QMAST Source Code

Generated by Doxygen 1.7.5.1

Fri Sep 30 2011 14:56:53

Contents

Chapter 1

The QMAST Alpha 6 Sailing Code

This Documentation

Is the same style as the JavaDoc documentation. The same commands are used in the code, and generates these pages. For info on the program used check out a program called Doxygen

Revised by Laszlo 2011-05-13

Ported to Arudino November 2010 by Christine and the supercool software team Created on: 2010-05-11 Author: Nader for MAST Software

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 files with brief descriptions:

Chapter 4

Data Structure Documentation

4.1 points Struct Reference

```
#include <LocationStruct.h>
```

Data Fields

- double latDeg
- double latMin
- double lonDeg
- double lonMin

4.1.1 Field Documentation

4.1.1.1 double latDeg

4.1.1.2 double latMin

4.1.1.3 double lonDeg

4.1.1.4 double lonMin

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

- /Users/allgood38/Desktop/qmast/sailcode_alpha6/LocationStruct.h

Chapter 5

File Documentation

5.1 /Users/allgood38/Desktop/qmast/sailcode_alpha6/DataAcquisition.pde File Reference

Functions

- void sensorData (int bufferLength, char device)
- void setErrorBit (int aBit)
- void clearErrorBit (int aBit)
- int checkErrorBit (int aBit)

5.1.1 Function Documentation

5.1.1.1 int checkErrorBit (int *aBit*)

5.1.1.2 void clearErrorBit (int *aBit*)

5.1.1.3 void sensorData (int *bufferLength,* char *device*)

5.1.1.4 void setErrorBit (int *aBit*)

5.2 /Users/allgood38/Desktop/qmast/sailcode_alpha6/LocationStruct.h File Reference

Data Structures

- struct points

Variables

- points waypoints [10]
- points stationPoints [4]
- points floatingStationPoints [4]
- points coursePoints [10]
- points clearPoints
- points boatLocation
- points stayPoint

5.2.1 Variable Documentation

5.2.1.1 points boatLocation

5.2.1.2 points clearPoints

Initial value:

```
{
 0,0,0,0}
```

5.2.1.3 points coursePoints[10]

Initial value:

```
{
{0,0,0,0},
{0,0,0,0},
{0,0,0,0},
{0,0,0,0},
{0,0,0,0},
{0,0,0,0},
{0,0,0,0},
{0,0,0,0},
{0,0,0,0}}
```

5.2.1.4 points floatingStationPoints[4]

5.2.1.5 points stationPoints[4]

5.2.1.6 points stayPoint

5.2.1.7 points waypoints[10]

Initial value:

```
{
 {44.0,13.6927,-76.0,-29.5175},
 {38.0,58.9443,-76.0,-28.7383},
 {38.0,58.9515,-76.0,-28.7127}}
```

5.3 /Users/allgood38/Desktop/qmast/sailcode_alpha6/Menu.pde - File Reference

Functions

- int displayMenu ()

5.3.1 Function Documentation

5.3.1.1 int displayMenu ( )

5.4 /Users/allgood38/Desktop/qmast/sailcode_alpha6/MotorControlFunctions.pde File Reference

Functions

- void servo_command (int whichservo, int position, byte longRange)
- void setrudder (float ang)
- void setSails (float ang)
- void setJib (float ang)
- void setMain (float ang)

5.4.1 Function Documentation

5.4.1.1 void servo_command (int *whichservo*, int *position*, byte *longRange*)

5.4.1.2 void setJib (float *ang*)

5.4.1.3 void setMain (float *ang*)

5.4.1.4 void setrudder (float *ang*)

5.4.1.5 void setSails (float *ang*)

5.5 /Users/allgood38/Desktop/qmast/sailcode_alpha6/NavigationCode.pde File Reference

Functions

- double GPSdistance (struct points location1, struct points location2)
- int getWaypointDirn (struct points waypoint)
- int getCloseHauledDirn ()
- int getOppositeCloseHauledDirn ()
- int getWindDirn ()

5.5.1 Function Documentation

5.5.1.1 int getCloseHauledDirn ( )

5.5.1.2 int getOppositeCloseHauledDirn ( )

5.5.1.3 int getWaypointDirn (struct points *waypoint*)

5.5.1.4 int getWindDirn ( )

5.5.1.5 double GPSdistance (struct points *location1*, struct points *location2*)

5.6 /Users/allgood38/Desktop/qmast/sailcode_alpha6/oldtack.pde - File Reference

Functions

- void oldtack ()
- void oldtack2 ()

  newer revision
- void getOutofIronsOld (int tackside)

5.6.1 Function Documentation

5.6.1.1 void getOutofIronsOld (int *tackside*)

5.6.1.2 void oldtack ( )

5.6.1.3 void oldtack2 ( )

newer revision

5.7 /Users/allgood38/Desktop/qmast/sailcode_alpha6/ParsingFunctions.pde File Reference

