.cpp File Reference

```
#include "alf_sensors.hpp"
```

Include dependency graph for common/ARM_HQ/alf_sensors.cpp:

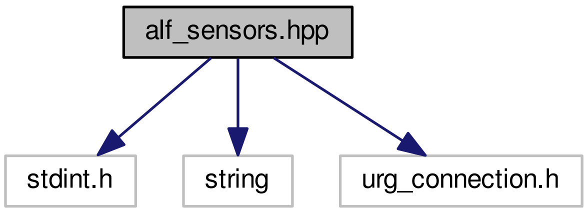


5.13 alf_sensors.hpp File Reference

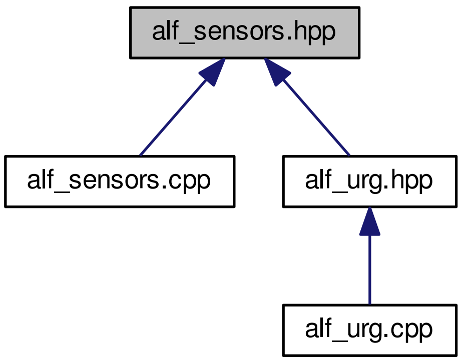
contains datatypes and functionalitys for sensors on the alf vehicle

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

Include dependency graph for Software_ARM/alf_urg/alf_sensors.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Alf_Urg_Sensor

  Represents the laser scanner on the alf vehicle and provide common settings etc.

5.13.1 Detailed Description

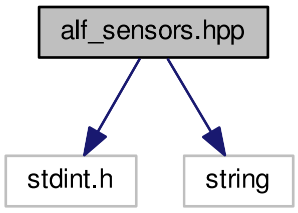
contains datatypes and functionalitys for sensors on the alf vehicle

5.14 alf_sensors.hpp File Reference

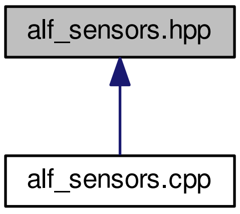
contains datatypes and functionalitys for sensors on the alf vehicle

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

Include dependency graph for common/ARM_HQ/alf_sensors.hpp:



This graph shows which files directly or indirectly include this file:



5.14.1 Detailed Description

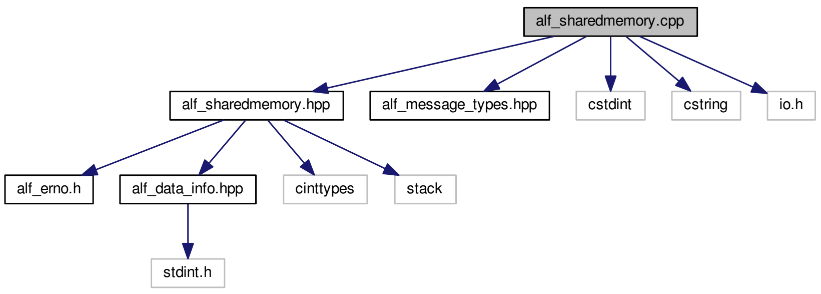
contains datatypes and functionalitys for sensors on the alf vehicle

5.15 alf_sharedmemory.cpp File Reference

Implementation of class to handle communication over hardware shared memory in the garfield fpga project. alf↩_sharedmemory.cpp.

```
#include "alf_sharedmemory.hpp"
#include "alf_message_types.hpp"
#include <cstdint>
#include <cstring>
#include "io.h"
```

Include dependency graph for alf_sharedmemory.cpp:



Macros

- #define **RW_REGISTER**(reg) ∗(volatile uint32_t∗)(reg)
- #define RAW_NEXT_REG 0x04

  Used to calculate the next register within a 32-bit addressed system. Works only AND only on 32-bit systems!

5.15.1 Detailed Description

Implementation of class to handle communication over hardware shared memory in the garfield fpga project. alf↩_sharedmemory.cpp.

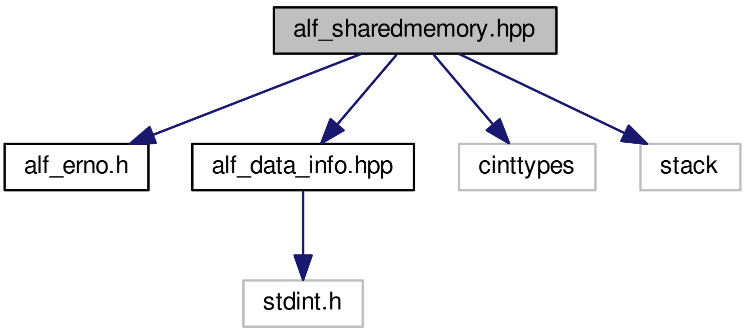
Created on: 02.03.2017 Author: florian

5.16 alf_sharedmemory.hpp File Reference

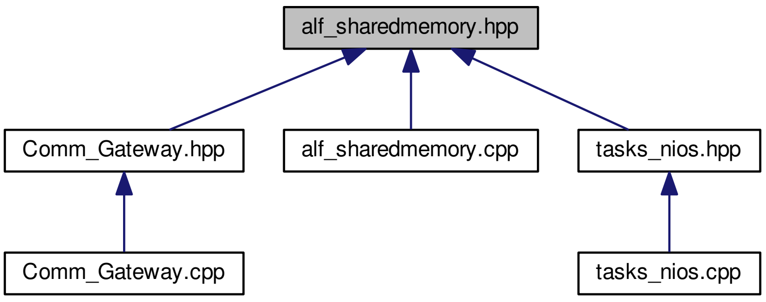
Header file of abstraction class for hardware communication on the hardware shared memory (with mutex and mailbox) in the garfield project. alf_sharedmemory.hpp.

```
#include "alf_erno.h"
#include "alf_data_info.hpp"
#include <cinttypes>
#include <stack>
```

Include dependency graph for alf_sharedmemory.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Garifield_RingBuffer< obj, size >

  Implementation of a ringbuffer with fixed size. If the queue is full, the oldest element will be overwritten.
- class Alf_SharedMemoryComm

  Implementation for communcatiing via a shared memory section on the fpga. Abstraction for the mailbox, the hardware mutex and the shared memory in both directions.

5.16.1 Detailed Description

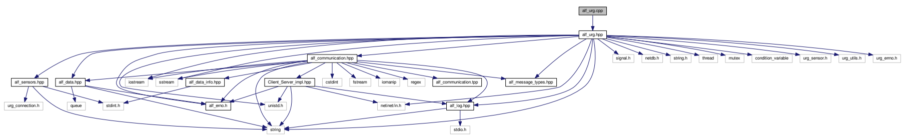
Header file of abstraction class for hardware communication on the hardware shared memory (with mutex and mailbox) in the garfield project. alf_sharedmemory.hpp.

Created on: 02.03.2017 Author: florian

5.17 alf_urg.cpp File Reference

contains the main application to collect measurements from the URG Lidar and offer the collected data in a properitary format other applications

```
#include "alf_urg.hpp"
```
Include dependency graph for alf_urg.cpp:



Macros

- #define **COMMSERVICE** Server
- #define **COMMFILE** 6666
- #define **msleep**(a) usleep(a∗1000)

Functions

- void GetMeasurements ()

  function for collecting data from a urg_sensor and pushing them into a the Alf_Measurements_Buffer
- void ServerConnection ()

  function for sending collected measurement data over the socket connection
- void Stop_Program (int sig)

  dummy function which wake up the main thread from "sleep". This is needed for a clean stop of the programm with a SIGINT of the OS (typical CTRL+C)
- int main ()

  the main process of this application this does

Variables

- Alf_Urg_Measurements_Buffer Alf_Measurements_Buffer (100)

    the buffer with the Size of 100 for all measurements
- std::mutex Alf_Measurements_Buffer_Mutex

    mutex to lock the Alf_Measurements_Buffer
- urg_t urg_sensor

    struct for the ONE connected sensor
- bool Run_Measurement_Task

    control variable for the thread which collects the measurements
- bool Run_Server_Task

    control variable for the thread which handles the communication
- std::condition_variable Run_Main_Task_cond

    variable to let sleep the main thread
- std::mutex Run_Main_Task_mut

    mutex to for the main thread
- Alf_Communication< COMMSERVICE > server_communication

    the communication which shall be handled

5.17.1 Detailed Description

contains the main application to collect measurements from the URG Lidar and offer the collected data in a proper-itary format other applications

5.17.2 Function Documentation

5.17.2.1 void GetMeasurements ( ) [inline]

function for collecting data from a urg_sensor and pushing them into a the Alf_Measurements_Buffer

Attention

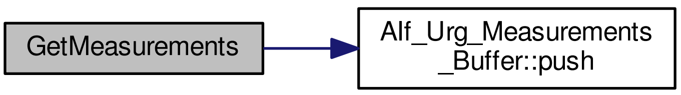
needs a initialized and running urg_sensor, given by the global variable urg_sensor

Note

normally executed as a standalone thread/task

Definition at line 41 of file alf_urg.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:

GetMeasurements
main

5.17.2.2 int main ( )

the main process of this application this does

The Main function.

- initializing the urg_sensor
- initializing the server connection
- starting the two threads
- ending the application in a clean way (after CTRL+C)

Definition at line 134 of file alf_urg.cpp.

5.17.2.3 void ServerConnection ( ) `[inline]`

function for sending collected measurement data over the socket connection

Attention

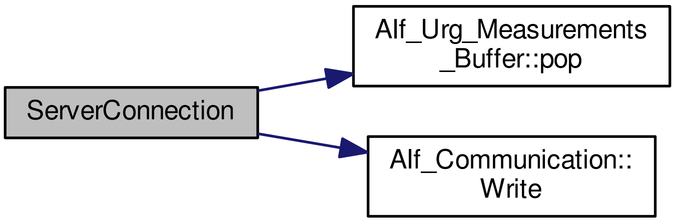
the server connection should be established before calling

Note

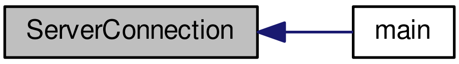
normally executed as an own thread

Definition at line 99 of file alf_urg.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



5.17.2.4 void Stop_Program (int *sig*)

dummy function which wake up the main thread from "sleep". This is needed for a clean stop of the programm with a SIGINT of the OS (typical CTRL+C)

Sig Handler for closing the socket.

