Software documentation - Command-line tools

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Contents

Chapter 1

Command line tools

Those functions allows to use the board through a serial port

Author

Centro "E.Piaggio"

Copyright

Date

October 01, 2017

This is a set of functions that allows to use the boards via a serial port.

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 3

File Index

3.1 File List

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

Chapter 4

Data Structure Documentation

4.1 global_args Struct Reference

Data Fields

- int **device_id**
- int **flag_set_inputs**
  ./qbadmin -s option
- int **flag_get_measurements**
  ./qbadmin -g option
- int **flag_activate**
  ./qbadmin -a option
- int **flag_deactivate**
  ./qbadmin -d option
- int **flag_ping**
  ./qbadmin -p option
- int **flag_serial_port**
  ./qbadmin -t option
- int **flag_verbose**
  ./qbadmin -v option
- int **flag_file**
  ./qbadmin -f option
- int **flag_log**
  ./qbadmin -l option
- int **flag_get_emg**
  ./qbadmin -q option to get the EMG sensors measurements
- int **flag_set_zeros**
  ./qbadmin -z option
- int **flag_use_gen_sin**
  ./qbadmin -y option
- int **flag_calibration**
  ./qbadmin -k option to start a series of hand closures and openings
- int **flag_get_currents**
  ./qbadmin -c option
- int **flag_bootloader_mode**
  ./qbadmin -b option

- int **flag_set_pos_stiff**

  ./qbadmin -e option
- int **flag_get_velocities**

  ./qbadmin -i option
- int **flag_get_accelerations**

  ./qbadmin -o option
- int **flag_set_cuff_inputs**

  ./qbadmin -u option
- int **flag_set_baudrate**

  ./qbadmin -R option
- int **flag_set_watchdog**

  ./qbadmin -W option
- int **flag_polling**

  ./qbadmin -P option
- int **flag_baudrate**

  ./qbadmin -B option
- int **flag_get_joystick**

  ./qbadmin -j option
- int **flag_ext_drive**

  ./qbadmin -x option
- short int **inputs** [NUM_OF_MOTORS]
- short int **measurements** [4]
- short int **velocities** [4]
- short int **accelerations** [4]
- short int **measurement_offset** [4]
- short int **currents** [NUM_OF_MOTORS]
- char **filename** [255]
- char **log_file** [255]
- short int **calib_speed**

  Calibration speed.
- short int **calib_repetitions**

  Calibration repetitions.
- short int **emg** [NUM_OF_EMGS]

  Emg sensors values read from the device.
- short int **joystick** [2]

  Analog joystick measurements.
- short int **ext_drive**
- short int **BaudRate**
- int **save_baurate**
- short int **WDT**
- FILE * **emg_file**
- FILE * **log_file_fd**

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

- **qbadmin.c**

4.2 global_var Struct Reference

Data Fields

- int **flag_set_time**
- int **flag_set_repetitions**

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

- **qbmove_test.c**

4.3 position Struct Reference

Data Fields

- float **prec**
- float **act**

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

- **qbadmin.c**

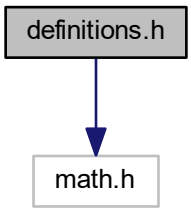
Chapter 5

File Documentation

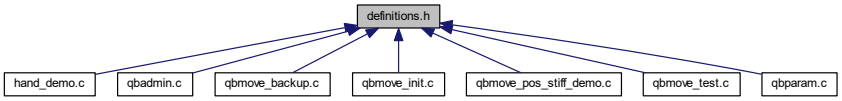
5.1 definitions.h File Reference

Definitions for board commands, parameters and packages.