Functions

- int DataValid (char ∗val)
- void ParseGPGLL (char ∗GPGLL_string, double ∗degree, double ∗minute)
- int Parser (char ∗val)

5.7.1 Function Documentation

5.7.1.1 int DataValid (char ∗ *val*)

5.7.1.2 void ParseGPGLL (char ∗ *GPGLL_string,* double ∗ *degree,* double ∗ *minute*)

5.7.1.3 int Parser (char ∗ *val*)

5.8 /Users/allgood38/Desktop/qmast/sailcode_alpha6/sailcode_alpha6.pde File Reference

```
#include "LocationStruct.h"  #include <SoftwareSerial.h>
#include <String.h> #include <stdio.h> #include <avr/io.h>
```

Defines

- #define TACKING_ANGLE 40

  for parsing - necessary?
- #define MARK_DISTANCE 4
- #define STATION_KEEPING_RADIUS 15
- #define WIND_CHANGE_THRESHOLD 10
- #define BUFF_MAX 511
- #define DEGREE_TO_MINUTE 60
- #define LATITUDE_TO_METER 1855
- #define LONGITUDE_TO_METER 1314
- #define noDataBit 0
- #define oldDataBit 1
- #define checksumBadBit 2
- #define twoCommasBit 3
- #define rolloverDataBit 4
- #define badCompassDataBit 5
- #define tooMuchRollBit 6
- #define badWindData 7
- #define badGpsData 8
- #define ALL_IN 0
- #define ALL_OUT 100
- #define resetPin 8
- #define txPin 9
- #define SHORTEST_NMEA 5
- #define LONGEST_NMEA 120

Functions

- void setup ()
- void loop ()

Variables

- int extraWindData = 0

    when testing by sending strings through the serial monitor, you need to select "newline" ending from the dropdown beside the baud
- int extraCompassData = 0
- int savedWindChecksum = 0
- int savedWindXorState = 0
- int savedCompassChecksum = 0
- int savedCompassXorState = 0
- char extraWindDataArray [LONGEST_NMEA]
- char extraCompassDataArray [LONGEST_NMEA]
- float heading
- float deviation
- float variance
- float bspeed
- float bspeedk
- float wind_angl
- float wind_velocity
- float headingc
- float pitch
- float roll
- float trueWind
- int rudderVal
- int jibVal
- int mainVal
- float headingVal
- float distanceVal
- float heading_newest
- float wind_angl_newest
- SoftwareSerial servo_ser = SoftwareSerial(7, txPin)
- int rudderDir = -1
- int points
- int point
- int currentPoint = 0
- int StraightSailDirection
- int CurrentSelection
- long startTime
- int stationCounter
- boolean timesUp
- int StationKeepingTimeInBox = 270000
- boolean tacking
- int tackingSide
- int ironTime
- int errorCode

5.8.1 Define Documentation

5.8.1.1 #define ALL_IN 0

5.8.1.2 #define ALL_OUT 100

5.8.1.3 #define badCompassDataBit 5

5.8.1.4 #define badGpsData 8

5.8.1.5 #define badWindData 7

5.8.1.6 #define BUFF_MAX 511

5.8.1.7 #define checksumBadBit 2

5.8.1.8 #define DEGREE_TO_MINUTE 60

5.8.1.9 #define LATITUDE_TO_METER 1855

5.8.1.10 #define LONGEST_NMEA 120

5.8.1.11 #define LONGITUDE_TO_METER 1314

5.8.1.12 #define MARK_DISTANCE 4

5.8.1.13 #define noDataBit 0

5.8.1.14 #define oldDataBit 1

5.8.1.15 #define resetPin 8

5.8.1.16 #define rolloverDataBit 4

5.8.1.17 #define SHORTEST_NMEA 5

5.8.1.18 #define STATION_KEEPING_RADIUS 15

5.8.1.19 #define TACKING_ANGLE 40

for parsing - necessary?

for pololu non-buffering serial channel for parsing - necessary?

5.8.1.20 #define tooMuchRollBit 6

5.8.1.21 #define twoCommasBit 3

5.8.1.22 #define txPin 9

5.8.1.23 #define WIND_CHANGE_THRESHOLD 10

5.8.2 Function Documentation

5.8.2.1 void loop ( )

if menu returned 0, any updating happened in the menu function itself and we want the code to just keep doing what it was doing before (e.g. setting RC mode)

Straight Sail towards N,S,E,W as 0, 180, 90, 270. No sail control.