Parameters

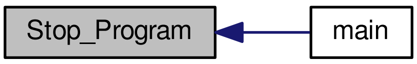
in	*sig*	- SIGINT

Returns

-

Definition at line 122 of file alf_urg.cpp.

Here is the caller graph for this function:

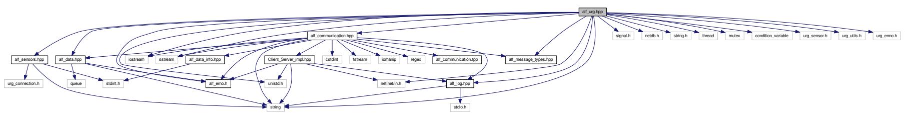


5.18 alf_urg.hpp File Reference

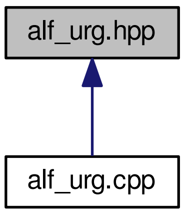
```
#include <iostream>
```

```
#include <sstream>
#include <string>
#include <signal.h>
#include <unistd.h>
#include <netdb.h>
#include <netinet/in.h>
#include <string.h>
#include <thread>
#include <mutex>
#include <condition_variable>
#include "alf_log.hpp"
#include "alf_data.hpp"
#include "alf_erno.h"
#include "alf_communication.hpp"
#include "alf_message_types.hpp"
#include "alf_sensors.hpp"
#include "urg_sensor.h"
#include "urg_utils.h"
#include "urg_errno.h"
```

Include dependency graph for alf_urg.hpp:



This graph shows which files directly or indirectly include this file:



Functions

- int main ()

  the main process of this application this does

5.18.1 Function Documentation

5.18.1.1 int main ( )

the main process of this application this does

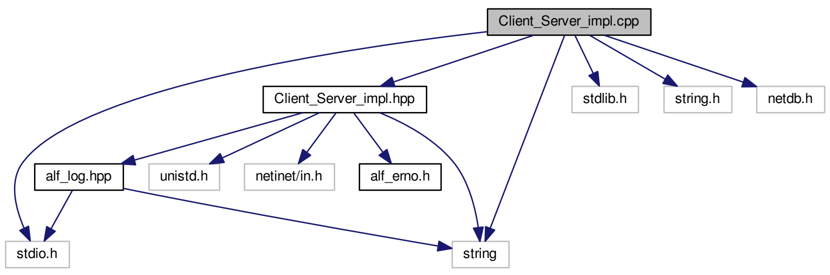
- initializing the urg_sensor
- initializing the server connection
- starting the two threads
- ending the application in a clean way (after CTRL+C)

Definition at line 134 of file alf_urg.cpp.

5.19 Client_Server_impl.cpp File Reference

```
#include "Client_Server_impl.hpp"
#include <string>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <netdb.h>
```

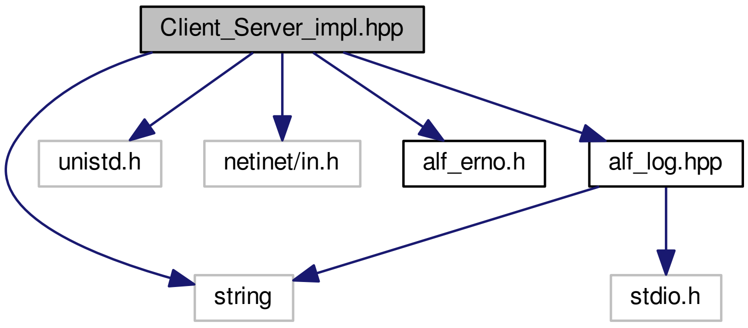
Include dependency graph for Client_Server_impl.cpp:



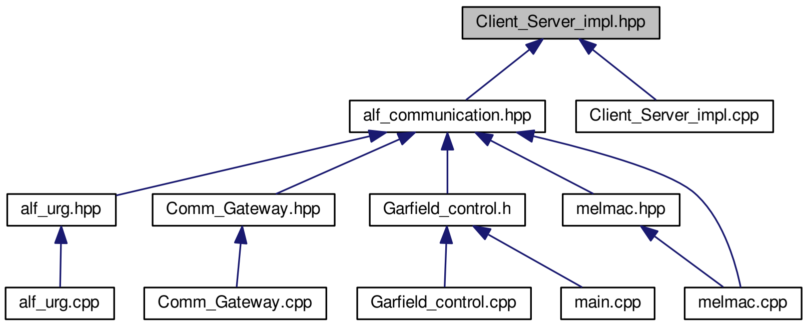
5.20 Client_Server_impl.hpp File Reference

```
#include <string>
#include <unistd.h>
#include <netinet/in.h>
#include "alf_erno.h"
#include "alf_log.hpp"
```

Include dependency graph for Client_Server_impl.hpp:



This graph shows which files directly or indirectly include this file:



Classes

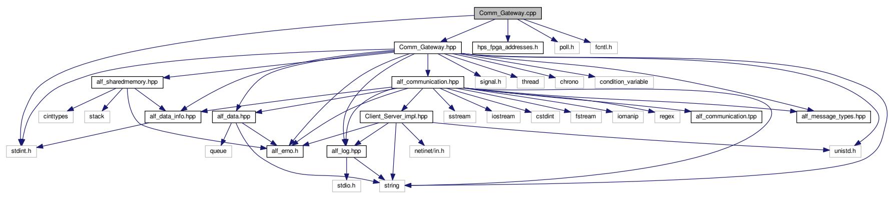
- class Client
- class Server

  Represents the serverside of an communication for the whole application.

5.21 Comm_Gateway.cpp File Reference

```
#include "Comm_Gateway.hpp"
#include "hps_fpga_addresses.h"
#include <stdint.h>
#include <poll.h>
#include <fcntl.h>
```

Include dependency graph for Comm_Gateway.cpp:



Macros

- #define COMPORT 6666

  Port on which socket is created.
- #define COMFREQ 50

  Send/Receive Frequence in Hz.

Functions

- void Stop_Program (int sig)

  Sig Handler for closing the socket.
- void HardwareReadHandler (void)

  This function is for interrupt handling in user mode. It should run in its own thread.
- void writeData (void)

  writeData() Function runs in a thread an writes cyclic the alf_drive_info data in the socket for Garfield_control to display
- void readData (void)

  readData() Function runs in a thread an reads cyclic the alf_drive_command data from the socket to send it over the Mailbox to the NIOS2
- int main ()

  the main process of this application this does

Variables

- Alf_Communication< Server > ServerComm

  Alf Communication Server object.
- std::condition_variable Run_Main_Task_cond

  variable to let sleep the main thread
- std::condition_variable **Run_ServerWrite_Task**
- std::mutex Run_Main_Task_mut

  mutex to for the main thread
- Alf_Log log

  Alf Log.
- Alf_SharedMemoryComm shared_mem

  Shared Memory Mailbox object.
- bool run_threads = true

  Run or close threads.
- bool **notify_ServerWrite_Task** = false
- int **fd**

5.21.1 Function Documentation

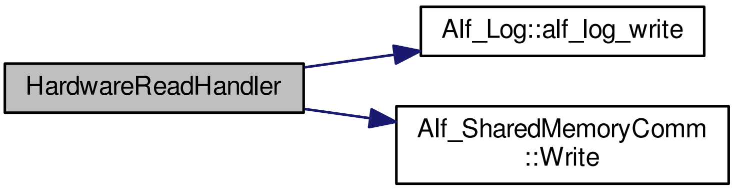
5.21.1.1 void HardwareReadHandler (void)

This function is for interrupt handling in user mode. It should run in its own thread.

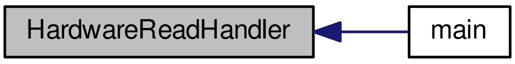
This function is for interrupt handling from the hardware mailbox in user mode. It should run in its own thread.

Definition at line 47 of file Comm_Gateway.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



5.21.1.2 int main ( )

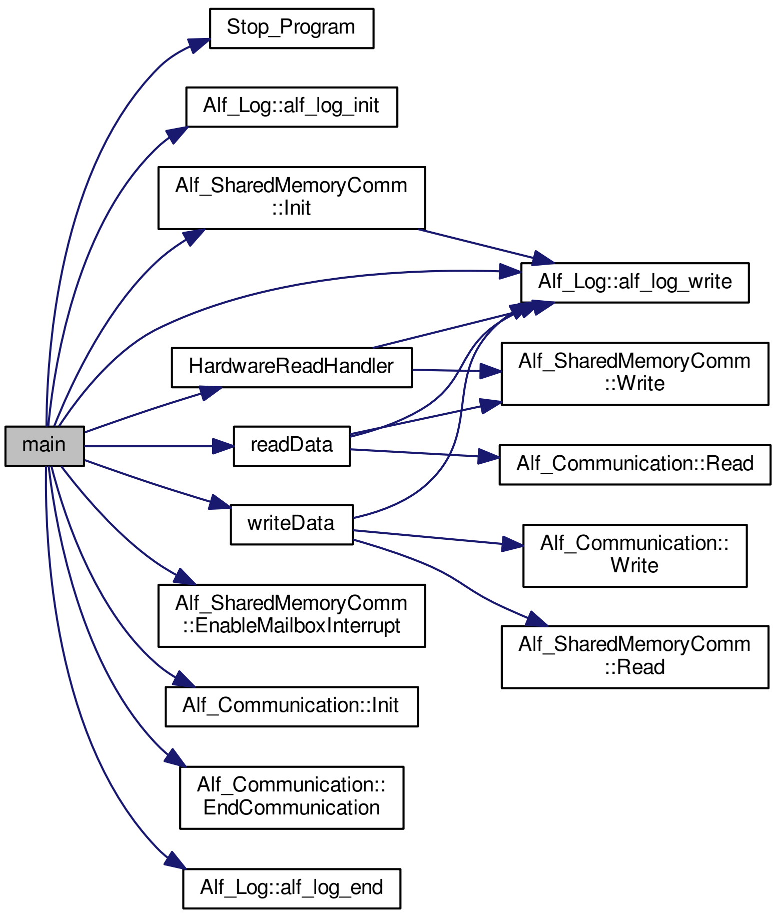
the main process of this application this does

The Main function.