`#include <math.h>`
Include dependency graph for definitions.h:



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



Macros

- #define **QBADMIN_VERSION** "v6.1.0"
- #define **NUM_OF_MOTORS** 2
- #define **NUM_OF_EMGS** 2

- #define **PI** 3.14159265359
- #define **DEFAULT_RESOLUTION** 1
- #define **DEFAULT_INF_LIMIT** -15000
- #define **DEFAULT_SUP_LIMIT** 15000
- #define **BROADCAST_ID** 0
- #define **DEFAULT_PID_P** 0.1
- #define **DEFAULT_PID_I** 0
- #define **DEFAULT_PID_D** 0.8
- #define **DEFAULT_INCREMENT** 1
- #define **DEFAULT_STIFFNESS** 30
- #define **DEFAULT_MAX_EXCURSION** 330
- #define **ZERO** 0
- #define **MAX_FORWARD_STIFFNESS** 32767
- #define **MAX_REVERSE_STIFFNESS** -32768
- #define **DEG_TICK_MULTIPLIER** (65536.0 / (360.0 ∗ (pow(2, DEFAULT_RESOLUTION))))
- #define **BAUD_RATE_T_2000000** 0
- #define **BAUD_RATE_T_460800** 1
- #define **SIN_FILE** "./../conf_files/sin.conf"
- #define **MOTOR_FILE** "./../conf_files/motor.conf"
- #define **QBMOVE_FILE** "./../conf_files/qbmove.conf"
- #define **QBBACKUP_FILE** "./../conf_files/qbbackup.conf"
- #define **QBMOVE_FILE_BR** "./../conf_files/qbmoveBR.conf"
- #define **EMG_SAVED_VALUES** "./../emg_values.csv"

  Default location where the emg sensors values are saved.

5.1.1 Detailed Description

Definitions for board commands, parameters and packages.

Author

Centro "E.Piaggio"

Copyright

This file is included in the board firmware, in its libraries and applications. It contains all definitions that are necessary for the contruction of communication packages.

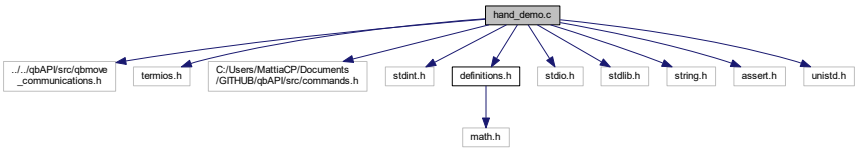
It includes definitions for all of the device commands, parameters and also the size of answer packages.

5.2 hand_demo.c File Reference

Demonstration file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <assert.h>
#include <unistd.h>
```

Include dependency graph for hand_demo.c:



Functions

- int **port_selection** (char ∗)
- int **open_port** (char ∗)
- int **hand_move** ()
- void **set_input** (short int)
- void **get_input** (short int ∗)
- void **print_current** ()
- int **main** (int argc, char ∗∗argv)

Variables

- int **device_id**
- comm_settings **comm_settings_t**
- const int **def_inc** = 100

5.2.1 Detailed Description

Demonstration file.

Author

Centro "E.Piaggio"

Copyright

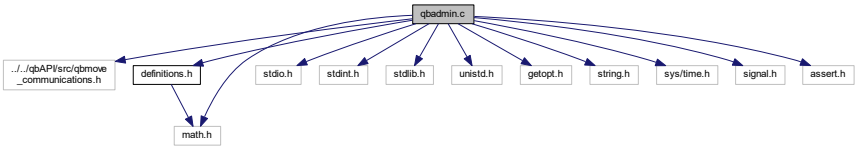
With this file is possible to see a brief demonstration of terminal device opening and closing.

5.3 qbadmin.c File Reference

Command line tools file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <stdio.h>
#include <stdint.h>
#include <stdlib.h>
#include <unistd.h>
#include <getopt.h>
#include <string.h>
#include <sys/time.h>
#include <math.h>
#include <signal.h>
#include <assert.h>
```

Include dependency graph for qbadmin.c:



Data Structures

- struct **global_args**
- struct **position**

Functions

- int **open_port** ()
- int **port_selection** ()
- int **polling** ()
- void **display_usage** (void)
- float ** **file_parser** (char *, int *, int *)
- void **int_handler** (int sig)
- void **int_handler_2** (int sig)
- void **int_handler_3** (int sig)
- int **baudrate_reader** ()
- int **baudrate_writer** (const int)
- int **main** (int argc, char **argv)

Variables

- static const struct option **longOpts** [ ]
- static const char * **optString** = "s:adgptvh?f:ljqxzkycbe:uoiW:PB:"
- struct **global_args global_args**
- struct **position p1**
- struct **position p2**
- uint8_t **resolution** [4]
- int **ret**
- int **aux_int**
- comm_settings **comm_settings_1**

5.3.1 Detailed Description

Command line tools file.

Author

Centro "E.Piaggio"

Copyright

With this file is possible to command a terminal device.

5.3.2 Function Documentation

5.3.2.1 baudrate_reader()

```
int baudrate_reader ( )
```

Baudrate functions

5.3.2.2 display_usage()

```
void display_usage (
            void  )
```

Display program usage, and exit.

5.3.2.3 file_parser()

```
float ** file_parser (
            char * filename,
            int * deltat,
            int * num_values )
```

Parse csv input file with values to be sent to the motors

Parse CSV file and return a pointer to a matrix of float dinamically allocated. Remember to use free(pointer) in the caller

5.3.2.4 int_handler()

```
void int_handler (
            int sig )
```

CTRL-c handler 1

handle CTRL-C interruption 1

5.3.2.5 int_handler_2()

```
void int_handler_2 (
            int sig )
```

CTRL-c handler 2

handle CTRL-C interruption 2

5.3.2.6 int_handler_3()

```
void int_handler_3 (
            int sig )
```

CTRL-c handler 3

Handles the ctrl+c interruption to save the emg sensors measurements into a file

5.3.2.7 main()

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

main loop

5.3.3 Variable Documentation

5.3.3.1 longOpts

```
const struct option longOpts[]  [static]
```

Initial value:

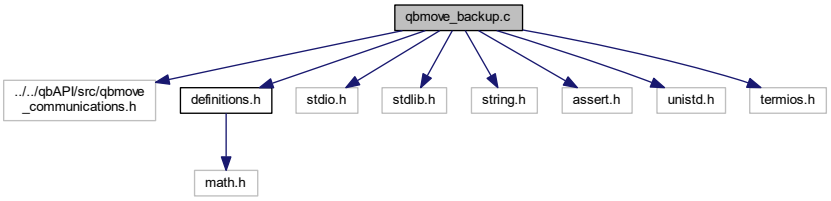
```
= {
    { "set_inputs", required_argument, NULL, 's' },
    { "get_measurements", no_argument, NULL, 'g' },
    { "activate", no_argument, NULL, 'a' },
    { "deactivate", no_argument, NULL, 'd' },
    { "ping", no_argument, NULL, 'p' },
    { "serial_port", no_argument, NULL, 't' },
    { "verbose", no_argument, NULL, 'v' },
    { "help", no_argument, NULL, 'h' },
    { "file", required_argument, NULL, 'f'},
    { "log", no_argument, NULL, 'l'},
    { "get_emg", no_argument, NULL, 'q'},
    { "set_zeros", no_argument, NULL, 'z'},
    { "use_gen_sin", no_argument, NULL, 'y'},
    { "get_currents", no_argument, NULL, 'c'},
    { "calibration", no_argument, NULL, 'k'},
    { "bootloader", no_argument, NULL, 'b'},
    { "joystick", no_argument, NULL, 'j'},
    { "external drive", no_argument, NULL, 'x'},
    { "set_pos_stiff", required_argument, NULL, 'e'},
    { "get_velocities", no_argument, NULL, 'i'},
    { "get_accelerations", no_argument, NULL, 'o'},
    { "set_cuff_inputs", no_argument, NULL, 'u'},

    { "baudrate", required_argument, NULL, 'B'},
    { "set_watchdog", required_argument, NULL, 'W'},
    { "polling", no_argument, NULL, 'P'},
    { NULL, no_argument, NULL, 0 }
}
```