Straightsail can no longer be called in isolation, needs sailtoWaypoint which keeps track of when tacking is necessary

stationskeeps around a single spot in the middle of the square

5.8.2.2 void setup ( )

Change wind to send 5 times a second default for now, need to make sure we can get everything out of the buffer

5.8.3 Variable Documentation

5.8.3.1 float bspeed

5.8.3.2 float bspeedk

5.8.3.3 int currentPoint = 0

5.8.3.4 int CurrentSelection

5.8.3.5 float deviation

5.8.3.6 float distanceVal

5.8.3.7 int errorCode

5.8.3.8 int extraCompassData = 0

5.8.3.9 char extraCompassDataArray[LONGEST_NMEA]

5.8.3.10 int extraWindData = 0

when testing by sending strings through the serial monitor, you need to select "newline" ending from the dropdown beside the baud

5.8.3.11 char extraWindDataArray[LONGEST_NMEA]

5.8.3.12 float heading

5.8.3.13 float heading_newest

5.8.3.14 float headingc

5.8.3.15 float headingVal

5.8.3.16 int ironTime

5.8.3.17 int jibVal

5.8.3.18 int mainVal

5.8.3.19 float pitch

5.8.3.20 int point

5.8.3.21 int points

5.8.3.22 float roll

5.8.3.23 int rudderDir = -1

5.8.3.24 int rudderVal

5.8.3.25 int savedCompassChecksum = 0

5.8.3.26 int savedCompassXorState = 0

5.8.3.27 int savedWindChecksum = 0

5.8.3.28 int savedWindXorState = 0

5.8.3.29 SoftwareSerial servo_ser = SoftwareSerial(7, txPin)

5.8.3.30 long startTime

5.8.3.31 int stationCounter

5.8.3.32 int StationKeepingTimeInBox = 270000

5.8.3.33 int StraightSailDirection

5.8.3.34 boolean tacking

5.8.3.35 int tackingSide

5.8.3.36 boolean timesUp

5.8.3.37 float trueWind

5.8.3.38 float variance

5.8.3.39 float wind_angl

5.8.3.40 float wind_angl_newest

5.8.3.41 float wind_velocity

5.9 /Users/allgood38/Desktop/qmast/sailcode_alpha6/SailingLogic.pde File Reference

Functions

- void sailCourse ()
- void sailToWaypoint (struct points waypoint)
- void sail (int waypointDirn)
- boolean checkTack (int corridorHalfWidth, struct points waypoint)
- void sailControl ()
- int rudderControl (int directionError)

5.9.1 Function Documentation

5.9.1.1 boolean checkTack (int *corridorHalfWidth*, struct points *waypoint*)

5.9.1.2 int rudderControl (int *directionError*)

5.9.1.3 void sail (int *waypointDirn*)

5.9.1.4 void sailControl ( )

5.9.1.5 void sailCourse ( )

5.9.1.6 void sailToWaypoint (struct points *waypoint*)

5.10 /Users/allgood38/Desktop/qmast/sailcode_alpha6/StationKeeping.pde File Reference

Functions

- void getStationKeepingCentre (double ∗centreLatMin, double ∗centreLonMin)
- void fillStationKeepingWaypoints (double centreLatMin, double centreLonMin, int windBearing)
- int stationKeep ()
- void stationKeepSinglePoint ()

5.10.1 Function Documentation

5.10.1.1 void fillStationKeepingWaypoints (double *centreLatMin*, double *centreLonMin*, int *windBearing*)

5.10.1.2 void getStationKeepingCentre (double ∗ *centreLatMin*, double ∗ *centreLonMin*)

5.10.1.3 int stationKeep ( )

5.10.1.4 void stationKeepSinglePoint ( )

5.11 /Users/allgood38/Desktop/qmast/sailcode_alpha6/Tack.pde - File Reference

Functions

- void tack ()
- void getOutofIrons (int tackside)

5.11.1 Function Documentation

5.11.1.1 void getOutofIrons (int *tackside*)

5.11.1.2 void tack ( )

5.12 /Users/allgood38/Desktop/qmast/sailcode_alpha6/Testing_Functions.pde File Reference

5.13 /Users/allgood38/Desktop/qmast/sailcode_alpha6/Transmit.pde File Reference

Functions

- void transmit (void)
- void relayData ()

5.13.1 Function Documentation

5.13.1.1 void relayData ( )

Similar to the transmit function except the output contains information which is not read by LabView, so codes are not needed?

Latitude and longitude of boat's location, split into more precise degrees and minutes, to fit into a float

5.13.1.2 void transmit (void)

The transmit function is used to communicate with LabView? through a series of preset strings, which are represented by the graphical gauages?

Prints directly to the serial and takes input from global values

5.14 /Users/allgood38/Desktop/qmast/sailcode_alpha6/Utilities.pde File Reference

Functions

- float degreesToRadians (int angle)
- int radiansToDegrees (float angle)
- boolean between (int angle, int a, int b)
- char convertASCIItoHex (const char ch)

5.14.1 Function Documentation

5.14.1.1 boolean between (int *angle*, int *a*, int *b*)

5.14.1.2 char convertASCIItoHex (const char *ch*)

5.14.1.3 float degreesToRadians (int *angle*)

5.14.1.4 int radiansToDegrees (float *angle*)