- initializing the urg_sensor
- initializing the server connection
- starting the two threads
- ending the application in a clean way (after CTRL+C)

Definition at line 127 of file Comm_Gateway.cpp.

Here is the call graph for this function:


Stop_Program
Alf_Log::alf_log_init
Alf_SharedMemoryComm ::Init
Alf_Log::alf_log_write
HardwareReadHandler
Alf_SharedMemoryComm ::Write
main
readData
Alf_Communication::Read
writeData
Alf_Communication:: Write
Alf_SharedMemoryComm ::EnableMailboxInterrupt
Alf_SharedMemoryComm ::Read
Alf_Communication::Init
Alf_Communication:: EndCommunication
Alf_Log::alf_log_end

5.21.1.3 void Stop_Program (int *sig*)

Sig Handler for closing the socket.

Parameters

`in`	*sig*	- the signal

Sig Handler for closing the socket.

Parameters

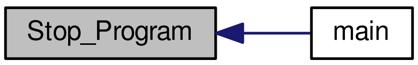
`in`	*sig*	- SIGINT

Returns

-

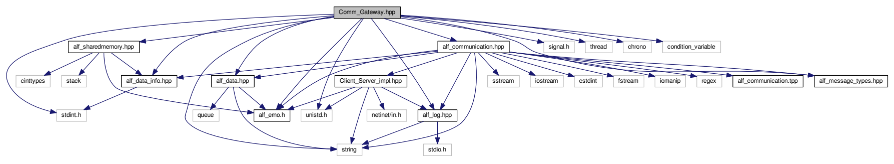
Definition at line 39 of file Comm_Gateway.cpp.

Here is the caller graph for this function:

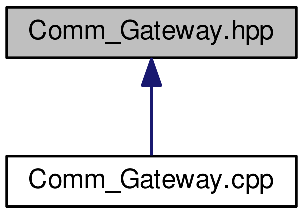


5.22 Comm_Gateway.hpp File Reference

```
#include <string>
#include <unistd.h>
#include <stdint.h>
#include <signal.h>
#include <thread>
#include <chrono>
#include <condition_variable>
#include "alf_log.hpp"
#include "alf_data.hpp"
#include "alf_data_info.hpp"
#include "alf_erno.h"
#include "alf_communication.hpp"
#include "alf_message_types.hpp"
#include "alf_sharedmemory.hpp"
```
Include dependency graph for Comm_Gateway.hpp:



This graph shows which files directly or indirectly include this file:



Functions

- void Stop_Program (int sig)

  Sig Handler for closing the socket.
- void HardwareReadHandler (void)

  This function is for interrupt handling from the hardware mailbox in user mode. It should run in its own thread.
- void writeData (void)

  writeData() Function runs in a thread an writes cyclic the alf_drive_info data in the socket for Garfield_control to display
- void readData (void)

  readData() Function runs in a thread an reads cyclic the alf_drive_command data from the socket to send it over the Mailbox to the NIOS2
- int main ()

  The Main function.

5.22.1 Function Documentation

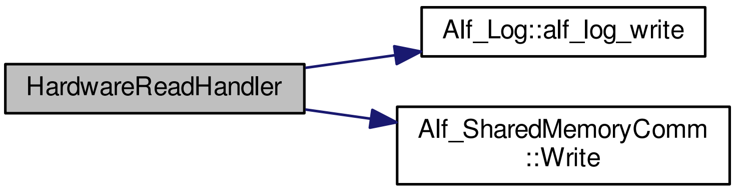
5.22.1.1 void HardwareReadHandler (void)

This function is for interrupt handling from the hardware mailbox in user mode. It should run in its own thread.

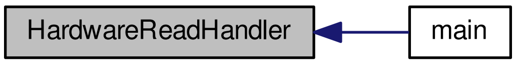
This function is for interrupt handling from the hardware mailbox in user mode. It should run in its own thread.

Definition at line 47 of file Comm_Gateway.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



5.22.1.2 int main ( )

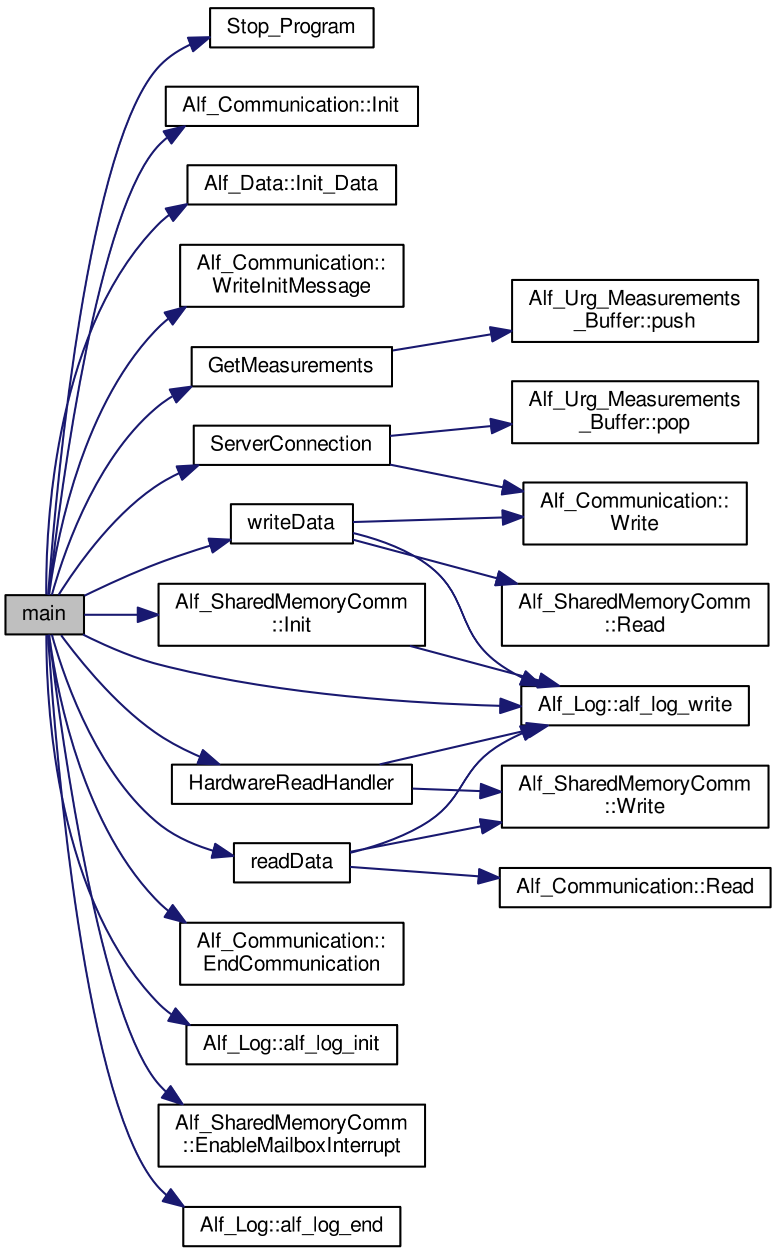
The Main function.

The Main function.

- initializing the urg_sensor
- initializing the server connection
- starting the two threads
- ending the application in a clean way (after CTRL+C)

Definition at line 134 of file alf_urg.cpp.

Here is the call graph for this function:



5.22.1.3 void Stop_Program (int *sig*)

Sig Handler for closing the socket.

Parameters

in	*sig*	- the signal

Sig Handler for closing the socket.

Parameters

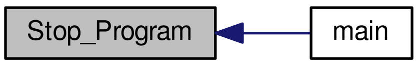
in	*sig*	- SIGINT

Returns

-

Definition at line 122 of file alf_urg.cpp.

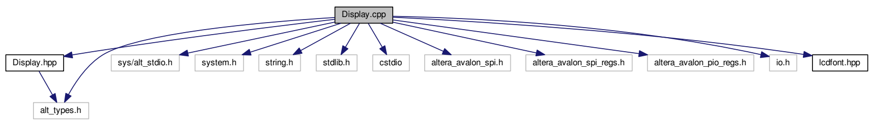
Here is the caller graph for this function:



5.23 Display.cpp File Reference

```
#include "Display.hpp"
#include "alt_types.h"
#include "sys/alt_stdio.h"
#include "system.h"
#include <string.h>
#include <stdlib.h>
#include <cstdio>
#include "altera_avalon_spi.h"
#include "altera_avalon_spi_regs.h"
#include "altera_avalon_pio_regs.h"
#include "io.h"
#include "lcdfont.hpp"
```

Include dependency graph for Display.cpp:



Functions

- void set_tft_dc (bool bit)
- void spi_write_byte (alt_u8 byte)
- void delay_ms (alt_u8 ms)
- void **reversestr** (char s[ ])
- void **itochptr** (int n, char s[ ])

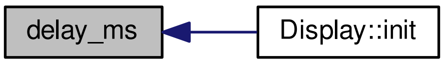
5.23.1 Function Documentation

5.23.1.1 void delay_ms (alt_u8 *ms*)

Delay Function. WARNING: This function is not accurate and needs to be updated

Definition at line 39 of file Display.cpp.