5.4 qbmove_backup.c File Reference

Command line tools file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <assert.h>
#include <unistd.h>
#include <termios.h>
```

Include dependency graph for qbmove_backup.c:



Functions

- int **open_port** ()
- int **retrieve_id** ()
- int **retrieve_serial** ()
- int **retrieve_offsets** ()
- int **read_conf_file** ()
- int **create_file** ()
- int **write_file** ()
- int **close_file** ()
- int **main** ()

Variables

- int **device_id**
- char **port** [255]
- char ∗ **serial**
- comm_settings **comm_settings_t**
- short int **offsets** [4]
- FILE ∗ **filep**
- char **backup_folder** [512]
- uint8_t **aux_string** [2000]
- int **sensor_num** = 0
- short int **temp_meas** [4]

5.4.1 Detailed Description

Command line tools file.

Author

Centro "E.Piaggio"

Copyright

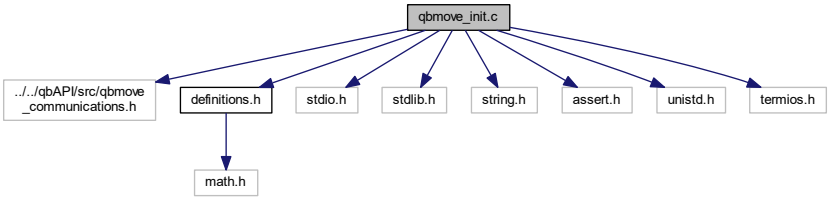
5.5 qbmove_init.c File Reference

Command line tools file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <assert.h>
#include <unistd.h>
```

```
#include <termios.h>
```

Include dependency graph for qbmove_init.c:



Functions

- int **mode_selection** ()
- int **port_selection** (char ∗)
- int **open_port** (char ∗)
- int **init_params** ()
- int **change_id** ()
- int **set_resolution** (int)
- int **set_pid_parameters** ()
- int **adjust_zeros** ()
- int **get_info** ()
- int **test** ()
- int **backup** ()
- int **calibrate** ()
- int **main** (int argc, char ∗∗argv)

Variables

- int **device_id**
- comm_settings **comm_settings_t**

5.5.1 Detailed Description

Command line tools file.

Author

Centro "E.Piaggio"