Here is the caller graph for this function:



5.23.1.2 void set_tft_dc (bool *bit*)

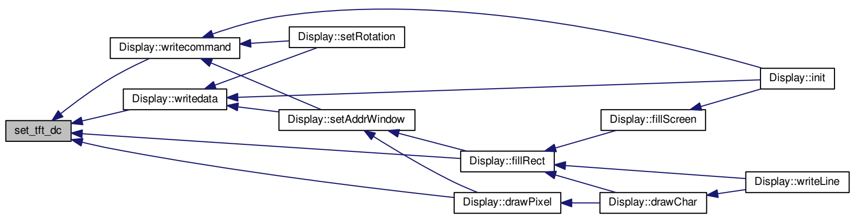
Function for setting the TFT-DC Pin for writing data or commands

Parameters

bit	If set false, DC Bit is set low, for sending a command. If set true, DC Bit is set high, for sending data

Definition at line 23 of file Display.cpp.

Here is the caller graph for this function:



5.23.1.3 void spi_write_byte (alt_u8 *byte*)

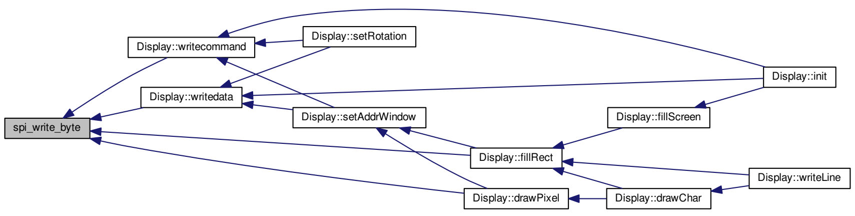
Function for writing 1 byte to the SPI TFT Slave Actually abstracting the generated SPI Function

Parameters

byte	to be sent

Definition at line 35 of file Display.cpp.

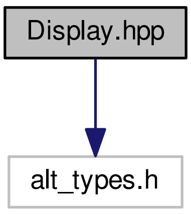
Here is the caller graph for this function:



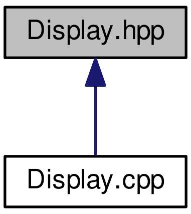
5.24 Display.hpp File Reference

```
#include "alt_types.h"
```

Include dependency graph for Display.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class Display

Macros

- #define **ILI9341_TFTWIDTH** 240
- #define **ILI9341_TFTHEIGHT** 320
- #define **ILI9341_NOP** 0x00
- #define **ILI9341_SWRESET** 0x01
- #define **ILI9341_RDDID** 0x04
- #define **ILI9341_RDDST** 0x09
- #define **ILI9341_SLPIN** 0x10
- #define **ILI9341_SLPOUT** 0x11
- #define **ILI9341_PTLON** 0x12
- #define **ILI9341_NORON** 0x13
- #define **ILI9341_RDMODE** 0x0A
- #define **ILI9341_RDMADCTL** 0x0B
- #define **ILI9341_RDPIXFMT** 0x0C
- #define **ILI9341_RDIMGFMT** 0x0D
- #define **ILI9341_RDSELFDIAG** 0x0F
- #define **ILI9341_INVOFF** 0x20
- #define **ILI9341_INVON** 0x21
- #define **ILI9341_GAMMASET** 0x26
- #define **ILI9341_DISPOFF** 0x28
- #define **ILI9341_DISPON** 0x29
- #define **ILI9341_CASET** 0x2A
- #define **ILI9341_PASET** 0x2B
- #define **ILI9341_RAMWR** 0x2C
- #define **ILI9341_RAMRD** 0x2E
- #define **ILI9341_PTLAR** 0x30
- #define **ILI9341_MADCTL** 0x36
- #define **ILI9341_PIXFMT** 0x3A
- #define **ILI9341_FRMCTR1** 0xB1
- #define **ILI9341_FRMCTR2** 0xB2
- #define **ILI9341_FRMCTR3** 0xB3
- #define **ILI9341_INVCTR** 0xB4
- #define **ILI9341_DFUNCTR** 0xB6
- #define **ILI9341_PWCTR1** 0xC0
- #define **ILI9341_PWCTR2** 0xC1
- #define **ILI9341_PWCTR3** 0xC2
- #define **ILI9341_PWCTR4** 0xC3
- #define **ILI9341_PWCTR5** 0xC4
- #define **ILI9341_VMCTR1** 0xC5
- #define **ILI9341_VMCTR2** 0xC7
- #define **ILI9341_RDID1** 0xDA
- #define **ILI9341_RDID2** 0xDB
- #define **ILI9341_RDID3** 0xDC
- #define **ILI9341_RDID4** 0xDD
- #define **ILI9341_GMCTRP1** 0xE0
- #define **ILI9341_GMCTRN1** 0xE1
- #define **ILI9341_BLACK** 0x0000 /∗ 0, 0, 0 ∗/
- #define **ILI9341_NAVY** 0x000F /∗ 0, 0, 128 ∗/
- #define **ILI9341_DARKGREEN** 0x03E0 /∗ 0, 128, 0 ∗/
- #define **ILI9341_DARKCYAN** 0x03EF /∗ 0, 128, 128 ∗/
- #define **ILI9341_MAROON** 0x7800 /∗ 128, 0, 0 ∗/
- #define **ILI9341_PURPLE** 0x780F /∗ 128, 0, 128 ∗/
- #define **ILI9341_OLIVE** 0x7BE0 /∗ 128, 128, 0 ∗/
- #define **ILI9341_LIGHTGREY** 0xC618 /∗ 192, 192, 192 ∗/

- #define **ILI9341_DARKGREY** 0x7BEF /∗ 128, 128, 128 ∗/
- #define **ILI9341_BLUE** 0x001F /∗ 0, 0, 255 ∗/
- #define **ILI9341_GREEN** 0x07E0 /∗ 0, 255, 0 ∗/
- #define **ILI9341_CYAN** 0x07FF /∗ 0, 255, 255 ∗/
- #define **ILI9341_RED** 0xF800 /∗ 255, 0, 0 ∗/
- #define **ILI9341_MAGENTA** 0xF81F /∗ 255, 0, 255 ∗/
- #define **ILI9341_YELLOW** 0xFFE0 /∗ 255, 255, 0 ∗/
- #define **ILI9341_WHITE** 0xFFFF /∗ 255, 255, 255 ∗/
- #define **ILI9341_ORANGE** 0xFD20 /∗ 255, 165, 0 ∗/
- #define **ILI9341_GREENYELLOW** 0xAFE5 /∗ 173, 255, 47 ∗/
- #define **ILI9341_PINK** 0xF81F
- #define **MADCTL_MY** 0x80
- #define **MADCTL_MX** 0x40
- #define **MADCTL_MV** 0x20
- #define **MADCTL_ML** 0x10
- #define **MADCTL_RGB** 0x00
- #define **MADCTL_BGR** 0x08
- #define **MADCTL_MH** 0x04
- #define **CHARSIZE_HEIGHT** 8
- #define **CHARSIZE_WIDTH** 6

Functions

- void set_tft_dc (bool bit)
- void spi_write_byte (alt_u8 byte)
- void delay_ms (alt_u8 ms)
- void **reversestr** (char s[ ])
- void **itochptr** (int n, char s[ ])

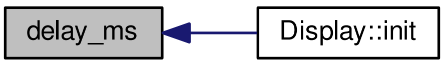
5.24.1 Function Documentation

5.24.1.1 void delay_ms (alt_u8 *ms*)

Delay Function. WARNING: This function is not accurate and needs to be updated

Definition at line 39 of file Display.cpp.

Here is the caller graph for this function:



5.24.1.2 void set_tft_dc (bool *bit*)

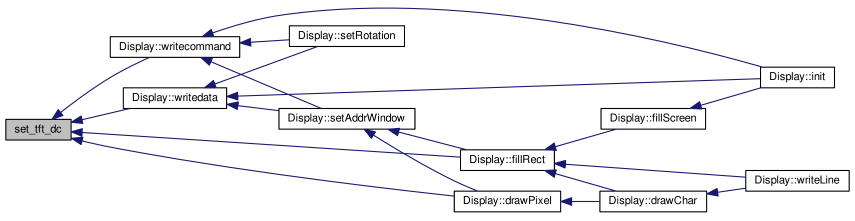
Function for setting the TFT-DC Pin for writing data or commands

Parameters

bit	If set false, DC Bit is set low, for sending a command. If set true, DC Bit is set high, for sending data

Definition at line 23 of file Display.cpp.

Here is the caller graph for this function:



5.24.1.3 void spi_write_byte (alt_u8 *byte*)

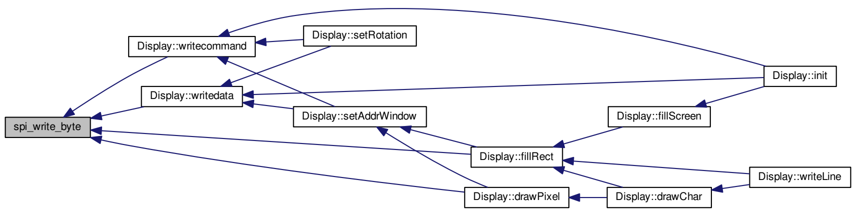
Function for writing 1 byte to the SPI TFT Slave Actually abstracting the generated SPI Function

Parameters

byte	to be sent

Definition at line 35 of file Display.cpp.

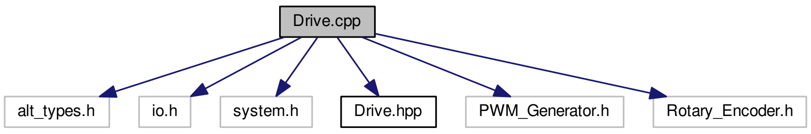
Here is the caller graph for this function:



5.25 Drive.cpp File Reference

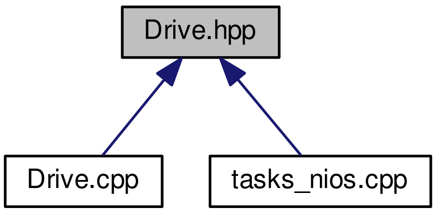
```
#include "alt_types.h"
#include "io.h"
#include "system.h"
#include "Drive.hpp"
#include "PWM_Generator.h"
#include "Rotary_Encoder.h"
```

Include dependency graph for Drive.cpp:



5.26 Drive.hpp File Reference

This graph shows which files directly or indirectly include this file:



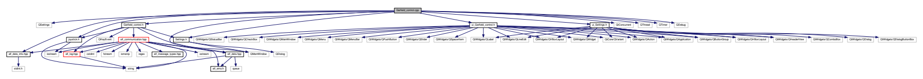
Classes

- class Drive

5.27 Garfield_control.cpp File Reference

```
#include "QSettings"
#include "alf_data.hpp"
#include "alf_data_info.hpp"
#include "joystick.h"
#include "Garfield_control.h"
#include "Settings.h"
#include "ui_Garfield_control.h"
#include "ui_Settings.h"
#include <QtConcurrent>
#include <QThread>
#include <QTimer>
#include <QDebug>
```

Include dependency graph for Garfield_control.cpp:



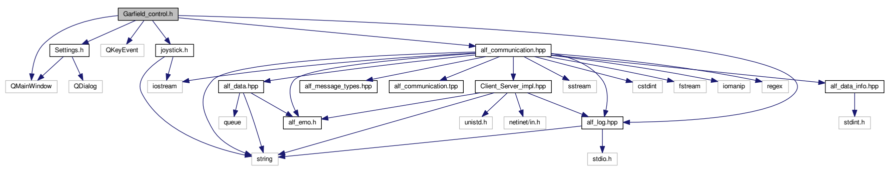
Macros

- #define **ANGLE_MAX_VAL** 90
- #define **ANGLE_MIN_VAL** -90
- #define **SPEED_MAX_VAL** 255
- #define **SPEED_MIN_VAL** 0
- #define **ACC_MAX_VAL** 2.0
- #define **ACC_MIN_VAL** -2.0
- #define **POLLING_GAMEPAD_INTERVAL_MS** 1
- #define **ACC_MAP_UPDATE_MS** 20
- #define **SEND_REC_INTERVAL_MS** 20

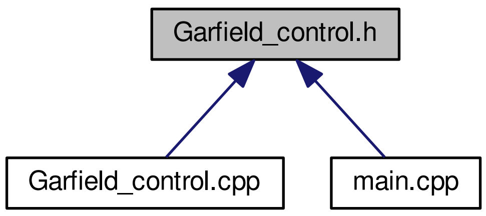
5.28 Garfield_control.h File Reference

```
#include <QMainWindow>
#include "QKeyEvent"
#include "joystick.h"
#include "Settings.h"
#include "alf_communication.hpp"
#include "alf_log.hpp"
```

Include dependency graph for Garfield_control.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Garfield_control

  Garfield_control is the main class that provides all functionalities for the Garfield control program.

Macros

- #define GAMEPAD_BUTTON_TRIANGLE 12

    ID of the gamepad triangle button.
- #define GAMEPAD_BUTTON_CIRCLE 13

    ID of the gamepad circle button.
- #define GAMEPAD_BUTTON_CROSS 14

    ID of the gamepad cross button.
- #define GAMEPAD_BUTTON_SQUARE 15

    ID of the gamepad square button.
- #define GAMEPAD_BUTTON_L1 10

    ID of the gamepad L1 button.
- #define GAMEPAD_BUTTON_R1 11

    ID of the gamepad R1 button.
- #define GAMEPAD_BUTTON_DPAD_UP 4

    ID of the gamepad direction pad up button.
- #define GAMEPAD_BUTTON_DPAD_RIGHT 5

    ID of the gamepad direction pad right button.
- #define GAMEPAD_BUTTON_DPAD_DOWN 6

    ID of the gamepad direction pad down button.
- #define GAMEPAD_BUTTON_DPAD_LEFT 7

    ID of the gamepad direction pad left button.
- #define GAMEPAD_BUTTON_SELECT 0

    ID of the gamepad select button.
- #define GAMEPAD_BUTTON_START 3

    ID of the gamepad start button.
- #define GAMEPAD_BUTTON_ANALOG_LEFT 1

    ID of the gamepad analog left button.
- #define GAMEPAD_BUTTON_ANALOG_RIGHT 2

    ID of the gamepad analog right button.
- #define GAMEPAD_AXIS_ANALOG_LEFT_LR 0

    ID of the gamepad analog left axis from left to right.
- #define GAMEPAD_AXIS_ANALOG_LEFT_UD 1

    ID of the gamepad analog left axis from up to down.
- #define GAMEPAD_AXIS_ANALOG_RIGHT_LR 2

    ID of the gamepad analog right axis from left to right.
- #define GAMEPAD_AXIS_ANALOG_RIGHT_UD 3

    ID of the gamepad analog right axis from up to down.
- #define GAMEPAD_AXIS_L2 12

    ID of the gamepad analog left axis L2.
- #define GAMEPAD_AXIS_R2 13

    ID of the gamepad analog left axis R2.
- #define GAMEPAD_BUTTON_DOWN 1

    Gamepad value button down.
- #define GAMEPAD_BUTTON_UP 0

    Gamepad value button up.
- #define GAMEPAD_AXIS_DOWN 32767

    Gamepad value axis down.
- #define GAMEPAD_AXIS_UP -32768

    Gamepad value axis up.

Functions

- template<typename T >
  T norm_value (T in_min, T in_max, T out_min, T out_max, T value)

  Function normalizes values from given intervall to given intervall.

5.28.1 Function Documentation

5.28.1.1 template<typename T > T norm_value (T *in_min,* T *in_max,* T *out_min,* T *out_max,* T *value*)

Function normalizes values from given intervall to given intervall.

Parameters

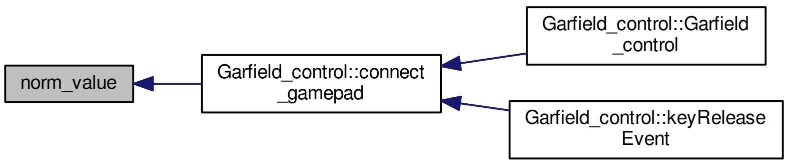
in	*in_min*	- This is the minimal value of the originally intervall
in	*in_max*	- This is the maximal value of the originally intervall
in	*out_min*	- This is the minimal value of the destination intervall
in	*value*	- This is the value to convert to the destination intervall

Returns

the converted value is returned

Definition at line 77 of file Garfield_control.h.

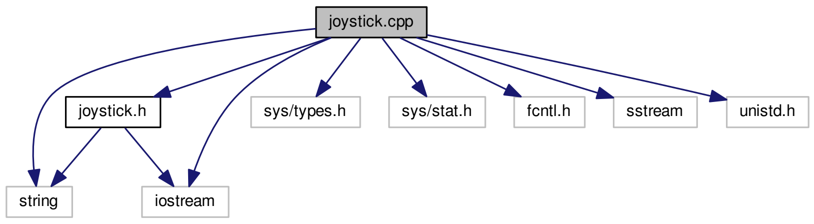
Here is the caller graph for this function:


norm_value
Garfield_control::connect _gamepad
Garfield_control::Garfield _control
Garfield_control::keyRelease Event

5.29 joystick.cpp File Reference

```
#include "joystick.h"
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>
#include <iostream>
#include <string>
#include <sstream>
#include "unistd.h"
```

Include dependency graph for joystick.cpp:



Functions

- std::ostream & operator<< (std::ostream &os, const JoystickEvent &e)

5.29.1 Function Documentation

5.29.1.1 std::ostream& operator<< (std::ostream & *os*, const JoystickEvent & *e*)

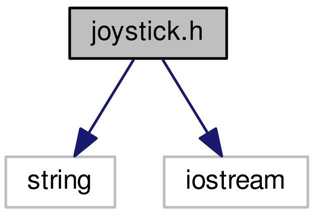
The ostream inserter needs to be a friend so it can access the internal data structures.

Definition at line 78 of file joystick.cpp.

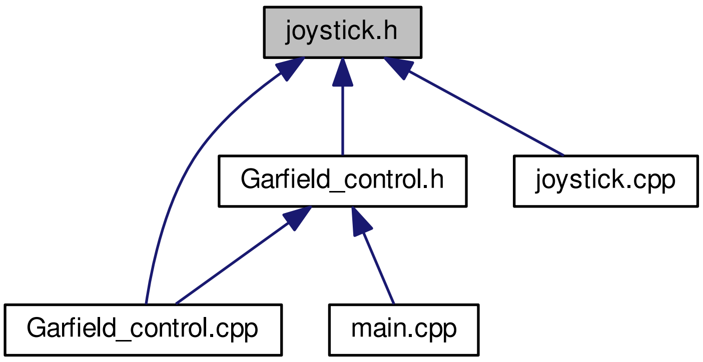
5.30 joystick.h File Reference

```
#include <string>
#include <iostream>
```

Include dependency graph for joystick.h:



This graph shows which files directly or indirectly include this file:



Classes

- class JoystickEvent
- class Joystick

Macros

- #define **JS_EVENT_BUTTON** 0x01
- #define **JS_EVENT_AXIS** 0x02
- #define **JS_EVENT_INIT** 0x80

Functions

- std::ostream & operator<< (std::ostream &os, const JoystickEvent &e)

5.30.1 Function Documentation

5.30.1.1 std::ostream& operator<< (std::ostream & *os*, const JoystickEvent & *e*)

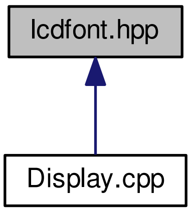
Stream insertion function so you can do this: cout << event << endl;

The ostream inserter needs to be a friend so it can access the internal data structures.

Definition at line 78 of file joystick.cpp.