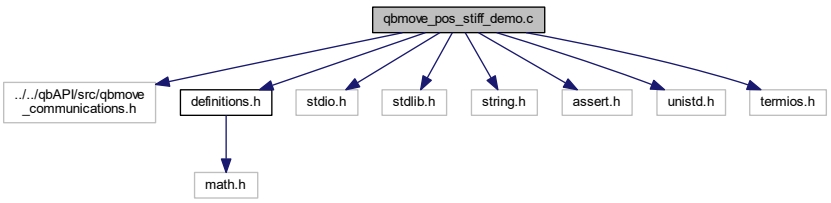
Copyright

5.6 qbmove_pos_stiff_demo.c File Reference

Command line tools file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <assert.h>
#include <unistd.h>
#include <termios.h>
```

Include dependency graph for qbmove_pos_stiff_demo.c:



Functions

- int **port_selection** (char ∗)
- int **open_port** (char ∗)
- int **pilot_pos_stiff** ()
- int **set_pos_stiff** (short int ∗, short int ∗)
- int **main** (int argc, char ∗∗argv)

Variables

- int **device_id**
- comm_settings **comm_settings_t**

5.6.1 Detailed Description

Command line tools file.

Author

Centro "E.Piaggio"

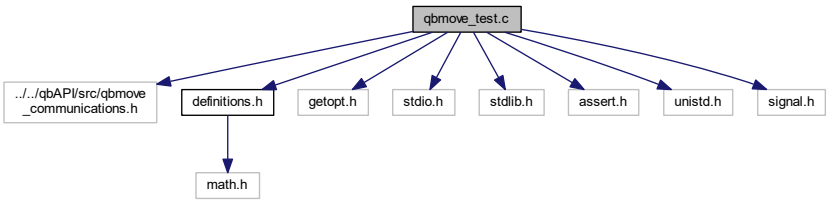
Copyright

5.7 qbmove_test.c File Reference

Command line tools file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <getopt.h>
#include <stdio.h>
#include <stdlib.h>
#include <assert.h>
#include <unistd.h>
#include <signal.h>
```

Include dependency graph for qbmove_test.c:



Data Structures

- struct **global_var**

Macros

- #define **REPETITION_PER_CYCLE** 2
- #define **BATCH_CYCLES** 5
- #define **DELAY** 1500000
- #define **LITTLE_DELAY** 5000
- #define **PAUSE** 30

Functions

- void **print_usage** ()
- int **open_port** ()
- int **cycle** ()
- void **int_handler** (int sig)
- int **main** (int argc, char ∗∗argv)

Variables

- static const struct option **longOpts** [ ]
- static const char ∗ **optString** = "t:r:"
- struct **global_var gv**
- comm_settings **comm_settings_t**
- int **device_id** = BROADCAST_ID

5.7.1 Detailed Description

Command line tools file.

Author

Centro "E.Piaggio"

Copyright

5.7.2 Variable Documentation

5.7.2.1 longOpts

```
const struct option longOpts[]  [static]
```

Initial value:

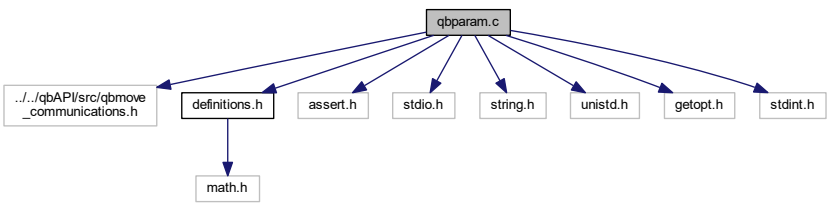
```
= {
    { "set_time", required_argument, NULL, 't'},
    { "set_repetitions", required_argument, NULL, 'r'},
    { NULL, no_argument, NULL, 0 }
}
```

5.8 qbparam.c File Reference

Command line tools file.

```
#include "../../qbAPI/src/qbmove_communications.h"
#include "definitions.h"
#include <assert.h>
#include <stdio.h>
#include <string.h>
#include <unistd.h>
#include <getopt.h>
#include <stdint.h>
```

Include dependency graph for qbparam.c:



Functions

- int **port_selection** ()
- int **open_port** ()
- int **initMemory** ()
- void **printMainMenu** ()
- void **printVersion** ()
- int **calibrate** ()
- int **baudrate_reader** ()
- int **main** (int argc, char ∗∗argv)

Variables

- char **get_or_set**
- comm_settings **comm_settings_t**
- uint8_t **device_id** = BROADCAST_ID
- static const char ∗ **optString** = ""
- static const struct option **longOpts** [ ]

5.8.1 Detailed Description

Command line tools file.

Author

Centro "E.Piaggio"

Copyright

With this file is possible to get or set firmware parameters.

5.8.2 Function Documentation

5.8.2.1 baudrate_reader()

```
int baudrate_reader ( )
```

Baudrate functions

5.8.3 Variable Documentation

5.8.3.1 longOpts

```
const struct option longOpts[]  [static]
```

Initial value:

```
= {
    { "id", required_argument, NULL, 0 },
    { NULL, no_argument, NULL, 0}
}
```

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