5.31 lcdfont.hpp File Reference

This graph shows which files directly or indirectly include this file:

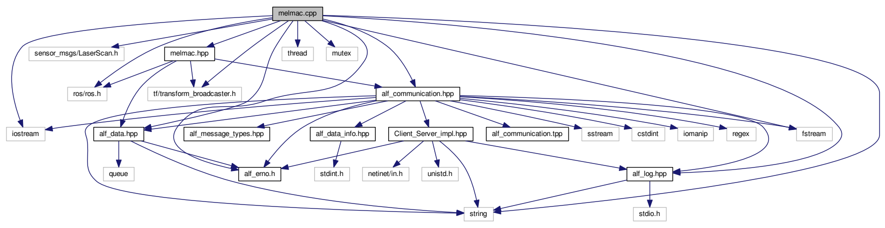


5.32 melmac.cpp File Reference

contains the main application for wrapping data which are collected with the alf_urg application and sended to this client

```
#include <ros/ros.h>
#include <sensor_msgs/LaserScan.h>
#include <tf/transform_broadcaster.h>
#include <iostream>
#include <string>
#include <fstream>
#include <thread>
#include <mutex>
#include "melmac.hpp"
#include "alf_erno.h"
#include "alf_data.hpp"
#include "alf_log.hpp"
#include "alf_communication.hpp"
```

Include dependency graph for melmac.cpp:



Macros

- #define BUF_SIZE 1322
- #define LIDAR_FREQ 10
- #define ANGLE_INC 0.006136
- #define TIME_INC 0.000098

Functions

- void rvizWrapper (ros::NodeHandle ∗n, ros::Publisher ∗scan_pub, tf::TransformBroadcaster ∗broadcaster, ros::Rate ∗r)

  This function represents the sendThread.
- void readStreamingData (void)

  function for reading the measurement data from the socket connection. If and end message was read the function returns and the user can end or reopen the communication
- int main (int argc, char ∗∗argv)

  Main function of rviz_wrapper.

5.32.1 Detailed Description

contains the main application for wrapping data which are collected with the alf_urg application and sended to this client

Attention

can only be build within a working ROS environment

5.32.2 Macro Definition Documentation

5.32.2.1 #define ANGLE_INC 0.006136

Better working ANGLE_INC which works better than the commented calculation

Definition at line 29 of file melmac.cpp.

5.32.2.2 #define BUF_SIZE 1322

This defines the size of AlfMeasBuffer

Definition at line 25 of file melmac.cpp.

5.32.2.3 #define LIDAR_FREQ 10

The frequence of the Lidar. It is needed for the ros loop and scan_time

Definition at line 27 of file melmac.cpp.

5.32.2.4 #define TIME_INC 0.000098

Better working TIME_INC which works better than the commented calculation

Definition at line 30 of file melmac.cpp.

5.32.3 Function Documentation

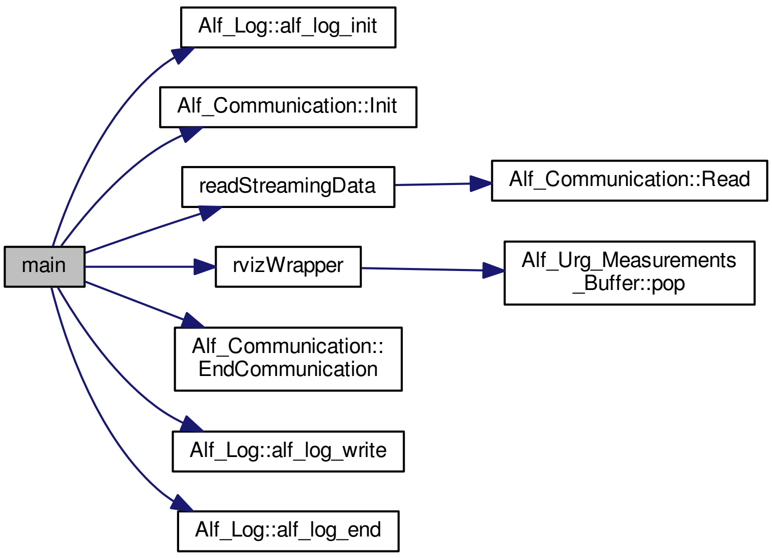
5.32.3.1 int main (int *argc,* char ∗∗ *argv*)

Main function of rviz_wrapper.

It opens the socket communication, starts the two threads (readThread and sendThread) etc.

Definition at line 125 of file melmac.cpp.

Here is the call graph for this function:



5.32.3.2 void readStreamingData (void)

function for reading the measurement data from the socket connection. If and end message was read the function returns and the user can end or reopen the communication

Parameters

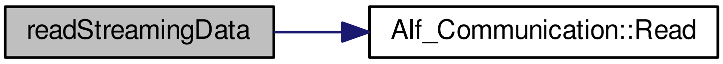
in	-	

Returns

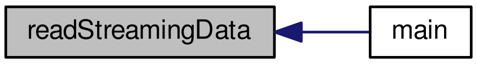
-

Definition at line 93 of file melmac.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



5.32.3.3 void rvizWrapper (ros::NodeHandle ∗ *n*, ros::Publisher ∗ *scan_pub*, tf::TransformBroadcaster ∗ *broadcaster*, ros::Rate ∗ *r*)

This function represents the sendThread.

It takes all data from Alf Measurement Buffer and maps the data to the ros data structure

Parameters

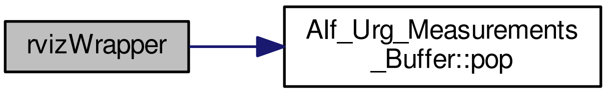
`in`	*n*	is the nodehandler which checks the status
`in`	*scan_pub*	is the Scan Publisher which sends all data to rviz
`in`	*broadcaster*	is the broadcaster to send tf messages to rviz
`in`	*r*	is necessary for creating a ros loop with the frequence of the lidar (here: 10 Hz)

Returns

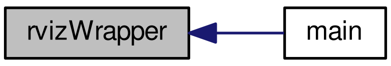
void

Definition at line 42 of file melmac.cpp.

Here is the call graph for this function:



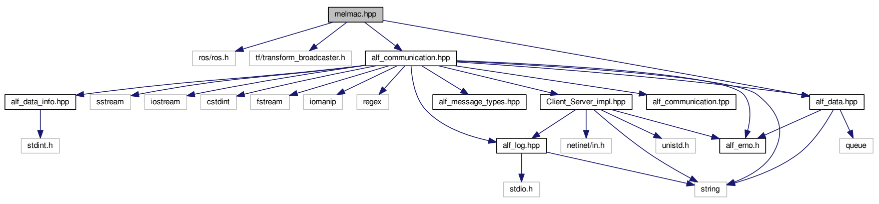
Here is the caller graph for this function:



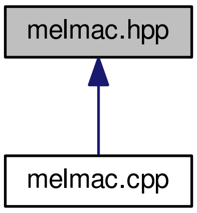
5.33 melmac.hpp File Reference

```
#include <ros/ros.h>
#include <tf/transform_broadcaster.h>
#include "alf_data.hpp"
#include "alf_communication.hpp"
```

Include dependency graph for melmac.hpp:



This graph shows which files directly or indirectly include this file:



Functions

- void rvizWrapper (ros::NodeHandle ∗n, ros::Publisher ∗scan_pub, tf::TransformBroadcaster ∗broadcaster, ros::Rate ∗r)

    This function represents the sendThread.
- void readStreamingData (void)

    function for reading the measurement data from the socket connection. If and end message was read the function returns and the user can end or reopen the communication
- int main (int argc, char ∗∗argv)

    Main function of rviz_wrapper.

5.33.1 Detailed Description

All global variables, defines and the two functions which represents the threads are declared here

5.33.2 Function Documentation

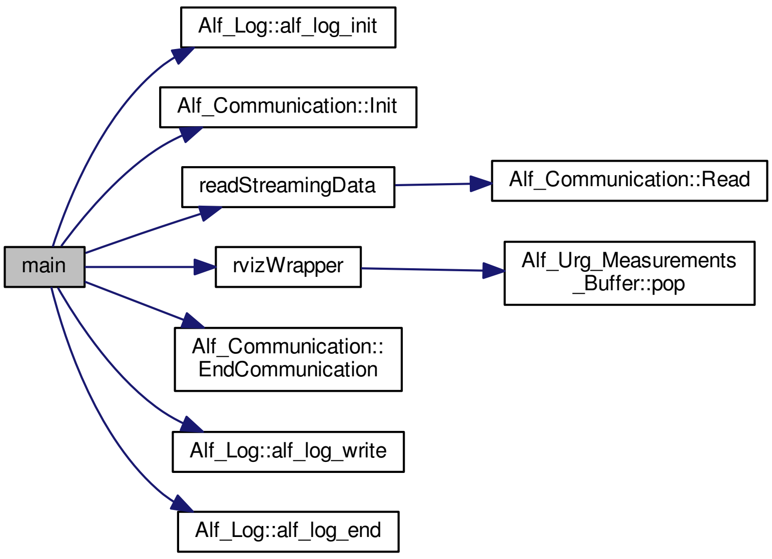
5.33.2.1 int main (int *argc,* char ∗∗ *argv*)

Main function of rviz_wrapper.

It opens the socket communication, starts the two threads (readThread and sendThread) etc.

Definition at line 125 of file melmac.cpp.

Here is the call graph for this function:



5.33.2.2 void readStreamingData (void)

function for reading the measurement data from the socket connection. If and end message was read the function returns and the user can end or reopen the communication

Parameters

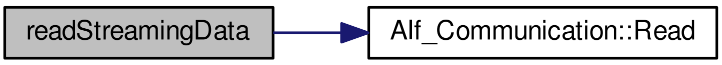
in	-	

Returns

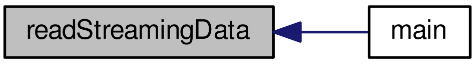
-

Definition at line 93 of file melmac.cpp.

Here is the call graph for this function:



Here is the caller graph for this function:



5.33.2.3 void rvizWrapper (ros::NodeHandle ∗ *n*, ros::Publisher ∗ *scan_pub*, tf::TransformBroadcaster ∗ *broadcaster*, ros::Rate ∗ *r*)

This function represents the sendThread.

It takes all data from Alf Measurement Buffer and maps the data to the ros data structure

Parameters

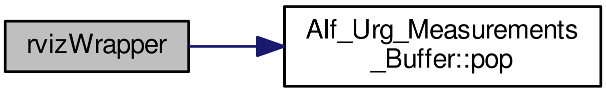
`in`	*n*	is the nodehandler which checks the status
`in`	*scan_pub*	is the Scan Publisher which sends all data to rviz
`in`	*broadcaster*	is the broadcaster to send tf messages to rviz
`in`	*r*	is necessary for creating a ros loop with the frequence of the lidar (here: 10 Hz)

Returns

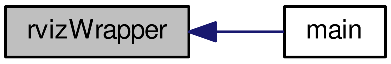
void

Definition at line 42 of file melmac.cpp.

Here is the call graph for this function:



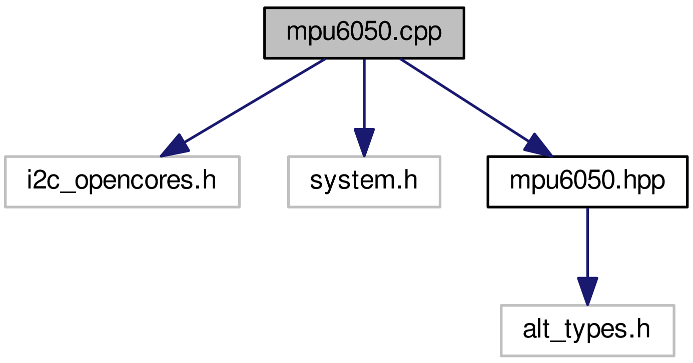
Here is the caller graph for this function:



5.34 mpu6050.cpp File Reference

```
#include "i2c_opencores.h"
#include "system.h"
#include "mpu6050.hpp"
```

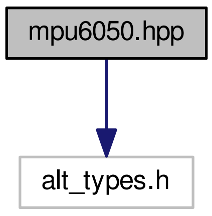
Include dependency graph for mpu6050.cpp:



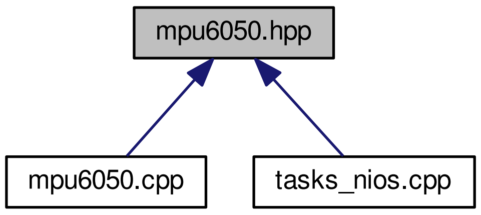
5.35 mpu6050.hpp File Reference

```
#include "alt_types.h"
```

Include dependency graph for mpu6050.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class mpu6050

    represents the mpu6050 hardware device
- struct mpu6050::AccelerometerData

    AccelerometerData.
- struct mpu6050::GyroscopeData

    GyroscopeData.

Enumerations

- enum MPU6050_Register : alt_u8 {
  SMPRT_DIV = 0x19, **CONFIG** = 0x1A, **GYRO_CONFIG** = 0x1B, **ACCEL_CONFIG** = 0x1C,
  INT_PIN_CFG = 0x37, **INT_ENABLE** = 0x38, **INT_STATUS** = 0x3A, **ACCEL_XOUT_H** = 0x3B,
  ACCEL_XOUT_L = 0x3C, **ACCEL_YOUT_H** = 0x3D, **ACCEL_YOUT_L** = 0x3E, **ACCEL_ZOUT_H** = 0x3F,
  ACCEL_ZOUT_L = 0x40, **TEMP_OUT_H** = 0x41, **TEMP_OUT_L** = 0x42, **GYRO_XOUT_H** = 0x43,
  GYRO_XOUT_L = 0x44, **GYRO_YOUT_H** = 0x45, **GYRO_YOUT_L** = 0x46, **GYRO_ZOUT_H** = 0x47,
  GYRO_ZOUT_L = 0x48, **SIGNAL_PATH_RESET** = 0x68, **USER_CTRL** = 0x6A, **PWR_MGMT_1** = 0x6B,
  PWR_MGMT_2 = 0x6C, **FIFO_COUNT_H** = 0x72, **FIFO_COUNT_L** = 0x73, **FIFO_R_W** = 0x74,
  WHO_AM_I = 0x75 }

defines all possible mpu6050 registers reset values are 0x00, except PWR_MGMT_1 = 0x40 and WHO_AM_I = 0x68

- enum MPU6050_Addresses : alt_u8 { **DEVICE_0** = 0xD0, **DEVICE_1** = 0xD2 }

  defines the two possible default i2c addresses (hardware setting)

- enum AccelerometerSettings : alt_u8 { **RANGE_2G** = 0x00, **RANGE_4G** = 0x08, **RANGE_8G** = 0x10, **RA**↩ **NGE_16G** = 0x18 }

  defines the possible accelerometer register settings

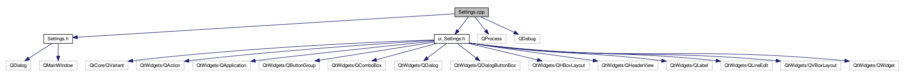
- enum GyroscopeSettings : alt_u8 { **RANGE_250_DEG** = 0x00, **RANGE_500_DEG** = 0x08, **RANGE_1000**↩ **_DEG** = 0x10, **RANGE_2000_DEG** = 0x18 }

  defines the possible gyroscope register settings

5.36 Settings.cpp File Reference

```
#include "Settings.h"
#include "ui_Settings.h"
#include <QProcess>
#include <QDebug>
```

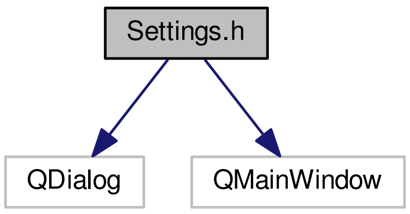
Include dependency graph for Settings.cpp:



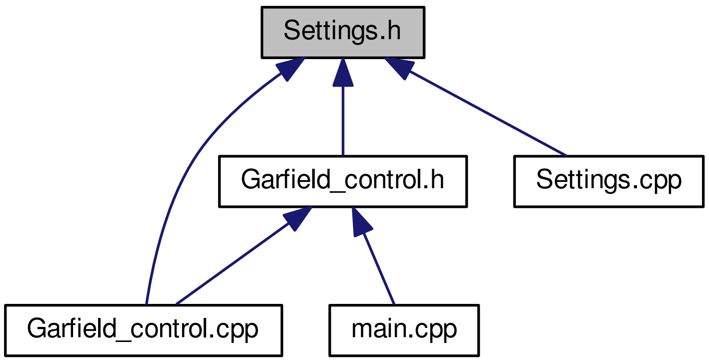
5.37 Settings.h File Reference

```
#include <QDialog>
#include <QMainWindow>
```

Include dependency graph for Settings.h:



This graph shows which files directly or indirectly include this file:



Classes

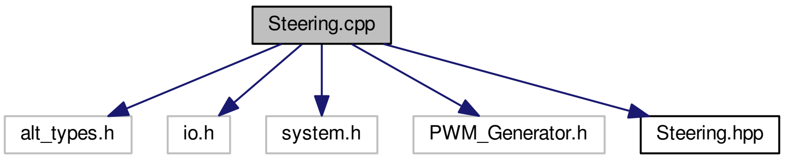
- class Settings

  Settings is the settings class for the settings window.

5.38 Steering.cpp File Reference

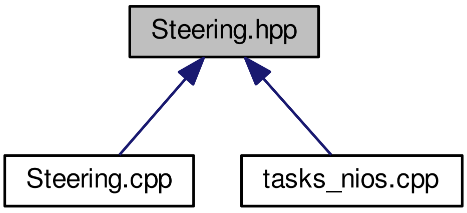
```
#include "alt_types.h"
#include "io.h"
#include "system.h"
#include "PWM_Generator.h"
#include "Steering.hpp"
```

Include dependency graph for Steering.cpp:



5.39 Steering.hpp File Reference

This graph shows which files directly or indirectly include this file:



Classes

- class Steering

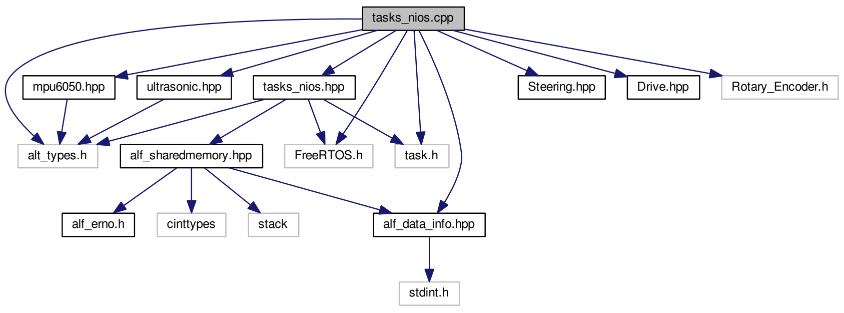
Macros

- #define **MAX_STEERING_ANGLE** 60
- #define **NEUTRAL_POS_VALUE** 51

5.40 tasks_nios.cpp File Reference

```
#include "tasks_nios.hpp"
#include "alt_types.h"
#include "mpu6050.hpp"
#include "ultrasonic.hpp"
#include "Steering.hpp"
#include "Drive.hpp"
#include "alf_data_info.hpp"
#include "Rotary_Encoder.h"
#include "FreeRTOS.h"
#include "task.h"
```

Include dependency graph for tasks_nios.cpp:



Functions

- void **readMPU** (void ∗p)
- void **readUltraSonic** (void ∗p)
- void **readRotary** (void ∗p)
- void **setMotor_and_Steering** (void ∗p)
- void **setDriveInfo** (void ∗p)
- void **Mailbox_isr** (void ∗ptr, alt_u32 a)

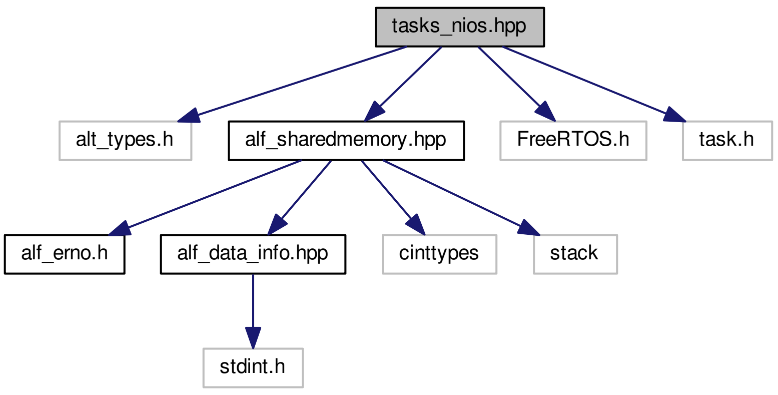
Variables

- Alf_SharedMemoryComm **sharedMem** {}
- TaskHandle_t **writeTask**

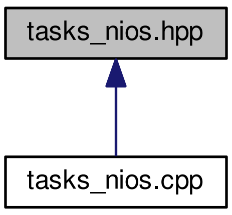
5.41 tasks_nios.hpp File Reference

```
#include "alt_types.h"
#include "alf_sharedmemory.hpp"
#include "FreeRTOS.h"
#include "task.h"
```

Include dependency graph for tasks_nios.hpp:



This graph shows which files directly or indirectly include this file:



Functions

- void **readUltraSonic** (void ∗p)
- void **readMPU** (void ∗p)
- void **readRotary** (void ∗p)
- void **setMotor_and_Steering** (void ∗p)
- void **setDriveInfo** (void ∗p)
- void **Mailbox_isr** (void ∗ptr, alt_u32 a)

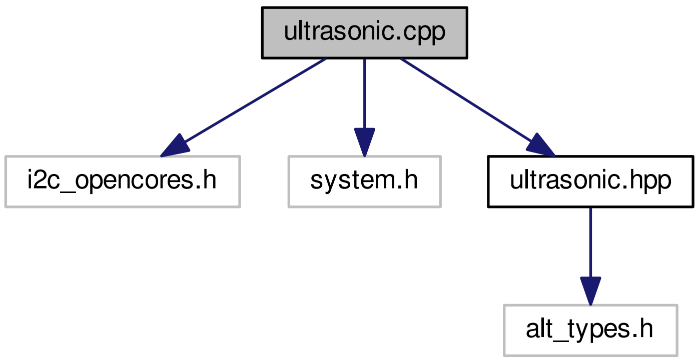
Variables

- Alf_SharedMemoryComm **sharedMem**
- TaskHandle_t **writeTask**

5.42 ultrasonic.cpp File Reference

```
#include "i2c_opencores.h"
#include "system.h"
#include "ultrasonic.hpp"
```

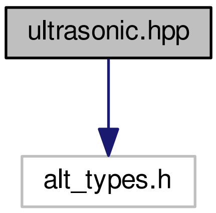
Include dependency graph for ultrasonic.cpp:



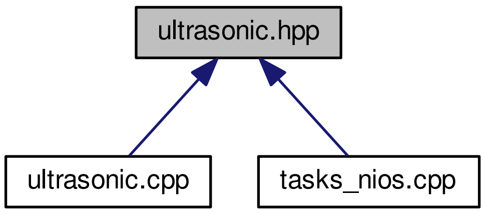
5.43 ultrasonic.hpp File Reference

this file contains the definition of all ultrasonic specific modules (currently only UltraSonicDevice)

```
#include "alt_types.h"
```
Include dependency graph for ultrasonic.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class UltraSonicDevice

  represents a ultrasonic hardware device

Enumerations

- enum UltraSonicAddress : alt_u8 {
  DEVICE_00 = 0xE0, **DEVICE_01** = 0xE2, **DEVICE_02** = 0xE4, **DEVICE_03** = 0xE6,
  DEVICE_04 = 0xE8, **DEVICE_05** = 0xEA, **DEVICE_06** = 0xEC, **DEVICE_07** = 0xEE,
  DEVICE_08 = 0xF0, **DEVICE_09** = 0xF2, **DEVICE_10** = 0xF4, **DEVICE_11** = 0xF6,
  DEVICE_12 = 0xF8, **DEVICE_13** = 0xFA, **DEVICE_14** = 0xFC, **DEVICE_15** = 0xFE }

  defines all possible IIC addresses for the SRF08 ultra sonic range finder
- enum UltraSonicRegistersWrite : alt_u8 { **COMMAND** = 0x00, **MAX_GAIN** = 0x01, **RANGE** = 0x02 }

  defines all possible write registers
- enum UltraSonicRegisterRead : alt_u8 {
  SW_REVISION = 0x00, **LIGHT_SENSOR** = 0x01, **ECHO_0x01** = 0x02, **ECHO_0x02** = 0x04,
  ECHO_0x03 = 0x06, **ECHO_0x04** = 0x08, **ECHO_0x05** = 0x0A, **ECHO_0x06** = 0x0C,
  ECHO_0x07 = 0x0E, **ECHO_0x08** = 0x10, **ECHO_0x09** = 0x12, **ECHO_0x0A** = 0x14,
  ECHO_0x0B = 0x16, **ECHO_0x0C** = 0x18, **ECHO_0x0D** = 0x1A, **ECHO_0x0E** = 0x1C,
  ECHO_0x0F = 0x1E, **ECHO_0x10** = 0x20, **ECHO_0x11** = 0x22 }

defines all possible read registers

- enum UltraSonicCommands : alt_u8 {
START_MEAS_INCHES = 0x50, **START_MEAS_CM** = 0x51, **START_MEAS_TIME_MICROSEC** = 0x52, **START_MEAS_INCHES_ANN** = 0x53,
START_MEAS_CM_ANN = 0x54, **START_MEAS_TIME_MICROSEC_ANN** = 0x55, **CHANGE_ADDRES↩ S_COMMAND_1** = 0xA0, **CHANGE_ADDRESS_COMMAND_2** = 0xAA,
CHANGE_ADDRESS_COMMAND_3 = 0xA5 }

  defines all possible commands for the ultrasonic sensor

5.43.1 Detailed Description

this file contains the definition of all ultrasonic specific modules (currently only UltraSonicDevice)

5.44 using_shared_memory_example.cpp File Reference

Functions

- void **this_is_my_interruptroutine** (void ∗mess)
- int main ()

  the main process of this application this does

Variables

- Alf_SharedMemoryComm communication

  This is a example how to use the Alf_SharedMemoryComm in a proper way. This example is not compileable!

5.44.1 Function Documentation

5.44.1.1 int main ( )

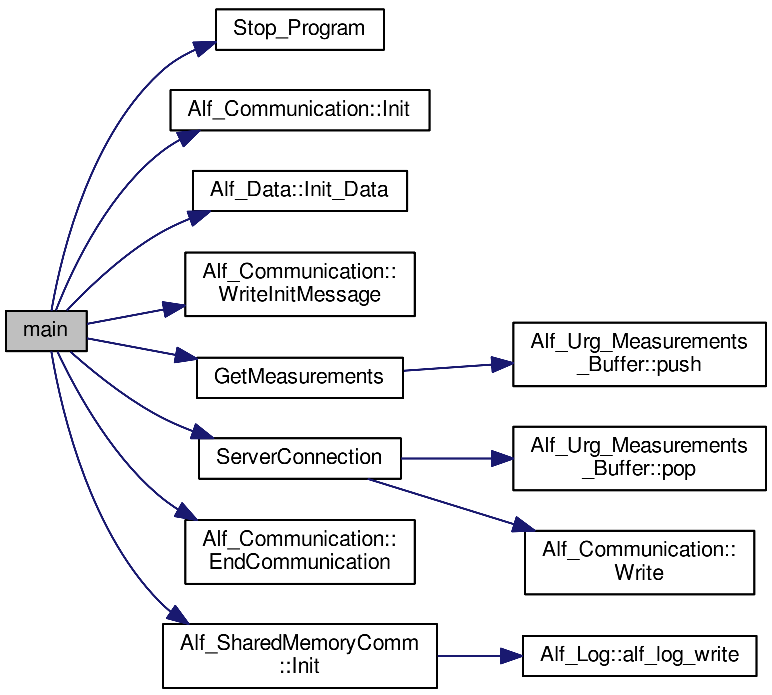
the main process of this application this does

The Main function.

- initializing the urg_sensor
- initializing the server connection
- starting the two threads
- ending the application in a clean way (after CTRL+C)

Definition at line 23 of file using_shared_memory_example.cpp.

Here is the call graph for this function:


Stop_Program
Alf_Communication::Init
Alf_Data::Init_Data
Alf_Communication::WriteInitMessage
main
GetMeasurements
Alf_Urg_Measurements_Buffer::push
ServerConnection
Alf_Urg_Measurements_Buffer::pop
Alf_Communication::EndCommunication
Alf_Communication::Write
Alf_SharedMemoryComm::Init
Alf_Log::alf_log_write

5.44.2 Variable Documentation

5.44.2.1 **Alf_SharedMemoryComm** communication

This is a example how to use the Alf_SharedMemoryComm in a proper way. This example is not compileable!

: florian : 2017-03-12T12:31:18+01:00 modified by: florian modified time: 2017-03-12T12:31:18+01:00

Definition at line 13 of file using_shared_memory_example.cpp.

Chapter 6

Example Documentation

6.1 using_shared_memory_example.cpp

The routine which should be called within the interrupt routine for receiving messages. It saves the pointer and command register from the read mailbox and saves that information. Later in a programm context, you can read a object from the shared memory with #Read This is an example how to proper use the class and in special this function!